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15-Minute City Models: Justice, Mobility, and Land-Use in Cairo

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Summary

This thesis examines the 15-Minute City concept as both a global paradigm and a locally situated urban practice, using Greater Cairo and three of its historically distinct urban areas as a lens. While the concept, built on principles of proximity, density, diversity, and digitalisation, has become central to debates on sustainability and mobility in post-pandemic cities, its understanding remains predominantly shaped by European perspectives.

Through a comparative analysis of Agouza, Madinaty, and Badya (under construction), the study explores how governance trajectories, planning and design logics, and lived experiences shape different 15-minute city models, whether existing or planned from scratch. This builds on the 15-minute city concept lineage of urban ideals: The Garden City Concept and New Urbanism. It illustrates how urban form, mobility patterns, and digital infrastructures intersect with residents' daily practices and social ties, shaping their experiences of accessibility and belonging.

The research is based on a comparative mixed-methods case-study approach that combines spatial analysis with qualitative inquiry. Spatially, it employs service area analysis (CLFS framework and service area coverage maps) to examine the manifestations of proximity, density, and diversity in Agouza, Madinaty, and Badya. Typological and morphological readings (MTSC framework) of buildings and neighbourhood form are concluded to understand how design choices shape the patterns.

The study relies on semi-structured multi-stakeholder interviews with residents, government representatives, and industry representatives. These interviews were thematically analysed to capture lived experiences of access to services, mobility, and community life, as well as the growing role of digital platforms in mediating access. This integration allows the research to move beyond abstract urban ideals, grounding the analysis in both measurable patterns of urban form and movement and in residents' lived realities and meanings.

Examining the three case studies, several themes emerged related to the different 15-minute city models. For residents, the accessibility to services feels reliable when diversity is paired with redundancy, that is, when there is more than one realistic option for essential services. In large parts of Madinaty and Badya, many district interiors feel more "single-option," with services concentrated in one main cluster. In Madinaty, these commercial clusters reflect a New Urbanist planning logic, while in Badya they reflect a more hierarchical 15-minute city approach. In both cases, residents' experiences reveal the limits of this arrangement: when

a key facility is closed, overcrowded, or too expensive, proximity becomes fragile, what is "nearby" in principle quickly turns into a detour in practice. Agouza, by contrast, shows a layered, locally adapted Garden City fabric that has built up over time. Most services have accumulated multiple nearby alternatives, which strengthens everyday resilience. However, this redundancy of services also brings consequences, including pressure on streets and sidewalks, more traffic and noise, and ongoing parking stress.

Second, mobility mode is a key factor. Cycling consistently acts as the equaliser, dramatically expanding what is reachable in the suburban cases and reducing "edge" distances in Agouza, often more than any planned proximity. However, in practice, people switch away from cars only when cycling routes are comfortable and safe door-to-door: softened edges (shade, crossings), protected cycle links, and end-of-trip support. Without these settings, walking and cycling remain recreational.

Third, activity nodes, community and social circles are the anchors that shape everyday life. Frequent local nodes in Agouza make walking functional and social ties locally resilient. In Madinaty and Badya, social life is more limited and channelled into a few planned nodes, making everyday social encounters less frequent and less layered. Centralised planned nodes in Madinaty concentrate on leisure. Provisional nodes in Badya can seed early routines, but until the fabric matures, they don't hold social life within a 15-minute radius.

Fourth, the study shows that digital platforms have become an "invisible infrastructure" of proximity. They complement the strong urban form in Agouza and reduce deficits in the new towns, effectively stretching or reshaping the lived 15-minute radius through delivery. This can reduce unnecessary short car trips, but it can also reinforce car-first routines unless neighbourhood pick-up nodes are designed to turn digital convenience into active trips.

From a broader perspective, conceptually, the research widens debates on the 15-minute city concept by positioning Cairo as an active site of urban knowledge. Methodologically, it develops and applies an integrated comparative mixed-methods framework that triangulates spatial quantitative metrics (service area analysis and CLFS framework), with qualitative inquiry (interviews, field notes, and thematic coding), thick mapping and morphological analysis (MTSC framework). This enables understanding and evaluation of context-specific 15-minute city models, examining how urban form becomes lived 15-minute-radius accessibility. Practically, it draws attention to both the possibilities and the constraints of applying 15-minute city principles in fast-urbanising contexts such as Greater Cairo.

In conclusion, the thesis shows that the 15-minute city is not a single formula but a plurality of models shaped by history, governance, and lived experience. It offers critical reflections on urban theory while providing planners and designers with grounded insights into how cities might move toward more just and inclusive forms of proximity planning.

To the memory of my grandmother, Khadiga, whose love guides and inspires me.

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Chapter 1: Introduction

1.1 15-Minute City Concept and Urban Ideals in Context

Sustainable urbanism has become a central area of research within fields of urban studies, geography, planning, and design for addressing how cities respond to climate change, mobility demands, and social equity (Farr, 2007; Sharifi et al., 2020; Elmqvist et al., 2018). Within this research body, the 15-minute city concept has emerged as a prominent framework, advocating neighbourhoods where essential services are reachable within a short walk or cycle (Moreno, 2016). Promoted as both a response to environmental pressures and a pathway to more liveable urban futures, it has gained wide attention among policymakers, researchers, and practitioners (Iqbal et al., 2025).

Revealing the challenges of existing urban systems, the COVID-19 pandemic exposed restricted mobilities and unequal access to services (Sharifi and Khavarian Garmsir, 2020; Uyttebrouck et al., 2023). It also highlighted the renewed importance of neighbourhoods for local living, working, and social interaction (Uyttebrouck et al., 2023; Allam and Jones, 2020). Meanwhile, rapid urbanisation, with 55% of the global population living in urban areas today and 68% projected by 2050 (UN, 2022), has intensified pressures on housing and infrastructure. Car-oriented development has further entrenched segregation, increased environmental stress, and weakened local economies (Moreno et al., 2021). In response, the 15-minute city concept proposes a human-centred, post-carbon model built on proximity, density, diversity, and digitalisation (Moreno et al., 2021). This model aims to reduce travel demand, support local economies, and foster resilient urban life (Moreno, 2016; Moreno et al., 2021; Allam et al., 2022).

Nevertheless, much of the literature still frames the concept's understanding and application through European perspectives, often treating European urban experiences as universal (Iqbal et al., 2025). This leaves limited room for engaging with the distinct development trajectories and urban–architectural character of cities in other regions, including North Africa and the Arab world, where published work remains comparatively limited (e.g., Omar et al., 2025; Megahed et al., 2024). In Greater Cairo, limited studies have examined the application of the 15-minute city concept, with existing research primarily focusing on spatial proximity and mobility indicators in specific urban contexts (Megahed et al., 2024; Omar et al., 2025; Aboulnaga et al., 2025). However, this gives less attention to how the 15-minute city principles can be integrated across Greater Cairo's diverse urban forms and

fabrics. This includes a mix of historic mixed-use neighbourhoods, localised Garden City developments, New Urbanism–influenced suburbs, and smart city projects, all of which form the foundational genealogy upon which the 15-minute city concept is being built (Khavarian-Garmsir, 2023; Bonfantini et al., 2025).

Garden City, New Urbanism, and the 15-Minute City are linked by a shared concern of liveable cities with organising urban life at the neighbourhood scale around daily needs, reducing travel burdens, and producing a higher quality public realm (Howard, 1902; Duany et al., 2000; Moreno et al., 2021). As elaborated in the next chapter, Garden City established the early model of a relatively self-contained community that integrates housing, work, and green space (Howard, 1902). New Urbanism articulated similar aims in late-20th-century urban design principles, including compact form, mixed-use, walkability, connected street networks, and transit-supportive development (Congress for the New Urbanism, 1996). The 15-Minute City builds on these foundations but reframes them through a time-based accessibility logic, emphasising that essential services should be reachable within a short active-mobility radius (Moreno et al., 2021; Allam et al., 2022; Khavarian-Garmsir et al., 2023). So conceptually, Garden City provides the early neighbourhood ideal, New Urbanism provides a design toolkit, and the 15-Minute City provides a contemporary chrono-urban accessibility framework.

In Greater Cairo, a layered urban history includes compact, mixed-use neighbourhoods in the historic core, and areas shaped by the Garden City concept. It also includes suburban expansions influenced by New Urbanism, which together form the historical foundations of the 15-minute city. More recently, new towns and smart city projects have introduced '15-minute city' concepts through public–private partnership (PPP) schemes (e.g. Badya and Il Bosco), aligning with Egypt Vision 2030's strategy for sustainable urban development (MPEDIC, 2016).

Together, different cases of urban areas in the city highlight these variations, each producing different forms of local urbanism and accessibility shaped by spatial design, governance, and lived practice (Hakim, 1986; AlSayyad, 2011). To assess how ideals of proximity, density, diversity, and digitalisation translate in such settings, there is a need for an integrated framework that connects tangible urban form with mobility and social life, whether physical or digital (Bruno et al., 2024; Burke et al., 2022; Chen et al., 2025). This allows a critical evaluation of the 15-minute city concept's potential and limits in encouraging local urbanism and inclusive mobility (Bruno et al., 2024; Burke et al., 2022; Chen et al., 2025).

This research, therefore, aims to analyse how design, planning, governance, and socio-political processes shape 15-minute city models in Cairo and their effects on everyday access, movement, and use of nearby facilities. It examines how urban form influences mobility and accessibility, how these patterns shape residents' daily experiences and community life, and how access to services is mediated both physically and digitally.

In this study, justice is used as an umbrella concept to evaluate whether these proximity-based planning translates into an inclusive everyday urban access. This means not only who is geographically near basic services within a 15-minute radius, but who can actually reach, use, and benefit from them across different social groups and neighbourhood types (Soja, 2010; Sheller, 2018). Building on mobility and urban justice scholarship, the thesis treats justice as multi-dimensional, distributive, in terms of how opportunities and burdens are allocated, and recognitional, in terms of whose needs are acknowledged (Sheller, 2018). It examines how these dimensions are produced and experienced through the interaction of land-use, mobility systems and residents' experiences.

To outline the research, this introduction chapter proceeds as follows: it presents the study background, defines the research problem, sets out the aims and questions, and explains the significance, limitations, and structure of the thesis.

1.2 Background of the study

The 15-minute city is a relatively recent urban planning paradigm that has rapidly moved from academic discussion to international policy debates (Moreno et al., 2021). First published in Carlos Moreno's 2016 book (Moreno, 2016), the idea captured global attention when it was adopted in Paris as a central theme of the 2019 mayoral campaign (Moreno, 2016). Its visibility grew further during the COVID-19 pandemic, when the disruption of everyday life revealed the vulnerabilities of cities organised around long commutes, car dependency, and monofunctional districts (Moreno et al., 2021). In this context, the 15-minute city emerged as a compelling alternative: a call for neighbourhoods designed around people rather than vehicles, where daily needs can be met close to home (Moreno et al., 2021). The fact that the concept has been taken up not only by urban scholars but also by politicians, architects, and media Figures speaks to its resonance across professional and public spheres.

At its core, the 15-minute city rests on a straightforward but ambitious claim: that residents should be able to reach the essentials of urban life: housing, work, supply, education,

healthcare, and leisure, within a quarter of an hour by walking or cycling (Moreno et al., 2021; Moreno, 2020). Moreno (2020) describes this not only as a matter of time but also as a measure of quality of life, while others call it an "ideal geography" of well-being (Duany and Steuteville, 2021). The insistence that services must be located within people's immediate radius, rather than simply available somewhere in the city, is what makes the idea distinctive. In this way, the 15-minute city is both a practical planning framework and a cultural re-imagining of neighbourhood life.

The concept has been articulated through four interrelated principles. Proximity highlights the need to bring essential services closer to where people live, reducing travel time and fostering neighbourhood attachment (Moreno et al., 2021). Density, reconceived as "organic density," encourages multiple uses of urban space over time rather than sheer vertical growth (Moreno et al., 2021). Diversity addresses both land use and social composition, promoting mixed housing, workplaces, and cultural life to strengthen equity and stimulate creativity (Moreno et al., 2021). Digitalisation integrates technological infrastructures, from mobility platforms to digital services, as tools to expand accessibility and ensure spatial justice (Moreno et al., 2021). Taken together, these principles position the 15-minute city as both a spatial framework and a social vision, linking urban form to questions of resilience, equity, and everyday experience.

Although the model is often portrayed as innovative, its roots extend back to earlier planning traditions (Khavarian-Garmsir, 2023). In particular, it has been compared to Ebenezer Howard's Garden City, which sought to balance the best aspects of the city and the countryside through self-contained settlements (Howard, 1902; Khavarian-Garmsir, 2023). Yet where Howard's approach relied on strict population caps and functional zoning, Moreno's vision applies to existing neighbourhoods, emphasising flexibility, mixed use, and the integration of digital infrastructures. In this way, the 15-minute city reinterprets long-standing ideals of accessibility and community for the twenty-first century.

The surge of interest in this model reflects the pressing challenges of the contemporary urban condition. Climate change, rising social inequality, and the rapid expansion of digital technologies have all reinforced the urgency of rethinking how cities are planned and inhabited (Allam et al., 2021). The 15-minute city has been celebrated as a pathway to reducing car dependency, revitalising local economies, and creating more cohesive communities (Moreno et al., 2021). Yet its understanding remains incomplete, and its applications, often framed in European contexts, risk overlooking the experiences and

layered histories of cities across the world. It is within this tension, between the universal appeal of the idea and the particularities of place, that this study situates itself.

1.3 Research Problem

As highlighted, the 15-minute city has been widely celebrated as a planning model, yet much of its development of understanding has taken shape within European contexts that often assume universal urban experience (Iqbal et al., 2025). Iqbal et al. (2025) analysed literature on the concept from 35+ cities, noting that they were unable to identify studies offering a comprehensive analysis of the 15-minute city concept in non-Western countries. There is a limited body of work studying, for example, Hong Kong by Liu et al. (2024), Ali et al. (2023) in Dubai, Omar et al. (2025) in Cairo, or Zhou et al. (2019) in 15-minute life cycles in Chinese cities and Isaac (2024) in Malawi. This framing does not always reflect the real-world experience of other regions, where urbanisation follows different logics, shaped by rich histories and ambitious expansion projects. In the context of the study, Greater Cairo, established districts such as Agouza coexist with master-planned new towns like Madinaty and emerging smart city projects such as Badya. Together they illustrate the city's dynamic capacity to combine inherited urban fabrics with emerging models of growth. Hence, this diversity of forms provides an opportunity to examine how the ideals of proximity, density, diversity, and digitalisation translate into different spatial and social contexts (Hakim, 1986; AlSayyad, 2011; Chen et al., 2025; Bruno et al., 2024; Burke et al., 2022).

As has been noted, the 15-minute city emerges as a response to some of the most pressing challenges facing urban life today. The COVID-19 pandemic revealed the vulnerabilities of global mobility systems, while also re-emphasising the importance of the neighbourhood as a place of local living, working, and social interaction (Sharifi and Khavarian Garmsir, 2020; Uyttebrouck et al., 2023; Allam and Jones, 2020). At the same time, rapid urbanisation continues to place immense pressure on housing, infrastructure, and services (OECD, 2025). Conventional models of development that prioritised car-oriented expansion have contributed to environmental stress, spatial separation, and weakened local economies. In contrast, the 15-minute city, as articulated by Moreno (2016; 2021), proposes a human-centred, post-carbon approach in which essential functions are accessible within a short walk or cycle, reinforcing both sustainability and quality of life.

The significance of addressing this problem lies in engaging the concept of the 15-minute city from the perspective of Greater Cairo's distinctive urban experience. By examining

neighbourhoods with varied morphologies and planning histories, the study seeks to contribute to global debates on the model while recognising Cairo's own role in shaping its urban knowledge and experience. In doing so, it offers insights not only into the applicability of the four core pillars, proximity, density, diversity, and digitalisation, but also into the broader possibilities of encouraging more connected, inclusive, and resilient forms of urban life.

1.4 Research Questions and Objectives

In light of the above, the research aims to analyse how design and planning, governance, and socio-political processes shape 15-minute city models in Cairo and their effect on the everyday use, access, and movement within nearby facilities. By examining these models, the study explores how the resulting urban form influences mobility and accessibility experiences, focusing on the interconnection between physical space and residents' mobility experiences. It also investigates how these transformations impact the social fabric of local communities across different models. It addresses access to urban services, whether physical or digital.

Research questions:

1- How do proximity-based planning ideals in Greater Cairo, envisioned in policy, practised in urban form, and experienced by residents, evolve across different urban fabrics, and to what extent do they produce just and inclusive 15-minute city outcomes?

1.1 How have governance-driven land use and mobility development patterns in Greater Cairo evolved, and how do these trajectories relate to the ideals of the 15-minute city concept?

1.2- In which ways are the ideals of the 15-minute city concept reflected in the urban form, social fabric, and mobility experiences of Agouza, Madinaty, and Badya?

1.3- How have different models of the 15-minute city concept developed over time, and to what extent have they been successful (or not) in creating just and inclusive sustainable mobility experiences?

Research objectives:

1- To examine how planning policies and design processes have shaped the evolution of land use and mobility development patterns in Greater Cairo and, through the cases of Agouza, Madinaty, and Badya, in relation to the ideals of the 15-minute city

2- To analyse the urban form, social networks, and mobility networks and experiences in Agouza, Madinaty, and Badya in connection with the accessibility of nearby 15-minute facilities

3- To explore how socio-cultural, economic, and political urban transformations shape distinct 15-minute city models and typologies and to develop a framework for just and inclusive sustainable mobility within them

1.5 Significance and Contribution of the Research

This research helps address the gap between the global discourse on the 15-minute city concept and its translation into the realities of rapidly growing urban regions such as Greater Cairo. By situating the study in Cairo and examining the case studies of Agouza, Madinaty, and Badya, the research provides a new perspective on how design and planning practices, governance trajectories, and socio-political processes shape urban form and mobility. In doing so, it contributes to a more nuanced understanding of how the ideals of proximity, density, diversity, and digitalisation manifest in cities with layered histories and evolving planning traditions.

As a contribution to scholarship, the study extends the theoretical debate on the 15-minute city concept into a non-European context. It develops a comparative and integrated framework that brings together the analysis of urban form, mobility patterns, social networks, and digital access, thereby bridging the tangible and intangible dimensions of city life. This interdisciplinary approach enriches the fields of urban studies by offering both conceptual refinement and methodological innovation for analysing sustainable mobility and accessibility across diverse settings.

For practice, the research generates insights that are highly relevant to urban policy, planning, and design. By critically examining different neighbourhood and city models in Greater Cairo, this study highlights both the opportunities and challenges of adapting the 15-minute city concept to contexts marked by rapid urbanisation and ambitious city-building agendas. The findings can support planners and architects in data-driven strategies to

enhance accessibility, improve mobility systems, and strengthen local communities in ways that are socially inclusive and context-sensitive.

Ultimately, this research makes a unique contribution by positioning Greater Cairo not only as a site of inquiry but also as a site of contemporary knowledge production with value for global urban debates. In this way, it advances academic understanding while offering practical guidance for building more connected, just, and resilient cities, both within Cairo and in other cities with similar dynamics worldwide.

1.6 Limitations

This research operates within certain boundaries, and it is important to acknowledge them clearly. The three neighbourhoods examined in this study, Agouza, Madinaty, and Badya, were selected with intention and representation to highlight different historically evolving urban environments in the Greater Cairo, but at the same time, these cases cannot reflect the full complexity of a metropolis as large and diverse as Cairo. The findings should therefore be read as indicative of broader dynamics rather than as a comprehensive portrait of the city.

The study is also context-specific. Its conclusions are deeply rooted in Cairo's unique histories, governance structures, and social practices. While the research contributes to global debates on the 15-minute city concept, the insights it offers should not be taken as universally applicable. Their significance lies instead in how they extend the discussion by bringing Cairo's and North African urban experiences and perspectives into dialogue with international scholarship.

A further limitation concerns the availability of a complete dataset of online data, particularly spatially related data. To mitigate this limitation, the study draws on a variety of sources, combining official reports and documents from the government or developers with secondary literature and the knowledge and experiences of residents and other stakeholders. This mix of sources strengthens the analysis by weaving together multiple perspectives and insights, but it also means that parts of the findings inevitably reflect the conditions of availability of updated spatial information at the time the research was carried out.

Finally, Cairo is a city in motion, continually shaped by rapid development and new projects. Large-scale urban developments, shifting governance priorities, and the growing influence of digital infrastructures are constantly reshaping its neighbourhoods. The analysis offered here captures these dynamics at the moment the research is conducted, acknowledging that

new developments may generate further changes beyond the scope of this study. By approaching the subject through an interdisciplinary lens that connects design, governance, and everyday social life, this research seeks to develop a fuller picture of accessibility and mobility. This broad perspective enables the identification of connections that might be overlooked in more narrowly defined studies. At the same time, the choice to work across disciplines inevitably comes with trade-offs: individual debates within each field cannot be pursued as deeply as they might be in a study dedicated solely to one discipline. Further methodological limitations are identified and addressed in the methodology chapter.

1.7 Outline of the thesis

This thesis unfolds over eight chapters. Chapter 1 sets the stage by outlining the research problem, aims, and guiding questions, and by positioning the work within wider debates on urban form, mobility, and the emerging ideals of the 15-minute city concept. Chapter 2 reviews the existing literature on sustainable urbanism, the just transition, and the 15-minute city concept, tracing their conceptual lineage to early urban reform movements such as the Garden City and New Urbanism. It also discusses global and local debates on inclusivity, accessibility, planetary urbanism, and postcolonial urbanism. It also engages with the critiques and debates surrounding the concept, highlighting its contested applicability across different contexts.

Chapter 3 introduces the methodological framework, explaining how different forms of spatial analysis are brought together with qualitative insights from multi-stakeholder interviews. Chapter 4, then, moves outward to consider Greater Cairo as a whole before zooming in on the three selected cases: Agouza, Madinaty, and Badya, exploring the policies, plans, and socio-economic and cultural factors that have shaped them. It examines the policies, plans, and socio-economic and cultural dynamics that have shaped each site. Chapter 5, after that, takes up the spatial analysis in detail. It introduces findings from the integrated spatial methods to assess the distribution of 15-minute city functions and the resulting urban form.

Chapter 6 shifts the focus to everyday life, drawing on residents' interviews and thick maps. It examines mobility experiences, social networks, and the roles of both physical and digital mediating spaces, noting how these experiences differ across groups, including gender, age, and family status. Chapter 7 brings these strands together by tracing the developmental phases of Cairo's 15-minute city models and drawing on the integrated morphological

analysis. It also reflects on how different groups experience space in divergent ways, combining findings from the interviews with a wider understanding of the meaning of space. The final chapter concludes by linking these empirical insights back to wider debates on urban public space and by sketching a possible roadmap toward a more integrated, inclusive, and just application of the 15-minute city concept and proximity-based planning in Greater Cairo.

Chapter 2: Literature Review

2.1 Introduction

Urban sustainability has become a central area of recent scholarship, bringing together questions about how cities can remain within ecological limits while also delivering social equity and building resilient systems (Sharifi and Khavarian-Garmsir, 2020; Uyttebrouck et al., 2023). One strand within this field is sustainable mobility, which arose in response to the heavy environmental costs of car-dependent transport (Sheller, 2012 and 2021). Here, the focus is on making systems more efficient, shifting travel behaviour, and in some cases reducing the need to travel at all (Button, 1993; Banister, 2008; Holden et al., 2017). The urgency of such debates became even clearer during the COVID-19 pandemic (Wright, 2021). Lockdowns and disruptions exposed the fragility of urban services, increased dependence on neighbourhood-level infrastructures, and reminded planners of the value of accessible, local environments (Allam and Jones, 2020; Uyttebrouck et al., 2023).

At the same time, the push for carbon neutrality gained prominence and was framed politically through frameworks such as the 'just transition' (Heffron and McCauley, 2017 and 2018; Waud, 2018). This approach, now more widely reflected in policies and plans, underscores that the burden of decarbonisation should not fall disproportionately on vulnerable groups (Heffron and McCauley, 2018; Hughes and Hoffmann, 2020). These two agendas, sustainability in mobility and justice in transition, both point to the need for urban models that are socially fair as well as ecologically viable.

The '15-minute city concept' is often put forward as one such model (Moreno et al., 2021). By reshaping cities and adapting existing infrastructure to promote proximity, diversity, and active mobility, it reduces car dependence, lowers emissions, and helps create more inclusive neighbourhoods (Moreno et al., 2021; Nieuwenhuijsen, 2021). Yet its appeal goes beyond technical fixes: it represents a rethinking of urban life itself, where global frameworks of transition are constantly reworked through local realities in the search for more just and sustainable futures (Cacopardo, 2022; Rainwater, 2021).

The 15-minute city concept builds on a long genealogy of urban liveability ideals and Western modernist planning models concerned with proximity, walkability, and the balance between social and environmental needs (Howard, 1902; Perry, 1929; Jacobs, 1961; Duany et al., 2000). At the same time, similar principles have long been lived and practised in other

contexts, where compact urban forms, mixed uses, and neighbourhood-scale social life evolved outside Western planning discourse, as seen, for example, in North African and Asian cities (Hakim, 1986; Abu-Lughod, 1987; Robinson, 2006). However, many scholars have recently traced parts of this lineage of the 15-minute city concept (e.g. Khavarian-Garmsir et al., 2023).

Focusing on the western lineage of urban ideals, early visions such as Ebenezer Howard's Garden City (1902) proposed self-contained neighbourhoods that combined housing, work, and green space, creating a model of decentralised but connected settlements. This was followed by Clarence Perry's Neighbourhood Unit (1929), which defined the neighbourhood as the fundamental unit of city planning, organised around schools, community facilities, and walkable catchments. These functionalist principles were consolidated through a contested process beginning with CIAM IV (1933) and later shaped by key Figures such as Sert and Le Corbusier, into what became known as the Athens Charter, most widely circulated via Le Corbusier's 1943 publication (Lawton, 2020; Gold, 1998). Its rigidity was later critiqued in The Quito Papers, which instead called for more adaptable and inclusive urban forms (Lawton, 2020; Sennett et al., 2018).

Mid-twentieth-century critiques, most famously articulated by Jane Jacobs in 'The Death and Life of Great American Cities' (1961), stressed the importance of mixed uses, density, and the vitality of street life against the failures of modernist urbanism. Later, the New Urbanism movement, advanced by Andrés Duany, Elizabeth Plater-Zyberk, and Jeff Speck (Duany et al., 2000), translated its principles into design guidelines that prioritised compact, walkable, and mixed-use neighbourhoods as alternatives to sprawling suburbanisation. While this trajectory reflects predominantly Western urban ideals, other traditions have long articulated different approaches to liveability and neighbourhood life. Fatimid urbanism, for example, historically embodied compactness, mixed uses, and walkable scales through the integration of mosques, markets, and communal courtyards (Hakim, 1986; Abu-Lughod, 1987). Additionally, many indigenous and postcolonial urban critiques and practices foregrounded collective life, ecological adaptation, and everyday proximity outside the frameworks of modern planning (Doxiadis, 1968; King, 1990; Robinson, 2006).

This is in addition to the long tradition of ancient sustainability, where urban forms were shaped by ecological adaptation and collective life well before modern planning ideas (Moeller, 2016). Other models of mixed and integrated urbanism that showed continuity in ancient cities, as the literature demonstrates, include Rageh (2000) and Moeller (2016) on

Egyptian urbanism. Additionally, Stefanou and Mitoula (2003) studied Hellenistic urban planning, and Wright (1977) examined the morphology of Chinese cities. All of which highlight the continuity of integrated and mixed urban functions rather than separate land uses.

In this sense, the 15-minute city does not emerge as an entirely new invention but as the latest iteration in a century-long, and historically grounded yet globally varied, search for more liveable, just, and sustainable urban environments.

While these planning ideals articulate visions of liveable neighbourhoods, the dynamics of urbanisation on the ground often unfold in response to wider political, economic, and social forces that exceed design paradigms. For example, urbanisation in countries that experienced colonialism has been shaped by uneven development, demographic pressures, and the legacies of colonial governance (Abu-Lughod, 1987). These factors prompted independent governments to push for postcolonial thought in the postcolonial era, emphasising the need to build on local contexts rather than through Eurocentric models (King, 1990; Robinson, 2006; Roy, 2011; Myers, 2011). This body of thoughts highlights, even if not declared, the postcolonial urbanism that foregrounds localisation, everyday practices, and hybrid forms of urbanism that negotiate global modernity while producing distinctive urban identities.

More recently, in an era of globalisation, scholarship on planetary urbanisation has sought to understand how urban processes extend far beyond the bounded city. These processes encompass regional infrastructures, resource flows, and ecological systems. Together, they shape urban life at a global scale (Brenner and Schmid, 2015; Merrifield, 2013; Angelo and Wachsmuth, 2015).

Together, these on-the-ground perspectives highlight that while ideals such as the Garden City, New Urbanism, or the 15-minute city offer normative blueprints, the lived reality of urbanisation is driven by multi-scalar processes that are simultaneously localised and globalised, historically situated yet embedded in planetary transformations.

Hence, given this introduction, this literature review chapter explores the evolution and application of the 15-minute city concept, tracing its historical roots and global adaptation in detail while examining its implications across different urban contexts. It begins by defining the 15-minute city concept and its core pillars: proximity, diversity, density, and digitalisation, before situating it within early urban ideals such as the Garden City movement, the neighbourhood unit, and New Urbanism. The discussion then considers how

the concept can be positioned within wider urban theories that explain the situation of postmodern urbanism in which new satellite cities are emerging, particularly through the lens of planetary urbanisation (Brenner and Schmid, 2011). Moving to a more localised lens, the section examines the 15-minute city concept in postcolonial urbanism thoughts, where historical legacies that were behind the formation of some inner-city areas. It also reflects the model's framing of transitions toward just and sustainable mobility as central. Finally, the chapter engages with critical perspectives, addressing ongoing debates over the 15-minute city's adaptability, its assumed universality, its risks of exclusion, and the socio-spatial consequences that accompany its adoption.

2.2 What is the '15-Minute City' Concept?

The 15-minute city concept is a term initially coined by the Franco-Colombian professor Carlos Moreno in 2016 (Moreno, 2016). Thereafter, it was adopted in 2019 as a flagship idea of the successful re-election campaign of the current mayor of Paris, Anne Hidalgo. Starting in 2020, 15-minute city concept has gained popularity during COVID-19 pandemic with increasing urgency and has become at the centre of the global community's attention (Moreno, 2016 and 2021). It was advocated as a shift away from the widespread modernist urban planning patterns in the last century (C40 Cities, 2020). This is following a long lineage of rejection of western functional planning (e.g. functionalist architects such as Le Corbusier (1935), and planners such as Robert Moses), and a call for a departure toward a liveable, compact urban planning (e.g. Jacobs, 1961, Gehl, 2010, Duany, 2000)

Moving away from car-oriented developments, transit-oriented cities, and monofunctional-built neighbourhoods, the 15-minute city concept paves the way for 'human-centred cities' (Moreno et al., 2021). As argued by Allam et al. (2021) from fields related to smart cities described it as a 're-orientation to the city planning approach' (Allam et al. 2021, p. 11), and Morris (2021, p. 2) from the community development perspective described it as 'retooling to the built environment.' As it has been used in different contexts by professionals ranging from urbanists to politicians, passing through architects, authority Figures, and media practitioners, an understanding of the 15-minute city concept is needed. Given the current general enthusiasm for the 15-minute city concept, clearly defining the term and explaining what it means is important. This section first outlines the basic definition of the 15-minute city concept and then discusses its key pillars.

The 15-minute city concept in Context

Moreno (2016), in his first published book on the 15-minute city concept, defines 'la ville du quart d'heure' as the city where, within 15 minutes or less of their residences, all its inhabitants can access their essential daily needs at any time. Duany[1] and Steuteville (2021, P.1), both key Figures in the New Urbanism movement, discussed below, defined it in their website article as "an ideal geography where most human needs and many desires are located within a travel distance of 15 minutes." This is the most unified basic definition, and most authors have built on it (see, for example, Herriges, 2019; Pozoukidou and Chatziyiannaki, 2021; Chaire ETI, 2019; Morris and Windle, 2021; Whittle, 2020). This definition indicates time (15 minutes) and the quality of life (the six basic functions of living, working, supplying, healthcare, education, and entertainment). Then, it is the product of the quality of everyday life within a relatively short distance.

When referring to the 15-minute city concept, some authors and municipal projects mentioned the term 'neighbourhood' instead of 'city' (Florida et al, 2020 and Gaglione et al. 2021 as examples). Even though using two terms can cause confusion, both terms have the same meaning and refer to the same definition. The confusion stems from the choice between 'city' and 'neighbourhood', which carries significant implications for scale, governance, and implementation: a 'city' implies a system-wide transformation, whereas 'neighbourhood' evokes a more contained, localised unit. Yet, the word 'city' is more precise than a single 'neighbourhood' in terms of outlining the geographical area covered by the 15-minute city concept, as argued by Duany and Steuteville (2021). This tension highlights the need to clarify whether the model is a city-wide planning framework composed of interlinked neighbourhoods, or whether it promotes the replication of idealised micro-urbanisms within existing urban fabrics. The use of the term 'neighbourhood' also draws upon a longer lineage in urban thought, influenced by Perry's (1929) 'Neighbourhood Unit.' This lineage will be discussed in detail later in this chapter.

The 15-minute city concept is referred to in the literature by a wide range of labels: concept, idea, urban agenda, planning model, political slogan, urban life development, urban strategy, conceptual framework, methodological approach, and analytical tool (Moreno et al. 2021; Moreno and Veltz 2022; Chaire ETI, 2019). This speaks to its framing flexibility, that is, its ability to inhabit multiple domains of meaning and action, which also enabled wide appeal.

[1] Andrés Duany is the American architect, urban designer and planner who is one of the main founders of the Congress of the New Urbanism.

It also enabled adoption by a wide range of stakeholders as the concept travels across geographies and policy arenas (Table 1). This is evident in the contemporary planning projects that draw upon and reinterpret the language of the 15-minute city to legitimise large-scale urban transformations (Lawton and Kayanan, 2023). Besides, different idioms are adopted to describe it as a place: a city of short distances and a polycentric city (Chaire ETI, 2019), or a city of complete neighbourhoods (C40 Cities, 2020).

Defining the geographical area covered by the 15-minute city concept largely depends on the modes of transport and/or mobility included, and in this regard, definitions vary. According to some authors (e.g., Moreno et al., 2021, Pozoukidou and Chatziyiannaki, 2021, Morris and Windle, 2021, Swinney, 2021) walking and cycling are the only included modes of mobility in the 15-minute city concept. On the other hand, Wright (2021), Leahy (as cited in Mooney (2021)), and the Growing Up Boulder initiative (2017) do strongly advocate combining public transportation with the ways of transport inside the 15-minute city concept. C40 Cities (2020), a global, politicised network, has a slightly different view: public transportation remains significant only as a connector between neighbourhoods. According to Duany and Steuteville (2021), we could also argue for the use of electric-powered carts and bikes, or for a wide range of alternatives. To that end, definitions that include only soft mobility are not the sole way to understand movement within the geographical area for authors who drew upon Moreno's 15-minute city concept. However, most agree that pedestrians and cyclists should be given priority (Mooney, 2021; Pozoukidou and Chatziyiannaki, 2021; Morris and Windle, 2021; Swinney, 2021). The understanding elaborated above serves to define the 15-minute city concept. At this point, to determine what the 15-minute city concept means as a framework, the next section explores its key pillars to understand the dimensions in which it is commonly approached in the literature. This is to define the constructs that shape the connectivity among the basic aspects of the 15-minute city: time, space, mobility, and the quality of urban life.

The key pillars of the 15-minute city concept

The understanding of the 15-minute city concept as a framework is based on four key pillars: proximity, density, diversity, and digitalisation (Moreno, 2021). These four will be discussed in detail below. Almost all authors agreed that the 15-minute city should be defined by the first three pillars. Proximity is often interpreted as a form of spatial localism (see Hinds and Whittington, 2021), while others may refer to density as compactness, a debate that will be discussed later in detail (see McMahon as cited in Clark, 2020, and Benedict and MacMahon,

2002). Mixity is used as a synonym for diversity (see Moreno et al., 2022), yet the two terms largely refer to the same concepts. On the other hand, the fourth pillar is most often understood outside the 15-minute city concept as a digital term. A later debate explores ambiguity in its meaning and its relation to the 15-minute city concept, which is explained in the following paragraph. Further, some 15-minute city concept advocates argue for modifying it to be digitalised (Allam et al. 2022a, and TUMI, 2021 as examples).

Digitalisation (framed previously as ubiquity) is explained by Luscher (2020), Intertraffic (2021), and Chow (2022) as the abundance and extent of access to the technology needed for the 15-minute city concept as a model in different districts regardless of their socioeconomic status, so that with time 15-minute city concept becomes the common form of neighbourhood. Consequently, this will prevent it from becoming a privileged way of life and instead allow it to grow into an affordable place for all. Bruno et al. (2024) argue that redistributing existing urban services more equitably, or even imagining cities with unlimited digital resources, can significantly reduce spatial and social inequalities. Chaire ETI[2] (2019) differently described ubiquity as the availability of technological services and the affordability of digital tools within the 15-minute city concept. Moreno et al. (2022) stated that this pillar is intended to make the 15-minute city concept possible in the era of the cyber revolution by leveraging current technological solutions and connectivity to bring it within reach of more urban inhabitants. Simultaneously, Moreno et al. (2021) and Allam et al. (2021) started using the term 'digitalisation' instead. This was followed by TUMI[3] (2021), which drew upon aspects commonly framed in the literature as 'smart cities' (e.g., Allam and Newman, 2018; Toppeta, 2010; Angelidou, 2014). It is then explained as an enhancement pillar of the 15-minute city concept, integrating advanced technological solutions and products (e.g., bike-sharing and online shopping apps, cashless transactions, sensors and cameras, and alternative energy and construction methods) into the model (Moreno et al., 2021). Allam et al. (2021) argue that utilising this aspect as a core part of the 15-minute city concept would ensure that digital infrastructure, as a key resource, is more evenly distributed. Also, complying with this 15-minute city concept's pillar benefits every

[2] A French academic initiative and research group at Paris–Sorbonne Business School and the University of Paris 1 Panthéon-Sorbonne. ETI stands for Entrepreneuriat – Territoire – Innovation

[3] TUMI stands for Transformative Urban Mobility Initiative. It is a global partnership that supports sustainable and inclusive urban transport, especially in cities of the Global South.

urban inhabitant in both spatial and economic terms, according to Moreno (as cited in Allam et al., 2021, p. 11).

The core pillar of the 15-minute city is the concept of proximity. Proximity in the 15-minute city concept is simply what Moreno packaged it as: "[magnifying] the place where we live" (Moreno, 2020, p. 31). It is identified as bringing the six essential urban demands mentioned previously close to the living place for daily access (Moreno, 2020). In other words, it is to minimise the distances between different basic urban activities. What is considered novel in this 15-minute city concept's core pillar is the turn from the need to access resources regardless of where they are located. Instead, it advocates delivering amenities within a 15-minute radius of urban residents (Pozoukidou and Chatziyiannaki, 2021). According to Moreno (2021), it is both temporal and spatial proximity. Also, it can be understood on a social level to strengthen the connection between inhabitants and their local places (Moreno, 2021). As Rolland, the commissioner for the 15-minute city concept in Paris, said in Yeung's website article, polishing long-held ideas: "a city of proximities – not only between structures but people" (cited in Yeung, 2021). It is argued that although the proximity pillar ends some urban systems that used to depend on the sprawl urban growth, for example, urban mobility and economic dynamics, it has the potential to develop new economic and social models (Chaire ETI, 2019). Besides, it opens new opportunities for local public facilities (Chaire ETI, 2020). In a wider sense, the resulting change in attitudes and perceptions towards mobility is posited to facilitate innovative models for delivering multimodal, shared public services that are accessible within both spatial and temporal proximities (Moreno, 2020).

In the 15-minute city concept, the third pillar is defined as the number of residents per square kilometre (Moreno et al., 2021; Intertraffic, 2021). This is an acceptable way that ensures the proximity of the six essential urban functions within a given radius (Moreno et al., 2021; Chow, 2022). On that account, density in the understanding of the 15-minute city concept is considered optimal if it supports the available amenities, not solely by producing high-density buildings, as Moreno described in a webinar as "a real organic density" (Moreno et al., 2022). Like proximity, it is viewed as enabling the production of new forms of locally based services and products (Moreno et al., 2021). It is also characterised by the dense utilisation of buildings and urban elements, enabling multiple functions to be assigned to the same space, either by shifting uses between day and night or between weekends and weekdays (Moreno et al., 2021; Allam et al., 2021). Moreno clearly crystallised this in his 2021 TED talk by saying "each square meter [in the 15-minute city] should serve many

different purposes" (Moreno, 2021). In this sense, the density pillar, along with proximity, ensures the 15-minute timeframe; hence, accessing essential urban functions without the need for vehicles becomes feasible.

It is important to mention the debate over density here. Density is central to the 15-minute city concept, enabling proximity, walkability, and access to services as discussed. Yet its benefits are not universally experienced. Economists highlight "experienced density," proximity to people and amenities, as key to productivity and accessibility (Duranton and Puga, 2020), but higher density can also slow mobility and strain infrastructure if not managed well, as also argued. Urban scholars urge a more relational understanding. Meanwhile, Keil (2020) distinguishes between built and social density, noting that density is often judged subjectively and shaped by inequality, race, and class. Suburban areas, frequently overlooked in density planning, are evolving spaces that challenge the simple dichotomy between compact cities and sprawl (Keil, 2018; Keil and Üçoğlu, 2021). To avoid becoming a technocratic fix, the density pillar of the 15-minute city can be analysed in relation to context, lived experience, and spatial justice, rather than solely quantitative indicators.

The concept of diversity is employed within the 15-minute city framework across interrelated dimensions. In relation to the physical built environment dimension, it is conceptualised as mixed-use neighbourhoods with residential, retail, and recreational zoning (Allam et al. 2022a; Intertraffic, 2021). This pillar also promotes the diverse uses of available infrastructure, in addition to land, buildings, and services, as suggested by Allam et al. (2021). Further, Allam et al. (2021) and Chow (2022) emphasised the importance of including a wide, diverse range of housing options that suit different urban residents with varying income levels. Socially, it is understood as encouraging the mixing of inhabitants with different cultural backgrounds to live and benefit from the 15-minute city concept. Creating this social mix would eventually lead to 'increased social coherence,' as Allam et al. (2022a) suggest. On the economic level, diversity means designing workplaces at different scales within the 15-minute city concept that could add economic vibrancy and interactions, as well as provide diverse opportunities for the diverse social mix (Moreno et al., 2021). Besides, it is claimed that the social level of diversity would, in turn, lead to economic growth, as a product of diverse cultures, hence increasing innovation and creativity (Allam et al., 2021). This pillar is advocated for as the 15-minute city concept's main dimension that will guarantee, ensuring and reducing the difficulties (Allam et al., 2021). Examples of 15-Minute City practices are spreading worldwide, as elaborated in the table below.

In practice, in Greater Cairo, the limited recent literature on the 15-minute city concept indicates that cultural and social dynamics play a major role in shaping how mobility and public spaces are used (Omar et al., 2025). Another study highlights that proximity-only approaches often do not fully reflect real-world conditions or the rest of the concept's pillars, including socio-economic factors (Megahed et al., 2024). Additionally, the usually used methods for analysing proximity and services coverage, such as grid-based or POI catchment approaches, should be combined with direct observations to achieve a more complete understanding of accessibility (Megahed et al., 2024). According to Aboulnaga et al. (2025), mixed-use developments support the 15-minute city's proximity, yet community engagement remains largely under-examined.

Table 1 Examples of the 15-Minute (15-min) City practices

Region	Example	Location	Relation to 15-min concept	Key 15-min practices	Sources
Europe and UK	Paris, "Ville du quart d'heure" (~2016–present)	Paris, France	Flagship political and planning narrative; reference model	Proximity to daily needs, mixed-use quartiers, cycling and walking priority, schoolyards as local facilities, polycentricity.	Moreno et al. (2021).
	Scotland- 20-Minute Neighbourhood policy ~2020–present	Scottish cities	National 20-min framework aligned with 15-min principles	Local access standards, active travel, equity orientation in statutory planning.	Chau et al. (2022).
	Dublin – 15-Minute City / Local Liveability - 2022–present (Dev Plan 2022–2028)	Dublin, Ireland	15-minute city embedded in Dublin City Development Plan (Policy plan)	Promotes 15-min city as basis for "liveable, sustainable urban neighbourhoods and villages"; strengthens hierarchy of urban villages; compact growth; active travel;	Dublin City Development Plan 2022–2028; EMRA (2025).

				community/social audits; alignment of capital investment with local services and public realm.	
Australia	Melbourne-20-Minute Neighbourhoods (2014–present)	Melbourne, Australia	Mature 20-min neighbourhood programme	Defined walkable catchments, daily needs within 800–1000m, support for activity centres, transit integration.	Chau et al. (2022); Gower and Grodach (2022).
N. America	Portland – 20-Minute Neighbourhoods (2009–present)	Portland, USA	Early x-min neighbourhood initiative	GIS-based 20-min access mapping, density and mix benchmarks, focus on walking/cycling.	Simon (2022).
N. Africa	Il Bosco City – "First 15-min city in Egypt" (2020–present (phased))	Mostakbal City, New Cairo, Egypt	mega-project satellite city branded as a 15-min city	Integrated residential, education, health, retail, offices and leisure; promise that essentials are ≤15-min walk/cycle; strong internal green and pedestrian network; enclaved and car-dependent at metropolitan scale → example of developer appropriation of 15-min discourse.	Misr Italia masterplan and brochure (2021–23); Daily News Egypt and Invest-Gate coverage; read critically alongside Moreno et al. (2021).
	Badya "5-10-15 rule" / creative city	New 6th of	Large private new town, smart/green	5-min to daily needs, 10-min to weekly, 15-	Palm Hills Badya brochure

	(~2016–present)	October, Egypt	city using 5-10-15 proximity rule	min to monthly needs (internally); distributed local and district centres; mixed uses, parks, sports club, education; walkable spines; again enclosed, privately managed, highway-oriented edge-city form.	and corporate materials (5-10-15 rule); AS+P masterplane
Asia	Shanghai – 15-min Community Life Circles (2016–present)	Shanghai, China	Formal 15-min "life circle" planning unit	Standards for essential services in 15-min walk; POI/network analysis; polycentric network of local hubs.	Wu et al. (2021); Li et al. (2019).

Examining the core literature on the 15-minute city and its pillars, one can conclude that the 15-minute city has a multifaceted meaning and various targeted implementations across the spatial, temporal, social, economic, and digital layers, yet all aspects are interrelated to generate a new formulation of urban space. A 15-minute city can then be defined as an urban transformation organised around the quality of everyday life within the inhabitants' reach, within a 15-minute covered area primarily limited to walking and cycling, but which could be extended to powered transport or public transportation. By supporting digital solutions, it operationalises through dense, proximate spatial forms of neighbourhoods that assemble diverse social forms of residents. Subsequently, it encompasses the topical production of economic models and mobility networks.

In the context of Greater Cairo, mixed-use developments set the stage for the 15-minute city, but actually making it work depends on paying attention to how people live and interact, understanding local social and cultural habits, ensuring equitable access, and combining on-the-ground observations with analytical tools. In addition, and importantly, the 15-minute city is viewed by many as having the potential to contribute to sustainable mobility, which will be explored in a separate section. Yet, although the concept promises to deliver human-

centred cities that will promote healthier daily life, sustainable mobility, more resilient urban areas, and better utilisation of common goods, there are also considerable critical voices questioning the 15-minute city model. These critiques will be discussed in detail in the following sections of this chapter.

2.3 The Historical Foundations and Early Urban Ideals of Proximity-Planning

2.3.1 The Garden City: The Early Foundations

Over a century ago, Ebenezer Howard's Garden Cities of Tomorrow was received as an ambitious urban ideal for future urban development and for responding to the urban and rural challenges of the era (Howard, 1902). It offered a bold, optimistic alternative to the prevailing living conditions in cities (Howard, 1902). At the time, these challenges stemmed from the imbalance between overcrowded, deteriorating urban cores and the lack of economic opportunities in surrounding rural areas (Howard, 1902; Osborn and Whittick, 1963). Urban cores had jobs, activities, vibrant energy, but were viewed as crowded and expensive, with poor living conditions (Howard, 1902; Osborn and Whittick, 1963). The countryside was peaceful, with fresh air, but it had fewer jobs and a less active social life. Howard proposed bringing together the best of both urban centres and the countryside into a unified model/urban ideal: the Garden City (Howard, 1902; Osborn and Whittick, 1963).

The 'magnets' of the garden city were used to articulate the vision. In his book, Howard (1902) framed three magnets as a metaphor for Town, Country, and Town-Country to explain three ways of life. The Town offers jobs and excitement but is crowded and chaotic (Osborn and Whittick, 1963). The Country is peaceful and healthy but lacks work and community life (Osborn and Whittick, 1963). The solution, the Town-Country, or Garden City, combines both, providing jobs, social life, and a clean, healthy environment by combining city energy with countryside peace (Osborn and Whittick, 1963). This is as Howard framed "Human society and the beauty of nature are meant to be enjoyed together" (Howard, 1902). Examples of Garden City practices spread worldwide, as elaborated in the table below. This urban ideal later informed other planning debates on proximity, accessibility, and the local economy.

To bring the garden city concept to life, an association for the concept was established and began promoting its ideals through various events, similar to Moreno and his team's approach. Furthermore, the financial support for the concept was a burden (Osborn and

Whittick, 1963). To facilitate this, a limited liability company (Ltd) was formed, subject to strict regulations that cap investors' profits at 5%. While this limits the funding and investment opportunities, it helped position the project as both socially responsible and a sustainable long-term investment (Osborn and Whittick, 1963). The funding approach was largely supported by public policies and land-use reforms (Osborn and Whittick, 1963).

With limited funds, the garden city faced many challenges in its early development, making Letchworth a notable early example (Osborn and Whittick, 1963). The company had to build essential infrastructure like roads, utilities, and services while also attracting businesses and residents. Growth was slow at first, especially compared with later government-backed new towns, but it demonstrated the potential to create self-contained, sustainable communities (Osborn and Whittick, 1963).

In summary, despite attracting a diverse workforce motivated more by employment than by the Garden City model's ideological appeal, early experiments such as Letchworth struggled to foster cultural vitality through formal planning. The absence of designated spaces for theatres, worship, or entertainment led residents to initiate their own clubs, societies, and cultural activities centred around arts, crafts, and religion (Meacham et al., 2021; Apollo Magazine, 2022). This grassroots engagement became a catalyst for social cohesion, contributing to a strong sense of community in which individuals were personally known and socially invested, markedly different from the anonymity typical of London's dense urban life (Elazzazy, 2022).

Despite the examples provided a vision for a balanced urban-rural relationship, it faced criticism from the popular press for adopting this rural-urban lifestyle. However, its core ideas, zoning, community-driven development, and rural landscaping, left an influence on urban planning and design practices globally. Years later, Letchworth Garden City showed industrial and commercial progress, but it was gradual and slow, despite early firms taking the risk of relocating to new towns. Its economy showed remarkable resilience, navigating war, economic depression, and market shifts. The next section will discuss its relation to the 15-minute city.

Table 2 Examples of Garden City practices

Region	**Example**	**Location**	**Garden City ideas**	**Key Garden City–Type Practices**	**sources**

UK and Europe	Letchworth Garden City (1903–1914)	Hertfordshire, UK	First purpose-built Garden City by Howard	Self-contained town; land-value capture ideal; greenbelt; mix of housing and industry; generous open space.	Clapson (2017); Buder (1990); Carter (1931)
	Welwyn Garden City (1920–1930s)	Hertfordshire, UK	Second Garden City; also post-war New Town	Formal axis and parkway; greenbelt; neighbourhoods; low-rise with gardens; civic centre.	Clapson (2017); Hall (2002)
	Hampstead Garden Suburb (1906–1920s)	London, UK	Canonical garden suburb	Low density; curvilinear streets; strong planting; architectural controls; local centre.	Stern, Fishman and Tilove (2013
	Harlow New Town (1947–1960s)	Essex, UK	Post-war New Town on GC principles	Planned neighbourhood units; "green wedges" open space network; partial traffic separation.	Hall (2002); Clapson (2017)
	Stevenage New Town (1946–1960s)	Hertfordshire, UK	First UK New Town (1946), GC lineage	Multiple neighbourhoods with centres; separation of pedestrians; structured open spaces.	Hall (2002); Clapson (2017)
N. America	Forest Hills Gardens (1909–1917)	Queens, New York	Early garden suburb inspired by English models	Rail-linked; curving streets; integrated green spaces and community facilities.	Stern, Fishman and Tilove (2013)
	Radburn (1928–1929 (initial phase))	Fair Lawn, New Jersey	"Town for the Motor Age", GC offshoot	Superblocks; cul-de-sacs; houses facing communal greens; full	Stein (1951); Wright (1972)

				ped–car separation.	
	Greenbelt (1935–1937)	Maryland, US	New Deal Greenbelt Town, GC-inspired	Superblocks; greenbelt; pedestrian underpasses; cooperative services; self-contained centre.	Buder (1990); Perkins (2007)
	Greendale (1936–1938)	Wisconsin, US	New Deal Greenbelt Town	Housing near village centre; greenbelt; walkability; community facilities.	Buder (1990)
	Greenhills (1935–1938)	Ohio, US	New Deal Greenbelt Town	Planned village; surrounding green; pedestrian paths; neighbourhood focus.	Buder (1990)
N. Africa	Mohandessin (Madinat al-Awqaf) (1940s plan; 1950s–1960s build)	Giza (Greater Cairo), Egypt	Planned cooperative suburb for professional syndicates; late GC/garden-suburb adaptation, later over-densified	Planned grid with serviced plots, early villas and clubs, collective land allocation; no greenbelt/self-contained economy	Volait (2001); El-Husseiny (2015); Mourad (2018)
	Garden City (1905–1910s)	Cairo, Egypt	1900s garden suburb; based on English GC ideas	Curved streets; villa plots with gardens; heavy planting; quasi-enclosed enclave.	Elazzazy (2019); Haag (2010)
	Heliopolis (1906–1920s)	Cairo, Egypt	1905 planned “desert city”; part of Cairo’s garden-suburb family	Grand boulevards; squares; tram; integrated leisure; strong landscape structure.	Mourad (2017); Elazzazy (2019)

	Maadi (1904–1920s)	Cairo, Egypt	1900s planned railway suburb with garden-suburb character	Gridded yet leafy streets; villas and gardens; controlled densities; rail connectivity.	Elazzazy (2019); Raafat (1996)
Africa	Pinelands (1920–1930s)	Cape Town, South Africa	First SA "Garden City" by Garden Cities Trust	Non-profit development; curvilinear streets; green reserves; neighbourhood centre.	Cuthbertson (1979); Pelteret (2016)
Asia	Jamshedpur (1907–1940s (key phases))	Jharkhand, India	Company town shaped by GC and neighbourhood-unit ideas	Zoning of industry and housing; wide, tree-lined streets; open spaces and facilities for workers.	Sinha and Singh (2011)
	Chandigarh (1951–1960s)	Chandigarh, India	Planned modernist capital; related to GC lineage via sectors	Sector-based units; green belts and leisure valley; traffic separation; self-contained sectors.	Kalia (1999)
	Singapore "Garden City"	Singapore (From 1967)	National greening strategy reworking "garden city" at high density	Systematic street tree planting; parks and connectors; nature integrated with urban growth.	Han (2017); Tan, Wang and Sia (2013)

The Garden City Concept and its Relation to the 15-Minute City

Building on these principles as Khavarian-Garmsir (2023) explained and Iqbal et al (2025) confirmed, the 15-minute city concept focuses on the same priorities of accessibility, sustainability and self-sufficient communities, but adapts them to the contemporary urban challenges. Both models separated functions; the garden city separated them into distinct zones, 'magnets' Howard (1902), whereas the 15-minute city concept promotes a mix of work, supply, healthcare, education, and recreational urban functions. However, the 15-

minute city concept has developed more flexible ideals (Khavarian-Garmsir, 2023). The Garden City was designed as a new, self-contained settlement with the central feature of a fixed population cap. The 15-minute city concept is more flexible and can be applied to existing urban areas, transforming neighbourhoods into walkable, mixed-use hubs. Additionally, the garden city envisioned a community-driven governance model to keep land affordable (Osborn and Whittick, 1963), while the 15-minute city concept relies on policy shifts and zoning reforms to reshape existing spaces.

As some studies have explained the connection between the two concepts (e.g., Casarin, 2023; Khavarian-Garmsir, 2023), the literature on the two concepts highlights main points on the 15-minute city pillars elaborated below. Adapting the ideals to modern realities, the 15-minute city concept, as discussed, differs in scale, density, and approach to designing the urban form. The four pillars of the concept, as discussed in detail, share similar aims with the Garden City. Proximity, a core pillar of the 15-minute city concept, aligns with the Garden City's self-contained community principle. Both aim to bring housing, jobs, and essential services closer together, reducing the need for long commutes.

In summary, density is another major difference between the two models. The Garden City promoted low-density urbanisation, with ample green space and a population cap to avoid congestion. In contrast, the 15-minute city concept promotes higher density to create compact, walkable areas. Diversity in the 15-minute city concept contrasts with the Garden City's concentric zoning model. The Garden City had separate areas for residential, commercial, and industrial uses, maintaining a structured layout. The 15-minute city concept, however, promotes mixed-use development, integrating urban functions and public spaces within the same area, ensuring that neighbourhoods remain active (Casarin, 2023). Digitalisation, a key aspect of the modern 15-Minute City, encourages smarter urban management, seamless mobility, and improved local governance through technology. In contrast, the Garden City relied on local governance and economic self-sufficiency through cooperative ownership and management (Osborn and Whittick, 1963). While both models emphasise community control, the 15-minute city concept encourages the use of digital tools to optimise infrastructure, provide real-time access to urban services, and promote ubiquity by ensuring equal access to nearby facilities.

Nevertheless, the 15-minute city concept's flexibility enabled its adaptation within existing neighbourhoods and newly planned cities, unlike garden cities, as mentioned above. This made its financial backing more reliant on private-sector partnerships or residents'

behavioural transitions rather than on starting from scratch, a critique of the garden city. Moreover, shaped by the urban logics of its time, Paris moved faster than any other European city as the first 15-minute city, with major support. Meanwhile, Paris moved quickly to develop the first European example of a 15-minute city, driven by strong support from the mayor, a development that differs from how the Garden City developed, as discussed above.

At present, while Letchworth and other garden city new towns gradually shed some of their early radical vision, they remain milestones in urban planning. As one of the first attempts at a balanced, sustainable community, it proved that people/families could live near their workplaces, green spaces, and essential services, fulfilling the dream of blending vibrant urban life with nature. Building on these ideas, as discussed by Khavarian-Garmsir (2023) and Iqbal et al. (2025), the 15-minute city concept carries forward the core values of accessibility, sustainability, and community self-reliance while responding to the realities of contemporary urban challenges. With this foundation in place, the following section discusses the next influential urban idea: New Urbanism.

2.3.2 The New Urbanism: Ideological Continuities and Shifts

The 15-minute city concept builds on a lineage of urban reform movements, including the Garden City (Howard, 1902), the Neighbourhood Unit (Perry, 1929), and New Urbanism (Duany et al., 2000) (Table 3). Ebenezer Howard's Garden Cities of Tomorrow was viewed a century ago as an ambitious response to the urban and rural challenges of its time, providing a daring alternative to the prevalent conditions of industrial cities and remote countryside, as was covered in the previous section. His model proposed a vibrancy of urban centres with the stillness of rural life, introducing an integrated spatial ideal that foregrounded balance, order, and well-being (Howard, 1902; Osborn and Whittick, 1963). As explained, the 15-minute city concept has been informed by this idealistic logic (Casarin, 2023). Decades later, New Urbanism would build upon this, mobilising a similar vision to respond to the fragmented landscapes and alienating logics of postwar suburban sprawl in the U.S. Ford (1999) also linked its emergence with Kevin Lynch’s ideals, which will be discussed below.

Emerging in the 1980s, New Urbanism framed itself as a response to interlocking challenges: sprawling, car-dependent, social and environmental fragmentation, deteriorating urban cores, and weakened public life (Katz, 1994; Congress for the New Urbanism and Talen, 2013). Housing mortgage systems and reliance on cars shaped suburbia, which promised space and privacy but often led to social isolation and environmental degradation (Keil,

2018). In contrast, New Urbanists advocated for compact, mixed-use, pedestrian-oriented communities, insisting on the importance of place-making, social interaction, and ecological sustainability (Liu, 2012). While sometimes read as nostalgic, this was not a call to return to a pre-modern past, but rather an attempt to recover certain enduring values, walkability, human scale, public life, and adapt them to contemporary urban complexity (Katz, 1994; Calthorpe, 1994).

This movement was grounded in ethical and practical aims, articulated most clearly in the Charter of the New Urbanism, a living document that sets out 27 interrelated principles across regional, neighbourhood, and architectural scales (Congress for the New Urbanism and Talen, 2013). Harvey's (2014) critique of market-led urban governance is useful here, as it highlights how these normative planning agendas can be selectively absorbed into private development logics rather than delivered as collective urban rights. Furthermore, it operates at three key levels, like the garden city: the region (including cities, towns, and rural areas), the neighbourhood (including districts and corridors), and the block and building scale. Scholars have called attention to a recurring tension in the movement: between its normative ideals and their partial, often elite-driven, implementation in practice (Talen, 2000; Garde, 2020). Examples of New Urbanism practices spread worldwide as elaborated in Table 3 below.

Table 3 Examples of New Urbanism practices

Region	**Example**	**Location**	**Relation to New Urbanism**	**Key New Urbanism–type practices embodied / contested**	**reference**
US	Seaside (1981–1990s)	Florida, USA	Iconic early NU resort town (DPZ)	Fine-grain walkable grid; short blocks; mixed-use centre; strong form-based codes; front porches; rear parking.	Macedo (2016); Fulton (1996).
	Kentlands (Late 1980s–1990s)	Gaithersburg, MD, USA	Classic TND by DPZ	Connected street network; mixed housing types; main-street centre; alleys and rear	Tu and Eppli (1999); Grant (2006).

				garages; 5–10 min walk structure.	
	Celebration (Mid-1990s–2000s)	Florida, USA	Disney NU/neo-traditional new town	Traditional main street; walkable grid; civic amenities; strong design codes; critiqued for corporate governance and exclusivity.	Njoh (2009); Grant (2006).
	Orenco Station (1990s–2000s)	Hillsboro (Portland), USA	NU-style TOD	Higher-density housing around light rail; mixed-use high street; walkable blocks; reduced parking, NU + TOD synthesis.	Bae (2002); NU/TOD case studies.
	Mueller (2000s–present)	Austin, TX, USA	NU-inspired infill (former airport)	Compact mixed-use districts; diverse housing incl. affordable; parks; strong walkability; CNU Charter Award.	Mueller case-study reports; Grant (2006).
Europe and UK	Poundbury (1993–present)	Dorchester, UK	Neo-traditional extension aligned with NU	Perimeter blocks; walkable mixed-use centre; design codes; human-scale streets; some tenure mix.	Lei (2014); Grant (2006).
	Upton (Late 1990s–2000s)	Northampton, UK	"Urban village" / NU-influenced	Street-based blocks; design codes; mixed tenure; SuDS and landscape integrated; NU principles tested in UK context.	Lei (2014).

	Vauban (1994–2006)	Freiburg, Germany	Eco-district with NU affinities	Car-lite; compact blocks; mixed uses; strong walking/cycling and transit; participatory planning; rich public realm.	Coates (2013).
N. Africa	Madinaty (mid-2000s–present)	East of Cairo, Egypt	Large gated new town with NU/TND-style masterplanning rhetoric	"neighbourhoods" with local centres, schools, mosques, club, linear parks; landscaped, walkable internally in parts; strong design control. At the same time: highly gated, car-dependent at metro scale, socio-spatially exclusive. Often marketed via "complete community" language similar to NU.	Azab (2018) Al-Rehab and Madinaty'; Alagamy (2023); Salma (2022).
Africa	Melrose Arch (Late 1990s–2010s)	Johannesburg, South Africa	NU-style mixed-use development (critical case)	Fine-grain blocks; active ground floors; offices + retail + apartments; very walkable internally; heavily privatised/secured, NU form + "post-public" space.	Murray (2013).
Turkey	Branded housing projects, Istanbul (e.g. Sinpaş, Ağaoğlu, Başakşehir/Bahçeşe	Istanbul, Turkey	NU/neo-traditional aesthetics and internal-mix enclaves under	Internal "town centre" streets, themed architecture, some mixed uses and	Serin (2016)

	hir-type enclaves) – (2000s–present)		neoliberal urbanisation	amenities within walking distance for residents; strong design/branding ; gated, car-oriented, exclusive, appropriates NU language of walkable mixed-use communities but as privatized compounds.	

The New Urbanism and its relation to the 15-minute city

It is within the introduction above that this intellectual lineage, in which the 15-minute city concept re-emerges, not as a radical departure, but as a rearticulation of many of these inherited logics under a new paradigm. Both New Urbanism and the 15-minute city concept seek to address the alienation and inefficiencies of sprawling urban form. Both call for proximity, access, and social cohesion. However, the 15-minute city concept, as popularised by Moreno, explicitly centres the temporalities of everyday life: it is not only about spatial form, but about rhythms, routines, and the equitable distribution of time across urban life. In this way, it can be read as both a spatial concept and a social ideal, and increasingly, as a governance strategy shaped by data, metrics, and urban experimentation.

While New Urbanism was often driven by private developers and design firms, sometimes with public support, the 15-minute city concept is increasingly embraced by municipal authorities, international agencies, and large-scale planning consultancies as a policy tool. It was implemented in places like Paris, Milan, and Melbourne, revealing how it functions both as a planning language and a branding tool for city councils or municipalities, framing urban transformation around liveability, resilience, and sustainability. However, some criticised the translation of ideals into zoning codes, design standards, or master plans, claiming that this can render them exclusionary or depoliticised, particularly when driven by market logic rather than social need (Garde, 2020), as discussed below.

New Urbanism were further consolidated through planning and regulatory tools, like the LEED-ND rating system and form-based codes (Garde, 2020). These tools lent credibility but also risked formalising flexibility, potentially resulting in rigid implementation. The 15-minute city concept faces similar issues as it is translated into metrics, indicators, and spatial plans, without continuous attention to who benefits from proximity and access. Dominczak (2021) highlights how New Urbanism's traditionalist ethos often conflicts with radical change. The 15-minute city concept, while more progressive in tone, still raises questions about whether its flexible framework can meaningfully support the distribution of services and facilities.

While both promote walkability and local life, they differ in how they conceptualise community. New Urbanism draws on classical traditions, imagining socially mixed neighbourhoods rooted in place. However, it often implicitly centres the needs of a narrow demographic. The 15-minute city concept expands this vision to include digital services and diverse mobilities, demanding greater attention to everyday rhythms and the availability of digital and physical infrastructure. Technological shifts, remote work, e-commerce, and micro-mobility have also reshaped what “local” means.

Both New Urbanism and the 15-minute city concept face critiques, which will be discussed in detail later in this chapter, of aesthetic nostalgia and elite capture. Talen (2000) argued that critics often conflate the movement’s vision with upscale, homogeneous developments without acknowledging that market dynamics and zoning laws drive these outcomes. Similarly, the 15-minute city concept risks being co-opted by technocratic or market-driven interests. When adopted by real estate developers or top-down municipal plans without participatory processes, it can reproduce the very inequalities it aims to resolve.

Garde (2020) warns that implementation barriers, restrictive zoning, land costs, and local resistance continue to hinder both paradigms. Despite their promises, New Urbanist projects often fall short on affordability and inclusion, a risk that similarly haunts 15-minute city plans. Moreover, Garde and others (e.g., Fulton 2017) note that New Urbanism’s initial visionary appeal has waned as its ideas have become mainstream. The same fate may await the 15-minute city concept if it becomes a checkbox in planning documents rather than a driver of systemic change.

Moreover, both models carry embedded assumptions about whose lives are being organised. The promise of walkable neighbourhoods, vibrant public spaces, and proximity to services

often masks inequalities in access. Talen (2000) warns that aesthetic coherence and urban form alone cannot guarantee inclusion. Similarly, scholars have questioned whether the 15-minute city concept adequately addresses structural issues such as housing affordability, informal labour, and unequal mobility.

Ultimately, the lineage from Garden Cities to New Urbanism to the 15-minute city concept reflects a continuity of urban desire for coherence, balance, and human-centred scale urban planning. More recently, Garde (2020) suggests that new urbanism is revitalised by the potential use of vacant properties and changing mobility habits, which can open new opportunities for adaptive reuse and infill development, if planners use them. The 15-minute city concept, as will be discussed later, has the potential to build on this by embracing third places (Oldenburg, 1999) and context-sensitive designs that reflect local cultures and needs while also responding to broader global forces, which will be discussed in the literature below related to the globalisation and the localisation of the 15-minute city models.

2.4 The Globalisation and the Localisation of the 15-Minute City Concept

2.4.1 Urban Theories and Planetary Urbanism

Looking at the three tables above, which illustrate practices in the lineage of urban ideals from the Garden City to New Urbanism and towards the 15-Minute City concept, three examples emerge from Egypt: Agouza, Madinaty, and Badya. Detailed context of the three urban areas will be provided in the following chapter, but before that, an overview of the wider theories [4] that explain the political, economic and social backgrounds of these suburban expansions is introduced. Complementing this, a policy mobilities perspective clarifies how ideas like the 15-minute city circulate through networks and other forms before being translated in specific places (McCann and Ward, 2011; Temenos and McCann, 2013; Peck and Theodore, 2015).

This section sets out to explore the globalisation of the 15-minute city concept, positioning it within urban theories and recent debates on planetary urbanism (Brenner and Schmid, 2011), in order to engage the concept with broader questions of global urban transformation, a perspective that is particularly relevant as two of the case studies in this research are

[4] These theories are not applied step-by-step in the analysis. Instead, they sit in the background and help frame the questions and make sense of the findings in this study and the comparative discussion of the three case studies.

satellite cities. Read in this way, planetary urbanisation helps situate Madinaty and Badya within outward extensions of Cairo's urbanisation without presuming identical forms or trajectories. Policy mobilities research adds that 'globalisation' of the 15-minute city proceeds not by simple replication but via assemblage and translation, as actors borrow, edit, and reframe "best practice" to fit local logics (Dolowitz and Marsh, 2000; McCann and Ward, 2013).

Ways of thinking that are grounded in context, responsive to local practices and everyday lived realities, while remaining attentive to the broader global forces shaping urban life, represent a critically important and needed engagement with the implementation of the ideals of the 15-minute city concept. This dynamic interplay between localisation and globalisation will be explored in the literature discussed below in relation to evolving 15-minute city models. After examining the 15-minute city concept's roots in urban ideals such as the Garden City and New Urbanism, which have influenced urban thinking and practice, this section explores its theoretical foundation to better understand its real-world applications. Planetary urbanism will be examined as a theoretical basis that provides insight into how the 15-minute city concept manifests in existing case studies established before the term was introduced. This will also help considering how the concept can be adopted in existing urban areas, which have been shaped by different processes, offering insights into its adaptability across diverse spatial and social contexts.

As explored in the earlier section, in the 20th century, urban practices shaped their theoretical frameworks by drawing implicit geographical contrasts. Definitions of urban life were often framed in opposition to an assumed 'non-urban/rural' environment (Brenner and Schmid, 2011). As urban theories evolved over the years, the terminology used to describe the urban-rural spectrum also shifted, introducing concepts such as 'suburban' and 'edge cities' (Lawton and Kayanan, 2023; Charmes and Rousseau, 2022). Over time, even as the boundaries between urban, suburban, and rural areas were seen as shifting, they were still generally treated as separate and clearly defined spaces. Urban practices also operated on the assumption that the 'non-urban' is a stable, fixed concept (Brenner and Schmid, 2011). Planetary urbanisation simply cautions that these categories now interpenetrate: "urban" processes increasingly shape ostensibly "non-urban" spaces, and vice versa. Policy mobilities scholarship likewise warns against assuming one-way 'transfer': policies mutate as they move, producing locally specific hybrids rather than uniform models (Temenos and McCann, 2013).

Over the past thirty years, major mega-city regions have experienced significant spatial and demographic growth, alongside profound socio-spatial transformations on a global scale (Jain and Korzhenevych, 2022). Brenner and Schmid (2011) listed these shifts as (1) the creation of new scales of urbanisation, (2) the blurring and rearticulation of urban territories, (3) the disintegration of the "hinterland, (4) the end of the 'wilderness.' For the purposes of this study, these shifts are read as context conditions, not determinants, within which proximity-based models are adapted, translated, or resisted.

Thus, the contemporary urban landscape can no longer be defined by a single type of settlement, such as a city, city-region, or megalopolis. Similarly, the traditional urban-rural distinction is no longer sufficient to describe the differences between densely populated areas and those with lower population density (Brenner and Schmid, 2011). This does not reflect the fluidity of the relationship between the two urban areas. Hence, this situation of 'planetary urbanisation' means that even urban areas far beyond traditional city centres and suburban edges are now deeply connected in the global urban fabric. Brenner and Schmid (2011) argued that innovative methodologies are required to study these emerging urban forms. In practice, this encourages pairing neighbourhood-scale analysis of the 15-minute city with attention to extra-local infrastructures that condition what "nearby" can deliver. Methodologically, this also implies tracing local translations, from national programmes and developer plans to municipal design guides, to see how proximity ideals are materialised (Peck and Theodore, 2015).

Brenner and Schmid (2015) challenge the traditional urban-rural divide as well, introducing the concept of "planetary urbanisation" to show how urban and non-urban spaces are increasingly connected. They argue that non-urban areas are linked to cities through infrastructure and social networks, making the boundaries between them less clear (Brenner and Schmid, 2015). This urbanisation happens in three ways: concentrated urbanisation, where businesses and infrastructure grow in both cities and surrounding areas; extended urbanisation, where rural spaces are shaped to support urban life; and differential urbanisation, where economic forces constantly change both urban and rural landscapes (Brenner and Schmid, 2015). However, some scholars, like Storper and Scott (2016) and Khan and Karak (2019), criticise planetary urbanisation for being too broad and argue that it needs more specific concepts to be useful in real-world cases of urban development. This research therefore adopts a restrained reading: concentrated, extended, and differential urbanisation are treated as diagnostic cues that help interpret how proximity planning is applied across different sites, rather than as a comprehensive theory to use in the analysis.

This suggests that the 15-minute city concept responds to these challenges created by planetary urbanisation; however, its practical implementation lies in the increasing interconnectedness of all spaces. The simple concept aims to mitigate the need for long commutes and the environmental consequences of extended urbanisation, and to build resilience against the destruction of existing socio-spatial arrangements/economic reliability caused by differential urbanisation. The 15-minute city concept, with its foundational pillars of proximity and diversity, as discussed previously (Moreno, 2021), challenges rigid urban boundaries, unlike the garden city model, and promotes more flexible/contextual ideals that address the fluid, interconnected urban experience. Put simply, planetary urbanisation names the conditions under which proximity must now work; the 15-minute city proposes one response calibrated to those conditions.

Contextualising planetary urbanism, Charmes and Rousseau (2022) argued how the COVID-19 pandemic exposed the expansive reach of urbanisation beyond city centres or urban–rural dichotomies. It should be seen as an interwoven system of urban networks that connects various forms and functions. As major city centres became hotspots for the virus, upper-class mobility helped spread the disease. Early outbreaks were often traced not in high-density urban areas but in luxury spaces like ski resorts or cruise ships, while historically pandemics were linked to long-distance trade, only now intensified by globalisation. However, individuals with the flexibility to work remotely and live in their localised self-sufficient 15-minute cities were better able to avoid outbreaks and the increased risk of infection from long commutes (Moreno, 2021).

This interconnected urban form undoubtedly faces new challenges. This is particularly relevant in the overwhelming urbanisation of rapidly growing megacities with a long history of cultural and economic vibrancy but also significant environmental challenges, such as São Paulo, Mexico City, Cairo, Lagos, Mumbai, or Shanghai (Harvey, 2014). While these cities face regional-scale challenges related to infrastructure, informality, governance, and environmental sustainability, the development of individual neighbourhoods and new cities within them manifests in distinct local characteristics, shaped by socio-economic dynamics, planning paradigms, and historical trajectories. As Harvey (2014) suggests, a conceptual approach is essential to navigate the complexities of modern urbanisation. Rather than treating cities as blank slates, he encouraged viewing them as layered places shaped by accumulated histories, where any future transformations must be negotiated alongside the social and cultural fabric (Harvey, 2014). This will definitely shape how different neighbourhoods adopt or resist certain features of the 15-minute city concept. In Cairo

specifically, this means reading Agouza's as a suburban extension turned to an inner city district within metropolitan networks alongside the extended-urbanisation logics of Madinaty and Badya, while still assessing how each locality stitches proximity into everyday life. It also requires attention to the routes by which proximity policies arrive, programmes, developer models, and networks, so that the ensuing neighbourhood forms are analysed as locally assembled outcomes rather than imported blueprints (McCann and Ward, 2011; Temenos and McCann, 2013).

2.4.2 Urban Realities and Postcolonial Urbanism

As discussed in the last section, as rapidly growing megacities and regional areas like Greater Cairo Region face challenges, their neighbourhoods developed in distinct ways with transformations influences by social, economic and historical factors. As noted, cities are layered landscapes where change must balance with existing social and cultural structures (Iqbal et al., 2025). Hence this section explores how the 15-minute city concept model interacts with the urban realties that shaped neighbourhoods mostly in non-western contexts, considering the legacies of postcolonial practices in urbanism. This could inform how existing dynamics shape the adaptation or transformation of this concept in diverse urban contexts. As the framing of the 15-minute city's ideals concept originated in the Global North, it is crucial to rethink how it manifests in non-Western settings, where different histories, social structures, and mobility patterns call for localised applications, as Pozoukidou and Chatziyiannaki (2021) and Angelo and Goh (2021) argued.

Originally, "postcolonial" referred to the era after formal decolonisation, describing societies undergoing this transition (Jazeel, 2012a). This includes spatial practices, actual spaces, and political dynamics. There is a growing emphasis in literature on analysing the role of space within modern discourses (Jazeel, 2012a and b; Libchaber, 2019), offering deeper insight into the intersections of culture, aesthetics, and politics in postcolonial contexts. Some describe it as an exploration of the impacts of colonisation on the post-independence era (Libchaber, 2019). It is worth mentioning that the term 'colonialism' is defined as the control and exploitation of land and resources, alongside the enforcement of political, economic, and ideological systems on the occupied territories. However, its impact manifests differently across countries, shaped by their long-standing histories, cultural foundations, and pre-existing governance structures (Libchaber, 2019).

This form of control extends to the spatial and mobility language of the city, including layout and street shapes, and the terminological system and zoning of land uses (Jazeel, 2012a). The postcolonial practices of urbanism go beyond recognising these urban forms and questioning the assumed link between them and modernity to restore power to local practitioners in reclaiming the urban landscape with their own spatial vocab. As Pinto Coelho et al. (2025) framed, its aim is to "seek to disrupt the entrenched colonial legacies… Confronting coloniality requires a twofold movement… engage directly with communities, fostering alternative ways of knowing and being that challenge dominant Western narratives," which all happens transitionally.

This challenges some western myths that modernity originates solely in the west and spreads elsewhere given that many countries endured extended colonial rule, during which local populations had little to no agency over their own urban landscapes (Pinto Coelho et al., 2025). As a result, their cities and towns developed distinct social, spatial, and cultural traits, deeply shaped by various influences, including European ones. However, rather than being mere imitations, these urban landscapes reflect a complex interplay of imposed structures and local adaptations in the colonial era, and passed through various transitional phases in post-independence eras (Pinto Coelho et al., 2025).

This explains why the 15-minute city concept and urban ideals need to be reconsidered in postcolonial contexts like Cairo and other non-Western contexts (Iqbal et al., 2025). The concept needs to be adapted to acknowledge historical design legacies, local mobility patterns, and everyday urban practices. This requires reframing the concept beyond its original roots and going back and forth between it and the lived realities and complexities of these cities.

Historically, as discussed in the next chapters, reshaping cities to embody new national identities was a complex and prolonged process. For example, the Garden City movement, as discussed, also influenced urban planning in Egypt (see Table 2). It aimed to create balanced communities with residential, industrial, and agricultural areas, promoting a healthier urban landscape in Cairo and contributing to modernising the city. While the model gained international traction, its local uptake was shaped by specific socio-spatial contexts, influencing colonial and postcolonial urban practices. Another example is some neighbourhoods in Cairo, such as 'Heliopolis,' which were originally settler-colonial towns; today, they are fully integrated into the city's urban fabric and social identity, functioning as

typical Cairene neighbourhoods. Other areas, such as 'Mohandseen' or 'Naser City', were developed as part of a national urban plan for the post-independence era (Volait, 2001).

Current discussions in postcolonial theory (Rabbat, 2018; Storper and Scott, 2016) highlight the importance of engaging with the context-specific urban form, networks of social practices, and mobility within it rather than limiting the analysis to representation and general discourse. This perspective might suggest different ways to understand the 15-minute city concept's pillars: proximity, diversity, density, and mobility, and how their manifestation are not universal, rather, they are shaped by local histories, socio-political structures, and spatial practices.

This reading suggests that, for example, proximity, as previously discussed, can be shaped by spatial divisions created in the colonial era, in which essential amenities remain concentrated in centres but peripheral areas lack infrastructure. Diversity may not always imply full integration; in some cases, it reflects spatial fragmentation, with developed and underdeveloped neighbourhoods existing side by side but remaining disconnected. Density can take many forms, from overcrowded housing resulting from rural-to-urban migration to low-density new cities. Mobility, rather than being centred on well-planned public transport, may rely on informal systems such as minibuses and shared paratransit to fill gaps left by formal infrastructure. These differences demonstrate that the principles of the 15-minute city concept are not universally applicable but must be adapted to specific urban contexts, taking into account colonial histories, socio-economic inequalities, and local urban practices. This thesis returns to this point later, drawing on the Greater Cairo case studies to show how such adaptations play out in practice.

2.6 From Ideals to Practices:

2.6.1 Liveable Urban Space and Kevin Lynch's Framework

Building on the discussion above, the next section turns to a framework that connects urban form to everyday experience and perception: Kevin Lynch's framework for how people mentally read and navigate urban space. Kevin Lynch reoriented urban design from "what is built" to "how it is mentally organised and used." In *The Image of the City*, Lynch (1960), in Figure 1, proposes that the everyday usability of urban environments depends on imageability, the ease with which inhabitants form clear mental maps. Across empirical work in Boston, Jersey City, and Los Angeles, he distils five recurring elements of this mental image: paths (channels of movement), edges (linear boundaries), districts (areas of

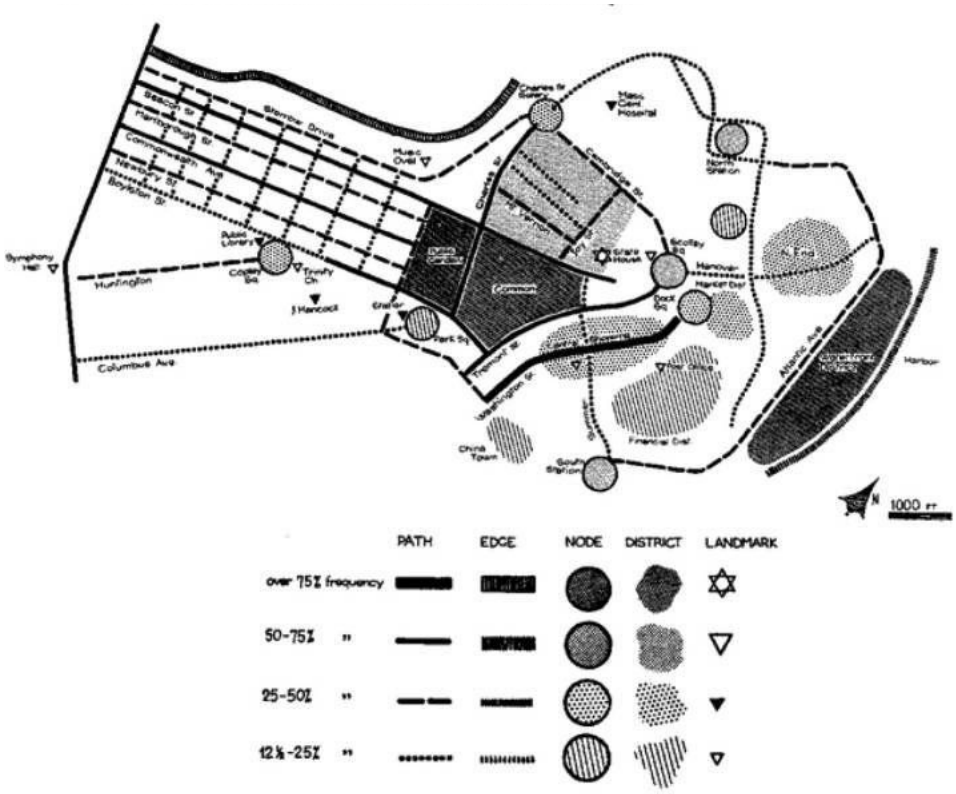


Figure 1 Ilustration from resident sketch maps, showing the perceived city structure: paths, edges, districts, nodes, and landmarks. Source: Lynch, 1960.

common character), nodes (strategic foci), and landmarks (external reference points). Legible environments, he argues, reduce cognitive load, strengthen orientation, and support confident movement, conditions that matter as much as geometry or land-use mix. His later A Theory of Good City Form (1981) widens the evaluative vocabulary (vitality, sense, fit, access, control), but keeps perception and everyday movement at the centre.

Early applications of Lynch's framework moved in two directions. First, environmental perception and wayfinding: Appleyard, Lynch and Myer (1964) examined how moving observers interpret streets and landscapes; Golledge (1999) linked mapping to route choice. Nasar (1998) extended Lynch's work to evaluative imageability, showing how affective judgements (e.g., "coherent," "inviting") correlate with physical cues. Second, operationalisation of urban design metrics: Ewing and Handy (2009) made "imageability" one of five measurable urban design qualities (along with enclosure, human scale, transparency, and complexity), later consolidated into field protocols for street audits (Ewing and Clemente, 2013). Parallel work in spatial configuration has engaged Lynch from a network perspective: space syntax (Hillier and Hanson, 1984) introduced intelligibility, how local connectivity predicts global accessibility, which resonates with legibility; street-graph analyses identify central paths and nodes that often align with people's cognitive "spines" (Porta, Crucitti and Latora, 2006).

What follows shows why this matters for proximity paradigms and sustainable mobility. For the Garden City, New Urbanism, and the 15-minute city, proximity and functional mix are necessary but not sufficient. Lynch (1960) explains the mechanism by which planned proximity becomes, or fails to become, practical accessibility. In practice, a clinic may be "within 15 minutes" on paper, yet effectively distant if edges are impermeable, paths are discontinuous, nodes are hidden, and landmarks fail to anchor wayfinding. Garden City greenbelts exemplify powerful edges that clarify identity but can act as barriers; New Urbanist fine-grain can devolve into confusing sameness unless district identity and node clarity are maintained. In mobility terms, greater legibility reduces wayfinding effort and perceived risk, supporting walking and cycling uptake even when distances are short but networks are complex.

Methods for applying Lynch's (1960) framework in the empirical analysis of this research are outlined in the methodology chapter. To briefly explain how this method has been used in the literature, the following points are listed below. Scholars translate Lynch's framework into mixed methods that pair perception with configuration: (i) sketch mental maps and interviews to surface personally salient paths, nodes, and landmarks (Lynch, 1960; Nasar, 1998); (ii) field audits of imageability at block scale following Ewing and Handy (2009); (iii) edge-permeability inventories counting walls, gates, highways, and crossings (Arthur and Passini, 1992); (iv) configurational analysis (space syntax intelligibility; street-graph centralities) to identify likely cognitive routes and decision points (Hillier and Hanson, 1984; Porta, Crucitti and Latora, 2006); and (v) photo/video transects documenting what a moving observer actually sees (Appleyard, Lynch and Myer, 1964). These tools let studies test the alignment between metric proximity (how near on paper), configurational accessibility (how networks channel movement), and perceptual legibility (how people make sense of it).

Beyond access, this thesis uses Lynch's (1960) concept of perceptual legibility to emphasise that proximity is also experienced as navigable, safe, and meaningful; it also links the results to the lived belonging and a sense of place. In this study, belonging is defined as both (i) an intimate feeling of being "at home" in place (place-belongingness) and (ii) a socio-spatial process through which inclusion, membership, and boundaries of legitimacy are produced (politics of belonging) (Antonsich, 2010), while sense of place is treated as a multidimensional person–place relationship comprising place dependence (how well local environments enable goal-directed everyday practices), place identity (how residents cognitively relate self to neighbourhood and its meanings), and place attachment

(positive/negative emotional bonds formed through lived experience) (Jorgensen and Stedman, 2001; Davis and Wagner, 2024).

Building on Davis and Wagner (2024), the study also foregrounds social bonding, functional (cooperation), cognitive (shared purpose), and affective (shared emotions) as main mechanisms through which proximity is converted into everyday social proximity. These definitions structure chapter 7's analysis around themes of lived proximity versus mapped proximity in chapter 5, active travel experiences across gender, age, and family condition, third places and everyday anchors of community in the context of Cairo. Care and safety were also determinants of local participation, and the role of urban form in shaping who can access, linger, and feel legitimate in neighbourhood space, thereby linking the 15-minute city to justice-sensitive lived experiences in Cairo (Allam et al., 2022; Moreno, 2024; Lewicka, 2011).

This section positions the study within the literature review. Placed after the Garden City, New Urbanism, the 15-minute city and alongside sustainable mobility, Lynch (1960) offers the experiential test to ask whether planned forms are experienced in practice as coherent networks. In the empirical chapters, his elements are operationalised. This suggests and enables saying not only how close services are, but also how readily people can reach them, precisely where proximity paradigms meet sustainable-mobility outcomes.

2.6.2 Sustainable Mobility Shifts: Policies and Practices

The 15-minute city concept, as elaborated earlier, signifies a broader shift in urban thought following a lineage of planning paradigms. As it travels globally, the model is reinterpreted and practised through local norms and lived realities, embodying a form of urbanism that is both context-sensitive and globally resonant. This process reflects longer transitions, including the post-independence one examined above, in which cities, particularly in formerly colonised contexts, have navigated hybrid forms of planning to assert modern urban identities beyond colonial legacies while engaging with global urban thinking. It also reflects recent EU policy agendas, where sustainable mobility and the 15-minute city align with initiatives and policies discussed below.

Framed within this lineage, the 15-minute city aligns with emerging western paradigm such as just transition and sustainable mobility, which foreground equity and ecological limits in urban development. While global in language, these concepts often find local correspondences in regionally grounded concepts and practices. Together, these concepts

reflect a growing convergence around transitions that are not only technical but deeply political and cultural, requiring modes of planning that are attentive to histories and planetary boundaries while looking at their futures.

This section aims to give an overview of the meaning of sustainable mobility and introduce its position in the literature. It then elaborates on the role of cities in achieving a sustainable future and proposes the 15-minute city concept as a potential contributor to the transition.

The Notion of Sustainable Mobility

Despite the significant role that the transport sector played in global economic growth, its costs had negative environmental consequences (Button, 1993; Litman and Burwell, 2006). Button (1993) and Litman and Burwell (2006) write from transport policy analysis and planning backgrounds, largely framed within technocratic approaches that are driven by growth-oriented logics rather than de-growth positions. Its damaging impact on the environment resulted from total reliance on non-renewable energy sources (Button, 1993; Litman and Burwell, 2006). Three decades ago, the need for sustainable mobility was first brought to global attention (European Commission, 1992). The European Commission (1992) reflects a supranational governance and ecological modernisation agenda generally aligned with centrist, pro-regulation policy frameworks. A substantial body of research and policy on sustainable mobility has been developed since then as a subdivision from the broader concept of sustainable development (e.g. Black, 2010, Banister, 2008, and Holden, 2007). Black (2010), Banister (2008), and Holden (2007) are situated in transport planning, geography, and sustainability studies, broadly informed by social-justice-oriented perspectives that lean towards progressive understandings of environmental responsibility and equity within the existing capitalist market.

Despite the absence of a commonly defined concept to identify sustainable mobility, the general lines of it stand on considering the planet's boundaries while satisfying residents' needs and ensuring social justice (Council of EU, 2006; Holden et al., 2017). These texts combine institutional EU sustainability agendas with academic sustainability ethics, generally reflecting green and centre-left orientations that link environmental limits with social justice**.** Holden et al. (2020) argued that mobility could be more sustainable in three cases: (1) if the current ways of commuting become more efficient, (2) if new ways of commuting are initiated, or/and (3) if the need for travel is reduced. Holden et al. (2020) write from a sustainability transitions and environmental policy background. In this sense,

the strategies introduced in research and policy for achieving sustainable mobility revolve around three main directions. The first direction leans towards improving the efficiency of transportation services in terms of vehicles, infrastructures, and energy sources (e.g. Gota et al., 2019, Letnik et al., 2018, and Tvaronavičienė, 2018). This strand is grounded in engineering and transport, typically framed in technocratic terms, without explicit alignment to political ideologies. The second direction is to alter the behavioural travel patterns by advocating other means of mobility, such as shared and active mobility (e.g. Santos, 2018; Viegas and Martinez, 2017; Tight et al., 2011). This work draws on transport studies, behavioural and mobility research and often aligns with centrist policy thinking that uses incentives rather than structural ideological rupture. The third direction focuses on cutting down the travel demand and establishing a new lifestyle depending on short trips through for example densifying the built-up area (e.g. Stevenson et al., 2016, Banister, 2011, and Inturri, 2017). This direction is rooted in urban planning and critical geography and is more closely associated with progressive, equity-oriented, and climate-justice narratives that advocate for compact, accessible cities.

Given the issue's interdisciplinary nature, Gallo and Marinelli (2020) suggested that sustainable mobility be addressed in the research through fundamental environmental, socio-economic, and technological themes. They distinguish strands with different disciplinary bases. Environment-related scholarship aims to address the need to protect the planet and focuses on the sides of the problem that mitigate the harmful impacts of the transport sector on the environment. Its topics promote sustainable mobility through the main question of how to reduce air pollution and greenhouse gas emissions, and its applications on vehicles, people’s patterns of mobility, and the built environment (e.g. Kugler and Sariego, 2016, Allison and Stanton, 2019, and Muslim et al., 2018).

This literature is anchored in environmental science and is usually linked to green and centre-left ecological discourses (Kugler and Sariego, 2016). The socio-economic scholarship offers a comprehensive perspective on sustainable mobility and focuses on the side of the problem that advances environmental objectives while reducing inequalities. The research on this theme tackles the issue through the lens of equity and inclusion and its employment in transport and urban improvements, incentives and pricing policies, and new teleworking systems (e.g. Litman and Brenman, 2016, Camporeale et al., 2016, and Sheller, 2021). These contributions stem from social policy, transport justice, human geography, and critical mobility studies, and are broadly aligned with progressive perspectives. The technological theme of sustainable mobility examines the problem from the perspective of technology-

enhanced solutions. Its extensive research developed into three main routes: replacement of fuel in vehicles, shared and collective means of transport, and advancement of big transportation systems using information and communication technologies (e.g. Das et al., 2020, Ampudia-Renuncio et al., 2020, and Edwards et al., 2018). This theme is driven by engineering and often reflects techno-optimist, market-driven, and post-political framings that prioritise innovation and efficiency over explicit, justice-driven ideological positioning.

Cities, Just Transition, and Sustainable Mobility

Cities are widely acknowledged as the main sites for progress in climate action (Yunfang et al., 2017; Klinsky and Mavrogianni, 2020; Horizon Europe, 2020; Waud, 2018). Urban systems s, such as transportation sectors, as mentioned, are among the highest sources of carbon emissions (Lieberman, 2019; Handy, 2022), not to mention the rapid expansion of urban areas (Yunfang et al., 2017). Also, 60-80% of the EU energy use is dedicated to serving urban areas (Horizon Europe, 2020). On the other hand, cities - as the main ground for historical social and economic injustice - face challenges of uneven development and urban inequality (Hughes and Hoffmann, 2020; Waud, 2018). In this sense, the role of urban areas became clearly significant in building a just transition, and local urban development is seen as fundamental to the deep-rooted success of this transition (C40 Knowledge Hub, 2020; Steenbergen and Schipper, 2017). This clearly highlights the need for sustainable urban transformations to shape the way forward (Horizon Europe, 2020). The mission eventually became to develop urban models that could encompass that economic shift, accommodate the development of new business models, and, at the same time, ensure distributional justice in the allocation of amenities and a high quality of life.

15-minute city, Just Transition, and Sustainable Mobility

As argued by Cacopardo (2022), Perfect Circle (2021), and Rainwater (2021), the 15-minute city concept as a novel vision for urban transformation could have the potential to fill this place and contribute to sustainable mobility and just transition. This framing also aligns with recent EU policy agendas (European Commission, 2021). As previously elaborated in the first section, the 15-minute city model relies primarily on walking and cycling as modes of transport (Moreno, 2021). Ways of micro-mobility are widely viewed as a more sustainable and healthier alternative to car-dependent mobility which is created by the traditional ways of urban development (Mocák et al., 2022; Graells-Garrido et al., 2022).

The resulting uncontrolled urban sprawl maximized the urban travel time (Mocák et al., 2022). On this basis, a considerable reduction in greenhouse gas emissions can be achieved by shifting into a living environment that requires less motorized transport and encourages more active travel (Lieberman, 2019). At the same time, this shift creates room for more green spaces that could replace the existing transport infrastructure (Lieberman, 2019). Furthermore, the concept of compactness, one of the main 15-minute city concept's pillars, is considered by many a sustainable answer to housing challenges (Haarstad et al., 2022; Lennon, 2021; Kjærås, 2020). Compact urban fabrics could enhance the efficiency of urban resources in terms of lands and services and allow environment-friendly urban growth (Lennon, 2021). Neighbourhoods with higher density also support diverse land uses, thereby shortening commuting distances (Nieuwenhuijsen, 2021).

On the other hand, the 15-minute city has the potential to reduce urban inequalities. By advocating proximity, inhabitants will engage more with their local life and their immediate surroundings. An issue that will strengthen a sense of belonging and ownership and, subsequently, increase citizens' participation (Mocák et al., 2022). As argued by Mocák et al. (2022) and Nieuwenhuijsen (2021), the proximity of essential services accessible within 15 minutes ultimately contributes to greater distributional justice and a more inclusive urban environment. Besides, creating a living environment with less car dependency reduces the financial burden of car ownership for low-income groups (Lui, 2021).

To sum up, this section explains that the process of just transition should include a plan for a new city model that creates an environment not only for sustainable mobility but also for more environmentally responsible ways of living and working. The transformations discussed for the 15-minute city concept evidently accelerate the emergence of new decarbonised economic models and the transition to a more sustainable way of daily living (Climatalk, 2021).

This transition, however, is not uniform. Concepts such as just transition and sustainable mobility, while rooted in Western organisational and advocacy frameworks, often find local correspondences and long-standing practices as they are reinterpreted through specific spatial contexts. The 15-minute city, in this light, becomes a site where global urban framings and local realities converge, reflecting the broader dynamic between globalisation and localisation in urban transformation. Thus, the movement toward the 15-minute city model is not only about environmental efficiency but also about fostering an inclusive, context-sensitive rethinking of urban life and its possibilities.

2.7 Critical Perspectives on the 15-minute city Concept

Despite the enthusiasm towards the 15-minute city concept (15-minute city) and its potential positive outcomes that are discussed in the previous section, it is subject to various critiques. Some showed vague rejection of the core idea of the concept, describing it at the Bloomberg CityLab Conference as "presumptive … not evidence-based … extraordinarily incomplete" (Pitter, 2021) or saying, "we should bury the idea", says Glaeser (2021) in a blog article. Others perceived it as a 'utopian vision' (O'Sullivan and Bliss, 2020), or a 'Euro-centric … colonial model' (Kucharek, 2021). On the other hand, substantial arguments are raised regarding aspects of the 15-minute city concept, which could offer a constructive lens for examining the challenges in implementing it. Hence, this section aims to present the arguments, highlight the concept's shortcomings, and offer suggestions for addressing them.

Concerns about inequalities and exclusion

Generally, the environmental promises of the 15-minute city concept and its spatial organisation, which encourage less car dependency, are well received, and almost all sceptics have no objections to its environmental claims. However, its predominant focus on spatial and environmental aspects, while being socially and economically blind, is the main critique of the concept, especially given its main premise of a 'human-centred city' (Moreno et al., 2021). Florida et al. (2020) argue that, after the pandemic, the priority is to build more equitable and inclusive cities, while keeping in mind the exacerbated urban inequalities COVID-19 has unveiled and exacerbated. Ratti and Florida (2021) perceived the 15-minute city concept as having little to do with tackling these inequalities. They consider the model to suit the upscale areas, where the disadvantaged people cannot benefit. Yeung (2021) further expressed concern that the urban transformation the 15-minute city concept would bring could widen the social inequality gap by deepening existing divides, which might add a burden to social mobility. On the other hand, shifting the 15-minute city concept to focus more on the question of 'how can we deliver a more just distribution of facilities?' was Sassen's suggestion (Sassen et al., 2021). The risk of worsening the social gap could be mitigated by first planning for the most marginalised urban areas (Yeung, 2021), while understanding urban transformation as a process to be implemented alongside social engagement (TUMI, 2021).

Concerns also include the loss of connectivity between urban residents across socially different neighbourhoods, rather than focusing on strengthening it. Limiting the need to

access other areas could aggravate segregation and exclusion. In this regard, a journalist denounced the implementation of the model in Paris, seeing that it is 'building additional walls and descending into egoism' (Delaleu, 2020). That could, by extension, according to some sceptics, further stigmatise territories, especially if marginalised communities continue to be supplied with poor-quality amenities (Pieri in an interview with Yeung, 2021). Sassen et al. (2021) question, instead, the way in which the benefits of a 15-minute city could meet the need for creating a city for all and guarantee the development of the organic social mix of metropolises without falling into 'the end of big cities' as Magrini warns (Magrini in an interview with Yeung, 2021). Moreno, on this basis, pointed out the new social fabrics the 15-minute city concept could bring, standing on co-working and co-living, while offering amenities at different scales and levels.

An enabling environment for virtual work within the 15-minute city concept is encouraged, despite Glaeser's (2021) strong criticism of the idea. It is viewed either positively as a potential improvement in the conditions of low-income workers who spend their time and health to reach the city centre, or as the inevitable future of work and living (Sassen et al., 2021; O'Sullivan and Bliss, 2020). Glaeser, on the contrary, believes it shall lead to a lack of social interaction and 'catastrophic inequalities,' saying in his blog article, "I cannot imagine a more unequal world than one which has eliminated real, urban face-to-face connections and tried to replace them with virtual links." Yet others consider this argument to raise the question of who belongs to the 15-minute city concept. This includes thinking about different circumstances of people; who can avail of a system promoting remote working and who do not have the opportunity to access the digital world (Gehl et al. 2020; Florida et al. 2020). And if so, the assumption that everyone can shift their house settings to accommodate a home office or be housed beside businesses is problematic (Whittle, 2020). On this point, O'Sullivan and Bliss (2020) noted that "not all people have the possibility of having jobs within 15 minutes," yet the 15-minute city concept could be a means to alter these conditions. While Glaeser confirms that the 15-minute city concept is for privileged urban residents, Coppola from C40 cities sees this paradigm shift as an opportunity to create more equitable and inclusive city models (Coppola in an interview with Yeung, 2021).

Concerns about industry agglomeration, housing affordability, and gentrification

The main economic argument is that the 15-minute city concept is quite limiting, given the actual geographies of work in cities. In other words, it is criticised for not building on the given of the current way cities work economically. Paul Swinney in the Centre for Cities

(2021) proposed the idea before giving much attention to prior discussions with urban economists. There is a logic behind the history of industry agglomeration in cities, as argued. The geographical proximity of work domains consistently served as a pool of creativity and innovation to develop production (Whittle, 2020). Also, attracting workers from all over the city's expanding suburbs to the centre makes it a high-scale business node. Simultaneously, its presence, as it is, enables urban inhabitants to choose to move from one industry to another or to develop their careers, given the numerous levels and types of jobs offered. The benefits of that industries' solidity that we might lose by working towards the 15-minute city concept was Swinney's apprehension, and the decline of the central business district is Florida's (2020) major concern. Nevertheless, it is inevitably viewed that "every time there is technological progress, people predict we will all be able to work in the countryside. But the attractiveness of city centres only increases" (Whittle, 2020). The agglomeration, described by Florida et al. (2020) as "the last hangover of the industrial revolution," can still play a role in the 15-minute city concept proposed by PDP London (2021). The fact that the 15-minute city concept is fairly flexible can enable the use of both options, considering various solutions, such as dividing workdays between the workplace and the local office (PDP London, 2021).

Another argument is that the 15-minute city will presumably change the geographies of residential locations. Peverini and Chiaro (2020) claimed that one of the half-truths of the 15-minute city concept is that it goes against the utilisation of a large population of middle and low-income workers to the land price differences between the centre and the suburbs. Florida (2020) argues that the process of families' mobility to the outskirts where more land and cheaper property ownership choices allows room for youth's more affordable housing options. This dynamic was crucially a motive for cities' growth, which generates urban phenomena like metropolitan areas (Peverini and Chiaro, 2020). Breach from Centre for Cities explained that saying "workers want to work in places where land values are high, and live in a place where land value is cheaper. That needs to be factored in; workers will try and exploit that mismatch" (Breach as interviewed in Whittle, 2020). Sprawling cities and development in transportation infrastructures have granted access to wider housing markets and the option not to necessarily have to live, and be able further to afford to rent where work is (Florida et al., 2020). Trying to alleviate these potential consequences, Paris, in its implementation plan for the 15-minute city concept, is developing actions for additional commercial and housing properties without the traditional high-profit real estate market dynamics,' Moreno confirmed (Sassen et al., 2021).

Calafiore et al. (2022) have pointed out gentrification as a possible implication to the 15-minute city concept, taking the New Urbanism approach as a reference. This New Urbanist planning approach that has a lot in common with the 15-minute city concept in terms of advocacy for active mobility and mixed land uses has triggered gentrification in many areas, London Docklands is an example. Urban interventions in local neighbourhoods might be understood as an invitation for high-scale developments (Descant, 2021). This issue could eventually result in the loss of affordable living in the area with regard to both housing prices and local services (Descant, 2021). "Gentrification is a common enemy," Moreno said while further affirming that the right deployment way of the 15-minute city concept focuses on better utilization of the common good that does not aim to serve a private interest (Moreno in an interview with Kucharek, 2021). Lawton (2026) argues that a key challenge in the 15-minute city theory is that it does not, on its own, provide the tools, such as land-oriented policies, to prevent these dynamics. Dunning et al. (2021) suggested that planners should be attentive to the concerns about enabling capital relocation from one area to another which risks social composition change and eventual displacement, and methods to prevent such events need to be considered.

Concerns about city and land use planning, and governance

Planning theories that organise cities around the neighbourhood unit are historically criticised for neglecting the holistic city-planning perspective and for their sole focus on the small-unit scale (Pozoukidou and Chatziyiannaki, 2021). The city works as a whole and as a well-connected urban area, and neighbourhood planning should not be separated from the wider city planning (Dunning et al., 2021). In other words, how these small parts impact the whole should always be within sight, "the city is not just a neighbourhood," Peverini and Chiaro (2020) said. A similar critique is offered by Glaeser (2021), who rejects the idea of spatially dividing the city into smaller 15-minute zones and planning accordingly. Descant (2021)'s view in this regard was to begin thinking with the city; we must be able to tackle the urban challenges and deliver the cities we desire. On the other hand, Sassen, in Sassen et al. (2021), argued that the 15-minute city concept and its small-unit planning are the first step toward stopping the expansion of cities the way they are. Ratti and Florida (2021) highlighted the importance of addressing the body of the city rather than its parts, as urban life is richer than just access to daily facilities. They said that "the truly vibrant parts of the city often begin when the first 15 minutes end." However, PDP London (2021) suggested that the role of the 15-minute city concept is to create the necessary urban planning balance between thinking locally while keeping an eye on the whole city.

How does the 15-minute city concept claim a hyper-local urban planning approach, yet it does not acknowledge the context differences in cities? Descant (2021) questions. What applies to Paris does not necessarily fit San Francisco, for example (Steuteville, 2021), and the dense areas of Barcelona could better exemplify the concept than London, a spread-out city (Yeung, 2021). Hence, planning for cities might significantly differ by their current urban form and how it is spatially developed. Expecting different places to meet the same urban code is illogical (Steuteville, 2021). However, the fact of the fair flexibility of the 15-minute city concept is viewed as a bright side (Steuteville, 2021). In such a way, cities can apply the concept in a manner that reflects their real priorities and responds to what local communities need, an approach recommended by several authors and initiatives (Dunning et al., 2021; Descant, 2021; PDP London, 2021). This requires a profound context-related understanding of the city's urban situation to better implement what shall benefit it and its residents (PDP London, 2021). Additionally, some argue the importance of taking each neighbourhood's own cultural and urban specificities into account (Peverini and Chiaro, 2020; PDP London, 2021). Persevering neighbourhoods' distinct characteristics is viewed as a challenge to 15-minute city (PDP London, 2021).

Furthermore, the argument of city planning against town planning is frequently raised. Many urbanists found the 15-minute city concept as a 'rebranding for villages' (Ratti and Florida, 2021), thus questioning how the idea could 'fit into a large, complex, sprawling global city?' (PDP London, 2021). Others are worried about a retreat towards a smaller scale of city planning (Peverini and Chiaro, 2020), as Gehl stated that the idea resembles cities we used to live in before the industrial revolution, all of them were 15-minute cities (Gehl et al., 2020). When people migrate to cities, they buy the promise to get away from the narrowness of village life (Gehl et al., 2020). Hence, moving backwards to simplifying the scale of city planning could lead to the moment when 'we would no longer have cities but many, many towns' (PDP London, 2021). Ratti and Florida (2021) explain that they have nothing against towns, it is a slowed-rhythm urban place that offers coherent and homogenous communities with short commuting distances. yet 'it lacks the dynamism of a real city.' Whittle (2020) responded that the 15-minute city concept does not in any case propose movement burdens; it does not include a '15-minute mark' in which residents cannot access beyond it. Moreno confirmed that there is no intention to reproduce towns (Moreno as cited in Whittle, 2020). 15-minute city aims to produce better organisation to cities where inhabitants could disburden their everyday lives of long journeys just to get daily essentials (Moreno as cited in Whittle, 2020).

On the other hand, some have concerns about land-use planning across the city (Ratti and Florida, 2021; PDP London, 2021). Concerns mainly focus on the feasibility of duplicating large organisations occupying extensive land to fully implement the 15-minute city concept (Ratti and Florida, 2021; PDP London, 2021). The market created for the most important educational, cultural, and sports foundations is built at the urban scale of an entire city, and it cannot simply be replaced by distributing it to smaller neighbourhood markets (Ratti and Florida, 2021). PDP London (2021) described it as 'misleading' to claim that 15-minute city planning can construct new high-level hospitals, huge stadiums and big universities across the entire geographical range of the 15-minute city concept. However, it suggested that it might be more accurate to claim a designed network of service and activity hubs at different scales that feed into the larger-scale facilities. Similarly, Paul Swinney in Centre for Cities (2021) recommended treating the 15-minute city concept as a new approach to urban planning that can foster the decentralisation of health, education, and recreational systems. At the same time, Sassen et al. (2021) affirmed that it is clear to all that some services must remain to serve at the national level, and the 15-minute city does not call for an urban condition in which we no longer need such institutions.

The way in which the 15-minute city concept could work in terms of governance was also a matter of question. Kucharek (2021) argued that decades of inconsistent sprawl in many cities have led to urban fragmentation, which crucially requires focusing on efficient governance at the metropolitan scale. Narrowing it again to the local scale could risk failing to administer urban phenomena at their current large, sprawling scale (Peverini and Chiaro, 2020). An issue that can easily aggravate the situation in the future if we do not find a way to address it now. The 15-minute city, according to Pozoukidou and Chatziyiannaki (2021), ignored the functional structure of the existing neighbourhood organisation. This could disturb the geography of governance, especially since the concept does not consider the 15-minute as an administrative boundary. However, some suggested that a governance model based on common goods should be considered in this case (Sassen et al., 2021; Kucharek, 2021).

Whittle (2020) raised another point regarding planning for the 15-minute city concept and its effects on residents' well-being. She wonders whether maintaining all aspects of everyday life in one place could lead to an 'overfamiliarity' with the scenery. In other words, when inhabitants are daily exposed to the same settings, can this form a sense of being stuck? Whittle acknowledged that it could, contrarily, form a strong sense of belonging to the place; however, the result is still not certain.

A close look at the critiques of the 15-minute city concept, as discussed in this section, raised questions about social inclusion and urban inequalities. These include concerns about neglecting the given geographies of work and housing, worries about triggering gentrification, overlooking certain city planning aspects, uncertainty about the concept's promises, and doubts about the governance structure (listed in Table 4).

Table 4 Summary of the main arguments raised against the 15-minute city concept

Main arguments	**Challenges**	**How the challenges could be addressed?**
Socially blind (Florida et al., 2020; Ratti and Florida, 2021; Yeung, 2021; Sassen et al., 2021)	-The concept has a sole focus on spatial and environmental aspects. -It has little to do to tackle urban inequalities (Ratti and Florida, 2021). - It overlooks the priority to build inclusive cities (Florida et al., 2020). - It could widen the social inequalities gap by extending the divides (Yeung, 2021).	- Focusing more on the question of 'how can we deliver a more just distribution of facilities?' - Planning first for the most marginalised urban areas - Implementing it along with social engagement.
Aggravation to segregation and exclusion (Delaleu, 2020; Yeung, 2021)	-The concept could cause a loss of connectivity (Yeung, 2021). - It could limit the need to access other areas (Yeung, 2021). -It could add to territorial stigmatisation (Yeung, 2021).	-Providing thinking on how the concept could meet the need for creating a city for all.
Overlooking the different circumstances of people (Glaeser,	-The concept assumes that opportunities to access the digital world are equal.	- Investigating the potentials of the concept to alter these circumstances.

2021; Sassen et al., 2021; O'Sullivan and Bliss, 2020; Gehl et al., 2020; Florida et al., 2020; Whittle, 2020)		
Neglect to the given geographies of work (Swinney, 2021; Whittle, 2020; Florida et al, 2020; PDP London, 2021)	-The concept neglects the history of industry agglomeration. -it could cause a decline of the central business districts.	-Including the role that the central areas can play in the 15-minute city concept.
Neglect to the given geographies of housing (Peverini and Chiaro, 2020; Florida, 2020; Whittle, 2020)	-The concept neglects the residential dynamics of sprawling cities. -It goes against the utilization of middle and low-income groups to the price differences between the centre and suburbs (Peverini and Chiaro, 2020). -It underestimates the ability of this mismatch to provide more affordable housing options (Whittle, 2020).	-Developing actions that could alleviate the potential consequences on affordable housing.
Triggering gentrification (Calafiore et al., 2022; Descant, 2021; Kucharek, 2021; Dunning et al., 2021)	-The concept's urban interventions might be understood as an invitation for high-scale developments (Descant, 2021). -It could cause loss of affordable local services (Descant, 2021).	-Working on better utilization of common goods. -Planning for methods to prevent the risks of social composition change and displacement.

Neglect to the holistic view of city planning (Pozoukidou and Chatziyiannaki, 2021; Glaeser, 2021; Descant, 2021; Ratti and Florida, 2021)	-The concept focus solely on the small unit scale. -It neglects the urban challenges of the city as a whole.	- Balancing between thinking locally while keeping an eye on the whole body of the city.
Disregard for the context differences in cities (Descant, 2021; Steuteville, 2021; Yeung, 2021)	-The concept expects different cities to meet the same urban code.	- Forming a profound context-related understanding of the city's urban situation first before implementing the concept. - Grounding the concept in cities' real requirements and local communities' actual needs.
Reproduction to village life (Ratti and Florida, 2021; PDP London, 2021; Peverini and Chiaro, 2020; Gehl et al., 2020; PDP London, 2021)	-The concept could be a retreat towards the narrowness of village life. -It could lack the dynamism of big cities.	-Focusing on the 15-minute city concept as a concept to disburden everyday lives of long journeys without creating movement burdens.
Unclarity of the feasibility of duplicating large organizations (Ratti and Florida, 2021; PDP London, 2021)	-The concept's promise could be understood as providing easy accessibility to large organizations of health, education and sports.	-Claiming for a designed network of services and activity hubs rather than duplicating the whole city in each 15-minute geographical range.

Disturbance in the geography of governance (Kucharek, 2021; Peverini and Chiaro, 2020)	-The concept does not build on the existing structures of governance.	-Considering a governance model based on common goods.

The critiques provided some essential points to keep in mind while approaching the 15-minute city concept (listed in Table 4). The main focus should remain on a more equitable distribution of facilities, starting with the most disadvantaged groups and ensuring residents' participation. Additionally, questions about how the new model of living in the 15-minute city concept could contribute to more connected social fabrics and who shall benefit from it must be central. Hence, considering different physical abilities and gendered responsibilities that necessitate distinct requirements in the built environment is essential to 15-minute city planning. Economically, the critiques suggested taking advantage of the 15-minute city concept's flexibility to provide more business options rather than cancelling the functional industries' agglomeration. It also reminds us of the importance of more efficient utilisation of common goods and of being attentive not to make the 15-minute city concept an agent of gentrification. From an urban planning perspective, it is recommended to maintain a balance between local planning and regional anticipation of consequences. A chain of local services and activities connected to broader regional providers should also be considered. Further, a 15-minute city should be built based on an understanding of the spatial context. A fundamental challenge facing the 15-minute city concept came into view: how to include it in current governance models. Taking these critical points into account could maximise the gains of the 15-minute city concept, which is widely seen as the fast track to sustainable mobility and a just transition, an issue that will be comprehensively examined in the next section.

2.8 Summary

This chapter has situated the 15-minute city within the broader debates on sustainable urbanism, liveable cities, just transition and post-carbon societies. It showed how recent calls for low-carbon mobility (Sharifi and Khavarian-Garmsir, 2020; Heffron and McCauley, 2018) connect with a much longer genealogy for more liveable neighbourhoods. Far from being a passing trend, the idea builds on over a century of urban thought, from the Garden

City and the Neighbourhood Unit to New Urbanism (Howard, 1902; Perry, 1929; Duany et al., 2000), while also echoing long-standing non-Western traditions of compact, mixed, and walkable urban life (Hakim, 1986; Abu-Lughod, 1987). Advocates today often describe the model through its four pillars, proximity, diversity, density, and digital ubiquity (Moreno et al., 2021; Nieuwenhuijsen, 2021), yet its significance is only fully understood when viewed against lived realities, which came into sharper focus during the disruptions of COVID-19 (Allam and Jones, 2020; Uyttebrouck et al., 2023). Table 5 summarises the key commonalities and differences between the concepts of Garden City, New Urbanism, and the 15-minute City.

As the chapter has shown, contemporary urbanisation brings with it the pressures of globalisation, planetary expansions, and the legacies of postcolonial planning. Set against this lineage, the chapter underscored a core tension: ideals travel, but urbanisation is uneven. Planetary urbanisation reframes cities as multi-scalar assemblages that blur urban–rural divides (Brenner and Schmid, 2011, 2015), while postcolonial urbanism works after years of colonial legacies, shaping hybrid forms and situated practices that shape accessibility, density, and mobility in non-Western contexts (King, 1990; Robinson, 2006; Roy, 2011; Myers, 2011). Read this way, the 15-minute city is not a universal blueprint but a flexible framework whose pillars take on different meanings in places often marked by layered historical urbanisation, peripheralization, or new-town expansion, as well as informality, conditions highly relevant to Greater Cairo. These examples suggest that the concept cannot be lifted wholesale from Paris or Melbourne and applied elsewhere without translation.

Concerns over gentrification, exclusion, governance gaps, and the narrow focus on neighbourhood-scale fixes highlight the risks of treating the 15-minute city concept as a ‘quick fix.’ What matters is not just the spatial form but the politics behind who gets access, who is left out, and how local conditions and community character shape outcomes. In short, the concept’s appeal is reviewed with its potential risks. It is clear from this review that assessment of the 15-minute city concept must move beyond design templates to examine how policies, morphologies, and everyday practices co-produce (or impede) just access.

This study's review makes two points clear. First, the 15-minute city should be read as a flexible framework rather than a universal model. Second, any serious evaluation has to connect urban form with lived experience. These insights set the stage for the next chapter, which outlines the mixed-methods approach used here to trace both the physical and social

dimensions of the models that manifest the ideals of the 15-minute city concept in Greater Cairo.

Table 5 key differences between concepts of Garden City, New Urbanism and 15-Minute City

	Garden City	**New Urbanism**	**15-Minute City**
Origin	Early 20th Century (UK)	Late 20th Century (USA)	21st Century Post-COVID (France), popularized in Europe
Core Goal	- Balance between town & country - Self-Sufficiency: Aims for self-contained towns with their own industry and land-value capture ideals. Prioritizes a greenbelt to prevent sprawl	Walkability and mixed-use with an emphasis on aesthetics via design codes	-Proximity, density, diversity and digitalisation -Accessibility to daily needs within a 15 minute radius
Density	Low Density: Characterized by low-rise housing with private gardens. Emphasizes "generous open space" and curvilinear, leafy streets	High Densities: Utilizes fine-grain walkable grids and compact, short blocks. Built form often includes "perimeter blocks" and "diverse housing types"	Higher Densities: Focuses on a compact urban form within existing city fabrics. Promotes "polycentricity" and "mixed-use quartiers"
Loca-tion	Separate from urban center	Suburban or urban edge extensions	Within existing metropolitan areas
Mobility	Originally rail-linked hubs with walkable designs. Often features "partial traffic separation," "pedestrian underpasses," and "superblocks"	Pedestrian-friendly, Uses "connected street networks" and alleys/rear garages to eliminate street-side parking. Strong focus on Transit-Oriented Development (TOD).	Pedestrian and bicycle-oriented (prioritization of active mobility over cars)
Target Areas	New, planned, satellite towns	Urban infill or new neighborhoods	Existing metropolitan areas, Often implemented as a "national framework" (e.g., Scotland) or "formal planning unit" (e.g., Shanghai)
Scale or size	At its conception, was aimed to create satellite city-scale communities (~30,000 people), but later adapted to create smaller scales neighborhoods and districts	Mostly neighborhoods and districts	City scale

Key Elements	Green belts, green spaces, self-sufficiency	Traditional neighborhood design (TND), community center, mixed housing	15-min walk/bike radius, mixed-use, digitalization, polycentricity
Implementations in Egypt	In early 20th century: planned green suburbs with villa plots with tram or rail connectivity and profession-based communities, no greenbelt/self-contained economy	Implemented in the PPP projects of large new town with NU/TND-style master planning with strong landscape, walkable internally and strong design control Marketed via “complete community” language similar to NU.	Implemented in PPP projects of new towns such as Il Bosco and Badya’s "5-10-15 rule at the west desert edge.

Chapter 3: Methodology

3.1 Introduction and Research Guide

As outlined in Chapter 2, after decades of layered urban changes[5], the 15-minute city framework has gained significant attention as a model for addressing contemporary urban conditions. These range from car dependency as a mobility issue to monofunctional zoning as a land-use issue (Allam et al., 2022; Moreno et al., 2021). Given the widespread adoption of 15-minute city models following this momentum, whether through governmental plans (e.g., Paris's Ville du Quart d'Heure strategy, Melbourne's 20-minute neighbourhoods, Shanghai's 15-minute community life circles) or through developer-led and public–private partnership (PPP) projects (e.g., Cherrywood in Dublin, Badya and IL Bosco in Cairo), which reflect principles of local urbanism and proximity planning.

Nonetheless, the way this concept is understood is still largely shaped by European viewpoints that treat European urban experiences as the standard, thereby influencing how the idea is perceived. Cities like Greater Cairo have distinct histories, urban forms, and everyday realities that are often overlooked. The city's urban fabric reflects a complex history, from the dense and mixed-use neighbourhoods of the historic core to areas influenced by the Garden City model and, more recently, suburban developments inspired by New Urbanism. New layers of the PPT's projects also adapt the 15-minute city concept in line with the state's vision for sustainable urban growth. As noted, research on the 15-minute city in Greater Cairo is still relatively limited (Omar et al., 2025; Megahed et al., 2024). Most existing studies focus on measuring spatial proximity and mobility in specific contexts rather than exploring how the concept can be applied across Cairo's diverse urban fabrics. Yet as mentioned, Greater Cairo includes everything from historic mixed-use districts and locally adapted Garden City areas to New Urbanism–style suburbs and newer

[5] Layered urban change describes how cities grow over time, with new developments built on top of older ones rather than completely replacing them. Streets, buildings, and land uses from different periods exist together, showing how the city has evolved. Many terms used to describe this phenomena, the "Layered City" refers to the idea that a city consists of many overlapping physical, social, and cultural layers. The past and present interact in the urban fabric, giving the city complexity and character ((D/O Architects, 2025). Cities can be seen as living layers of different periods of history, where traces of older urban forms/areas exist alongside newer developments. Often called also the "urban palimpsest," this concept helps to understand how historical and modern elements come together to shape a city's structure and character, widely discussed in urban morphology studies (e.g., Turgut, 2021).

smart-city projects, each forming part of the urban “genealogy” that today’s 15-minute city discussions are building on.

Hence, there is a need for a contextual understanding of both governmental policies and developer-led planning and design processes shaping the urban form of the ‘15-minute cities,’ and of how the everyday, intangible relationships unfold within the urban form that is created. This means inquiring into the multilayered nature of the city and its neighbourhoods, its urban form as designed and as used by residents. Given the complexity of the line of inquiry, a context-aware methodology is needed.

This chapter outlines the research methodology, starting with the formulation of the research questions and objectives, which serve as a guide for the study. It then describes the research design, explaining the overall approach chosen to explore the topic and how it aligns with the research goals.

Following that, the first section details the data collection methods, including the tools and techniques used to gather relevant data, such as multi-stakeholder interviews and geographic networks and points of interest, as well as the secondary data of plans and strategies. This includes details about what, how, when, and where data were collected, and why these specific choices were made. It also does so by moving through the chapters, illustrating the process step by step. The measures taken to ensure validity, reliability, and robustness throughout the process are also described. Additionally, ethical considerations were covered, such as required approvals, consent processes, and the researcher’s positionality. It then includes procedures for cleaning and organising the data for the analysis part.

Then, in the data analysis section, the process is described step-by-step, including the data analysis techniques, coding, and software used. This makes clear how the collected data will be analysed and interpreted to address the research questions and the objectives. The section highlights how consistency is maintained through the process. It also does so by moving through the chapters, illustrating the process step by step. As the research uses a comparative mixed-methods case study approach, each section explains how data-collection techniques and analytical methods are integrated across the study. Finally, it discusses the methodological limitations faced and how they were mitigated.

Research questions:

1- How have governance-driven land use and mobility development patterns in Greater Cairo evolved, and how do these trajectories relate to the ideals of the 15-minute city concept?

2- In which ways are the ideals of the 15-minute city concept reflected in the urban form, social fabric, and mobility experiences of Agouza, Madinaty, and Badya?

3- How have different models of the 15-minute city concept developed over time, and to what extent have they been successful (or not) in creating just and inclusive sustainable mobility experiences?

Research objectives:

1- To examine how planning policies and design processes have shaped the evolution of land use and mobility development patterns in Greater Cairo and, through the cases of Agouza, Madinaty, and Badya, in relation to the ideals of the 15-minute city

2- To analyse the urban form, social networks, and mobility networks and experiences in Agouza, Madinaty, and Badya in connection with the accessibility of nearby 15-minute facilities

3- To explore how socio-cultural, economic, and political urban transformations shape distinct 15-minute city models and typologies and to develop a framework for just and inclusive sustainable mobility within them

The research aims to analyse how design and planning, governance, and socio-political processes shape 15-minute city models in Cairo and their effect on the everyday use and movement within nearby facilities. By examining these models, the study explores how the resulting urban form influences mobility and accessibility experiences, focusing on how physical space, mobility patterns, and residents' daily experiences are interconnected. It also investigates how these transformations impact the social fabric of local communities across different models. It addresses access to urban services, whether physical or digital.

As will be discussed in detail in the context chapter, the research examines three case studies: Agouza neighbourhood, Madinaty City, and Badya City. Badya, a newly planned city, is part of the recent trend toward designing in line with the 15-minute city concept framework

within Cairo's expanding urban boundaries (PHD, 2022)[6]. Madinaty is one of the new cities developed in the 2000s, where the principles of the concept are established (Alagamy, 2023). Agouza, a central district of Cairo, is a planned community dating back to the 1950s, where the essence of the concept is embedded and understood through a history of evolving urban and mobility landscapes (El-Husseiny, 2022).

Nevertheless, there is a limited understanding of how the concept of ideals is applied in practice. Its impact on mobility experiences and residents' daily accessibility in different historical and evolving urban contexts remains unclear (please refer to the literature review chapter for more details). Hence, by analysing the three case studies, the research explores the linkages between urban planning and design, governance and policy structures, and the actual use of 15-minute facilities through sustainable mobility. It also investigates how broader socio-cultural, economic, and political processes influence these models and whether they create just and inclusive urban and mobility experiences. Ultimately, this research seeks to bridge the gap between the theoretical ideals of the 15-minute city concept and its real-world implementation in diverse urban contexts.

3.2 Research Design

This research is grounded in a critical realist approach and adopts a comparative, mixed-methods case study design. It integrates quantitative service-area analysis using geospatial primary data on POIs and the street network with qualitative thematic analysis and thick mapping of in-depth multi-stakeholder interviews, supplemented by content analysis of relevant secondary plans and policy documents. To do so, it employs two main frameworks, "CLFS[7]" and "MTSC[8]", to synthesise results. This is to generate contextual, mechanism-

[6] PHD refers to Palm Hills Development (see references).

[7] The CLFS framework stands for Cumulative opportunities, Land use mix, Functional redundancy, and Space syntax. It is a structured approach to analyse urban areas. While some of these metrics are commonly used in urban studies, the specific combination as the CLFS framework is developed for this study to provide a comprehensive assessment of urban form and service accessibility.

[8] The MTSC framework brings together the four layers of Morphological, Typological, Syntactic, and Character into a single tool to analyse urban form. It allows to examine physical layout, building types, street connectivity, and social context together, helping to understand how well a city supports accessibility, functionality, and liveability. Some approaches, like Monteiro and Pinho (2021) used it to also combine multiple perspectives on form and configuration. Please refer to the data collection and analysis section for details.

based explanations of proximity planning as intended in policies, and as produced in spatial manifestations, and as experienced by residents. The software used is NVivo and ArcGIS.

As the research is grounded in a critical realism theory, recognizing that proximity and the concept of the 15-minute city itself are a real urban condition, but one that emerges from the interaction of institutions (plans, regulations), urban material form (streets, services), and mobility and social experiences (routines, norms, constraints). Critical realism treats the 15-minute city not just as an idea or framework, but as an emergent outcome of causal mechanisms embedded in governance, urban form, and mobility and social practice, mechanisms that can be explained through their patterned effects and lived realities (Næss, 2015).

In this study, the 15-minute city concept is examined as a dynamic and evolving concept, meaning that it is not a static, one-size-fits-all model, but rather one that adapts and changes based on the specific urban context, local needs, and the interactions between various stakeholders. This means it is influenced by urban governance, policy narratives, and local practices/actual usages. By focusing on how different actors construct and negotiate the meaning and implementation of the 15-minute city concept in Cairo, this research highlights the interplay between urban ideals, socio-political forces, and everyday lived experiences. The study views the 15-minute city concept as an ideal that is interpreted and applied/lived differently depending on the contextual urban landscape, policy frameworks that shaped the space, and local community practices. These factors continuously transform its meaning and impact.

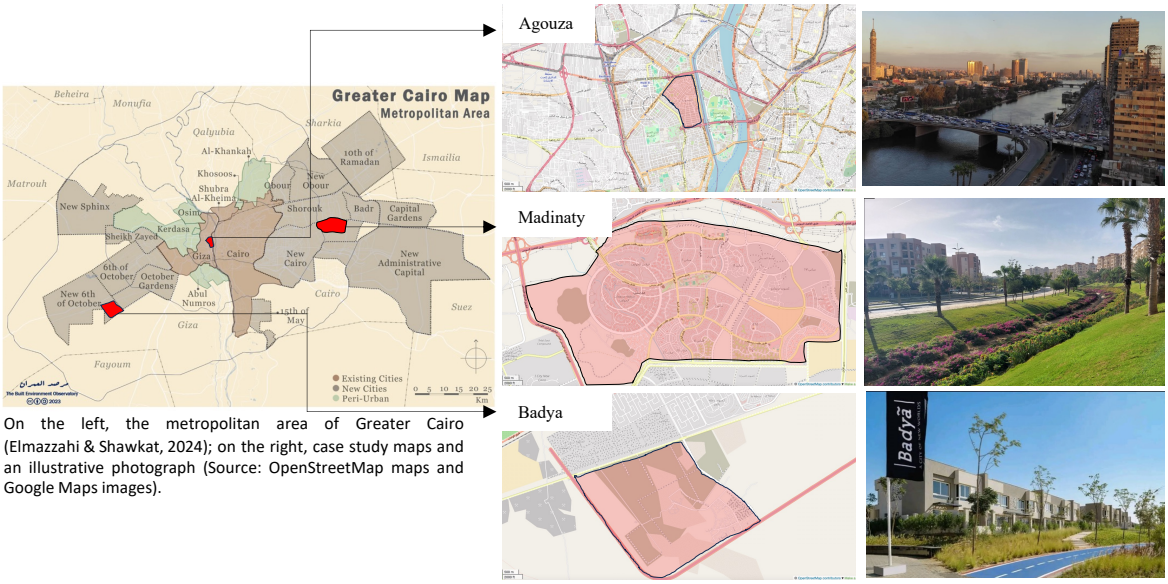
By examining the concept this way, the research emphasises that the 15-minute city concept is not just a ‘predefined’ urban model but an adaptive framework that reflects the multi-layered reality of a specific place in different Cairene urban contexts. It becomes a living concept that evolves/manifests through the interactions of various stakeholders/actors, shaping how cities are designed, planned and experienced over time.

Epistemologically, the study leans towards an abductive stance, combining quantitative spatial analysis with qualitative accounts to develop the most plausible explanations of how proximity is enabled, constrained, and experienced. The study goes back and forth between the theoretical framework of the 15-minute city concept and on-the-ground observations, not acknowledging it as a ‘predefined’ urban model but rather as an adaptive framework, and

tests how this concept is manifested and interpreted in different models within the urban contexts of Cairo (Arefi and Tayyebi, 2024).

To test these different contexts in the Greater Cairo region (Figure 2), a comparative mixed-methods case study approach is employed. Multiple case studies, as explained in the introduction, are used as a key method for examining the practical application of the concept in the urban form and its manifestations in residents' use of it across different urban contexts within Cairo. As Yin (2013) suggested, this approach allows for an in-depth exploration of how the ideals of the 15-minute city are implemented, experienced, and interpreted in real-life settings. Agouza neighbourhood, Madinaty City, and Badya City were selected as different models of the 15-minute city concept (detailed in the context chapter). They serve as case studies that are similar in population size but distinct in the historical development of urban forms and mobility networks.

To give brief context, Agouza, Madinaty, and Badya are middle-class neighbourhoods in central, east, and west Cairo, respectively. Agouza (~350 acres; population 302k) is part of Giza Governorate. Planned in 1935 and completed after 1955, it mixes Garden City ideas with local Fatimid influences (Volait, 2022; Behrens-Abouseif, 1989). Today, residents can reach shops, services, and daily needs on foot, making it a clear example of a 15-minute city. Madinaty (8,000 acres; population 318k; planned 700k) was developed in phases from the 2000s as a public-private partnership. Its masterplan applies New Urbanism principles with local Fatimid-inspired design (TMG, 2024; Duany & Marion, 2023).. Daily necessities, schools, and green spaces are organised to be within walking distance. Badya (3,000 acres; planned population 150k) is a newly built city designed from scratch around 15-minute city ideas. Developed in phases between 2019 and 2038 under Egypt's Vision 2030, it is led by private developers. Its masterplan by AS+P blends European urban planning with local adaptations (PHD, 2024).



On the left, the metropolitan area of Greater Cairo (Elmazzahi & Shawkat, 2024); on the right, case study maps and an illustrative photograph (Source: OpenStreetMap maps and Google Maps images).

Figure 2 Description of the Greater Cairo Region and the three case studies[9]

The comparison between the case studies can highlight how the urban form, social fabric, and mobility network (and the conditions behind their development) shape the adoption of the 15-minute city concept and its response to community needs (and their actual use). As mentioned, Agouza is an inner-city planned community dating back to the 1950s, Madinaty City in New Cairo is a well-established new city dating back to the 2000s, and Badya City in New October is an emerging new city currently under construction[10]. This will allow examining the diversity of experiences and variations in urban forms/spatial configurations within the same metropolitan region.

This cross-sectional study combines qualitative and quantitative research methods to gain a comprehensive understanding of different models of the 15-minute city concept in Cairo. The qualitative methods involve interviews with multi-stakeholders, such as residents, urban planners and designers, and local authorities (as suggested by Roulston and Choi (2018) and Brockington and Sullivan (2003)). The interview strategy followed purposive sampling and was designed to capture diversity of experiences and perceptions across gender, age, mobility profile, and neighbourhood context, rather than to achieve statistical representativeness by sample size (Palinkas et al., 2015). Then, NVivo's thematic analysis

[9] The Figures are illustrative. The maps are drawn at a common fixed scale placed to fit the A4 layout, with scale bars for reference, making Agouza appear smaller and Madinaty and Badya larger, thereby highlighting their contrasting territorial extents despite accommodating populations within the same range

[10] Both New Cairo and New October are part of the Greater Cairo Metropolitan region.

was used to capture their perceptions and experiences of designing and planning, as well as their lived experiences of accessing services. Meanwhile, the quantitative methods involve collecting geographical networks and Points of Interest (POIs)[11] data. Then, GIS mapping is employed to analyse the current urban form of the three case studies, assessing their density and other essential networks. It is also used to analyse the spatial distribution of essential facilities to fulfil functions of work, supply, healthcare, education, sports and recreation, assessing their proximity and diversity.

By integrating these methods, the study offers a holistic view, where qualitative insights inform and contextualise the quantitative data as Gerring (2008) advised, providing a nuanced understanding of how the 15-minute city concept model is realised in different urban contexts.

3.3 Data Collection Methods

The methods used to gather the data and the rationale behind their selection are described in this section. It explains the use of multi-stakeholder interviews, GIS street network and points-of-interest data, and supporting secondary documents of plans and strategies. It clarifies what was gathered, where and when it was collected, and how it was handled across the chapters step by step. Additionally, it discusses ethics (approvals, consent, and researcher positionality), details the procedures used to improve validity and robustness, and explains how the data were cleaned and arranged before analysis. Further, it elaborates how the mixed-methods are integrated at this stage of research.

Data collection was conducted on two separate forms, conducting multi-stakeholder interviews, and collecting point of interests (POIs) (including facilities of supply, education, sports, healthcare, recreational, and businesses), and geographical data for urban form from secondary data (including urban fabric, land uses, building heights, streets and mobility network), summarized in Figure 3.

A total of 75 in-depth interviews were conducted, categorised as follows: Residents (55 interviews), Government Stakeholders (10 interviews), Industry Stakeholders (10 interviews). Resident interviews were conducted with 22 participants in Agouza, 23

[11] In this study, Points of Interest (POIs) refer to geolocated destinations that support the 15-minute city's daily essentials services, such as supply, work, education and health services, sports and recreational facilities, used to assess proximity and potential access within each case-study area.

participants in Madinaty, and 10 participants in Badya. Each interview lasted approximately 30-60 minutes, resulting in a comprehensive dataset. As mentioned, the interview strategy was purposively designed to capture the diversity of experiences and perceptions across gender, age, mobility profile, and neighbourhood context. This prioritises variation in experiences over statistical representativeness by sample size. The data collection process is carried out in two phases: from August 2024 to December 2024, which ran in parallel with data analysis and other data collection activities. followed by a follow-up phase, from March 2025 to August 2025, the second phase was conducted in parallel with the completion of the remaining analysis and writing up.

The multi-stakeholder interviews method is chosen because the study required sufficient coverage across three case studies and multiple participant categories to capture variation in how proximity is planned, delivered, and lived (Yin, 2018). Planners and designers offer expertise on the design intentions and implementation barriers. Local authorities contribute an institutional perspective, highlighting governance, policy frameworks, and regulatory constraints. Residents provide firsthand insights into daily mobility and access to services. This multi-stakeholder approach helps bridge the gap between proximity planning as intended in policies, as produced in spatial manifestations, and as experienced by residents. (Appendix 1 summarises the information gathered from interviews)

The recruitment of participants began with a call for participation (Figure 4), which was disseminated through relevant social media platforms, including LinkedIn, X, and Instagram, and to people at the basic facilities in each case study (e.g. sports clubs, schools and parks, etc.). Industry stakeholders were selected purposively based on their professional experience and involvement in design decisions related to Agouza, Madinaty, and Badya (Palinkas et al., 2015). The sample includes 75 in-depth interviews. Interviews were continued until thematic saturation was reached within the main groups, meaning that additional interviews no longer generated substantively new themes but instead consolidated and refined the emerging explanations (Saunders et al., 2018). For example, in practice, saturation was reached after 10 interviews in Badya, 22 in Agouza, and 23 in Madinaty. The sample size supports both within-case richness and cross-case comparison (Yin, 2018). Finally, including residents alongside decision-makers strengthened triangulation between policy intent, spatial conditions, and lived mobility experiences, improving the robustness and credibility of the findings (Flick, 2004).

Stakeholders are identified through LinkedIn searches and Google queries. Local authority stakeholders were selected based on their roles in governance and regulatory frameworks that directly impact the three case studies or intersect at the regional scale, with their profiles sourced from relevant government websites. Resident selection followed a purposive sampling approach to ensure diverse perspectives on experiences and access to 15-minute city facilities (as suggested by Suri (2011) and Palinkas (2015)). However, Limitations of the sample include that people who respond to an open call (especially via LinkedIn/X/Instagram) may be more engaged, more educated, more digitally connected, or more opinionated than non-respondents. To mitigate this and expand participant recruitment, a snowball sampling technique was employed, asking residents to suggest a family member who is not active on social media. (Appendix 2 provides the pre-sampling form used in participant selection, which was handed to participants during the recruitment process)

Using the gathered POI data, this was the main method employed to evaluate accessibility to the six basic functions. A mix of four complementary tools was planned for Chapter 5 during POI collection. Each tool measures a smaller part to form an understanding of the bigger picture of how easy they are to reach. The mixed four are: cumulative opportunities-based[12], land-use entropy[13], functional redundancy[14], and space syntax (integration)[15] quantitative metrics (CLFS) analytical framework. This will be explained in detail in terms of data gathering in this section and in the analysis in the following section.

[12] Counts how many relevant destinations (e.g., groceries, clinics) a person can reach within a set time (5–10–15 minutes) along real streets. More reachable options = better access.

[13] Measures how balanced the mix of uses is (housing, shops, schools, etc.) in an area. Higher entropy = more varied uses nearby, making trip-chaining easier.

[14] Tells how many alternative providers exist for the same need within reach (e.g., several pharmacies, not just one). More redundancy = more resilience and competition.

[15] Measures how the street layout supports movement, how direct and connected routes are, and how likely people are to use them. Note: "integration" is one specific measure from the broader space syntax toolkit. The paper uses this selected part to quantify network legibility/permeability, not the whole method.

Another analytical framework was in mind while gathering data, for findings in chapter 7, it brought together four layers: Morphological[16] –Typological[17] –Syntactic[18] –Character[19] (MTSC[20]) framework. This was to study street patterns, block structures, building types, and the overall urban fabric at different scales in the three case studies. The aim was to see how well these areas fit the ideals of a 15-minute city, and what can they add. This is explained in detail in the next section.

[16] The study of the physical form of a city, including street layouts, block shapes, and overall urban structure.

[17] The classification of buildings and spaces based on their design, function, and form.

[18] Space Syntax (Integration) is part of the Space Syntax metrics and a way to measure how streets and pathways connect and how easily people can move through an area.

[19] Community Character is the social and cultural qualities of a neighbourhood, including how it feels, how people use it, and its identity.

[20] MTSC framework brings together the four layers above into a single tool to analyse urban form. It allows to examine physical layout, building types, street connectivity, and social context together, helping to understand how well a city supports accessibility, functionality, and liveability. Some approaches, like Monteiro and Pinho (2021) used it to also combine multiple perspectives on form and configuration.

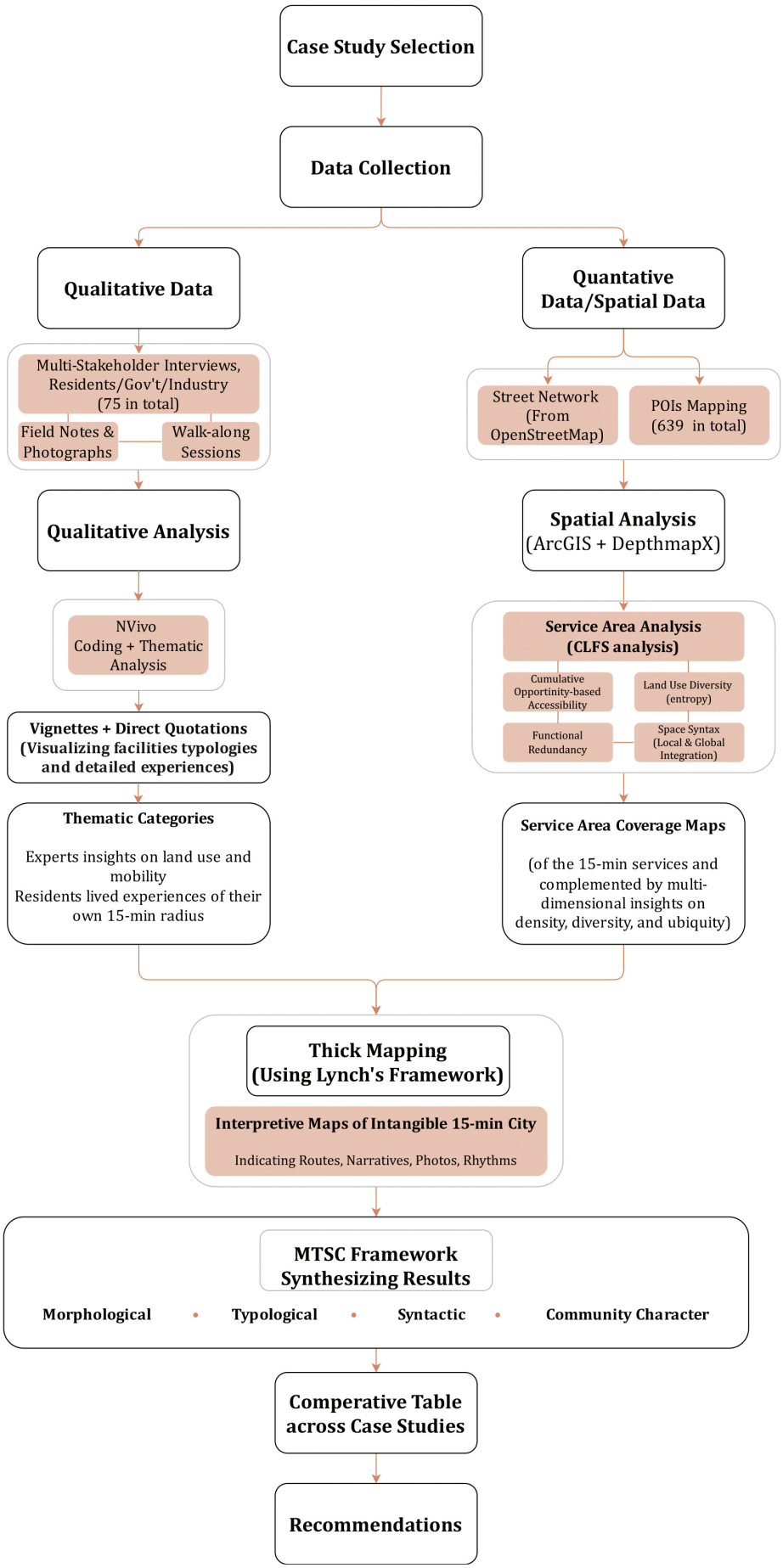


Figure 3 Summary of data collection and analysis steps



Figure 4 The call for participation in the research

All interviews were semi-structured, using a pre-prepared interview guide tailored to each stakeholder group (Appendix 3 provides the interview guides used). The interview guide for industry stakeholders covered their roles in urban form and mobility planning, alignment with the 15-minute city (services access and short-distance travel). It also covered policy and governance mechanisms (regulations, partnerships, implementation), community-making, and additional reflections. The interview guide for local authorities stakeholders included themes of urban form and planning, policy and governance, and additional insights. The residents' interviews guide included themes of general description of their experience accessing basic facilities within a 15-minute radius, built environment and infrastructure, affordability, and sense of belonging.

Interviews were conducted both in-person and online, depending on participants' preferences. As mentioned, each interview lasted an average of 30-60 minutes. Informed consent and an information leaflet were provided to each participant, in person or via email, at least 7 days prior to the scheduled interview, where relevant. Anonymity and data

confidentiality were assured, and the procedures for handling and protecting the data were outlined in the information leaflet after obtaining the ethical approval[21].

To strengthen the credibility of the findings, triangulation was maintained by not relying on interviews alone. Instead, they were consistently checked what people described against spatial evidence, such as network conditions and access to key destinations, and against plans and strategy documents, so that agreements and contradictions could be explored rather than smoothed over (as suggested by Flick (2004)). Reflexivity is also treated as part of the research work, throughout fieldwork and analysis a running record was kept of key decisions and reflections, paying attention to how researcher's position and interactions with participants might shape what was said and how it was understood, and returning to the coding when needed (Berger, 2015). Finally, transferability was supported by describing each case in enough detail, documenting recruitment and sampling transparently, and clearly stating the conditions under which particular mechanisms and experiences of proximity appeared, so that readers can judge how far these insights might apply in similar contexts (Tracy, 2010).

The interviews were organized, cleaned, and categorized based on case studies and stakeholders. They were then transcribed with a local transcription office using Arabic transcriptions, ensuring confidentiality through data anonymization, secure file transfer, and restricted access to stored data on Google Drive with personalised sharing controls. It is then translated into English by the same office through a rigorous process to preserve context and meaning. Transcription was supplemented with contextual annotations for clarity, transliteration was also used in the context-specific terms and places. Relevant gestures accompanying specific answers in the interviews were documented as well.

For the data collection of the maps in the thesis either related to the urban form or the distribution of facilities in findings chapters, OpenStreetMap (OSM), as an open-source geographical information system, was primarily used as a reservoir of spatial data. In the context of Cairo, OSM data can show inaccuracies and overlaps in mixed-use services. To address this limitation, it was supported by manual verification and Google Maps to validate the geographical data.

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[21] Ethical approval for this research was obtained from the Trinity College Dublin Research Ethics Committee (REC), Trinity College Dublin, the University of Dublin (Risk Level 2; Ref# 3497; approved 28 June 2024).

A total of 639 POIs were identified across all the facilities in the three case studies[22]. POIs were collected using API-based extraction[23] based on the contextualised categorisations. They were collected from the mentioned sources to identify the locations of various urban facilities. To ensure comprehensive search coverage and robustness, relevant keywords were used in both Arabic and English for each facility category. OpenStreetMap (OSM), as an open-source geographical information system, was primarily used as a reservoir of spatial data. It was supported by manual verification[24] with Google Maps to validate the geospatial data; its use and data quality in volunteered geographic information are well documented (Perkins, 2014; Basiri et al., 2016; Wilmott, 2019). An initial categorisation was conducted using a systematic Contextual Ground Truthing[25] method to group the services according to the 15-min city concept's facilities and to verify their on-site names and presence (Yeow et al., 2021). The categories and corresponding search terms are included in Figure 5.

Service	**Categorisation**
Supply	store (matjar), shop (mahal), market (souq), supermarket (supermarket), hypermarket (hypermarket), kiosk (koshk), grocery (baqala)
Retail	shop (mahal), store (matjar), retail (mahalat tajzi'a)
Education	school (madrasa), university (jama'a), education (taalim)
Sports & Fitness	club (nadi), gym (sala riadiya), studio (istudio), yoga studio (istudio yoga), fitness (liqa'a badaniya), sports (riyada), swimming (sibaha), dance (raqs)
Food & Beverage	café (Ahwa, maqha), bakery (mukhbaza), restaurant (mat'am)
Professional Services	company (sharika), office (maktab)

[22] All data were collected outside Europe and processed under the authors' European university data-protection framework in line with the EU GDPR.

[23] An API (Application Programming Interface) provides a way to access data directly from online sources in a structured format, removing the need for manual collection. In this study, the open-source tool Overpass Turbo was used to extract locations and names of services/facilities from OpenStreetMap.

[24] It was cross-checked by hand using Google Maps, spot-verifying names, locations, and categories to validate the geospatial data.

[25] Contextual ground-truthing is going on site to confirm POI really exists, is correctly named/categorized, and is in the right spot. In this case, it's used when there's confusion: mismatched names, overlapping categories (clinic vs. pharmacy), or places that have moved/closed. This cleans errors before analysis so your service areas and metrics reflect lived reality,

Recreational & Cultural Spaces	green space (mashat khadra), parks (hada'iq), cultural centres (mara'ez thaqafiya), traditional qahwas (qahawi taqlidiya), libraries (maktabat), cinemas (dawr sinama), theaters (masrah)
Personal Services	hairdresser (musaffaf sha'ar), salon (salon), coiffeur (halag), car cleaning services (khidamat tanzif al-sayarat), barbershop (mahal halaga)
Hospitality	hotel (funduq), hospitality (diyaafa)
Places of Worship	mosque (masjid), church (kanisa)
Healthcare	hospital (mustashfa), polyclinic (eiyada muta'addida al-takhasusat), clinic (eiyada), pharmacy (saydaleya), medical centre (markaz tabi)"

Figure 5 Table for categories and corresponding search terms used in the spatial mapping

For Agouza and Madinaty, after the initial search, to ensure validity and reliability, manual verification was conducted in areas where keyword search results appeared incomplete or inaccurate, especially in densely developed areas such as certain streets in Agouza. In these instances, a visual review was conducted on Google Maps by zooming in on the area and checking registered points to confirm their proper classification in each category. In the three cases, each registered POI was evaluated to verify its categorical assignment[26].

For Badya City, where development remains largely unfinished, the analysis relied on land-use maps provided by Palm Hills Developments, along with other planning documents outlining the projected distribution of facilities not marked on the land-use maps, such as healthcare and hospitality services. The estimated number of hospitals and hotels was derived from these official plans, and their locations were based on the urban centres designated in the city's master plan. Pharmacies were then placed in the neighbourhood service centres, all in accordance with Palm Hills Development's master plan for Badya.

In chapter 4, for the introductory maps related to the urban form and context understanding in Agouza, including land use, density, and building height maps, secondary master plans were used as the main reference for an inner-city neighbourhood, and this spatial data is not expected to change drastically. However, to ensure the data's accuracy and reflect recent changes, the information was updated using more current sources, including Giza's

[26] Supply vs retail for example were shown with different tones for easy visual separation, supply appears in supply maps and retail appears in businesses maps. POIs with multiple uses were mapped in each relevant thematic map (e.g., a supermarket–pharmacy appears in both supply and healthcare maps).

Governmental plans, Google Maps and field visits to the area. These updates provided a more precise and relevant overview of the current urban form.

In chapter 5, to complement the main service area analysis thematic maps, and to examine the urban performance with regard to the principles of the 15-minute city concept, multi-layered spatial analysis is used. The interrelated analytical metrics used are cumulative opportunities-based accessibility, land use mix (entropy), functional redundancy, and space syntax (integration), (CLFS framework[27]). Each metric has been widely used in urban studies, as elaborated below; however, its integration into a single framework remains limited. Combining the four metrics turns "what's nearby on a map" into "what's usable, varied, and reliable in real life." It pinpoints which constraint is binding in each place, quantity, mix, substitutability, or street network form, so interventions are targeted rather than generic.

Accessibility analysis provides a clear understanding of how easily people can reach everyday services within walking distance (Geurs and van Wee, 2004), while land-use entropy reflects the diversity and vibrancy of a neighbourhood's functions (Yeh and Li, 2001; Song et al., 2013). Functional redundancy, though less common in urban analysis, helps identify whether residents have multiple options for essential services, contributing to urban resilience and equity (Meerow and Newell, 2019). Space syntax complements these measures by revealing how street networks shape movement and social interaction through their spatial configuration (Turner, 2004). Although previous research has explored some of these methods in combination (Karimi, 2012; Silva and Larsson, 2018), this study brings them together, along with the service area analysis, to form a more holistic picture of urban life, that reflects the interwoven qualities of proximity, diversity, density, and digitalisation, the pillars of the 15-minute city model (Moreno et al., 2021).

To explain the CLFS analytical framework further, accessibility is assessed by measuring how many key services, such as grocery stores, schools, parks, and clinics, can be reached within a 15-minute walking and cycling distance from each residential area. Using OpenStreetMap data and the OSMnx toolkit (Boeing, 2017), a pedestrian network was constructed and used to generate walkable isochrones. To enable consistent sampling, a

[27] The CLFS framework stands for Cumulative opportunities, Land use mix, Functional redundancy, and Space syntax (integration). It is a structured approach to analyse urban areas. While some of these metrics are commonly used in urban studies, the specific combination as the CLFS framework is framed for this study to provide a comprehensive assessment of urban form and service accessibility.

uniform grid with a 5m x 5m resolution was established across the study area, allowing for detailed, spatially consistent sampling. Within these, a useful number of reachable destinations was counted, providing a practical measure of the proximity of opportunities/services (Geurs and van Wee, 2004).

To determine how well-mixed the land uses are in each area, an entropy index[28] was calculated using GIS-based classifications of residential, commercial, institutional, and recreational land uses. The index was applied across a consistent grid to capture how well-mixed the land uses are in each area. Higher entropy values suggest greater functional variety, which is crucial for supporting vibrant, inclusive, and self-sufficient communities (Yeh and Li, 2001; Song et al., 2013).

This is expanded upon by functional redundancy analysis, which asks whether residents have several options of the same kind within walking distance, as well as whether services are close by. This matters in daily life; for example, having several shops, pharmacies, or schools nearby increases reliability and resilience in the event of closures or overload. Areas with more alternatives are more robust, equitable, and adaptable (Meerow and Newell, 2019).

Space syntax (integration) analysis was conducted to assess how the street network's spatial structure supports or limits movement. Using DepthmapX (Turner, 2004), global and local integration metrics were calculated from an axial map of the pedestrian network. These values help reveal the relative connectivity and permeability of streets, which influence walkability, visibility, and social interaction (Hillier and Hanson, 1984).

The combination of the spatial analyses[29] provides a robust basis for identifying areas that already reflect the qualities of the 15-minute city, and those that may require targeted improvement. This integrated approach supports evidence-based, spatially sensitive planning. The results were manually arranged for comparison between the three case studies, given their historical urban and mobility context.

For chapter 6, especially the mobility network in Agouza, a variety of sources were used to create a comprehensive and accurate representation. These sources included Tadamun

[28] Measures how balanced the mix of uses is (housing, shops, schools, etc.) in an area. Higher entropy = more varied uses nearby, making trip-chaining easier.

[29] Results from the four complementary metrics are presented in the text, resulted maps for them are excluded for scope.

(2019) for general urban data, Transport for Cairo for metro and bus station locations, CairoBike (2022) for bike-sharing station locations, Mwasalat Misr for bus stop data, and OpenStreetMap (OSM) for additional spatial information. The integration of these diverse sources ensured a well-rounded, up-to-date depiction of Agouza's urban infrastructure and transportation system.

For Madinaty, the primary reference material consisted of official planning documents and schematics from Talaat Moustafa Group (TMG). However, to confirm the data's accuracy, additional updates were made by reviewing Google Maps and conducting field visits to key areas within the city to observe changes firsthand.

For Badya, the analysis was primarily based on planning documents, schematics, and other available secondary materials from Palm Hills Developments (PHD). Since Badya is still under development, updates were incorporated through Google Maps and field visits to focus on areas that have already been completed, ensuring the data reflected the most accurate state of development to date.

3.4 Data Analysis Methods

The data analysis methods section explains how the data were analysed using thematic analysis, service area analysis (CLFS Framework), and the MTSC framework, with 'thick mapping. This was supplemented by a content analysis of secondary data. It then sets out, chapter by chapter, how the material was handled, what techniques were used, how coding was carried out, and how NVivo and ArcGIS, as the main software, have supported the process. It explains how the data was interpreted to answer the research questions and how consistency was maintained across the chapters. It details the specific steps involved in processing, coding, and visualising the data to extract meaningful patterns and insights, as outlined in the findings chapters[30]. Because the study is a comparative mixed-methods case study, it also shows how different data sources and methods are brought together across the

[30] It is important to mention that the text was revised with the assistance of OpenAI's ChatGPT (GPT-4) as a large language model to enhance grammar and coherence in accordance with TCD's policies (https://www.tcd.ie/academicpractice/resources/gen-ai-hub/genai-in-research/). The tools were employed ethically as editorial aids, without influencing the originality or analytical content of the author's work.

analysis. The section closes by outlining key methodological limitations and the steps taken to mitigate them.

After the data were collected and prepared, including transcribing, translating, organising, and categorising, the transcripts were ready for analysis. NVivo software was used (college software acquired before starting the analysis). NVivo was used to help code transcripts and documents consistently across stakeholder groups and the three case studies, to track how themes developed as the fieldwork progressed, and to return to the original extracts whenever an interpretation needed to be checked. In practice, it provided an organised audit trail for coding and comparison, which strengthens the transparency and trustworthiness of the qualitative analysis (Bazeley and Jackson, 2013).

To ensure consistency and rigour, data underwent a final stage of preparation, including cleaning the texts and ensuring consistent formatting. This involved removing any transcription errors, standardising terminologies, and verifying speaker attributions. The cleaned transcripts were then imported into NVivo in a Word format. Other data sources were also imported, including field notes.

For consistency, in NVivo, files are imported and categorised as per case studies (as suggested by Bazeley and Jackson (2013). Cases are created for each participant, and relevant demographic attributes (e.g., gender, age) are assigned for later comparative analysis. After reviewing the data, initial coding was assigned to create broad categories (e.g., proximity to markets, supply delivery trends), and codes were refined afterwards. Thematic categorisation was done after. NVivo data were imported in parallel with the interviewing process, on an interview-by-interview basis.

Thematic analysis was conducted using a coding framework due to its effectiveness in managing large volumes of qualitative data (each interview transcript averaging around 4,000 words) in a systematic manner (Guest et al., 2012). This approach facilitated the extraction of meaningful patterns based on themes related to the 15-minute city concept framework (codes were influenced by identified community character characteristics), enabling the grouping of insights into coherent categories. Additionally, it helped identify patterns of lived experiences in relation to demographic attributes and revealed contrasts or gradual shifts across the three case studies.

As the analysis was conducted in phases alongside data collection and writing, NVivo's thematic analysis allowed for continuous refinement as new data emerged. Ultimately, the

main aim was to make this thematic analysis help translate subjective experiences into actionable insights on just and sustainable mobility, accessibility, and proximity to facilities.

Word Frequency and Text Search Queries were used to identify common patterns and relevant quotations needed (see findings chapters). Visualisation was the final step of the analysis, and Photoshop software was used to supplement the extracted patterns and direct quotes into the vignettes of facility typologies and detailed experiences (see the findings chapters).

The extracted data points from OpenStreetMap (OSM) were georeferenced in ArcGIS software. OSM data were downloaded, and specific datasets were extracted based on relevant layers, including roads, public transport networks, land use, and services. The service layers, for example, were previously detailed in Figure 3.

For validity and reliability, missing or outdated layers were identified and supplemented through a continuous process of manual verification (field visits) and Google Maps (zooming in on specific areas), as elaborated on the data collection section. This approach enabled ground truthing, improving data accuracy by validating multiple inputs across different layers, given their large numbers.

Once collected, spatial data were cleaned and formatted into an ArcGIS-compatible structure, converted to shapefiles (.shp). Duplicate entries were removed, inconsistencies corrected, and data from different sources merged to ensure coherence.

In more detail, the extracted OSM data points were georeferenced in ArcGIS. The required OSM data sheets were downloaded, and relevant datasets were selected based on service network layers, including roads, public transport, land use, and services. Because of the large amount of data, some layers were found to be missing or outdated, so they were checked and updated through ongoing manual verification using field-based ground truthing. This step helped improve the overall accuracy of the data. After the data were collected, checked and verified, they were carefully cleaned, organised, and prepared in a format compatible with ArcGIS, before being stored as shapefiles (.shp).

For chapter 4, urban form maps were structured consistently to elaborate urban fabric, density, building heights, land use, and mobility networks based on the gathered primary

data and supported by secondary data from municipal and developers' plans[31]. Maintaining consistency in the analysed maps across the three case studies enabled a comprehensive assessment of the overall urban form.

For chapter 5, the data were visualized using the research's theoretical framework of the 15-minute city guided by the literature review. Thematic maps were created using service-area analysis to show walking and cycling distances to various facilities across all layers, including educational, sports, recreational, and other services. Establishing a single average for walking and cycling speeds is difficult because individual pace depends on a complex interplay between many personal and environmental factors. These include age and gender, local land use, cultural habits, route slope, temperature, and trip purpose (Radics et al., 2024). For simplification and comparability purposes, standard estimates were used. A 1.2 km buffer was applied to represent a 15-minute walking distance at an average speed of 4.8 km/h (Ali et al., 2023). Similarly, a 4.35 km buffer corresponded to a 15-minute cycling range at a typical speed of 19.3 km/h (Chiaradia et al., 2024)[32].

The resulting proximity maps were manually arranged for comparison, providing a comparative lens (as elaborated in the findings chapter). This visual representation provided an image that helped in assessing how services are distributed or clustered and whether their coverage is evenly distributed or sufficiently accessible (see chapters 6 and 7).

In chapter 6, to capture the realities of mobility experience in Cairo within the urban form, a central component of the analysis and digitalisation of data to maps was the 'Thick Mapping' process. It is used to visualise the qualitative data. The term is borrowed from Geertz's idea of "thick description" (1973), where "thick description" of social insights is accompanying spatial practices of cartography and GIS. Rather than reducing maps to technical or neutral representations of space, thick mapping positions them as interpretive,

[31] For this study, municipal and developers' plans were used as secondary sources. Municipal plans came from the 6th of October City and the New 6th of October City Authorities, as well as the New Urban Communities Authority (NUCA). These included future development plans such as the Green City Action Plan, Cycling Lanes in New Cities, and zoning plans. Approval decisions for the master plans and phases of Madinaty and Badya from the Ministry of Housing were also used. Developers' plans came from companies like Palm Hills Developments (PHD) and TMG. They included master plans, project presentations, strategy documents, designer and consultant presentations, and brochures for different phases.

[32] Public transport (PT) buffers are excluded: Cairo's mobility network is highly dynamic (microbuses, minibuses, buses, metro lines, monorail) (Cherif & Wahdan, 2023). Although Transport for Cairo's GTFS provides dataset on route–stop data, for robust multimodal PT measurements would require separate data and methods, so it is outside this paper's scope.

narrative-rich devices that combine quantitative spatial analysis with qualitative cultural insights (Presner et al., 2014; Bodenhamer et al., 2010).

For this study, thick mapping was about layering, so to systemise this 'thick description' and give it various socio-spatial layers, Kevin Lynch's (1960) framework, the image of the city, where paths, edges, nodes, landmarks, and districts form the layers. For each case study, the thick map combines these different layers of evidence, combining residents' narratives with urban form. The five aspects are generated from the participants' in-depth experiences that they shared and photographed during the walk-alongs. The paths participants narrated, the quotations they shared, the spatial points they referred to, and the photographs we took are brought together to create a map that captures not only where things are but also what they mean and how they are lived (Bergeronet al., 2017).

Participants were invited to explore urban spaces through layered temporal and cultural narratives; some established digital humanities projects also used this method, such as 'HyperCities' (Presner et al., 2014). As the study's main inquiry was the interplay between spatial form, historical processes, and lived experience, thick mapping was found to be the most relevant method for capturing this complexity in a single final map (Bodenhamer et al.,, 2010). Many discussed how the tool is especially relevant in urban studies, where questions of accessibility, belonging, and memory often escape purely technical forms of mapping (e.g., Bergeron et al., 2021).

This approach is useful as it asks researchers to hold together the spatial and the social, the quantitative and the qualitative, the technical and the humanistic. It was also useful for comparing experiences across three historically distinct urban areas: planned urban extensions such as Madinaty and Badya, and long-established inner-city areas like Agouza. A thick mapping exercise enables tracing differences in experiences spatially while retaining their social meaning (Toole, 2015).

Next, the maps were digitised with the gathered layers. These draw on the thematically analysed interviews, where codes were developed inductively and then refined into several categories. One set of themes captures participants' accounts of their routes to the main 15-minute facilities, such as work, supply, education, and recreation. A second set reflects the broader experience of mobility, including rhythm, duration, and modes of travel. A third category goes into further detail, focusing on the qualitative experience of each transport mode, with particular attention to active travel (walking and cycling) and public transport.

Finally, another layer of coding was developed through the lens of Lynch's framework, mapping participants' references to districts, edges, nodes, landmarks, and paths. These layers are then integrated with observations, photographs, quotations, and the routes recorded during walk-along interviews, producing thick maps that hold together both spatial and experiential dimensions.

To structure the analysis in Chapter 6, Kevin Lynch's (1960) framework is adapted to guide the interpretation of participants' experiences. Several scholars have applied Lynch's (1960) framework beyond its original urban form context. Lynch's five elements continue to frame research on perception in urban digital contexts (Wessel et al., 2018), and in heritage contexts, Patel (2023) assessed the framework, confirming its physical elements and highlighting the need to account for cultural associations. More recently, Qiu (2025) extended Lynch's notion of "nodes" to identify socially meaningful anchor points in collective memory. Not directly referencing Lynch, Brown et al. (2013) showed that physical meeting places and nodes act as foci that structure social networks in cities, an idea resonant with Lynch's focus on spatial anchors.

In this research, each element is examined in greater detail in its dedicated section of the chapter. In this research, in brief, each element is examined in greater detail within its dedicated section of the chapter. For mobility, 'paths' capture the actual routes and rhythms of daily movement, while 'edges' highlight perceived or physical barriers to circulation. Districts reflect zones of everyday activity, 'nodes' indicate decision-making or convergence points, and landmarks reveal memorable anchors of orientation and belonging (Lynch, 1960). In relation to participants' social networks analysis, these same elements are reinterpreted to trace channels of interaction, 'paths,' boundaries to social interactions are 'edges,' meeting points are 'nodes,' and symbolic sites of collective memory are 'landmarks' Lynch's (Lynch, 1960). 'Districts' in both analyses are the boundaries of each case study (Lynch, 1960). This framework allows the chapter to move beyond the tangible urban form and into the intangible dimensions of accessibility, offering grounded insights into how participants navigate their daily lives across spatial, social, and digital domains.

Altogether, these dimensions provide a more holistic understanding of accessibility that goes beyond spatial measurements of the 15-minute city concept to include emotional, relational, and technological aspects of urban life. This helps the chapter develop more grounded insights into how participants experience accessibility in relation to the 15-minute city concept. By centring lived experiences, the chapter highlights the adaptations and contextual

realities that shape how accessibility is felt and navigated across different urban settings (Lynch, 1960; Appleyard, 1981; Saadallah, 2020).

Using large-scale, thick maps, the exact paths participants took to the basic 15-minute functions were identified, along with the durations, rhythms, and modes of transport used. The maps also traced the edges that structured these journeys, the nodes where movement converged, and the landmarks recalled in participants' narratives. Built from data collected, the maps integrated multiple layers, observations, photographs, and direct quotations, to visualise lived experiences.

In chapter 7, the four main layers of the MTSC framework of analysis: morphological, typological, space-syntax (integration), and community character to examine urban fabrics, street patterns, block structures, and building types across multiple scales and evaluate to what extent they accommodate the 15-minute city concept ideals, four main stages were carried out in this research. Building on methods of the integrated morphological approach (Monteiro and Pinho, 2021). The analysis was developed from data collected from secondary sources, field observations and field photographs, and the maps produced and analysed in previous chapters. Many recent studies have applied urban morphology methods to assess and evaluate urban performance in line with the pillars of the 15-minute city concept (e.g., Megahed et al., 2025). Others have developed frameworks to examine the typologies of existing neighbourhoods in relation to the 15-minute city paradigm (Burke et al., 2022). Some have analysed how different urban morphologies have shaped the development of different urban forms and building functions, and have leveraged this evolution to refine context-related 15-minute city frameworks (Chen et al., 2025). The method of integrating the four layers was as follows.

Regarding the morphological layer, this layer draws on historical maps, spatial datasets, and fieldwork to examine how the urban fabric has evolved across the case study areas. Materials include Al-Madaq Maps, a publicly accessible digital archive of Cairo's historical maps, to trace the area's morphological build-up and long-term patterns of subdivision and form. AutoCAD maps datasets are used to create precise, georeferenced vector overlays representing subdivided units of the urban fabric. To ensure accuracy, this is cross-validated against the municipality's and the developer's master plans to verify boundaries and zoning designations. A selective field survey further grounds the urban fabric data by checking land uses, building typologies, and the configuration of form complexes, with particular attention

to mixed-use and vertical-layering areas. This allowed the development of spatial groupings of urban fabrics characterised by shared traits as suggested by Oliveira (2016).

In the study, each case is divided into walkable 5×5-minute units, within which the urban fabric is divided and cropped based on: (1) Plot and block morphology, (2) Land use mix (horizontal/vertical), (3) Density and building typologies, (4) Street network permeability (5) Public-private interface conditions. Contextual variations, such as informal modifications or shifts from planned to lived reality, are noted and interpreted within their socio-historical and regulatory settings. This process led to the identification of 22 representative and distinct fabric types, reflecting a range of urban conditions, from dense mixed-use corridors to low-density villas and transitional zones, which will be listed in detail below. Contextual literature reading helps reveal how different historical, social, and economic forces have shaped the morphology of each area. “MU1B”, for example, is simply a coded label that identifies a specific morphological unit and case study, and “CS1A”, for example, is the study area, used to categorise and compare patterns of urban form systematically.

In the typological layer, the morphological analysis provided a crucial historical lens through which the typological layer could be understood. By situating building types within their spatial and temporal contexts, the study was able to trace how specific functions of the 15-minute city concept, such as residential, supply, work, healthcare, education, sports, recreational, have adopted different built forms over time, shaped by shifts in planning paradigms, socio-economic forces, and cultural practices.

The typological analysis began with the identification of basic building types across the six primary functional categories: residential, work, supply, healthcare, education, and recreation. In total, 60 distinct types were identified, including apartment blocks, villas, shops, clinics, hospitals, schools, cafés, parks, cinemas, theatres, mosques, churches, and other mixed-use buildings.

The study also examined facade treatments and structural characteristics, highlighting how certain types, particularly in the healthcare sector, for example, have undergone significant transformation (Scheer, 2010). As mentioned, for validity, a selective field survey further grounds the checking of land uses, building typologies, and the configuration of form complexes. Photographs of buildings were post-processed to isolate architectural form by applying a single-colour overlay to the building. This technique, inspired by typological and

visual analysis traditions (Caniggia and Maffei, 2001; Scheer, 2010), enables a focus on massing, rhythm, and building articulation while removing visual noise. Human Figures and vehicles were reintroduced as symbolic overlays in contrasting colours, using vector annotations to denote activity intensity, spatial use, and mobility patterns in relation to the architectural setting. This selective colour-coding supports comparative analysis across sites while maintaining a legible and standardised visual language.

Overall, this layer of analysis revealed not only the diversity of urban types but also the enabling and restricting conditions that shape their development, offering deeper insight into how form, function, and context are co-produced over time along with their corresponding urban fabrics.

In the space syntax (integration) layer[33], to understand the spatial logic of movement and accessibility, space syntax analysis was conducted as part of the overall investigation into urban form. This layer focuses on how street configuration influences pedestrian access, functional distribution, and, potentially, social interaction.

The process first began with the preparation of base maps derived from AutoCAD datasets, simplified to represent the core street network. Base maps were prepared in ArcGIS, and space syntax analysis, including axial mapping and integration calculations, was conducted using DepthmapX. Axial maps were created for each case study, following Turner's (2007) suggestions, capturing the longest lines of sight and movement within the area.

Then, a consistent boundary, typically a 15-minute walking radius, was defined to ensure comparability across cases. Within these limits, spatial integration values were calculated at both local (R=3) and global scales to identify how accessible and connected each space is within the network. The results were then interpreted in relation to morphological and typological patterns. Highly integrated spaces are often aligned with mixed-use corridors and social functions, while segregated areas tend to be residential or gated. This helped reveal how spatial layout supports or limits proximity, diversity, accessibility, and active travel, and it is then combined with morphological and typological findings.

[33] Integration was selected as the single space syntax metric because it is the measure most directly aligned with the thesis focus. The full set of space syntax metrics was not used because it would have added complexity and overlapping measures without clearly improving the study's ability to answer the research questions which focus more on proximity planning on three main layers: as intended in policies, and as produced in spatial manifestations, and as experienced by residents.

Then, to complement the spatial and morphological analyses, a community character layer was developed using a combination of qualitative and spatial data sources. Collection of community insights focused on four key dimensions: demographic profile, economic activity, urban form and visual identity, and social use of space (Pivo, 1992; Murshed, 2022). The process began with secondary data collection (e.g., census data, planning documents, developers' documents) to outline the demographic and economic profiles of each area. This was followed by on-site observations and photographic documentation to capture insights into economic activity, street activity, and service use that reflect local identity, distinguishing the three case studies within each of the 6 urban functions. These insights helped contextualise observed spatial and social practices and contributed to a grounded understanding of morphology and typology layers. The collected data were then synthesised and coded into the maps.

Then, in the synthesis, the application of the four layers of analysis, morphological, typological, space-syntax (integration), and community character, allows for a more grounded and nuanced understanding of how the ideals of the 15-minute city take shape in different parts of GCR. The morphological layer helps trace how each area has developed physically, revealing patterns of streets, blocks, and densities that mediate how people live, move and access daily services. The typological layer focuses on the buildings themselves, the kinds of uses they host, and the different forms of daily urban services (such as villas, clinics, or shops).

Finally, through space syntax (integration) analysis, the study examines how well-connected and accessible different parts of the neighbourhood are, helping to understand which areas naturally support walking and which remain disconnected. Finally, the community character layer brings in the human perspective, offering insight into how residents use the spaces around them, and how local identity and social life influence access to services across the three case studies. Together, the three layers allow the study to assess the 15-minute city principles not just as a planning model, but as a lived experience of how proximity, density, and diversity are practised. Four layers are combined to form the Morphological–Typological–Syntactic–Character (MTSC) analysis presented in the last chapter of the findings, Chapter 7.

3.4 Limitations of the Methodology

The lack of a fully comprehensive dataset of online, especially spatial, information, in a coherent and consistent way across the three case studies, particularly because they differ greatly in their histories. While spatial data and planning documents for Madinaty and Badya were relatively accessible, similar material for Agouza was more difficult to locate. To address this limitation, the study brings together different types of material, official reports and documents from government bodies and developers, secondary literature, and the lived knowledge of residents and other stakeholders. This combination allows the analysis to benefit from a wider range of perspectives and insights, helping balance the available data for Agouza, Madinaty, and Badya. At the same time, it also means that parts of the findings are shaped by the extent to which up-to-date spatial information was available at the moment the research was conducted.

Another limitation is that one of the case studies, Badya, is still under development and partly under construction. This makes the available data and observations provisional, as many of the planned facilities, mobility networks, and spatial arrangements are not yet in place or fully functioning. The available maps and master plans outline the vision for how the city is expected to function, but they cannot fully anticipate how people will actually use and adapt these spaces once the community becomes more established. At the same time, interviews with residents and stakeholders are fewer, as only a limited number of people are currently living there. The analysis combined available plans, early resident accounts, and field observations to capture both planned areas and residents' emerging patterns of use.

3.4 Summary

The methods outlined in this chapter combined different forms of data collection and analysis in order to capture both the material and the lived dimensions of the 15-minute city. On the collection side, official documents, plans, and policies were gathered alongside fieldwork that included multi-stakeholder interviews and observations. This mix provided not only a record of formal plans but also insight into everyday experiences and local knowledge.

For the analysis, spatial techniques such as GIS-based service area mapping, space syntax, and land-use measures were brought together with thematic interpretation of interviews and thick maps. These were further complemented by an integrated morphological analysis, which linked form, function, and character across the case studies. The combination enabled

the research to move across scales, connecting design and policy frameworks with patterns of accessibility and the more intangible social and cultural aspects of neighbourhood life. Together, these approaches provide the foundation for the empirical chapters that follow.

Chapter 4: Policies, Urban Form and Mobility Networks: Agouza, Madinaty, Badya

4.1 Introduction

Contextualising the regional scale of Cairo and the local scale of the case studies is an important step toward understanding the broader dynamics shaping its land-use and transportation systems and their alignment with the principles of the 15-minute city concept. The city's urban planning and mobility landscape have long been influenced by interconnected socio-cultural, economic, and political forces. Introducing the regional scale of Cairo, its historical development alongside its multi-level governance structures is crucial for exploring in later chapters how residents navigate and experience urban space at the local scale. It helps identify the underlying structural and policy-driven factors that have historically shaped, and continue to shape, mobility patterns across different areas of the city.

This chapter explores how governance and policy frameworks have shaped the evolution of land use and mobility in Greater Cairo, and how these trajectories can be read through the principles of the 15-minute city. The concept of the 15-minute city provides a useful contemporary benchmark for sustainable and accessible urbanism, yet the emphasis here falls on the concrete patterns of governance, planning, and spatial development that have defined Cairo's urban form over time. The guiding question is therefore: How have governance-driven land use and mobility development patterns in Greater Cairo, as seen through Agouza, Madinaty, and Badya, evolved, and how do these trajectories relate to the principles of the 15-minute city?

The analysis works on two levels. At the regional scale, it follows the institutions, policies, and key decisions that have shaped Cairo's expansion and transport systems over time. By piecing together governance models, planning acts, and major infrastructure projects, the chapter places today's land use and mobility patterns within the broader historical and institutional story of Greater Cairo.

At the local level, the discussion turns to three contrasting case studies. Agouza is defined by its layered identity and transport systems; Madinaty by the influence of public–private partnerships and international planning models; and Badya by the role of technology-driven

policies, lifestyle trends, and smart mobility. Each case is introduced with maps, timelines, and key transformations that mark its development.

Bringing the two scales together shows how governance and policy choices materialise in urban and mobility outcomes. It also allows for reflection on how far these outcomes resonate with, or fall short of, the ideals of the 15-minute city. In this way, the chapter speaks directly to the research objective: to analyse how governance and policies have shaped the evolution of land use and mobility in Greater Cairo and, through the cases of Agouza, Madinaty, and Badya, to interpret these trajectories in relation to the 15-minute city.

To achieve this, this chapter will first contextualise the regional scale of the Greater Cairo Region. It will then provide a background on the development stages of the three case studies: Agouza, Madinaty, and Badya. Finally, it will undertake a detailed analysis of their urban form, examining its alignment with and deviations from the principles of the 15-minute city concept. The detailed methods used to produce the data and the analysis steps in this chapter are outlined and elaborated upon in the methodology chapter.

4.2 The Regional Scale: Greater Cairo Region in Context

As introduced, this section explores how the city's social, economic, and political dynamics shape its urban planning and mobility landscape. It aims to do so by examining the main events shaping development throughout the city’s history. It also examines the metropolis's governance structures, tracing relevant policies and institutional frameworks.

The Greater Cairo Region (GCR) is an extended metropolitan area. Due to the rich and layered history and the large population, it serves as a major urbanisation centre in Africa and the Middle East and North Africa (MENA) region (Jaad and Abdelghany, 2021). It covers an area of 5,020 km2 in 2023, on both sides of the River Nile, making it the second-largest city in Africa (Elmazzahi and Shawkat, 2024). It experienced rapid urbanisation, like most megacities in the MENA region, to accommodate the accelerated population growth, intensive migration from rural areas, and the rapid influx of people displaced from politically unstable neighbouring countries (Jaad and Abdelghany, 2021). The metropolitan area of the GCR comprises the governorate of Cairo and Giza, including the new communities in both governorates (Figure 6). The population of Cairo Governorate, including New Cairo, is around 10 million, while Giza has a population of 9 million, making a total of 19 million,

according to the latest published census (CAPMAS, 2025), with an average population density of 8300 inhabitants per km2 (Kenawy et al., 2020).

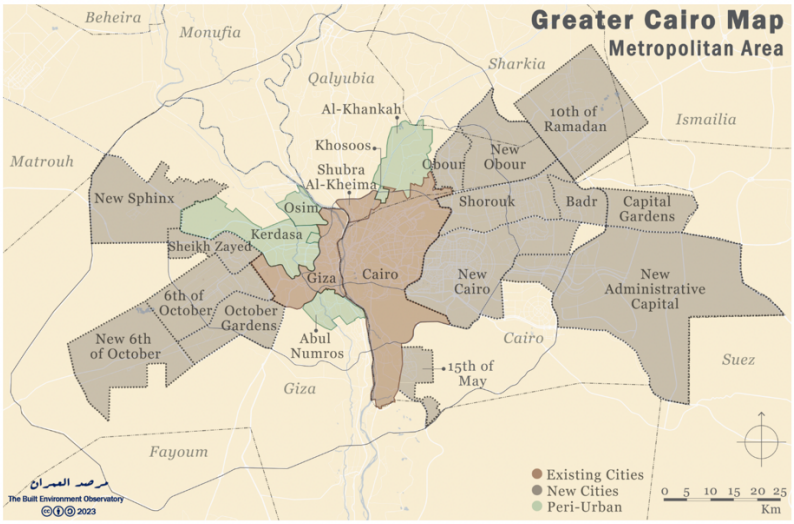


Figure 6 The metropolitan area of Greater Cairo (source: Elmazzahi and Shawkat, 2024)

The development of the metropolitan area's cityscape is influenced by a blend of historical events, narratives of modern urban planning, demographic shifts, economic dynamics, and cultural transformation. A brief overview of the historical key events shaping major neighbourhoods will be outlined, divided into three main phases: the Fatimid Cairo, the Khedival Cairo, and the post-independence Cairo.

The core of the old city, the historic Fatimid city established in 969 A.D., is characterised by traditional Islamic urban planning, featuring human-scale neighbourhoods, a network of narrow streets, and mixed-use buildings. The houses, typically built from stone and spanning two or three floors, are distinguished by their windows adorned with "Mashrabiyah" (wooden lattice window screens) to ventilate the space. These structures are notable for their protruding elements in walking and public spaces, where they provide shade for pedestrians along the way. It is renowned for its dense urban layout and architectural style. It features a variety of structures of residential, religious, and commercial buildings. These include mosques, "*Sabil and Kuttab*" (water fountains and schools) ", *Khankah*" buildings (spiritual retreats), and "*Wakkalah*" (inns and commercial buildings) as illustrated by Attia (2021).

During the nineteenth and twentieth centuries, colonial urbanism introduced monofunctional Western urban forms to Cairo. Areas like Zamalek, Heliopolis, and Maadi were planned by English, Belgian, and French architects to create new societal paradigms, a "modernised" one (Zied Abozied and Vialard, 2020). Heliopolis, also known as Masr El Gedida (translated

as 'new Egypt'), was established in the twentieth century by Baron Édouard Empain. Originally envisioned by Khedive Ismail as an Eastern Paris, he appointed the French planner Haussmann to design a master plan for areas of Downtown Cairo, extending southwest of the old Islamic city of Cairo. It then developed to reflect the influence of the European architecture at this time (Shafik and Salama, 2020).

After the 1960s, significant shifts were introduced in the city's development and urbanisation, influenced mainly by Arab nationalism under Nasser and by the *Infitah* Policies introduced by Sadat. This era was shaped by extensive postcolonial local practices of urban planning and architecture, paving the way for the city to be a regional centre (Figure 7) (Daher, 2011). It also marked the beginning of establishing new cities and urban communities, primarily in response to rapid population growth and global investment needs (Mahmoud and Rashad, 2016). As an example, Egyptian architects Sayyid Karim and Mohamed Riyad planned and built complete neighbourhoods including residential, government buildings, the campus of Al-Azhar University, wide roads for military parades (El Husseiny, 2015), and then centric highways constructed in the 70s by local contractors (e.g. Arab Contractors company implementing 6 October bridge (Figure 7).



Figure 7 Sayed Karim, the Egyptian modernist architect and urban planner, with his maquette of Nasr City (Cairo observer, 2015) on the left and a major transportation project, 6th of October bridge on the right (Baloncici | Dreamstime.com)

The rapid urban expansion in Cairo in the 1990s led scholars to view new cities and communities developed from scratch as symbols of global modernity and consumerism, and to often compare them to American suburbs (Mahmoud and Rashed, 2016). These communities were analysed through various lenses: some view them as an inevitable byproduct of neoliberal urbanism and the emergence of public-private partnerships (e.g. Denis, 2009). Others criticised it and framed their development within practices of exclusion and segregation (e.g. Marafi, 2011).

On the other hand, the development of these communities is regulated by the New Urban Communities Authority (NUCA) (as presented in Table 6 illustrating the governance structure). This is introduced by the state as a way of "depopulating the centre," as previously introduced in Cairo Vision 2050 (presented in Figure 9 in a timeline alongside other central multi-governance policies over the last twenty years). The policy was criticised as a controversial plan due to its top-down approach (Tarbush, 2012). It aimed to treat urban space as a "white paper" on which to draw visions, clearing areas of informal settlements while overlooking the daily realities and challenges faced by the people who live there (Tadamun, 2014; Tarbush, 2012).



Figure 8 One of eastern cities in New Cairo on the left, while another is located in Sheikh Zayed, West of Cairo (TMG, 2025).

Residents of new cities often felt more connected to global networks than to local realities, as El Husseiny (2015) argued, leading to movements from older city centres to newer suburbs (Rifaioğlu and Güçhan, 2007) to fulfil global aspirations. The new communities provide an opportunity also for 'all inclusive' urbanism by enhancing the overall quality of life, and escaping the traffic and deterioration of the centre (Mahmoud and Rashed, 2016). This transformation facilitated the expansion of global capital, particularly through suburbs on the city's outskirts, helping regional and foreign capital to accumulate there (Adham, 2005; Sims, 2018).

This process of neoliberalisation brought substantial changes to both land and built environments, as real estate markets became more liberalised and state involvement in development decreased. Gulf capital played a crucial role in this transformation, aligning

with the broader strategies of the Gulf Cooperation Council (GCC) (Adham, 2017; Hanieh, 2018).

Cairo's regional and global position was challenged in the post-revolutionary era by Dubai, which has set benchmarks with its developments, such as man-made islands and skyscrapers (Daher, 2011). These urban innovations inspire other cities in the region to compete for international investments and business. As a result, this trend served as a starting point for the construction of new capital to foster competitive business environments and attract residents and investors (Bolleter and Cameron, 2021; Daher, 2011), mainly adopting the Dubai model.

Table 6 Institutions and laws governing the transportation and urban development nationally and regionally (Table by author)

Urban Development	
Relevant Institution (present-day)	**Responsibilities**
Ministry of Local Development (MoLD)	-Oversees local governments
Ministry of Housing, Utilities and Urban Communities (MHUC)	-Controls the transportation and development in the New Urban Communities (NUC) as it supervises NUCA and the GOPP
Ministry of Planning and Economic Development	-Prepare transport strategies and policies
General Organization for Physical Planning (GOPP)	-Develop spatial plans and policies -Regulate land uses
New Urban Communities Authority (NUCA)	-Developing and regulating new urban communities
Local Governorates (Cairo-Giza)	- Falls under MoLD - Development and maintenance of the governorate infrastructure and public services

Transportation and mobility	
Relevant Institution	**Responsibilities**
The Ministry of Transport (MoT)	Transport-specific plans
NUCA's transportation regulation unit (TRU)	-Manage transportation operations within the NUC's.
Cairo Transportation Authority (CTA)	- Responsible for the Greater Cairo Region metropolis's transportation system
Land Transport Regulatory Authority (LTRA) (Former The Greater Cairo Transport Regulatory Authority (GCTRA) replaced in 2019)	- Monitoring land transport services, operators, and providers
The General Authority for Transport Projects Planning (ministry of transportation)	-Planning and coordinating major transportation infrastructure projects across the country
Supporting Institutions	
Relevant Institution	**Responsibilities**
Ministry of Environment (MoE)	-Oversees the sustainable mobility projects: public transportation and active travel
The Egypt Environmental Affairs Agency (EEAA)	-Finance the sustainable mobility projects
Institute of National Planning	-Provide data and information relevant to the policies and strategic plans
National institute for governance and sustainable development (NIGSD)	- Provide consultations, research and training programs

Relevant laws and acts	
Law 84/1968	Regulate roads
Law 43/1979	Regulate local roads
Law 87/2018	Ridesharing
Law 124/1974	On road public transport service
Law 55/1975	Paratransit operators services

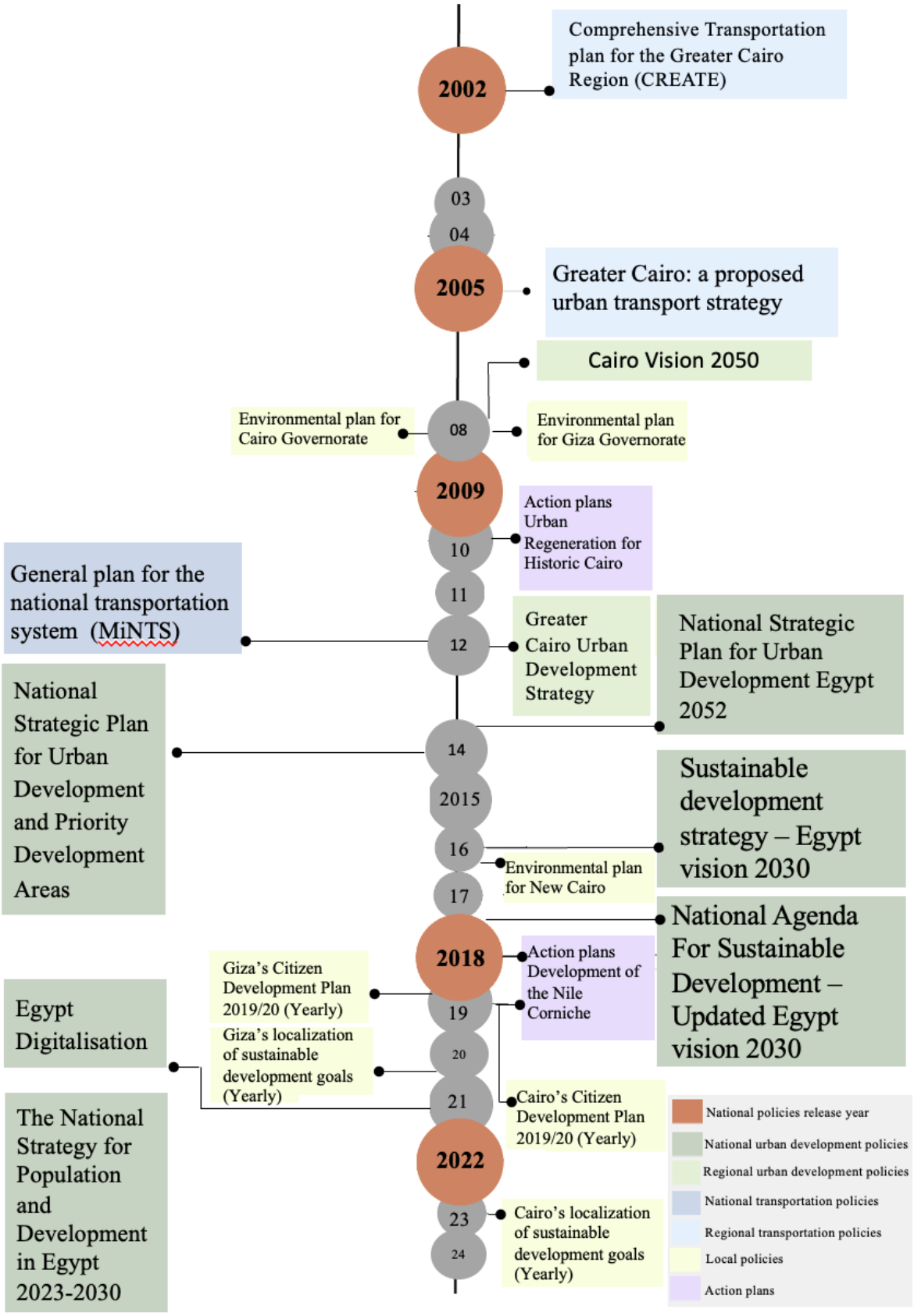


Figure 9 Timeline of Main development and transportation policies

4.3 The Local Scale: Agouza, Madinaty, and Badya in Context

As discussed at the beginning of the chapter, this section introduces the selected case studies and provides background information on their planning histories, characteristics, and relationships with surrounding areas. It outlines the design logic behind the urban form of the three case studies: Agouza neighbourhood, Madinaty City, and Badya City. It is based on the conducted multistakeholder in-depth interviews and supported by relevant previous literature and planning documents.

This section aims to add a theoretical understanding of the case studies within broader urbanisation processes and trace the genealogy of the urban ideals that informed the current case studies of the 15-minute cities.

Agouza Neighbourhood

Agouza, a middle class residential neighbourhood located in central Cairo. as articulated in El-Husseiny (2022), it is a neighbourhood where "you can find everything you need at arm's reach, from glass shops to mirrors, watch repair, bicycle shops, tires, mechanics, car batteries, kiosks, qahwa-baladi, shisha, nuts and patisserie, barbers, coiffeurs, etc." It was initially planned in 1935 and advertised in 1948 as part of the 'Madinat Al-Awqaf,' known today as 'Mohandessin' (Volait, 2022). The development was built and completed after 1955 (Volait, 2022).

The main development idea behind Agouza was driven by a vision to transform state-owned agricultural estates into a planned suburban area for the middle and upper-middle classes. The initial master plan, created in 1934/35 by Mahbub, was influenced by Garden City principles, which are discussed in detail in the literature review chapter. It features wide roads, curved streets, green spaces, and a central park. Although the original plan was abandoned, architect Mahmoud Riad later reimagined the area with a modernist approach, emphasising clear geometric layouts, broad parkways, and low-density villa neighbourhoods designed for the same social classes. Starting in 1948, advertisements began appearing to promote the sale of land plots (Figure 10). The area was envisioned as Cairo's capital counterpart to modernised areas in cities with rich cultural backgrounds, similar to Paris and Vienna, as capital cities with such modernised areas.



Figure 10 One of Agouza advertisements(Source: Old.egypt.history | Instagram)

Agouza is part of the "Mohandessin" area, which translates to "engineers." As the name suggests, the division of land in this area was organised into profession-based housing cooperatives in 1955, with the main aim of creating communities with shared professional backgrounds inspired by the community-driven principle of the garden city movement, as discussed in the historical roots of the 15-minute city concept. This undoubtedly impacted Agouza, both as being part of the area and during its ongoing development.

With the planning context in view, the socio-political changes following Egypt's 1952 revolution, which secured the country's independence from British colonial rule, significantly altered the area. The urbanisation practices that took place in Agouza in the following years can be understood as part of a broader post-colonial urbanism, both in Cairene neighbourhoods like Nasr City and in other countries. These urbanisation practices contrast with the earlier settler neighbourhoods, such as Zamalek and Heliopolis, designed in the early 20th century and mentioned in the first section of this chapter, which leave a vast reservoir of urban and architectural history. It is a lasting impact on cities, shaping their design, layout, and structures, even as these elements have been integrated into the modern urban fabric.

Nevertheless, they also led to the imposition of Western urban systems, design ideologies, and vocabularies such as grid layouts and monofunctional and segregated zoning in these territories, reinforcing British spatial and cultural forms under the pretext of 'civilising' the non-West (Libchaber, 2019).

To provide historical context, Khedive Ismail transformed Cairo in the 1870s with wide Parisian-style boulevards, grand buildings, and projects such as the Suez Canal (Volait, 2001). He was inspired by European reforms happening in the Ottoman Empire at the time known as ‘Tanzîmât’ (Volait, 2001). This brought many European architects to Egypt and also established local schools to train Egyptian architects in these modern styles. Later architects such as Mustafa Fahmi blended these European ideas with Egyptian traditions, creating a unique blend. Though these changes made Cairo look more European, they also cost so much money that they contributed to Egypt's bankruptcy and, some argued, eventually, to the British control (Volait, 2001). Egyptian architects gradually made it their own after independence.

Agouza, in contrast, can be seen as a manifestation of the hybrid and transitional urban thinking that followed the physical colony era, establishing a modern urban identity. An effort was made to blend the urban ideals of this period with localised control and understanding over the urban environment and resources, eliminating the influence of the colonial legacy. This effort resulted in a new set of social, spatial, and cultural characteristics in the neighbourhood, influenced by British modernised urban ideals such as the Garden City principles, though not fully adopting them.

During the post-independence Arab Socialist era 70 years ago, political desires sought to redefine Egypt's identity to reflect national sovereignty (Elsheshtawy, 2013). Architecture and urban planning were used to project a modern, global image. The movement distanced itself from Egypt’s Islamic and colonial heritage. Instead, it built an anti-colonial and pan-Arab vision to craft the new Egyptian national identity. This does not necessarily mean breaking free from the Western urban ideas in the urbanisation of neighbourhoods, including Agouza, but rather positioning it within other global planning ideals as a transitional phase to reclaim the urban landscape in the decolonised nation (Elsheshtawy, 2013).

As outlined earlier, the state-led post-colonial planning visions involved an ambitious effort to impose order, relying on modernist ideals while showing a commitment to localising them to genuinely address community needs and respond to the local realities (Selim, 2014). However, some of these projects were left incomplete due to a lack of expertise, such as the development of the working-class neighbourhood, Boluq (Selim, 2014).

In the middle-class neighbourhood of Agouza, development continued in response to two major local realities: rapid population growth and rural migration into cities. This led to significant densification to accommodate the changes (Figure 12). After nearly three decades, low-rise villas were replaced by high-rise residential buildings to meet housing demands. Then, in the 1990s, economic shifts and infrastructure improvements, such as the construction of the 26th of July Street in 1998, transformed the district into a major commercial and entertainment hub (Figure 11). Over time, the whole area of Mohandessin evolved from a modernist profession-oriented residential neighbourhood into a dense and vibrant urban centre, marked by a mix of architectural styles and socio-economic diversity.



11 The Mobility Network in Agouza [34]



Figure 12 Development stages in Agouza

As mentioned, Agouza was initially planned in 1935 and advertised in 1948 as part of the 'Madinat Al-Awqaf,' known today as Mohandessin (Figure 13) (Volait, 2022). The development was built and completed after 1955 as a large state-owned suburban extension project with park system, large paved ways, and residential buildings, localising the town planning movements at that time (Volait, 2022). Such extensions replaced old village houses with residential buildings (Figure 12) (El-Malt, Attia, and Khalil, 2017). The urban planning direction was the subject of Mahmoud Riad's doctoral thesis, the neighbourhood planner. Riad, who served in the Ministry of Public Works in Cairo Municipality, had designed and

[34] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

prepared the plans for the new development (Volait, 2022). He played an important role in influencing Egyptian architecture and urban planning in the mid-twentieth century with local practices. His work was so influential that his family continued his practice into the third generation, contributing to the design of projects globally (RiadArchitecture, 2023). No clear information was found on the construction delays in Agouza until the mid-50s. It was probably due to World War II and related economic strains.

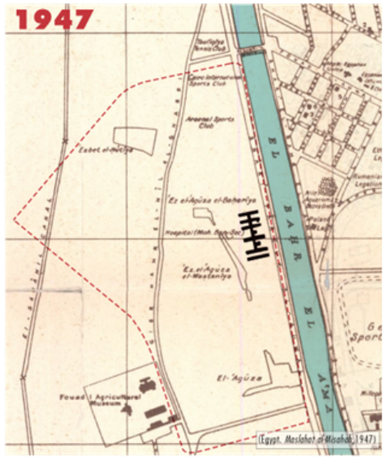
The development of Agouza in the 50s and afterwards has progressed through distinct stages. Each one of them reflected changes in ownership, planning, and urban transformation. Initially, in 1947, the area consisted of royal and agricultural estates owned by the state, characterised by villages, translated as 'Izbas', such as Al-Hutiyya. By 1958, the government, under the guidance of architect Mahmoud Rad, initiated a scheme to transform Agouza into a planned suburban area within Mohandessin, designed with villas and low-rise apartment buildings surrounded by gardens.

In 1985, urban densification began, marked by the replacement or expansion of three-story villas into taller structures, contributing to vertical growth. Developers systematically demolished villas and small residential buildings, replacing them with high-rise apartments (up to 6 storeys). Some argued that it absorbed local migration to Cairo and also maximised financial returns (Edeisy, 2020). Between 1980 and 1992, nearly a third of the neighbourhood’s original structures were replaced with multi-story buildings, drastically increasing population density. Although earlier the government had introduced urban planning laws in the 1970s to regulate construction and curb illegal development, economic struggles following the 1967 war prevented their effective enforcement (Edeisy, 2020). Also, the widespread use of reinforced concrete as a fast and cost-effective material further accelerated high-rise construction.

By the 1980s, official planning efforts sought to manage this growth by reorganising the Greater Cairo Region into 16 planning sectors and encouraging expansion into new settlements such as ‘6th of October’ and ‘New Cairo.’

To support expansion policies, the year 2000 saw the introduction of major infrastructure projects, including the 15th of May Bridge, the 6th of October Bridge, and the 26th of July transit corridor, which improved accessibility but also led to traffic congestion. By 2010, another influx of rural migrants further densified the neighbourhood, transforming it into a crowded residential district (Edeisy, 2020). Gentrification followed, turning Agouza into a

hub for businesses while shifting the neighbourhood's social and demographic mix (Edeisy, 2020). From 2017 to the present, urban renewal projects have revitalised the area, including the regeneration of key streets like 'Sulaiman Gawhar' and 'Street 306,' as well as initiatives like the 'Along the Line' project and the cultural program 'Aash Huna,' translated into 'Lived Here.' These stages collectively narrate Agouza's evolution from a rural estate to an urbanised district with a mobility network that serves the area. Figure 13 on the next page shows Agouza's development timeline. The next three pages complement each other. (The next three pages complement each other)



Mostly Royal and Agricultural estates owned by the state, consisiting of villages and *"'izbas"* such as *Al-Hutiyya.*



Newly Built Highway Roads & Transit Corridors

The opening of 15th of May bridge, 6th of October transit bridge and 26 of July transit corridor led to an increased accessibility but also traffic and congestion.



Some streets regeneration projects
Along the Line project
Some of the Aash Huna initiative

Several urban renewal projects has taken place, like the regeneration of important streets such Sloiman Gawhar and street 306, and *Along the line* project, and the cultural initiative *Aash Huna.*

1950 1960 1970 1980 1990 2000 2010 2020 2030



The government developed a scheme for Agouza as part of Mohandessin, planned by Egyptian architect Mahmoud Riad. The area was planned for villas and up to 3-story apartment buildings with gardens.



Vertical Densifiaction Newly Built Buildings

Urban densification occurred not only through the emergence of new buildings but also through vertical densification, where 3-story villas were either replaced or extended into taller structures.



Further Densification

After a process of further urban densification due to an influx of rural emigrants, the neighbourhood turned into a crowded residential district, and later gentrification led to transforming it into a densely populated hub for businesses.

Figure 13 Timeline of Agouza's Development (Note: This Figure is to be printed in a foldable wide format)

Madinaty City

Madinaty is a large-scale, built-from-scratch new city east of Cairo. The master plan, covering 8,000 acres, was established in the early 2000s and developed in phases between the 2000s and 2010s.

In the context of the rise of new industrial and residential cities in Egypt since the 1970s, Madinaty City was developed as an urban expansion to accommodate middle- and upper-middle-class residents, primarily from overcrowded areas such as Naser City. As the state began to step back from urban planning, private developers like the Talaat Moustafa Group (TMG) took on the responsibility of developing new residential areas. In the 2000s, TMG, through its operating arm, the Arab Company for Projects and Urban Development (ACPUD), introduced projects such as Al-Rabwa, Al-Rehab, and later Madinaty, contributing to the broader trend of suburbanisation (El-Husseiny, 2024).

The main purpose of developing Madinaty was to create a residential project that meets residents' needs by providing essential, well-planned activities and services, and to serve as an investment outlet, as mentioned in one of the ads (Figure 14). This concept revolves around building an integrated city, based on a planning approach in which a central service strip runs through the city, with 15 residential districts surrounding it, and places of worship serving as hubs for community connections. This strip serves two purposes: offering centralised services at the city level and acting as another hub connecting the residential neighbourhoods, which in this case comprise ten districts.



Figure 14 One of Madinaty City advertisements

Madinaty City embodies a hybrid urban ideology. It blends aspirations of global modernity with local identity under the slogan "Madinaty: An International City on Egyptian Soil[35]." Designed to attract middle- and upper-middle-class residents, Madinaty also embodied the state's vision of urban spaces that could accommodate the "happy Egyptian family." The extent to which these marketing slogans are materialised and embedded in residents' lived experiences will be critically examined in the findings chapter, drawing upon in-depth interviews with residents.

The layout created a situation in which clear boundaries were drawn between the residential area and its immediate surrounding greenery, and the non-residential/commercial areas, which serve as gathering places for the city's activities/potential crowds. The city is encircled by a green barrier with entrance gates, serving as a buffer zone between the urban area and the surrounding transportation network and highways (Figure 16). This coherent urban form and its stages/processes of development can be understood through the lens of planetary urbanism, as defined in the literature review chapter.

The emergence of large-scale urbanisation has led to the development of "urban galaxies," as Brenner and Schmid (2022) argued, blurring traditional distinctions between rural and urban areas. This phenomenon results in settlements that combine elements of both environments, creating mid-sized towns interconnected with other urban regions and the urban city core. Such developments can also be seen as "edge cities." It is characterised by the merging of urban and non-urban features, as exemplified in Madinaty City, including concentrated service strips and expansive, separated residential zones surrounding it. This challenges the conventional urban-rural dichotomy.

Madinaty's urban fabric seamlessly blends suburban living with convenient access to the broader city's amenities and activities, while maintaining a connection to Cairo's urban core. This interconnectedness of urban and non-urban features blurred the line between the city

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[35] MadinatyAlyoum, 2012. إعلان مدينتي | *Madinaty Commercial*. Available at: https://www.youtube.com/watch?v=te-_XNnEm9U [Accessed 14 January 2025].

Talaat Moustafa Group, 2018. Madinaty | مدينتى. Available at: https://www.youtube.com/watch?v=X4onzt8tbpA [Accessed 14 January 2025]

CBC, 2019. Madinaty: A global city on Egyptian soil | مدينتي.. مدينة عالمية على أرض مصرية. Available at: https://www.facebook.com/CBCEgypt/videos/457253155146915/ [Accessed 14 January 2025]

and the town as Charmes and Rousseau (2022) argue, due the phenomenon of planetary urbanism. Noticeably, a process of localisation occurred in parallel. The urban forms responds to the need to accommodate the increased population through multi-story residential buildings. The 'Craft Zone' serves as a modernised 'Souq,' revitalising local markets to better serve the community's activities.

On the other hand, Madinaty City reflects broader shifts in Cairo's urban governance and economic strategies, as a public-private partnership model marked by a retreat of the state from direct urban planning in Favour of privatised development, exemplifying the neoliberal trend in which market forces dictate urban expansion, as elaborated earlier in this chapter. Following the Egyptian revolution and other political instability in neighbouring countries, Madinaty attracted displaced populations, such as refugees from Iraq and Syria, seeking temporary safety and starting businesses, thereby intertwining its evolution with regional geopolitical dynamics.

Going through some of the main design features, Figure 15 shows the master plan of Madinaty City, designed as mentioned by ACPUD with contributions from local and international design firms of Dar-El Handasa, HHCP, SWA, and Sasaki. Serving as focal points for community gatherings, provisioned shopping centres, modernised markets, and places of worship are discussed below as key design features.

In Madinaty, each district is designed with a fully equipped service centre, typically covering about 300 feddan. The standardised provision of commercial and service amenities, in the form of shopping centres, later began to play a role in new cities in reshaping urban consumption patterns. However, the layout ensures that residents can reach their daily essential needs within the district. Each district (referred to as 'D' in Figure 15) is designed with a standard set of services, including the basic everyday facilities, a mosque, supermarket, bakery, pharmacy, library, and kindergarten. Often, an administrative building is also included to support the management and coordination of services.

The central planning logic in the services centre extends to recreational spaces but in a wider hierarchy to cover the city level, such as the club, which spans approximately 150 feddans, and the Central Park areas, covering 70-80 feddans, offering green areas and sports facilities that connect the community on a neighbourhood level. The central strip, then, is complemented by a core city-level area on the outskirts, including key facilities such as markets and multiple malls that serve the entire city. The hierarchy of services constitutes a

deliberate spatial framework that structures urban life, facilitating differentiated access to essential amenities across multiple scales: localised, neighbourhood level, and overarching city-wide facilities.



Figure 15 The distribution of districts in Madinaty City (produced by author based on (TMG, 2007))[36]

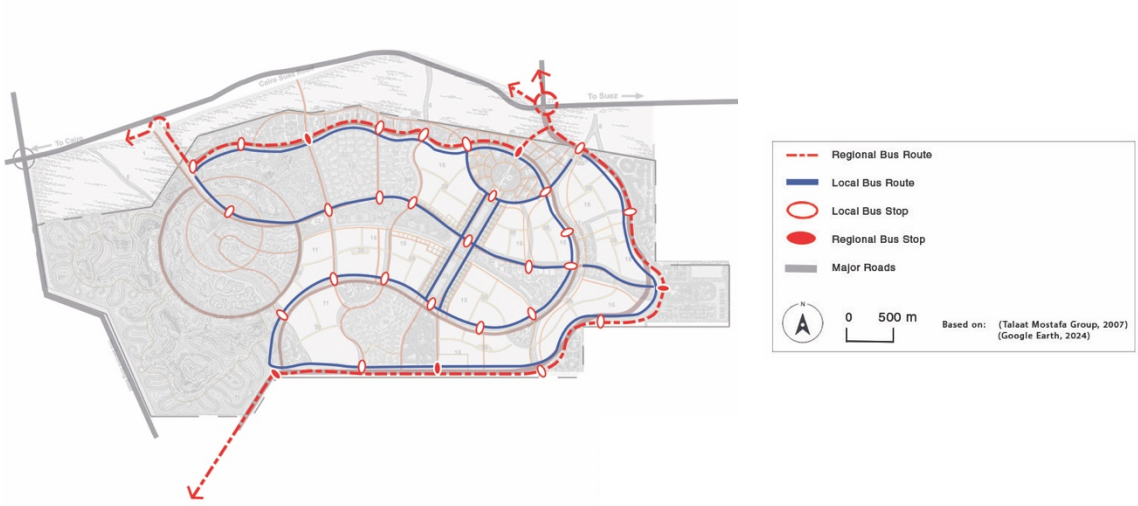


Figure 16 The Mobility Network of Madinaty City (produced by author based on (TMG, 2007))

As stated by the design lead at TMG, places of worship are often among the first facilities to be operational in the city for an immediate sense of community. As mentioned earlier, it

[36] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

is planned to serve as a focal point for the emerging community. Their early establishment reflects cultural expectations and the reliance on spiritual institutions either mosques or churches, beside other sports facilities, to function as a central gathering spots.

Markets also play a role in the city's design. Inspired by the early concept of Rehab's (another TMG'snew city in new Cairo) market, the idea evolved into Craft Zones, first seen in Madinaty. These zones address the need for services like artisans, repair shops, and medium-scale industries, Reducing the need for residents to travel to other specialized urban areas within the Greater Cairo Region for such services. Craft Zones provide a self-sufficient solution, to day-to-day repair and crafts requirements.

As discussed, the planning logic following hierarchy of services and proximity-based models, embedded essential services with different urban scales to reduce commuting influenced by different urban ideals framed in the literature. The interrelationship between the social and economic dimensions within the planning model of Madinaty highlights its role in shaping the residents' lived experiences within a 15-minute range, which will be further explored in the following chapters.

Figure 17 in the next page shows the timeline of Madinaty's development. The next two pages complement each other.

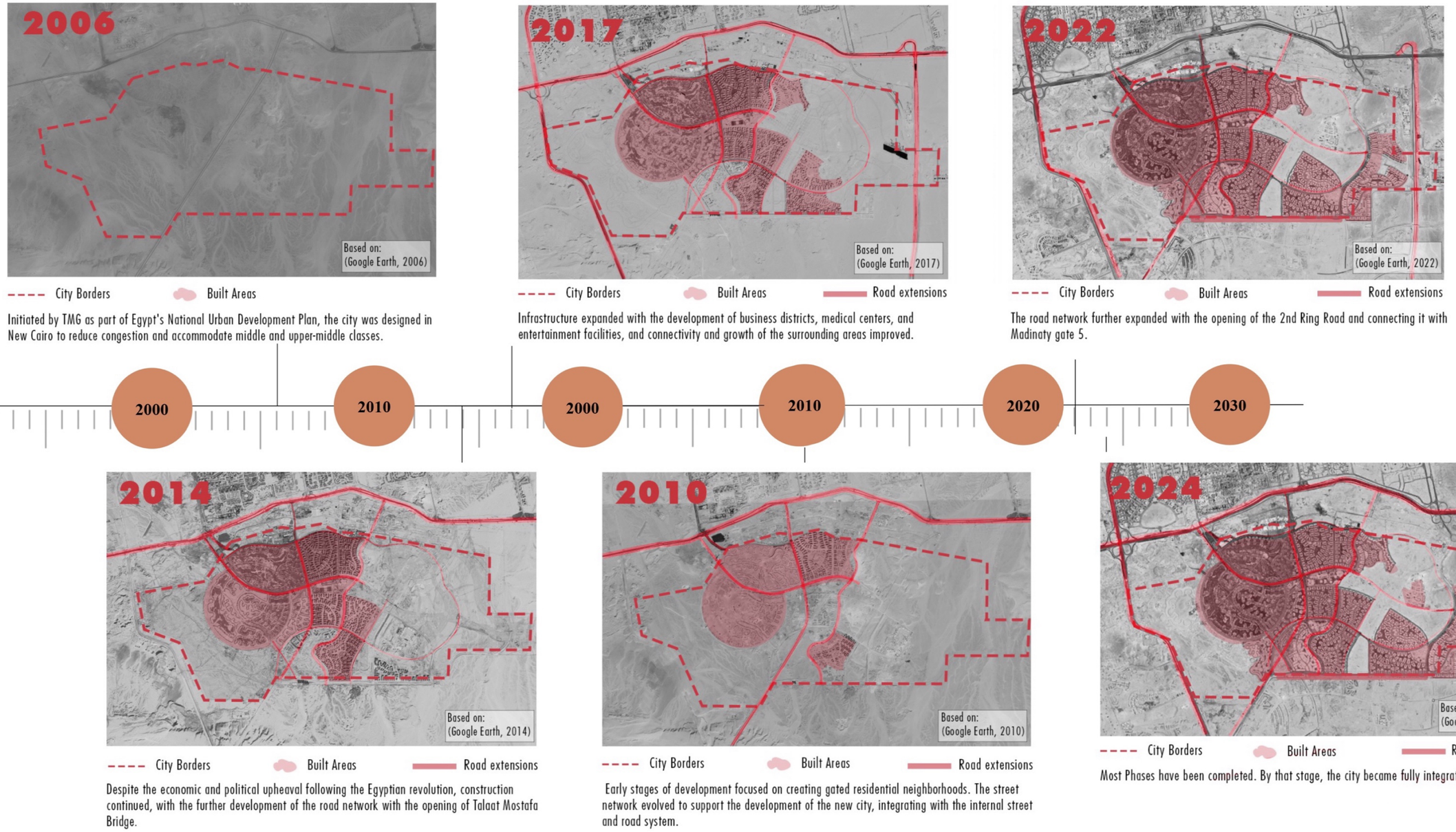


Figure 17 Timeline of Madinaty's Development (Note: This Figure is to be printed in a foldable wide format)

Badya City

Badya is a large-scale city built from scratch west of Cairo, located at New 6th of October area and part of its master plan. It was launched in 2018 by Palm Hills Development (PHD) with a development plan between 2019 and 2030 in multiple phases (Figure 18).

Badya reflects the country's complete shift towards neoliberal urbanism, where private developers take the lead in creating large-scale new cities following the transformations in the state's role. The state has repositioned itself as a facilitator and regulator of large-scale private projects. The state has repositioned itself as a facilitator and regulator of large-scale private projects. This shift has empowered private developers to dominate new city-making. It allowed them to take over urban spaces, focusing on creating high-end residential areas designed for the middle and upper-middle classes.



Figure 18 One of Badya City's billboards

Badya presents an explicit embodiment of the 15-minute city concept, purposefully designed to meet residents' everyday needs in 5, 10, and 15 minutes, a vision evident in its master plan brochures and marketing campaigns[37]. The city draws on the aspirations of the creative city and creative class (Florida, 2003), to craft a branded lifestyle centreed around everyday

[37] *Palm Hills Developments, 2018). |Badyã| by Palm Hills Developments. [YouTube* video] Available at: https://www.youtube.com/watch?v=eFhJLliTpnkandt=1s [Accessed 15 January 2025].

Palm Hills Developments, 2021/. Badya: A City of New Worlds. [YouTube video] Available at: ***https://www.youtube.com/watch?v=kp0RojCNYYI*** *[Accessed 15 January 2025].*

activities that are designed to be fulfilled within the city. As discussed earlier in the literature, the aspirations of the creative city revolve around attracting talent and creative individuals, later elaborated as skilled individuals, instead of focusing on firm-centric attraction, with policies designed around this vision. However, given the differences in non-Western contexts, new cities are never purely single-functional; rather, they are inherently multifunctional, even if in the form of just integrating service centres as discussed earlier.

With reference to international debates, the vision of the creative city was later criticised for its sole focus on investing in upscale cultural facilities rather than balancing economic growth to benefit low-income areas, or at least for the absence of such thinking (Perry, 2011; Malanga, 2004). Globally, some residents even expressed feelings of alienation due to a shift in the political and cultural landscape in the transitioning neighbourhoods, as Hyra (2014) argued, resulting in consequences such as the back-to-the-city movement (Hyra, 2014).

Influenced by the principles of the new urbanism movement, but notably representing a different approach (illustrated in Figure 19), Badya is built from scratch on a once-empty desert plot to accommodate the growing population and serve as a spatial fix. It aspires to meet essential everyday urban needs while promoting a slower, more balanced and grounded pace of life. This vision cultivates the interconnectness of a small-town lifestyle within a structured urban framework. Also, the extent to which these marketing slogans are realised and reflected in residents' everyday experiences will be thoroughly analysed in the findings chapter, based on insights gathered from in-depth resident interviews.

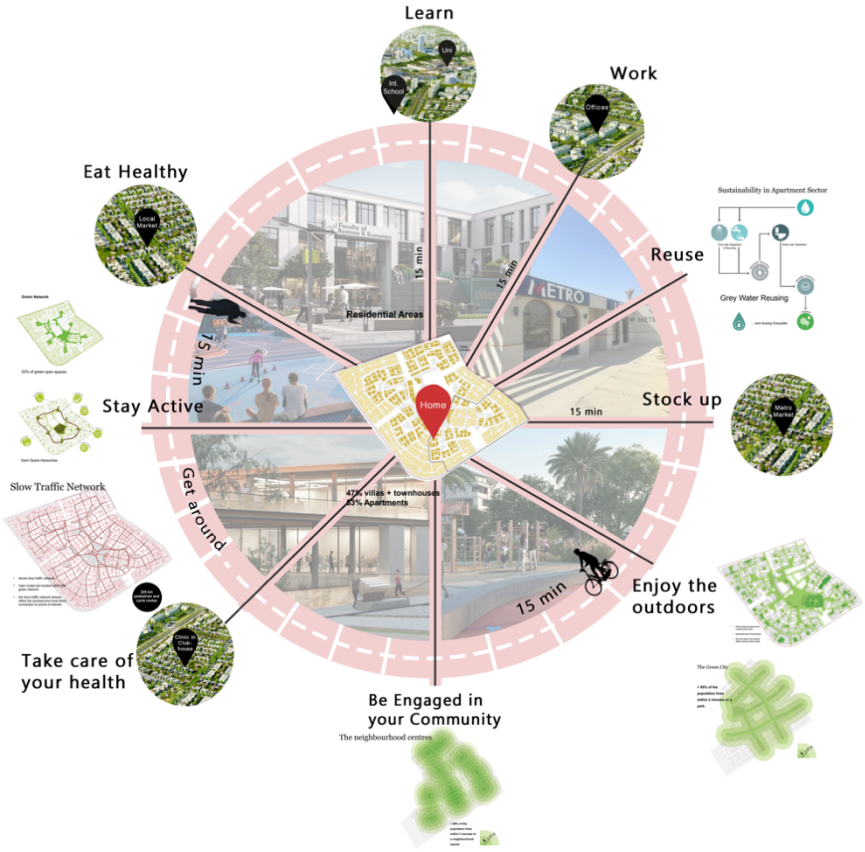


Figure 19 Badya's adoption to the principles of the 15-minute city concept (based on PHD and AS+P (2018))

This form of interwoven urbanisation as Jain and Korzhenevych (2022) and Brenner and Schmidt (2022) argued is where urban areas adopt rural characteristics, and vice versa. Similarly, Monte-Mor (2014) viewed that the boundary between what defines urban and rural life is blurred and hard to define, as urban space stretches across both nearby and distant territories. Characteristics of this newly formed hybrid landscapes in Badya allow for the blending of urban lifestyles with a rural-like environment (e.g. greenery , low-rise buildings, and separated zoning) maintaining the vibrancy of city life without compromising calm and slow-paced lifestyle, evident in the continuous stream of commercials for the city[38].

[38] Palm Hills Developments, 2024. Badya presents Egypt's first college town, The Village. [YouTube video] Available at: https://www.youtube.com/watch?v=JA3kXumpeng [Accessed 15 January 2025].

Palm Hills Developments, 2022. *Badya Stories | The one without a hi. [*YouTube video] Available at: https://www.youtube.com/watch?v=6q-FaVIDhds [Accessed 15 January 2025].

To trace the development in the design and urban form, initially marketed as a creative city, it aligns with many traits of this concept. These include encouraging a cultural and creative economy, as evidenced by the planned cultural district and efforts to attract creative professionals. Figure 22 illustrates the main stages of development. Moreover, these initiatives were clearly communicated through the city's advertising campaigns and television ads[39]. The city also supports collaborative networks, particularly with the inclusion of a university, which encourages interaction between various sectors. Sustainability remains a core value within the Creative City framework (Florida, 2003), further aligning Badya with this model.

While the development of a thriving arts scene, a key feature of the Creative City, is still uncertain, as the city is not yet fully completed, it was promised as part of the city's vision later shifted to the 15-minute city concept ideals. Consequently, Badya was first developed by blending Garden City and Creative City principles; however, it later evolved into a 15-minute city model, without any engagement with the creative city ideals, as the examination of the master plan revealed. The urban form is a tangible expression of this.

To better understand the urban form of Badya, the following paragraphs will briefly go through the city's main design features. The 5, 10, and 15 minutes zones will be discussed along with the distribution of the 15-minute city concept facilities.

Upon entering Badya, the urban sequence unfolds with villa developments, followed by apartment subdivisions distributed across six primary districts. This diversity of residential units is regulated by a security-controlled entry point that leads into a self-contained community. The zoning framework systematically organises the six residential districts (referred to as 'D' in Figure 20), converging at a centrally positioned service hub that functions as the city's core for essential amenities and economic activities.

To ensure the districts are interconnected yet self-sufficient, the first district, for example, is outlined horizontally along the street, forming a square as shown in Figure 21. Four of the districts are similar in layout, and the six districts are designed as harmonious replicas.

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[39] *Palm Hills Developments, 2018). |Badyã| by Palm Hills Developments. [YouTube* video] Available at: https://www.youtube.com/watch?v=eFhJLliTpnkandt=1s [Accessed 15 January 2025].

Each district accommodates residents' daily and weekly needs through a structured provision of commercial, recreational, and social amenities. For instance, ‘District 1’ incorporates a clubhouse, a market, cafés, and restaurants, a localized consumption patterns and potential economic activity within the city’s internal urban economy.

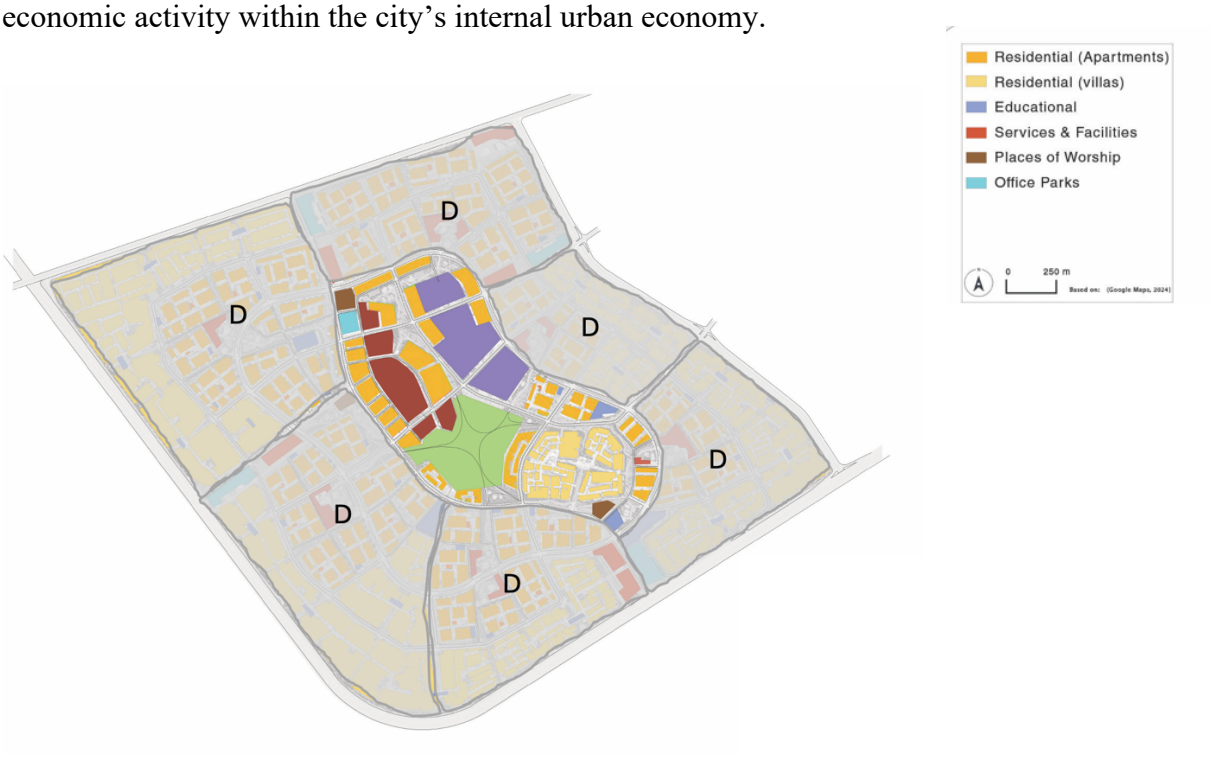


Figure 20 The distribution of districts in Badya City[40]

[40] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

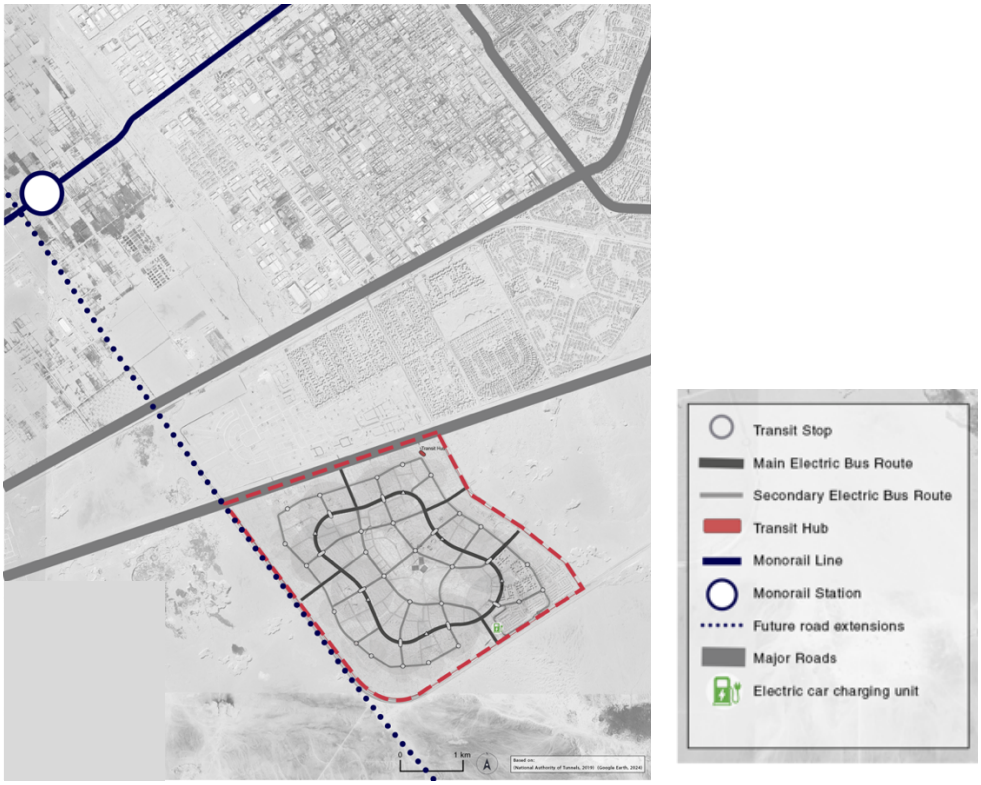


Figure 21 The Mobility Network of Badya City

Similar to Madinaty, to further embed a community-oriented lifestyle, districts integrate sports and recreational facilities, such as padel and basketball courts, for an active social engagement and well-being. This zoning logic serves a dual purpose: it minimises the necessity to commute to other districts to access essential services while also shaping residents' spatial practices and mobility patterns within the daily, local, urban fabric. For city-level services, the Green Zone spans 80 feddans and is one of the city's standout features, including the city's main sports club.

In contrast to Madinaty, there is specific attention paid to the hierarchy of educational services, including a high-level one. The educational amenities are distributed across the districts and include a higher education institution, the 'Badya International University' (a private university in partnership with the University of Riverside in Texas). This collaboration currently houses five faculties. The primary and secondary education amenities are distributed, with four international schools: three built and operated, and one under construction.

To create a city-level commercial and service nucleus, the Downtown area of Badya serves as such by being strategically designed to facilitate localised economic circulation. By centralising essential services: retail, dining, entertainment, and recreational spaces, this

model reduces residents' reliance on external urban centres in other areas of Cairo outside of Badya. As a placemaking strategy, this city-level amenities integrates commercial and leisure: cinemas, shopping complexes, and green spaces, to spatially shape patterns of social and economic interaction and shape everyday life within predefined parameters. As said by one of the developers, the emphasis on convenience-oriented urbanism is intentional to attract residents who travel outside Egypt frequently and prioritise seamless access to essential services upon return.

The city's master plan, developed by the German firm "AS+P," sets out the zoning as described above. Villas are placed centrally, with apartments on the outskirts, allowing for better natural airflow and ventilation throughout the city. This arrangement ensures that all residential areas are well-integrated into the overall design, and well-ventilated, making the design of the city as a whole practical to accommodate both needs for stand-alone villas and compact apartments.

Badya's planning model demonstrates how social and economic factors intersect to structure residents' everyday lives within a purposed 5, 10, and 15 minutes radii, a theme that will be analysed further in the following findings chapters.

Figure 22 in the next page shows the timeline of Bayda's development, followed by a timeline summary (Figure 23) of the development of the three case studies in a two pages that complement each other.



Figure 22 Timeline of Badya's Developmen (Note: This Figure is to be printed in a foldable wide format)

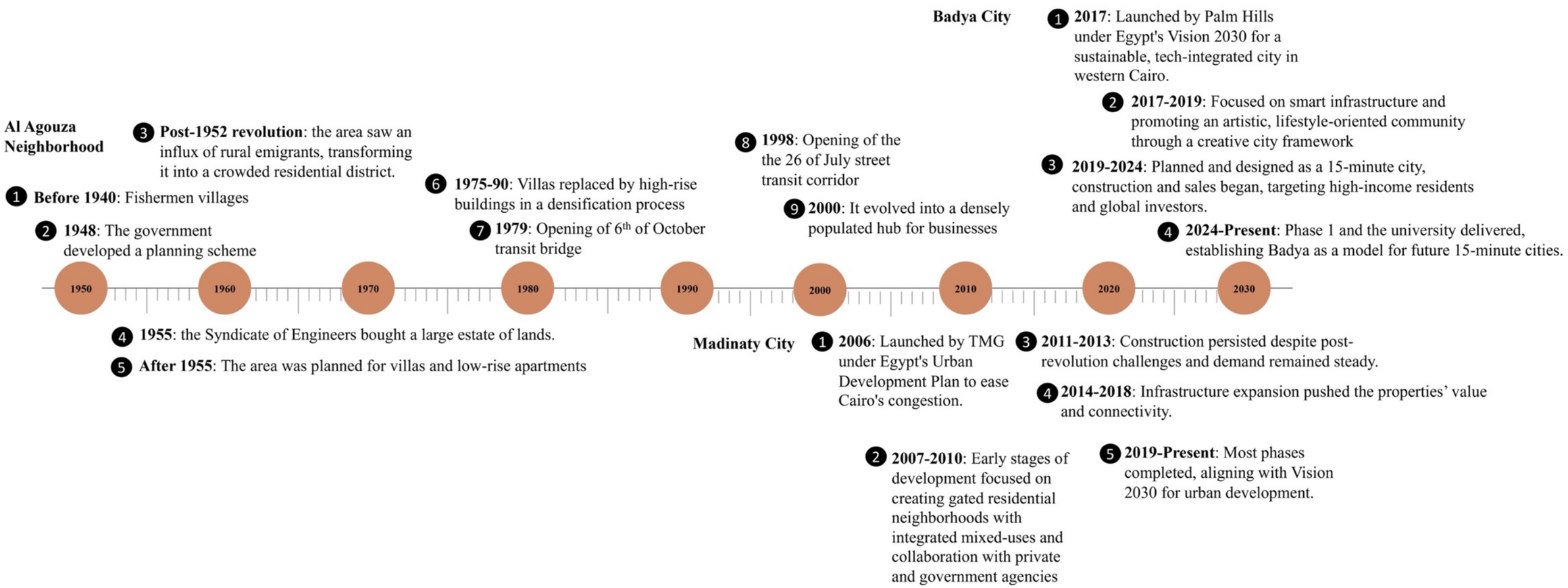


Figure 23 Key Milestones and Transformations in Agouza, Madinaty City and Badya City (Note: This Figure is to be printed in a foldable wide format)

Building on the earlier discussion of Greater Cairo's governance frameworks, policy instruments, and development timelines, the focus now turns to the three case studies themselves. The broader analysis has shown how national visions and planning agendas, from state-led housing strategies to public–private initiatives and emerging smart city discourses, have shaped the metropolitan trajectory. What follows below examines how these agendas materialize within specific urban contexts in the three case studies, and also introducing different typologies of spaces and buildings. Each case study reflects a distinct mode of planning and identity: Agouza, embedded in long-standing Egyptian policies of development and structured within historic transport corridors such as Nile Corniche and 6th of October bridge. Madinaty, developed as a flagship public–private partnership with international aspirations as detailed below and Badya, envisioned as a technology-driven new satellite city tied to lifestyle trends and smart mobility trends. To anchor these narratives; the analysis draws on a series of spatial maps, covering density, land use, building heights, street patterns, and mobility networks, that illustrate how policy frameworks are translated into concrete urban form and mobility infrastructures. These are introduced in detail below.

4.4 Egyptian Policies, Identity and Transportation Corridors in Agouza

The neighbourhood of Agouza has evolved over time through a continuous layering of architectural, social and cultural transformations, as highlighted in Chapter 3 of the case studies' context. This evolution shaping the urban form and networks of mobility can be observed in multiple dimensions of its spatial characteristics, including urban fabric, density, land use distribution, building heights, streets and mobility networks.

As mapped in Figure 24, Agouza's urban form is characterized by a radial core with a grid-like periphery as shown in the urban fabric map. Two main nodes, such as prominent squares, *Midan*, act as central hubs, creating a strong focal point for community activity (usually used as a place for a landmark or garden centres, *Mashtal*) while ensuring efficient land division. The neighbourhood demonstrates a mix of different eras planned growth (as previously demonstrated in the urban development map), with its evolving characteristics now manifesting the principles of the newly framed '15-minute city' model. Despite not being designed with this framing in mind, it has naturally/gradually adopted mixed-use, dense, and diverse characteristics, as seen in its markets, *Souqs*, (Figure 24) integrated into the urban fabric (Land-uses map, Figure 24). These souqs and mixed-use streets cultivates the core of vibrant area and accessibility to the basic facilities.

Agouza is a highly dense neighbourhood (see density map in Figure 24), with compact urban forms that utilize land intensively. This density is evident in the variety of services available on the same street, ranging from private to public amenities (as shown in land uses map). The streets are often busy with delivery bike drivers (Figure 24), reflecting the impact of digitalization on mobility and proximity of supply needs. Additionally, the demographic diversity extends the potential for broader social integration within public spaces and shaping of the neighbourhood's cultural identity.

The cultural identity has developed with an added layer, especially in the past two years, as a result of political instability in neighbouring countries. This period of upheaval has led to an influx of diverse nationalities, with Sudanese communities being particularly prominent. The presence of Sudanese-owned businesses, such as uniform shops and bakeries, serves as tangible evidence of this migration, offering a glimpse into how the new arrivals have influenced the neighbourhood's busy daily life and cultural fabric. There is also a past influence from Yemeni businesses, such as restaurants in the area.



Figure 24 One of the local market, Souq, in Agouza on the left and the delivery bicycle of one of the supply aplications on the right

The zoning is varied, with residential cores interspersed with two primary *Souqs* and other services. Most commercial activities are concentrated along the edges of the area, while significant institutions such as schools, hospitals, and government offices occupy larger plots as shown in the land uses map. Residential buildings predominantly consist of 4-5-story structures, alongside a few towers and villas, while ground-floor spaces often house mixed-use shops, banks, or warehouses for delivery services such as 'Talabat.' However, the distribution of land uses is somewhat unstructured in specific areas of the urban fabric reflecting evidence of informality.

As represented in the building heights map, the neighbourhood exhibits a mix of old and new architectural styles with different housing types. While most buildings are over five stories tall, some villas remain, serving as remnants of a past era where owners resisted demolishing their homes in favour of newer developments. These villas contrast with the increasing densification of the area. Many 'old-fashioned' shops are no longer fully operational due to economic shifts, but they remain nostalgic landmarks, often used as filming locations by the film industry. An example is the vinyl record shop, which evokes glimpses of the 1980s trends that defined that period, remaining largely unchanged since



Figure 25 In the left photo of one of the Sudanese businesses and on the right one of the old shops used in filming

then.

As shown in the mobility network map, the transportation corridors shaping the mobility networks in Agouza have also undergone significant changes, further shaping the ongoing changing dynamics. Key additions like the 15th May Bridge and the 6th of October Bridge have expanded the mobility network, improving accessibility and connectivity within the area. While these transport corridors are instrumental in facilitating the movement of people and public transportation, they are also intricately intertwined with the urban fabric that facilitates walkability in the area.

In the last twenty years, as broader urban patterns in Egypt have changed, Agouza faces challenges that affect the diversity of recreational facilities and walkability. This includes limited green spaces, as evident in the land-use map, which is targeted in Egypt's 2025 strategic plan as a national urban challenge in the historical areas of Core Cairo. The plan highlighted the severe lack of green spaces and encouraged the creation of public spaces for walking to the facilities. It also noted that this shortage is particularly evident in some Cairo neighbourhoods, which resemble massive urban blocks with little greenery or open spaces.

Moreover, the dominance of private cars (85% of vehicles) on Cairo's streets contributes to congestion and reduces the usability of public space by using streets as parking for this large number of cars. Despite these issues, Agouza's existing features, such as its mixed-use layout and souqs, offer a foundation for the neighbourhood's use as a 15-minute city model. For instance, projects like the Cairo Bike initiative, implemented following the Misr National Transport Study (MiNTS), aim to implement gender-responsive design and expanded access to active travel facilities.

The strategy, along with the National Strategy for Population and Development 2023-2030, also indicated the overcrowding, labelling it as "poor population distribution" that leads to pressure on services and traffic problems. The need to attract new populations to leave the core areas and move to new cities arises as the population has increased drastically over the last 50 years. As a result, this population growth needs to be accompanied by spatial expansion.

Figures 26 to 28 in the next pages show the spatial analysis of Agouza, including the mapping of the urban fabric, building heights, land uses, density, street and mobility networks[41].

[41] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.



Figure 26 map of Agouza's urban fabric on the left and buildings height on the right as part of the spatial analysis



Figure 27 map of Agouza's land-uses on the left and density on the right as part of the spatial analysis

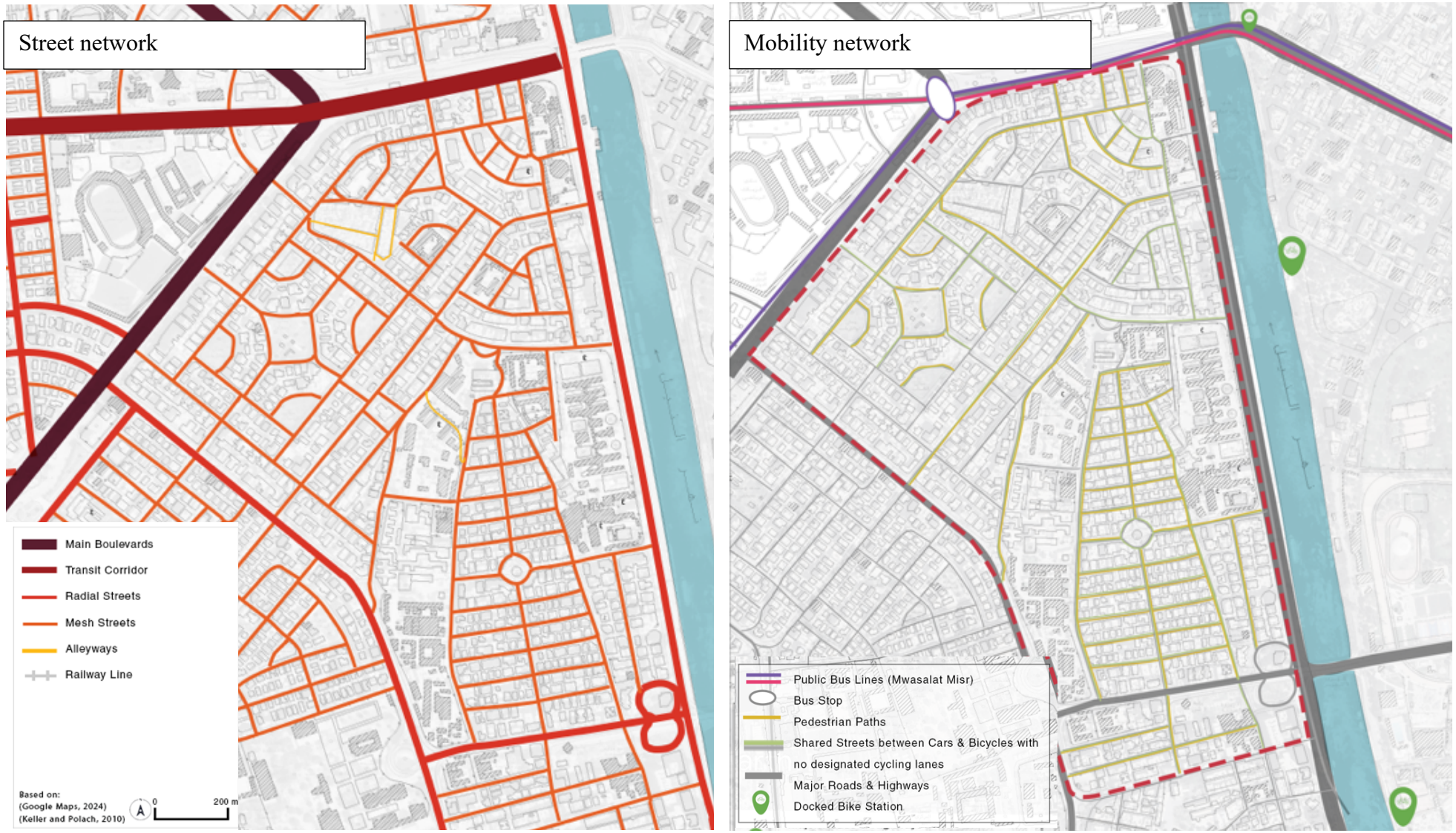


Figure 28 map of Agouza's street network on the left and mobility network on the right as part of the spatial analysis

4.5 Public-Private Partnership and International Cities in Madinaty City

The urban layout of Madinaty City, which draws on New Urbanism ideals[42], reflects a state-led policy vision to expand the city with new developments for middle- and upper-middle-class residents relocating from overcrowded inner-city areas. Designed by ACPUD in collaboration with US firms, its plan adapted American modern urban principles to the Egyptian context, incorporating localised mixed-use service areas alongside residential clusters. It consists of large green spaces and main facilities of places of worship located at the centre of residential zones, as elaborated in the case studies' context chapter. Unlike Agouza, there is a clear separation between different residential buildings, creating a diverse range of housing units forming different density ranges, from high-density areas to very low-density ones (density map in Figure 34). The urban form is characterised by a radial core with a grid periphery (see Figure 31), along with a mix of curving and circular street networks. The residential buildings vary in height (building heights in Figure 32), with most being 5-12 stories high, while a significant number are 2-5 stories high. Four main plots are designated for buildings over 12 stories, while there are also areas with buildings less than 2 stories.

In terms of land use, the area is predominantly high-density, with villas representing low-density zones. There are two mixed-use strips in the middle of the area, characterised by high density. Commercial areas, however, are limited in contrast with Agouza's land use distribution. There are no mixed-use developments or shops at ground level, except for a strip of densified commercial areas in the middle, such as shopping centres and other commercial centres known as "craft zones," which represent the modern transformation of the local urban landscape of *Souqs*. These areas serve as a bridge between traditional Islamic

[42] Many of them mentioned here: MadinatyAlyoum, 2012. إعلان مدينتي | *Madinaty Commercial*. Available at: https://www.youtube.com/watch?v=te-_XNnEm9U [Accessed 14 January 2025].

Talaat Moustafa Group, 2018. Madinaty | مدينتى. Available at: https://www.youtube.com/watch?v=X4onzt8tbpA [Accessed 14 January 2025]

CBC, 2019. Madinaty: A global city on Egyptian soil | مدينتي.. مدينة عالمية على أرض مصرية. Available at: https://www.facebook.com/CBCEgypt/videos/457253155146915/ [Accessed 14 January 2025]

city structures and modern urban shopping forms, embodying the identity of the city as “International city on Egyptian soil.”



Figure 29 Madinaty's shopping centre on the left and Crafts Zone on the right

The urban development follows a phased approach, with each phase being proposed to and approved by NUCA (New Urban Communities Authority), allowing for the city to evolve gradually. The development is designed to avoid overcrowding, maintaining the residential nature of the area by limiting the presence of offices to small designated strips. This design is in line with the afore-mentioned National Strategy for Population and Development 2023-2030, the relocation of populations from the core urban areas to new cities, driven by the rapid population growth. and the phased development of these new cities planned to help accommodate this growth.

Regarding local businesses, business activities and spaces like offices have limited presence in the city zoning in one main land plot at the north west of the city. Informal/unregulated economic activities also have a limited presence, such as cooking food at residential buildings’ kitchens and selling it on online platforms such as large food apps, which are prevalent.

In contrast to Agouza, as for institutional structures, there are no governmental institutions. Schools are located on the outskirts. The area does not feature large-scale hospitals either. This is evident in the land use map.

Green spaces, particularly in the city’s core, are an important consideration. The design appears to address the historical issue of shrinking green areas by dedicating larger portions of the city to green spaces, reflecting an ecological approach in the choice of landscape materials, aligning with the national strategic plan that aims to encourage building new cities with modern infrastructure and abundant green spaces.

Aligning with Egypt's Vision 2030, focusing on expanding affordable housing options in new cities and the resulting agreements with NUCA to deliver a specific number of residential units to act as social housing units in Madinaty.

Regarding the mobility networks, public transportation is also a key component of the city's design, with a bus fleet and bus routes that connect the city to Cairo's urban core. The street network is designed to separate bus routes from other vehicles which serves better mobility for residents despite the lack of dedicated active travel infrastructure. There is a noticeable lack of dedicated cycling lanes, despite the presence of a designated slow lane which has been used informally as a cycling lane. This reflects a limited reliance on cycling infrastructure, as demand for such facilities has not yet grown significantly.





Figure 30 Madinaty's walking paths on the left and the slow lane used for personal transporters and active travel on the left

The development of the city clearly follows Egypt's Vision 2030, which emphasizes the importance of the transportation sector in supporting development in new cities, as the plan focuses on creating a well-connected transport network to make new cities more accessible and liveable. This includes planning for integrated transport network (mobility network map in Figure 36). At the same time, Vision 2030 aims to ease the strain on crowded urban areas by encouraging people to move to these new cities, helping to reduce the pressure on housing and public services in areas like Agouza while offering a more balanced and sustainable way of living. Figure 31-36 in the next pages shows the spatial analysis of Madinaty including the mapping of the urban fabric, building heights, land uses, density, street and mobility networks.

43

Urban Fabric

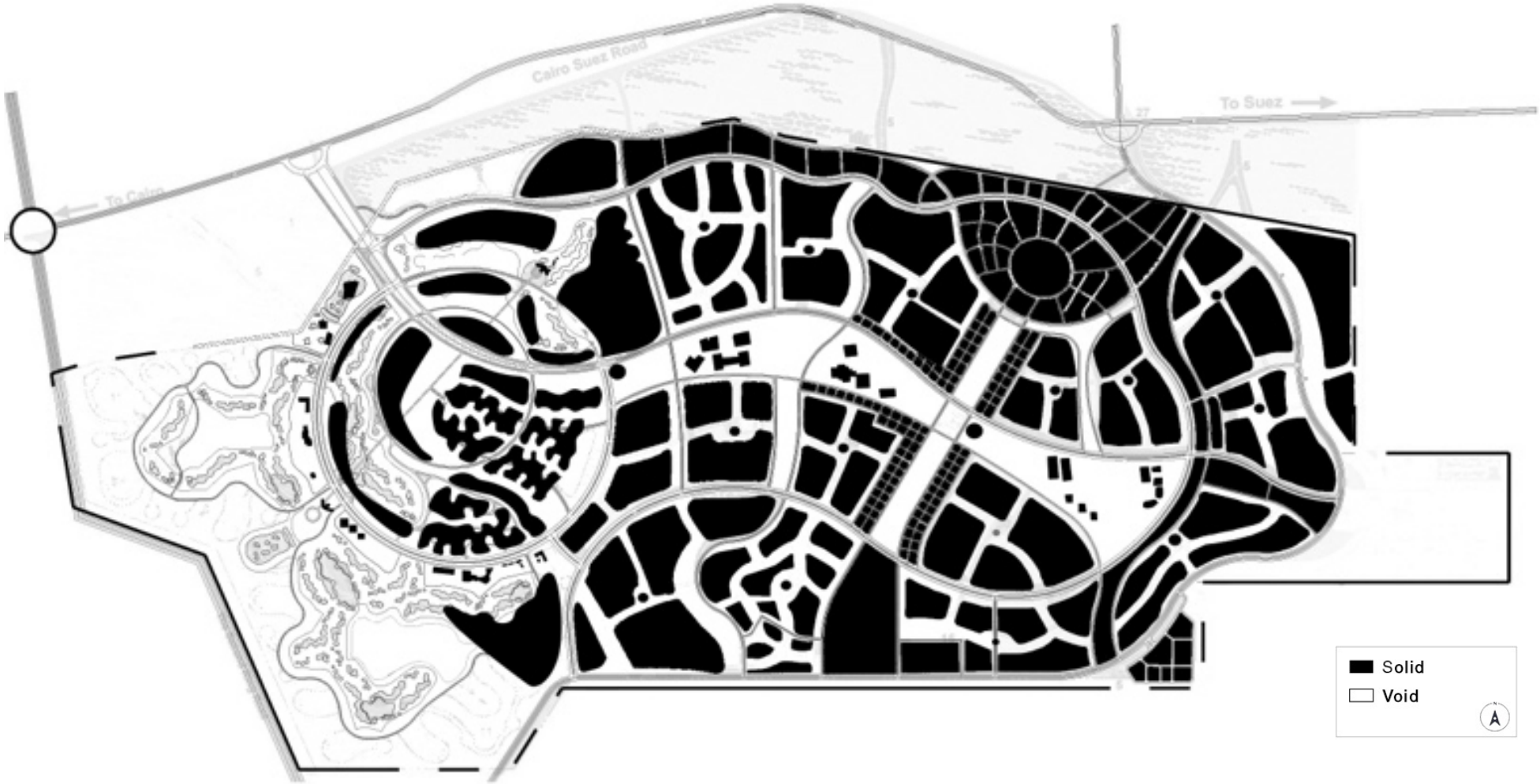


Figure 31 Map of Madinaty's urban fabric as part of the spatial analysis



Figure 32 Map of Madinaty's building heights as part of the spatial analysis



Figure 33 Map of Madinaty's land-uses as part of the spatial analysis



Figure 34 Map of Madinaty's density as part of the spatial analysis



Figure 35 Map of Madinaty's street network as part of the spatial analysis

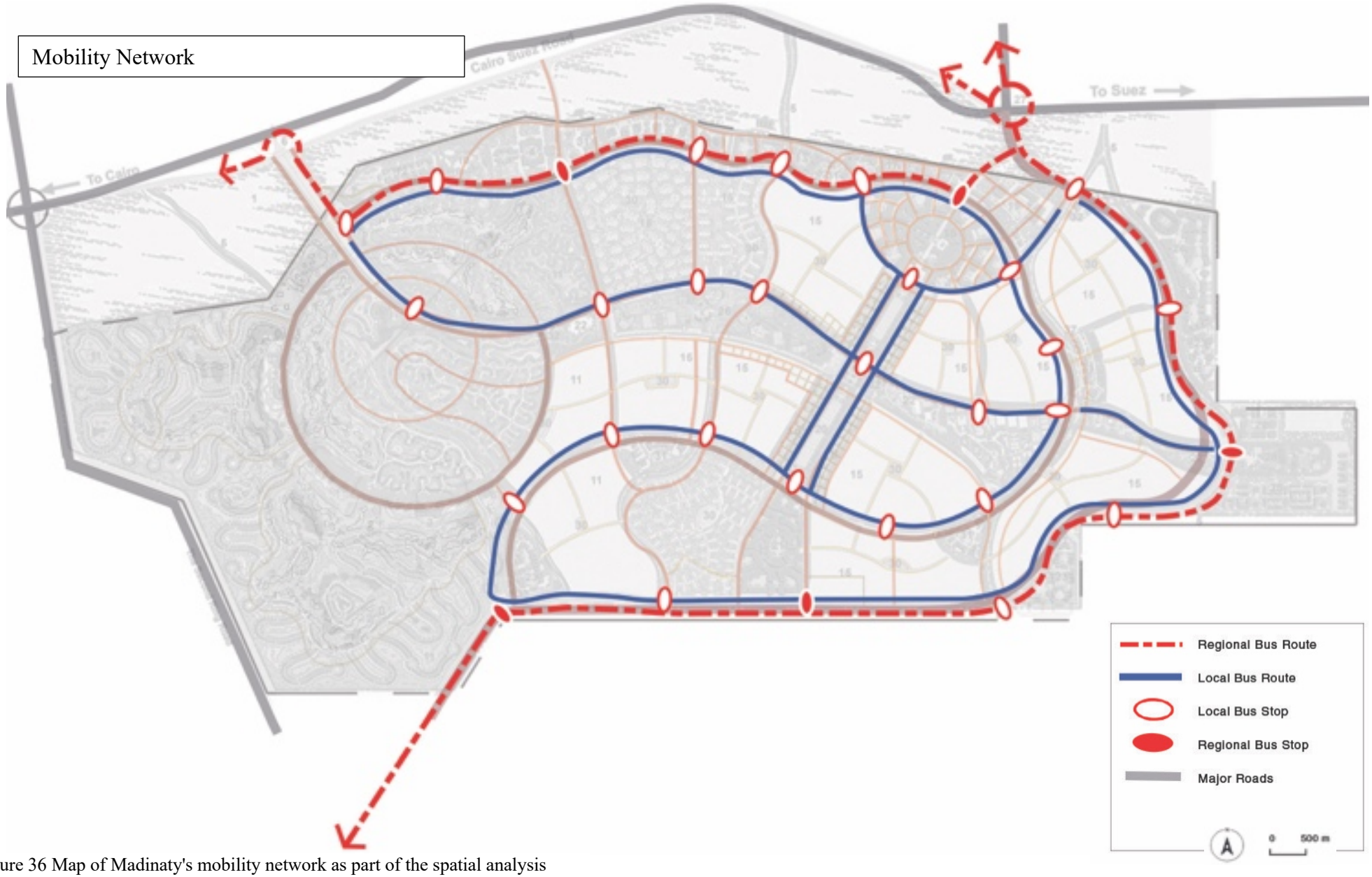


Figure 36 Map of Madinaty's mobility network as part of the spatial analysis

4.6 Technology-Driven Policies, Lifestyle Trends, and Smart Mobility in Badya

Badya City, part of Egypt's Vision 2030 expansion policy, was designed by AS+P Albert Speer + Partner to address population growth and promote sustainable urbanisation. Initially envisioned as a creative city, its plan evolved into a localised 15-minute city model that integrates European urban ideals with smart city principles. Inspired by future urban trends, Badya city embodies smart city principles and efficient urban systems, designed from scratch as a 15-minute city model. Specific patterns in the urban form and mobility networks are interwoven to define the city's distinctive functional character, shaping spaces for everyday activities.

Since 2014, state-led initiatives have implemented a strategic plan for urban development aimed at expanding built-up areas and creating smart cities that rely on integrated smart facilities and a unified digital infrastructure (Kamal et al., 2020). While Badya is not a government-developed city like New Administrative Capital (NAC) or New Alamein, it aligns with such initiatives and with the global development trends.

The urban plan incorporates eco-friendly innovations in the street infrastructure, such as solar panels, lanes for autonomous buses, and energy-efficient architecture (Figure 37). Additionally, charging stations for electric vehicles further accommodate growing trends of electric car usage (Mobility network map in Figure 44).



Figure 37 EV chargers on the left and solar panel lighting units on the right

With an urban fabric establishing a radial urban core surrounded by a grid-like periphery, and a mix of curving streets, Badya's zoning reflects a distribution of land uses that meets

the residential areas' urban needs (see the urban form map in Figure 39). It is clear from the density and building heights maps that the distribution of land uses could be analysed as smaller plots on the periphery house low-density residential areas. Meanwhile, larger plots in the urban core are dedicated to commercial services, educational facilities, and office buildings. Badya University, as the largest educational facility, for instance, occupies a prominent central location alongside major commercial hubs and sports facilities such as Palm Hills Sports Club. The tallest buildings are concentrated at the core, ensuring unobstructed views and optimal air ventilation throughout the city. Denser areas are concentrated in the north, helping manage urban heat. In regions with hot climates, such as Egypt, positioning denser areas in the north can reduce direct sunlight in southern zones.

Residential clusters are designed with smaller services at their centre, providing a hierarchy of accessibility and movement (see land uses map in Figure 41). Residents do not need to travel long distances for basic needs, reflecting the principles of a 15-minute city. The city's functional identity is primarily shaped by a service hierarchy, ranging from local amenities within residential clusters to large-scale commercial and educational facilities.

Recreational services such as green spaces and various landscaping elements are also distributed to provide this hierarchy of services. Unlike Madinaty, the land plots dedicated to businesses and office buildings are distributed across residential clusters and the central business district. Educational facilities cater to the target demographic of middle and upper-middle income classes, offering four main international schools (in partnerships with prestigious academic institutions). Despite the variety in educational facilities, there is a noticeable absence of public educational facilities and social housing in contrast with Madinaty, which forms a public-private partnership and offers a number of units as social housing.

Even though there are plenty of green spaces and family-friendly facilities (Figure 38), the city still lacks other recreational options like cinemas, theatres, and art centres that could help the 'creative class' thrive, and provide spaces for residents working in such industries to collaborate, innovate, and engage in cultural activities. Instead, the city, like other new cities, emphasises 'planned bonding' through designated gathering spaces, sports clubs, and communal areas. Meticulously designed to appeal to residents searching for a fulfilling lifestyle, these spaces are not spontaneous or stimulating, nor do they foster the natural social interactions that develop over time in areas like Agouza and the social interactions developed in places like the 'local Souqs.'



Figure 38 Recreational spaces in Badya

While there is significant attention to quality of life, the city's design fails to build on elements shaping local identity, as TMG did with the 'craft zone' in Madinaty or with other cities' historical layers. Instead, it reflects global trends and the aspirations of middle and upper-middle-class residents. Although the city is designed to meet this growing demand for international living standards, it raises questions about its disconnect from local urban systems and whether it truly represents a departure from local reality or an aspiration for global lifestyles. Figure 39-44 in the next pages shows the spatial analysis of Madinaty, including the mapping of the urban fabric, building heights, land uses, density, street and mobility networks[44].

[44] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

Urban Fabric



Figure 39 Map of Badya's urban fabric as part of the spatial analysis

Building Heights



Figure 40 Map of Badya's building heights as part of the spatial analysis



Figure 41 Map of Badya's land-use as part of the spatial analysis

Density



Figure 42 Map of Badya's density as part of the spatial analysis

Street Network



Figure 43 Map of Badya's street network as part of the spatial analysis

Mobility Network

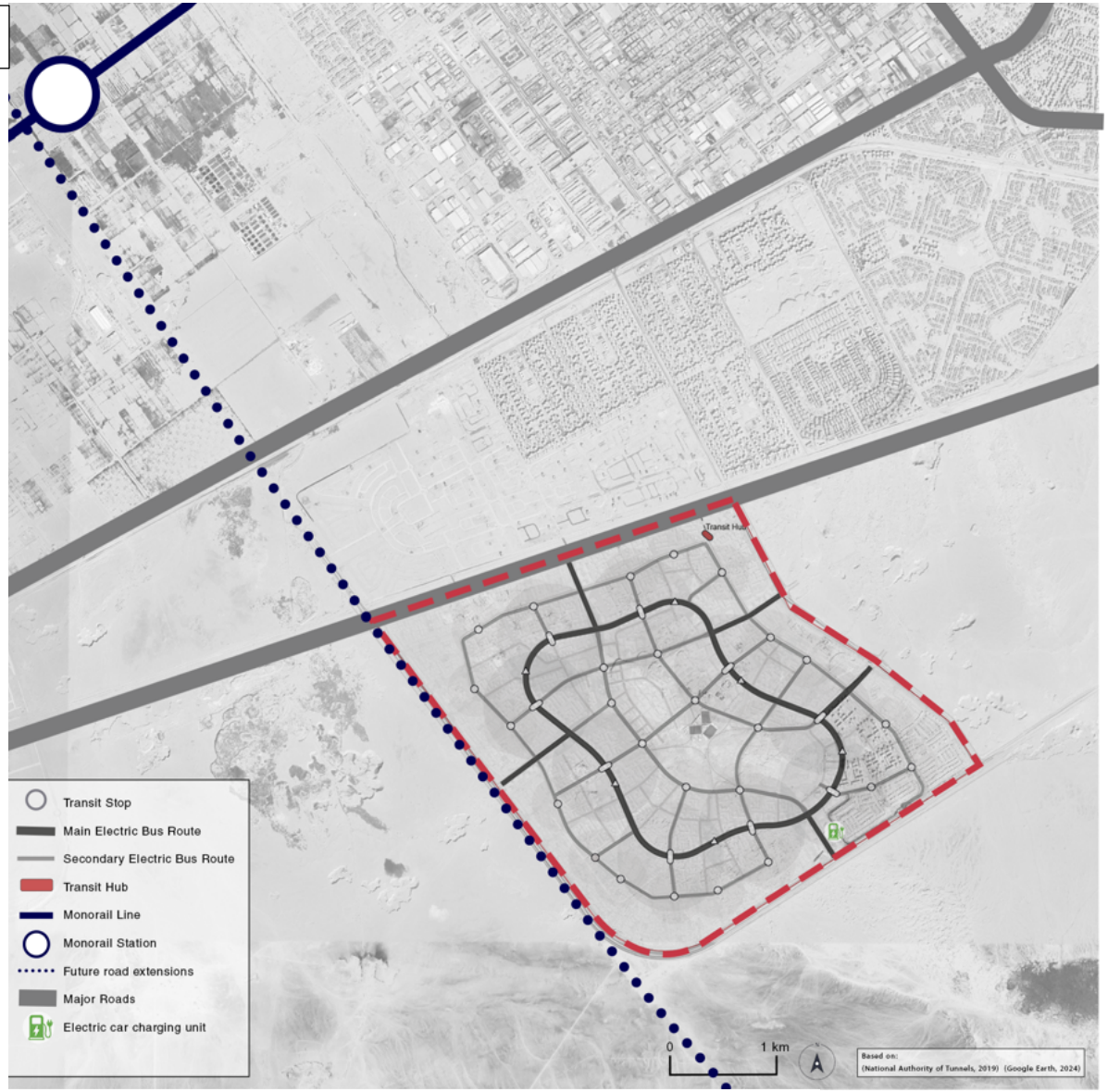


Figure 44 Map of Badya's mobility network as part of the spatial analysis

4.7 Summary

Looking across the Greater Cairo context as shown in this chapter, it becomes clear that urban growth of the metropolis region has been driven by overlapping ambitions and pressures. Multiple policies have sought to relieve congestion in the old city, expand housing supply, and project images of modernity. Yet, alongside these official visions, everyday practices and social networks have continued to shape how neighbourhoods actually function. These ongoing interactions and dynamics between planned expansion and lived reality are central to understanding the city today.

The three case studies capture distinct sides of this development while also reflecting the broader lineage of planning ideals discussed previously in detail in the literature review. Agouza, with its long history, embodies the layered character of the inner city, where formal and informal patterns meet, but it also resonates with a localised version of the Garden City principles introduced in mid-twentieth-century Cairo. Madinaty, by contrast, illustrates how the principles of New Urbanism have been adapted to the Egyptian suburban context, resulting in a planned, serviced environment. Badya, still under construction, represents the most recent iteration of private-sector visions for sustainable, future-oriented cities, an experiment that speaks to contemporary global debates around the 15-minute city concept, with a hierarchical serviced centre, while its lived reality continues to take shape.

Taken together, these cases underscore the contrasts within the same metropolitan region. They show how national policies, planning, private development, and local socio-cultural dynamics intersect in heterogeneous ways, creating very different forms of urban life. This context sets the stage for the next findings chapters, which turn from policy frameworks and history to the spatial analysis of how the principles of the 15-minute city concept are distributed and experienced across the three models: Agouza, Madinaty, and Badya.

Chapter 5: Proximities and Distribution of the 15-Minute City-Radius Facilities: The Case of Agouza, Madinaty, and Badya

5.1 Introduction

This chapter uses service-area spatial analysis to further explore the urban forms of the case studies within the 15-minute city concept framework[45]. Four analytical metrics are used: cumulative opportunities-based accessibility, land use mix (entropy), functional redundancy, and space syntax (integration) (CLFS framework). They are integrated as complementary layers to explain the spatial patterns revealed through the analysis. To ground these findings, insights from residents' interviews are included, linking quantitative measures of proximity with lived experiences of access and everyday mobility.

Through spatial analysis of the service area, three overarching patterns of facility distribution were found across the case studies: embedded, clustered, and hierarchical. These spatial arrangements reflect how existing urban morphologies (see Hakim, 1986 and AlSayyad, 2011) engage with and respond to the ideals of the 15-minute city concept. Each pattern constitutes a distinct layer within the urban fabric, as spatial mapping usually reveals (e.g. Elfadaly and Lasaponara, 2019). This shapes diverse lived experiences of proximity and influences how accessibility to everyday services is perceived and navigated. A detailed analysis of the results for each case study will follow.

Embedded distribution is a spatial pattern in which essential services and facilities are distributed throughout residential areas, allowing for immediate, walkable access and promoting integrated, mixed-use development, often emerging in organically developed or retrofitted urban contexts. This integration is closely aligned with the ideals of Gehl (2010) and Jacobs (1961) regarding everyday urbanism and local autonomy.

Clustered distribution is a concentration of facilities within designated centres or hubs, such as neighbourhood cores, town centres or transport nodes, serving multiple surrounding areas and encouraging focused activity and trip efficiency. It reflects a more formalised and often

[45] The detailed methods used to produce the data and the steps of analysis in this chapter is outlined and elaborated upon in the methodology chapter.

market-driven logic of urban accessibility, aligned with what Hall and Pain (2006) and Calthorpe (1993) argued about polycentricity.

Hierarchical distribution is a multi-layered arrangement of services based on frequency of use and functional importance, ranging from local daily needs to district-level or city-scale facilities, reflecting a multi-level availability model. This is linked to central place theories (Christaller, 1933) and is usually integrated into city planning scale-sensitive frameworks that seek to balance proximity with broader regional coherence at multiple levels (e.g., UN-Habitat, 2022).

Although the 15-minute city concept is not only about spatial proximity, as discussed in chapter 2, examining the distribution of facilities within different models in a x-minute radius format is essential for understanding how spatial justice and lived accessibility are enacted on the ground. While the concept aspires to ensure equitable access to everyday services within a walkable or cyclable distance (Moreno et al., 2021), its realisation is deeply dependent on the actual spatial configuration of these services across different case studies.

Hence, following the chapter that discusses the contexts at the regional scale of the Greater Cairo Region and the local scale of the case studies, this chapter examines the distribution of 15-minute city-radius facilities in Agouza, Madinaty, and Badya, closely examining their availability and accessibility for residents interviewed. The methodology used to generate the spatial distribution maps is detailed in Chapter 4.

Each distribution model, whether embedded, clustered, or hierarchical, reveals distinct dynamics in the availability and accessibility of local services. These differences are shaped not only by spatial form, but also by the type and scale of facilities present, including variations between public and private typologies. The analysis further highlights a diversity in service types, particularly in recreational amenities that cater to a range of age groups, social interests, and everyday needs. A wide range of businesses, institutions and facilities was identified, operating at different scales, from small, locally embedded enterprises to larger city-level institutions. In some sectors, such as education, facilities were found to be structured across stages. These dynamics provide insights into the layered, functional logic of service distribution across the urban landscape in the three case studies, each shaped by distinct historical trajectories. Therefore, this chapter will also serve as an entry point for exploring the typologies of spaces for each facility.5.2 The Distribution of 15-minute city-Radius Facilities in Agouza

Through the service area analysis of Agouza, ‘embedded distribution’ emerged as the most prominent spatial pattern for the organisation of facilities around the residential areas. The specific organisational structure will be examined in detail in the following sections.

Through the four analytical metrics used: cumulative opportunities-based accessibility, land use mix (entropy), functional redundancy, and space syntax (integration), distinct patterns emerged. Walking revealed localised access with strong centre–edge imbalances, cycling expanded reach to more than 150 facilities in just 5 minutes, and as a result, has the potential to mitigate these imbalances. Land use diversity shaped the vibrancy of daily life, and redundancy exposed the resilience of services across the neighbourhood. The space syntax analysis reveals a strong configurational hierarchy at the global scale, while at the local scale (R5) it appears largely homogeneous, with little differentiation between streets[46]. Together, these patterns highlight that accessibility in Agouza is not only a matter of proximity in a 15-minute radius, but also depends on the diversity of functions, the density of opportunities, and their ubiquity and street connectivity. The specific results of the four analyses will be discussed in detail.

Supply, Food and Businesses Proximities in Agouza

Across the three neighbourhoods, supply and everyday businesses reveal a split between embedded mixed-use fabrics and node-based planned landscapes. In the first type, facilities are distributed along permeable streets, and daily needs are within walking distance. In the second type, services are concentrated in centres, and access becomes more mode-dependent. In Agouza, the first type translates into a high walkable reach supported by both fine-grained retail distribution and strong commercial corridors.

[46] In space syntax analysis, Rn (e.g. R3, R5) refer to syntactic radii, indicating how far movement is calculated from each street segment, e.g. R3 means connections within three turns (a unit in the space syntax) in the street network, roughly capturing local neighbourhood movement, while R5 extends further to capture a wider area. The numerical values (e.g., 16.6–66.2) are integration scores: the higher the number, the more accessible and likely to attract activity a street is.

There is a diverse range of supply facilities in Agouza, including small kiosks, supermarkets, large hypermarkets, and local souqs (see Figures 45 and 46). A broad spectrum of small and mid-sized businesses is distributed across the neighbourhood (see the maps below).



Figure 45 Types of supply facilities in Agouza, local supermarket on the left and local markets, souq, on the right

Office buildings, including government institutions, are primarily clustered in the southern part of Agouza and along the Nile Corniche street (Figure 47). The most common businesses are small-scale food and beverage enterprises. While hypermarkets are relatively scarce, local supermarkets are well distributed, providing full coverage within walking and cycling distance.

Ready-to-eat food options (Figure 46), though fewer in number, are diverse in form. Fine dining restaurants are concentrated along the Nile Corniche, while smaller restaurants, bakeries, and similar food providers are spread throughout the area, ensuring accessibility for people of different income levels.

The 'cumulative opportunities–based accessibility' analysis shows that the walking scenario at a 15-minute threshold reveals a strongly localised pattern of accessibility[47] and a centre-edge gradient of walking. Central neighbourhoods can have between 170 and nearly 200 opportunities in total, while peripheral areas have fewer than 100. This centre–edge gradient

[47] Please refer to the methodology for basic definitions of methods used.

highlights the concentration of opportunities in the urban centre and its limitations on the edges for those who rely exclusively on walking.

By contrast, cycling, even at the short five-minute threshold, transforms the accessibility landscape, with most areas reaching between 150 and 200 opportunities and some achieving as many as 238 facilities within five minutes of cycling. Extending the cycling threshold to 15 minutes produces the most balanced outcome, with accessibility peaking at 238 opportunities and the edges of neighbourhoods enjoying levels of access comparable to those in central areas. In this sense, cycling primarily equalises peripheral access rather than changing the underlying spatial logic of supply and business distribution.

'Space syntax- integration' analysis of Agouza's 'global integration' shows a balance between metropolitan integration and neighbourhood residential intimacy [48]. Global integration values range from 74.7 to 225.7, with the highest scores concentrated along the east–west and the southern roads. By contrast, the interior fabric records values between 74 and 153.

At the neighbourhood scale, 'local integration values' (R3)[49] between 16.6 and 66.2 show how activity is distributed. Extending the radius (R5), the same structuring corridors re-emerge as dominant, with values peaking above 76, while interior lines remain low. The outcome is a dual system: highly connected corridors that support commerce and flows, and sheltered interiors that preserve community-oriented living. Overall, this duality underlines Agouza's unique ability to combine city-scale accessibility with the preservation of a stable, neighbourhood atmosphere. The next paragraph links these spatial patterns to the thematic analysis of participants' interviews on access to supply points and business facilities[50] [51].

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[48] In space syntax integration, local means how easy it is to reach nearby streets from a street, while global means how easy it is to reach the wider city network from it.

[49] In space syntax analysis, Rn (e.g. R3, R5) refer to syntactic radii, indicating how far movement is calculated from each street segment, e.g. R3 means connections within three turns (a unit in the space syntax) in the street network, roughly capturing local neighbourhood movement, while R5 extends further to capture a wider area. The numerical values (e.g., 16.6–66.2) are integration scores: the higher the number, the more accessible and likely to attract activity a street is.

[50] Please note that in all the following maps the scale differs from the walking maps, as the cycling catchment is larger.

[51] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

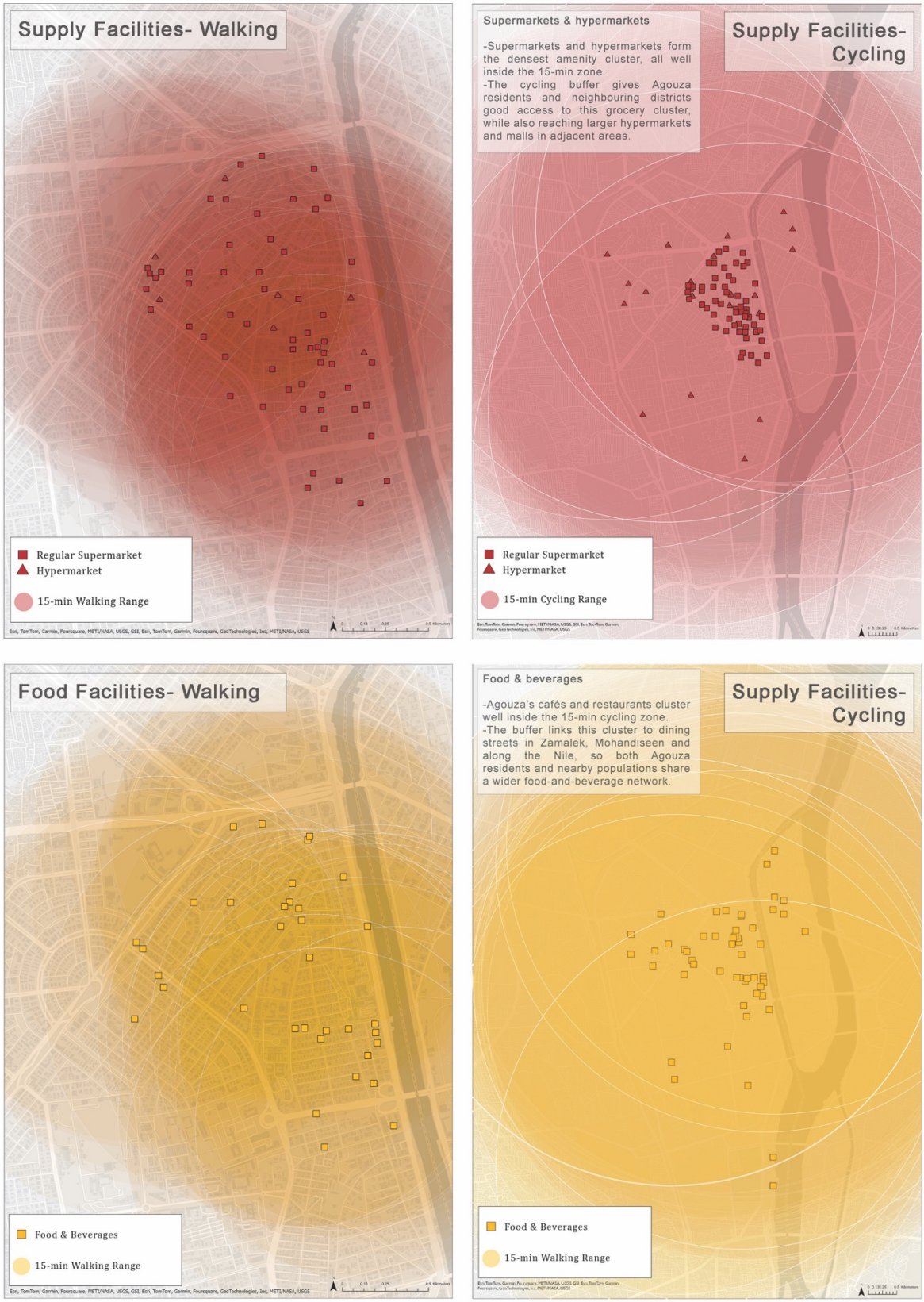


Figure 46 Distribution of supply and food facilities in Agouza- Walking and cycling ranges

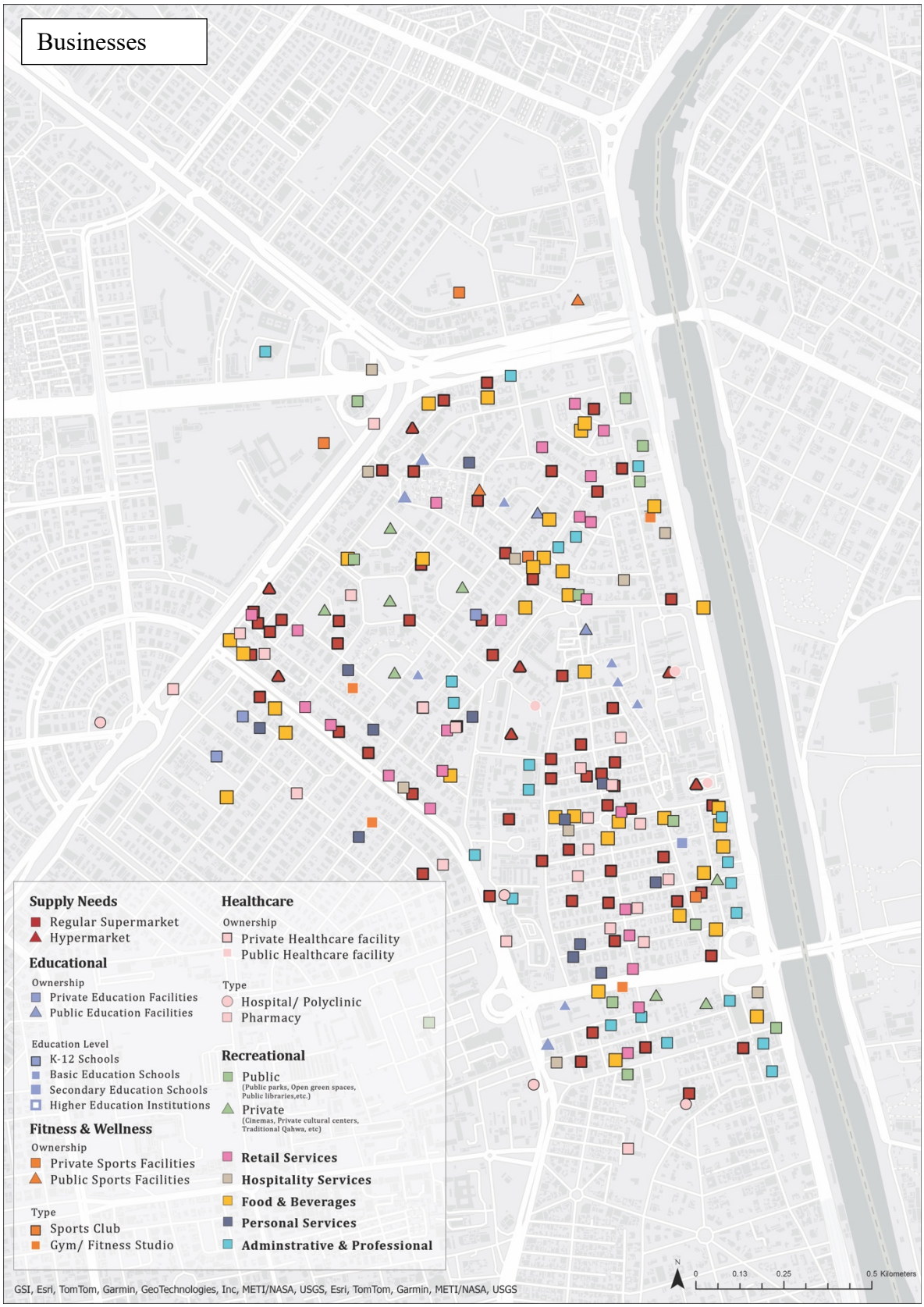


Figure 47 Distribution of businesses in Agouza

The working modes of participants in Agouza were particularly diverse. Many participants described hybrid arrangements, typically working from home with one or two office days per week[52]. As one participant explained, “Sometimes I work from the office, other times, I don’t need to be physically present. My working hours aren’t fixed either; at times, I work in the evening. It largely depends on the task at hand, the workload, and whether I need to meet with other team members.” Some mentioned occasional work-related travel overseas. Others commuted to the office daily, while only a small number worked full-time from coworking spaces. Participants worked across media/arts/culture, the public sector, and private companies. Among those who commuted regularly, whether daily or weekly, several noted that their workplace was within a short walk of less than 30 minutes, another group described a medium-length walk of up to an hour, while the remainder faced commutes lasting more than an hour.

Most residents of Agouza meet their daily needs through nearby shops, either by going themselves or by ordering from home. Most of these shops are within a short walk, whereas certain speciality stores and the bigger hypermarkets take a bit longer to reach. Some participants said they sometimes shop at local stores and other times rely on delivery, depending on factors such as the type of items needed, quantity, weather, or the urgency of the purchase. In the words of a woman participant, “for me, sometimes I order items online because they are not easily available at one place, or because of their heaviness, or simply because it is late at night.” Those who choose to shop in person are often people who enjoy the walk itself or prefer picking out their products firsthand.

[52] In this text, given the total number of participants in Agouza is 22, qualitative expressions are used in place of exact proportions: “a noticeable share or portion” refers to roughly a quarter of participants (around 5–6), “some” indicates around a third (around 7), “most” corresponds to a majority (around 11), “few” refers to a small minority (around 2–3), “a very small number” suggests only isolated cases (1 or 2), and “none” indicates absence.



Figure 48 Forms of supply facilitates in Agouza, speciality shop on the left and shopping streets on the right

Healthcare, Education, and Sports Local Services in Agouza

Across the three neighbourhoods, healthcare and basic schooling are generally within walking distance, while higher education is the service most likely to exceed a 15-minute walking threshold. In Agouza, healthcare and school access are generally strong, while higher education remains more time- and mode-dependent.

Healthcare facilities are well distributed throughout the area, ranging from large hospitals to smaller clusters of clinics/medical centres (Figure 49). Regarding education, schools from primary to secondary levels are found within the neighbourhood, providing access to basic education (Figure 50). However, higher education institutions are not within a 15-minute walking radius but are within a cycling radius. The closest universities, Cairo University in Giza and Helwan University in Zamalek, are approximately 45 minutes away on foot. Cycling reduces travel time substantially, but routes may involve highways and heavy traffic, limiting its feasibility for those relying on walking or public transport.

Sports facilities in Agouza include large venues, such as the Shooting Club, as well as smaller gyms scattered throughout the neighbourhood (Figure 51). These facilities offer ample opportunities for physical activity, catering to a wide range of sports interests and different fitness levels.

The results of the land use mix and diversity (entropy) analysis in Agouza reveal that some parts of the neighbourhoods achieve high entropy values above 1.5, signalling the coexistence of educational, healthcare, recreational, supply and business functions, while others register values close to 0, reflecting homogeneity and functional specialisation. Moderate-entropy areas show partial mixing (two to three dominant functions), while low-entropy pockets, often at edges, remain more mono-functional.



Figure 49 Types of healthcare facilities in Agouza

This differentiation across Agouza suggests that while certain corridors and central nodes already function as diverse and active urban anchors, other parts of the district remain dependent on broader city networks for fulfilling everyday needs. When combined with cumulative opportunities, the link between land use diversity and accessibility becomes clear. High-entropy areas support stronger walking access, as diverse functions are within short walking distance. Low-entropy areas, by contrast, restrict opportunities despite proximity to central districts. Cycling can alleviate some of these imbalances by extending reach, but it does not fully compensate for mono-functional residential areas.

Most participants in Agouza depended on nearby medical services such as pharmacies, clinics, and hospitals. Some balanced between-person visits by using healthcare apps to order medicines or book doctor appointments, while a smaller number relied only on apps, often citing rising costs as the reason. One participant clarified, “I usually depend on online reviews or apps like ‘Vezeeta’ to look for recommended doctors when I don’t have personal recommendations. I choose from the available options based on what others have written in the reviews.” Those who preferred the apps mentioned their time-saving, practicality, and

ease of tracking. Visiting nearby pharmacies was part of everyday routines, with many participants visiting them a couple of times each week, usually just a short five-minute walk away. Clinic visits showed more variation: many chose clinics within a short walk from their residences, while others preferred to travel a bit further to surrounding areas like Mohandseen or Zamalek, where clinics are more concentrated in a ‘poly clinics’ typology. A few went to doctors located much farther away, especially when seeking specialists they trusted or felt familiar with. On the other hand, participants who chose only nearby doctors often did so for the simplicity and ease of follow-up visits.

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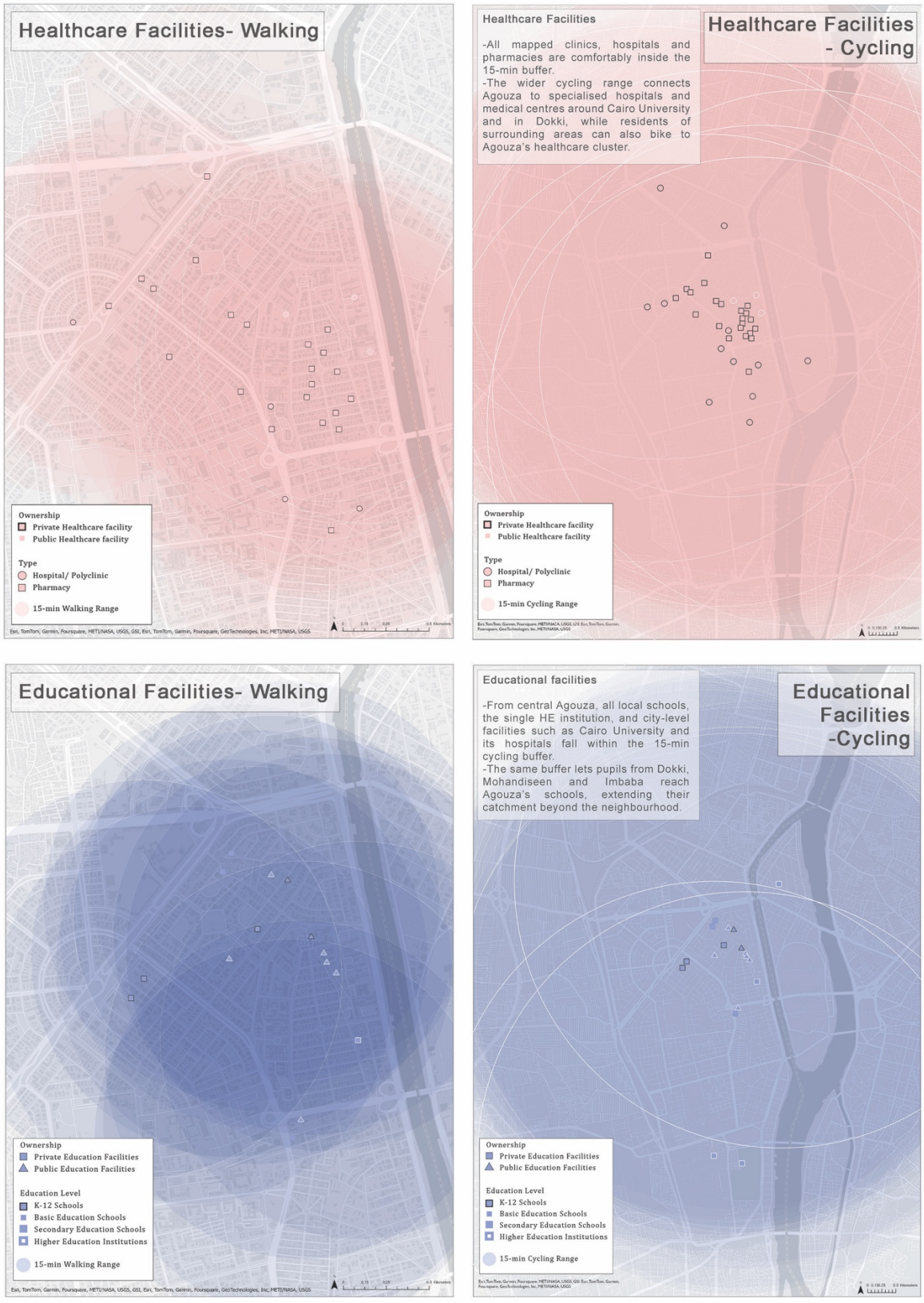


Figure 50 Distribution of healthcare and educational facilities in Agouza- Walking and cycling range

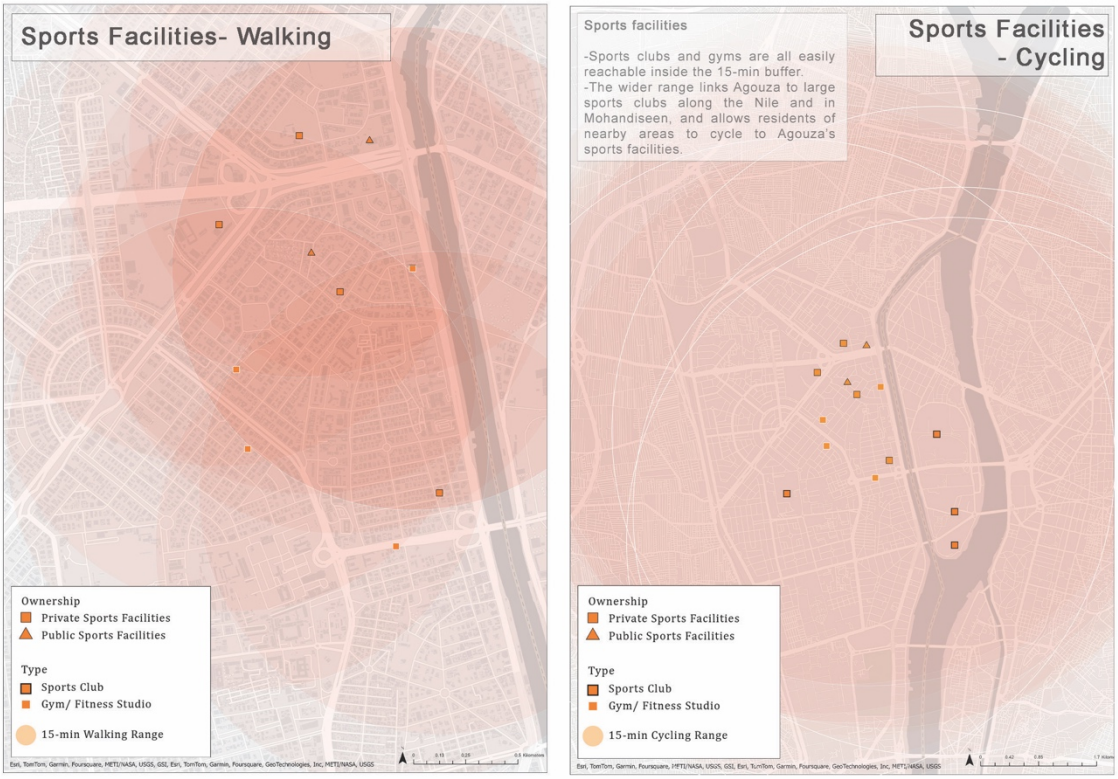


Figure 51 Distribution of sports facilities in Agouza- Walking and cycling range

Across the sample, parenting practices varied by neighbourhood: Agouza and Madinaty included fewer participants with children, while Badya participants with children were more commonly enrolled across educational levels. Within Agouza, parents described schooling decisions and everyday routines shaped more by perceived quality and manageable commute than by strict proximity. Some adult residents in Agouza were themselves still pursuing higher education, undertaking master's programs at institutions such as Cairo University or the Faculty of Arts in Zamalek.[53]

Senior parents who had raised their children in Agouza recalled sending them to schools in Dokki, followed by higher education at Cairo University, typically a short 20–30-minute commute from their homes. They reflected and said, "The girls went to school in Dokki. Sometimes they walked to and from school, and other times they used the school bus. As they grew older, they began walking home on their own from Suleiman Gohar Street." Parents with children currently in school also tended to select schools in surrounding areas like Dokki, but emphasised that their choices were guided primarily by the quality of education rather than proximity. They noted, however, that they were fortunate to find strong schools close by and relied on school bus services for daily commuting.

Many participants in Agouza said they include sports in their daily or weekly routines, though the kinds of activities varied. For some, it was as simple as walking around the neighbourhood or going to a nearby gym, while others preferred playing football on rented courts or exercising at private sports clubs. A participant elaborated, "The kids learned swimming and basketball at one of the private clubs, which was nearby and at a reasonable distance, so we'd usually drive there after school." A good number mentioned the Shooting Club, which they could reach in about 10 to 20 minutes from home. Walking (including along the Nile Corniche) and nearby gyms were common low-friction options, often within 5–10 minutes on foot. Another group preferred the small gyms close to home, often just a five- to ten-minute walk away. Interestingly, none of the participants thought of sports clubs as places for socialising; for them, these were mainly about physical activity. Those who did not practice sports described alternative leisure routines, discussed in the following section.

[53] Dokki and Zamalek are the immediate surrounding areas to Agouza.

Places of Worship and Recreational Local Services in Agouza

Recreational and places of worship facilities found in Agouza vary in both form and scale, offering a diverse range of options for residents. Recreational facilities include parks, local coffee shops, *Ahwa* (traditional cafes), bars, and cinemas and theatres (see Figure 52). Overall, recreational services are widely reachable within the neighbourhood, though their density varies across sub-areas. Places of worship (mosques and churches) are fewer in number (n≈5), yet function as visible community landmarks.



Figure 52 Types of recreational facilities in Agouza, Ahwa on the left and bar on the right

Recreational facilities are generally concentrated around the edges of the neighbourhood, creating a spatial distinction between leisure and residential zones. In terms of private versus public facilities, private recreational venues are 1.5 times more prevalent than public ones, indicating a higher concentration of privately owned leisure spaces in the area.

Beyond coverage, Agouza's recreational access is shaped by the reliability created through functional redundancy: where multiple alternatives cluster, residents can switch options when venues are crowded, unaffordable, or unavailable. It takes different typologies that will be discussed in detail in the next chapters. This redundancy often overlaps with high-diversity (high-entropy) areas, strengthening resilience in everyday leisure access.

Participants in Agouza described a wide range of recreational activities they practised at different times of the week and day. With one exception, nearly everyone engaged in more than one type of recreational activity. Sports-related practices accounted for a noticeable portion of the sample, including memberships in sports clubs, gyms, or yoga centres. Most of the participants also reported cultural and artistic engagement, such as attending arts centres, public libraries, museums, or cinemas. One participant recalled, "We also used to go to the Agriculture Museum. This place offered us open spaces to play and move around,

and it was very close to home, making it easy to access. I do not seem to be in the same shape now." The rest of the participants mentioned more social and leisure-oriented activities, which usually ranged from visits to local *Ahwa*, game shops, public gardens, and parks, to outings at restaurants, bars, and pubs. A smaller number mentioned walking as a form of recreation (discussed in chapter 7), while only a few participated in workshops or made occasional visits to local markets and bazaars.



Figure 53 Distribution of recreational and places of worship facilities in Agouza- Walking and cycling range

Participants who engaged in sports reported that the relevant facilities were generally within a short walking distance, typically no more than a quarter of an hour from their homes. Arts and cultural venues showed greater unevenness in proximity, ranging from brief walks to longer trips. Those who frequented local *Ahwa*, parks, or bars emphasised that most of these places were only a few minutes away, with occasional visits to nearby districts reserved for specific events. Another participant, a man, recalled, “Honestly, it changes with age and the different phases I’ve been through. When I was younger, I used to go to simple places for entertainment, like Ahwa. There was one Ahwa with a PlayStation and a nice atmosphere, and that felt like a great addition to my day, but now I no longer find it entertaining.” Workshops and markets were typically farther away and required longer trips. When reflecting on preferences, those drawn to enclosed spaces noted a desire to avoid street congestion, whereas those choosing outdoor recreation described it as a way of escaping office routines.

Most participants in Agouza who attended places of worship went to nearby mosques for Friday prayers, and a smaller number occasionally visited local churches (Figure 54). These places were generally within a short walking distance from their homes. A few preferred worship in neighbouring districts due to familiarity and social ties, while weekday religious activities were not commonly reported as regular routines.



Figure 54 Types of places of worship in Agouza

5.3 Distribution of 15-minute city Radius Facilities in Madinaty

Through the service area analysis of Madinaty, 'clustered distribution' emerged as the main way facilities are typically arranged around the residential areas in the city. The specific organisational structure will be examined in detail in the following sections.

Through the four analytical metrics used (CLFS): cumulative opportunities-based accessibility, land use mix (entropy), functional redundancy, and space syntax (integration), Madinaty reveals a spatial distribution organized around centralized services clusters either at the district level or the city level[54]. Centralized service clusters provide functional accessibility, creating a balance between connectivity and relatively low-density residential zones. Although this spatial arrangement does not attain the theoretical walkability within a 15-minute radius, the high-entropy land use mix, or the resilient facility redundancy characteristic of inner-city case study of Agouza, the broader residential fabric preserves a predominantly low-density and nature-oriented character. This configuration offers a balance between the efficiency of accessing essential services (largely achievable within a 15-minute cycling range) and the preservation of a high-quality living environment. The specific results of the four analyses will be discussed in detail below.

Supply, Food and Businesses Proximities in Madinaty

In the completed phases of Madinaty, which comprise almost all of the development, a supermarket is found in each cluster of apartments, is marginal by walking but generally reachable within a 15-minute cycling range. The villa areas do not include supermarkets within the walking radius, although they are within the cycling range. Ready-food venues are concentrated in shopping centres, with limited provision inside residential zones.

Business establishments, encompassing a full range of services, tend to be clustered within the shopping centre zones, unless they are supermarkets, childcare facilities, or a few restaurants and personal care services, which align with the city's zoning and master planning. Cultural industries in Madinaty take fewer forms compared to Agouza, where a wide array of cultural spaces exists. In Madinaty, most cultural facilities are located within shopping mall cinemas.

[54] Please refer to the methodology for basic definitions of methods used.

Office buildings, excluding governmental ones, are similarly concentrated in shopping centre zones. Overall, the service economy is structured around planned hubs rather than continuous mixed-use streets. Unlike Agouza, which is an inner-city neighbourhood with a diverse mix of industries, Madinaty, as a suburban area, offers fewer cultural typologies and limited governmental presence, with some essential services provided through mobile/temporary service vehicles.

Cumulative-opportunities accessibility shows constrained walkability: many locations reach ≤3 opportunities within a 15-minute walk, typically rising to 10–20 in better-connected areas, and peaking at 35–46 mainly near service centres. Walking, therefore, supports mostly intra-cluster trips rather than a complete set of daily functions.

Cycling, by contrast, considerably expands the accessible range. With a 15-minute ride, many residential spots can reach 78-133 opportunities, while the best-connected spots, mostly around service centres, can reach 160–184 opportunities, including supply and business facilities within a 15-minute cycling range. This demonstrates how cycling bridges the spatial separation between the residential and commercial land uses in Madinaty's design, effectively connecting residential clusters to the planned service hubs. However, areas located close to central commercial and educational nodes still enjoy stronger accessibility. Cycling improves access to 15-minute destinations substantially, but its benefits remain shaped by mobility infrastructure and the hub-and-spoke land-use structure. The next section links these patterns to participants' lived experiences of accessing supply and workplaces inside and outside Madinaty.

Space syntax - integration confirms the master-planned logic: highly integrated arterials and spines concentrate movement, while residential loops and cul-de-sacs remain low-integrated, preserving quiet interior streets. At local scales (R3/R5), the highest values cluster around central spines and service hubs, while cul-de-sacs remain low, reinforcing a layered system of external connectivity and internal [55] [56].

[55] Please note that in all the following maps the scale differs from the walking maps, as the cycling catchment is larger.

[56] The Figures below are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.





Figure 55 Types of supply spaces in Madinaty

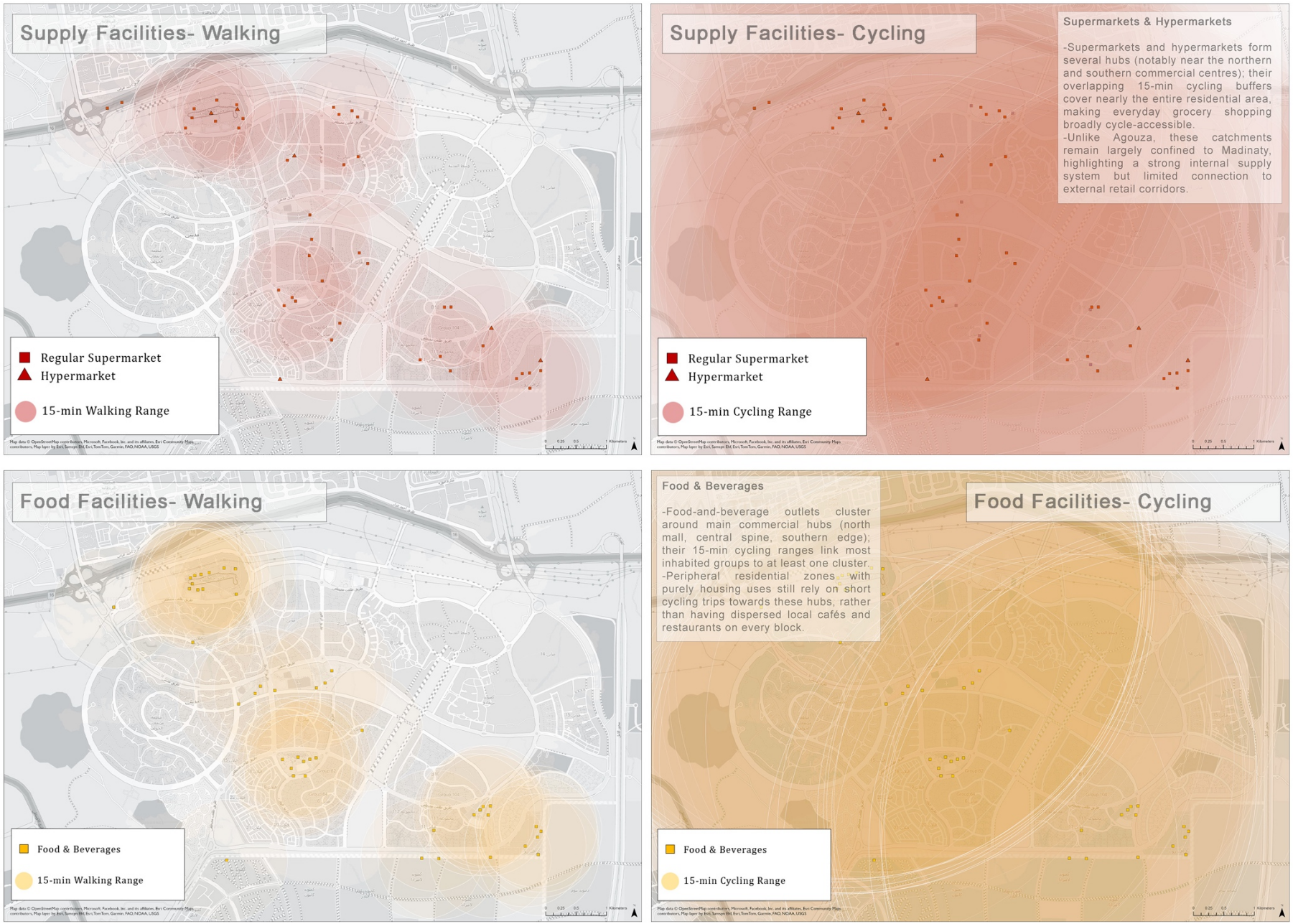


Figure 56 Distribution of supply and food facilities in Madinaty- Walking and cycling range

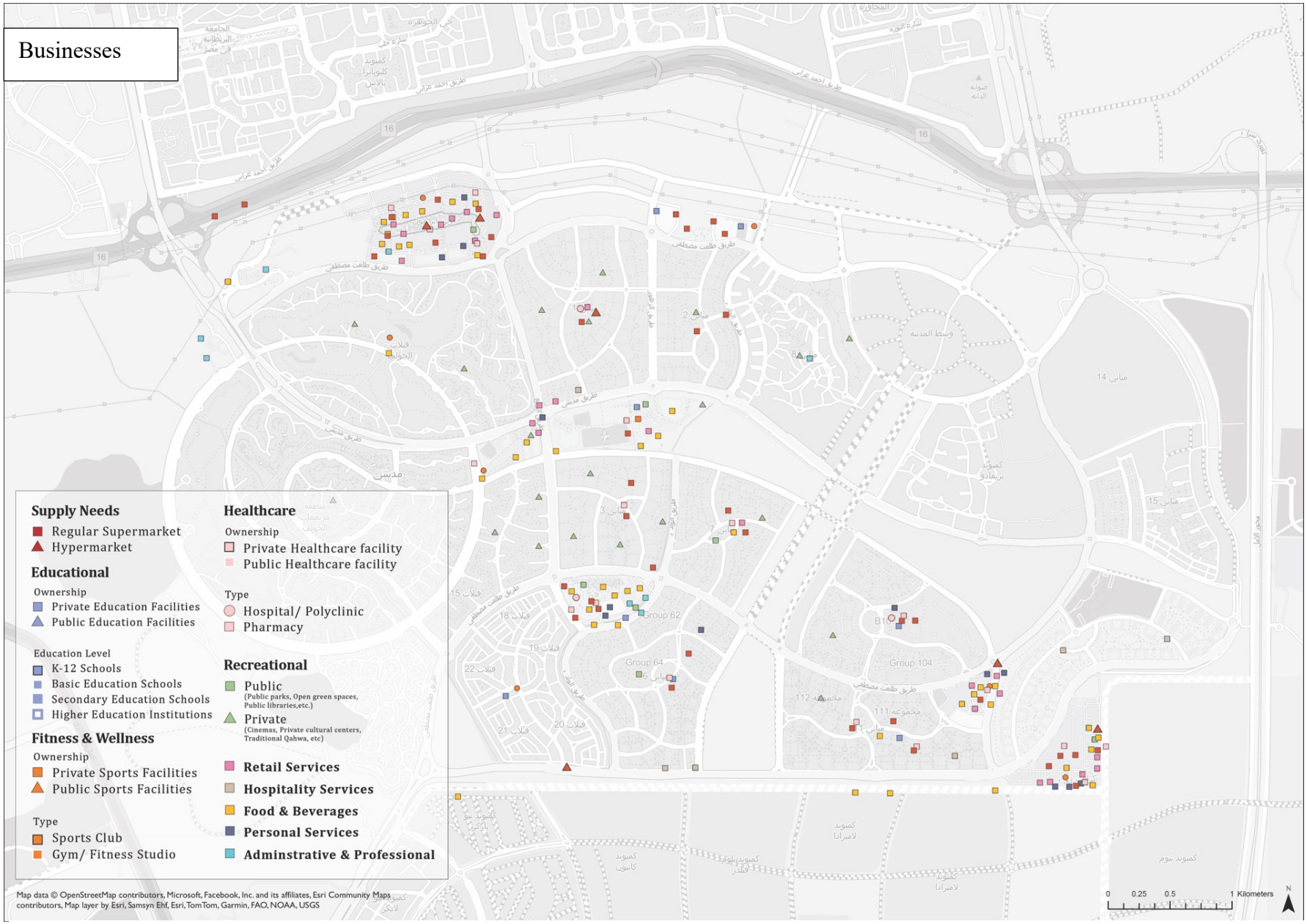


Figure 57 Distribution of businesses facilities in Madinaty

Work modes in Madinaty displayed considerable variety among participants. A noticeable share[57] of participants reported working in a hybrid arrangement, while another significant group commuted to the office daily. One participant explained, “commuting downtown is exhausting, often taking more than an hour because of traffic, with costs ranging from very little to as much as 250 pounds. For this reason, I try to work from home whenever possible, or use Uber and sometimes the metro to save time. Most of my work is currently done online, but I need to go to the workplace some days.” A smaller group worked fully from home or used coworking spaces, while a few reported occasional work travel; only a limited number were students. Employment was mainly in the private sector across finance, engineering, real estate, technology, and creative industries; public-sector employment was not reported in this sample.

In Madinaty, many participants said they mostly rely on delivery applications to meet their daily supply needs, while a comparable number preferred using nearby kiosks, shops, or hypermarkets, turning to apps only when necessary (Figure 58). As one participant explained, “small daily items are quick and easy to bring home after work, but larger monthly supplies are usually bought from the hypermarket. Sometimes my wife takes care of the big monthly shopping online orders, and for baby products, they make sure to get them separately when needed on a weekly basis.” Others described mixing between the two options, depending on how busy they were, how much they needed to buy, or how urgent the shopping was. In-person shopping was typically described as walkable for small items, with longer trips for hypermarkets, and valued for choice and trip-chaining. Delivery apps were used to save time and reduce friction, especially for heavy or bulk purchases.

[57] In this text, given the total number of participants in Madinaty are 23 in total, qualitative expressions are used in place of exact proportions: “a noticeable share or portion” or refers to roughly a quarter of participants (around 6), “some” indicates around a third (around 8), “most” or “large proportions” corresponds to a majority (around 12), “few” refers to a small minority (around 2-3), “a very small number” suggests only isolated cases (1 or 2), and “none” indicates absence.



Figure 58 Types of Supply kiosks in Madinaty

Healthcare, Education, and Sports Local Services in Madinaty

In the completed phases of Madinaty, healthcare, education, and sports facilities are generally well covered within a 15-minute walking radius, though a few districts are not fully covered. However, all of these facilities are within a 15-minute cycling distance. Villa zones remain largely mono-functional and do not host these facilities. Unlike the clustering of other basic facilities, these essential services are spread fairly evenly throughout the city's master plan, with a presence in each residential district.

Similar to Agouza, the nearest third-level education facility or university is a private institution located within a 25-minute cycling range. The nearest public university, however, is situated outside this zone, in central Cairo. Most healthcare facilities in Madinaty consist of clinics and mid-sized medical centres. The nearest public high-level hospital is located within a 30-minute cycling range, while a private hospital is approximately 20 minutes away by bike.

Nearly all healthcare, education, and sports facilities in Madinaty are privately owned (Figure 59). Service provision is dominated by small- to mid-sized facilities (clinics, nurseries, gyms), with fewer large public institutions.

Entropy values range from 0.00 to ~1.66, with most residential areas concentrated in very low bands (0.00–0.69), indicating predominantly mono-functional housing with only limited embedded services. Mid-range values (0.69–1.09) are spatially limited, while higher values (1.24–1.66) are confined to service hubs where multiple activities co-locate.

This distribution reflects Madinaty's master-planned structure: the vast residential fabric is characterised by extremely low entropy, reinforcing the dominance of housing as the single land use. By contrast, the higher-entropy pockets are clustered around the main commercial and institutional centres, particularly along the central axes and near designated service hubs. Unlike Agouza's embedded mixed-use fabric, many residential clusters, including edges, remain mono-functional, reinforcing dependence on central hubs for non-residential activities. The next part shares key insights from the interviews, highlighting participants' access to nearby healthcare, education, and sports facilities.



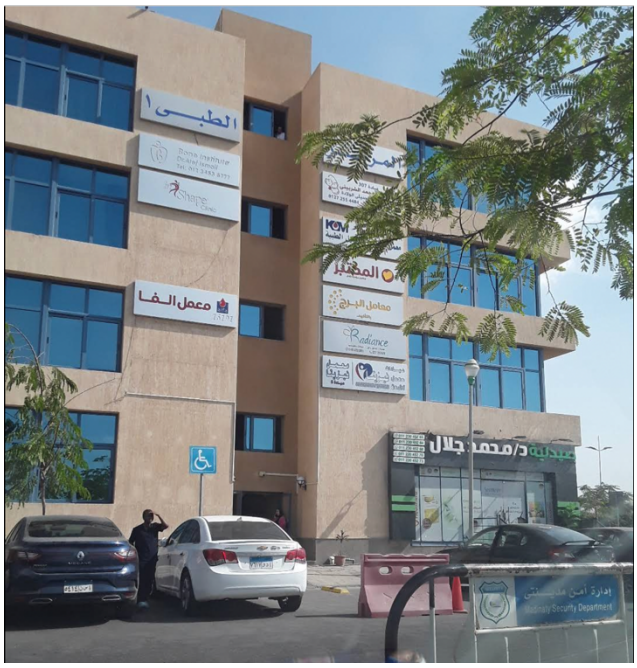


Figure 59 Types of healthcare facilities in Madinaty

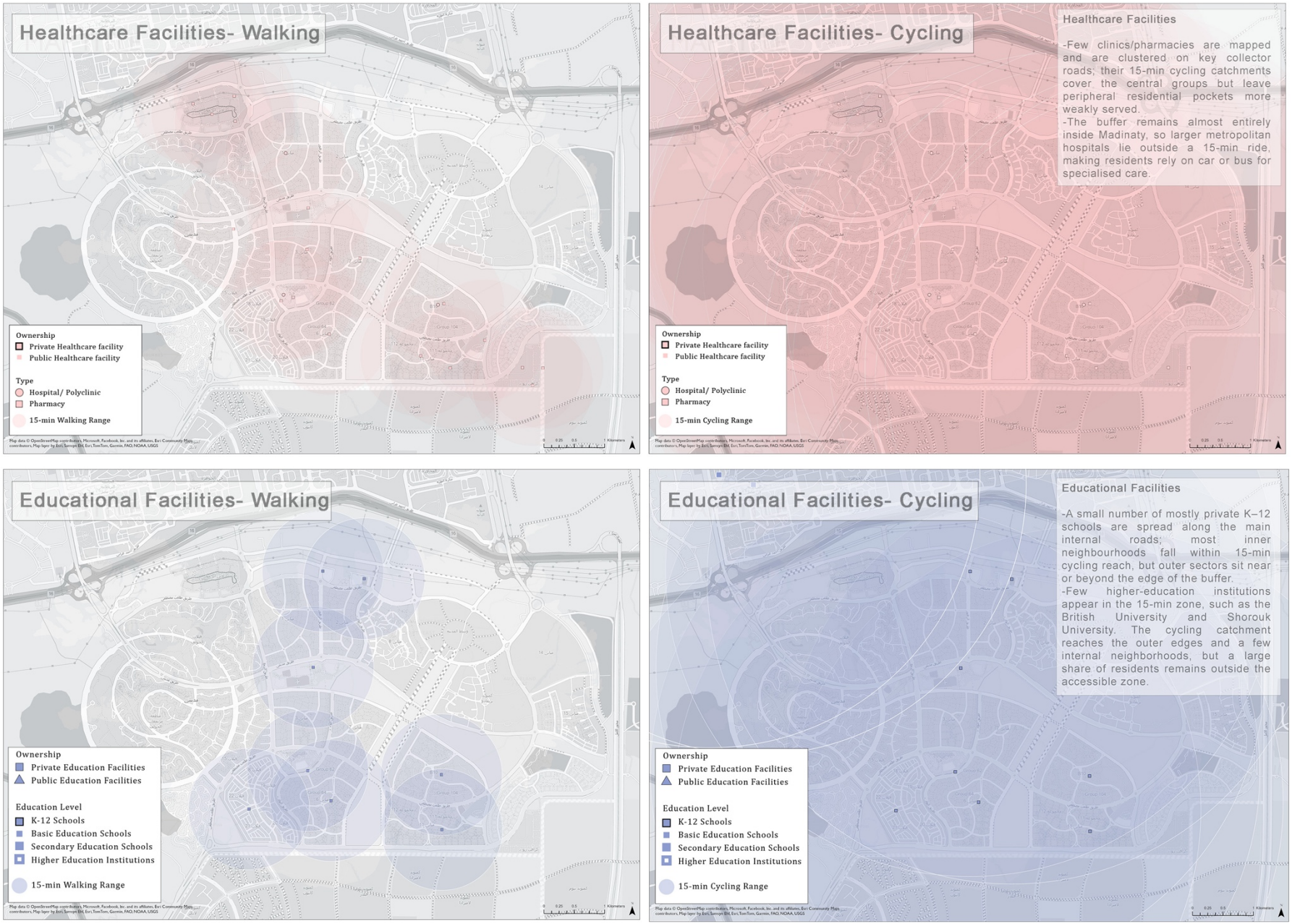


Figure 60 Distribution of healthcare and educational facilities in Madinaty- Walking and cycling range

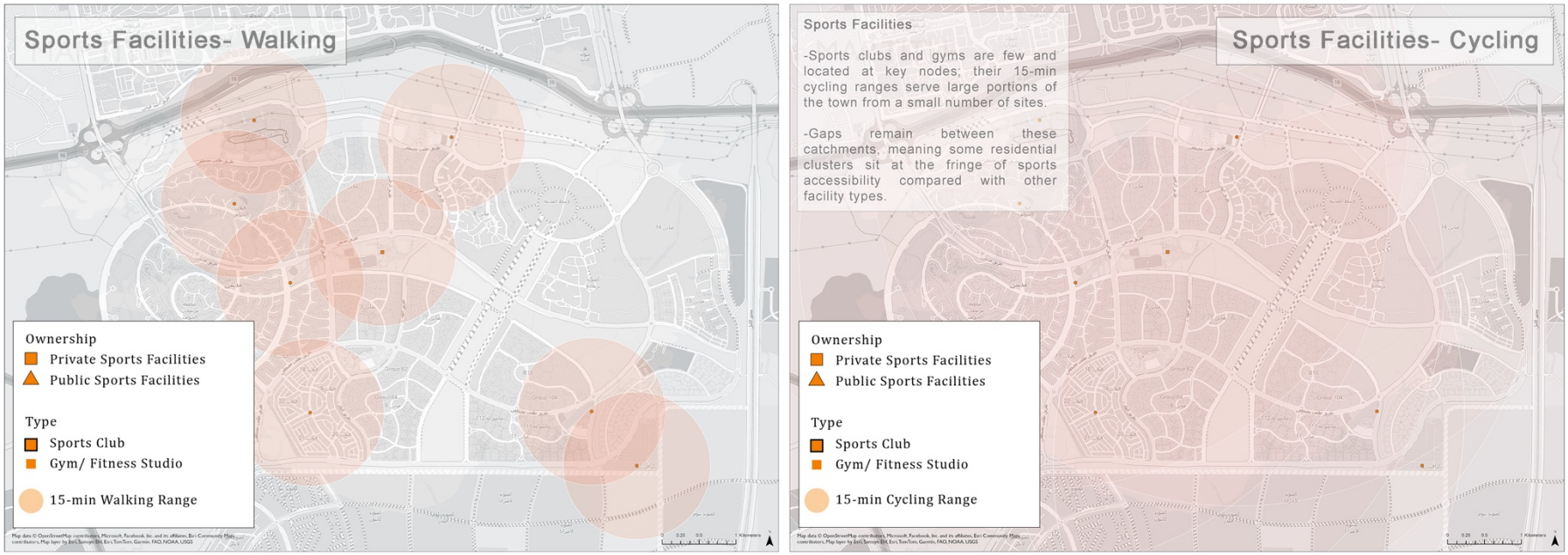


Figure 61 Distribution of sports facilities in Madinaty- Walking and cycling range

In Madinaty, participants had different views about how healthcare should be accessed. Many preferred to get their medication directly from neighbourhood pharmacies, while another group said they combined local pharmacies with healthcare apps. One participant noted, “I do not know any reliable doctors in Madinaty and usually rely on family or friends for recommendations, sometimes healthcare apps are useful. The pharmacy, however, is conveniently located at the beginning of her street.” A smaller number relied solely on the apps because nearby pharmacies did not always stock what they needed, whereas the apps offered a wider range. Regarding clinics, some reported walkable access, while others preferred larger medical centres outside Madinaty, such as Medical Park in New Cairo. Within Madinaty, frequently mentioned clinics included gynaecology, paediatrics, and dentistry, often linked to regular follow-ups. A few preferred care near extended family due to trust and familiarity.

In Madinaty, only a few participants had children living in the area, most of them young parents. Those who sent their children to school often chose institutions in the New Administrative Capital, despite the distance, prioritising quality. She elaborated, “I pay a lot for the school bus fees, almost as if I own a private car for them.” Others preferred schools closer to home, within walking distance, underscoring the importance of reaching their children quickly in an emergency. For higher education, universities were generally much farther away, requiring longer commutes. School buses were common, but long rides and multiple stops were tiring.

In Madinaty, many participants reported participating in some form of sports activity. For most of them, this meant regularly going to the Madinaty Sports Club, where they either joined a specific sport or used the gym at least once a week. A smaller number preferred individual activities, such as running near their homes. Access to the club varied by district. One participant shared an insight on the integration of sports and social activities, saying, “Playing football and squash at the Madinaty Club is enjoyable, which is only a few minutes away by car. There are also plenty of cafés and restaurants in the area, so whenever he wants to go out with friends afterwards, the options are there.” Several participants also pointed out that going to the club was not just about exercise but also a chance to spend time with their children, meet friends, or even do some work using the club’s facilities. Some found running outdoors monotonous and noted limited gym options outside the main club. Others admitted they did not practice any sport at all, explaining that busy schedules and late working hours left them with little time, with time constraints cited more often than distance.

Places of Worship and Recreational Local Services in Madinaty

Places of worship and recreational facilities are abundant and fully cover the surrounding residential areas in Madinaty. However, the standalone villa areas lack such places. In the master plan, places of worship function as visual and social hubs, structuring community nodes across districts (Figure 62).

A notable absence in Madinaty compared to Agouza is the lack of traditional *Ahwas* (coffee shops) and bars. Some coffee shops are located in the craft zone and surrounding areas, while others within the shopping centres fulfil similar roles (Figure 62). Where "ahwa-like" spaces exist, they are typically formalised café formats linked to craft zones or malls. Green spaces are evenly distributed across the completed phases of Madinaty, with some agglomeration observed in the services and commercial areas at the centre of the master plan. Most of these green spaces are open, allowing them to function as public facilities.

Functional redundancy remains low across most residential clusters (≈0.00–0.14), indicating limited alternative options within typical catchments. Higher redundancy appears mainly around centralised hubs (up to ~1.45), where multiple facilities of the same type co-locate.

This hub-and-cluster structure produces limited service overlap in residential districts compared to Agouza's embedded mixed-use fabric. As a result, residents often depend on single facilities for specific needs, reducing flexibility when venues are closed, overcrowded, or unsuitable, and forcing them to shift to other clusters. The next section draws on interviews to examine lived access to worship and recreation (Figure 63).



Figure 62 Places of worship on the left and spaces for recreational walks on the right

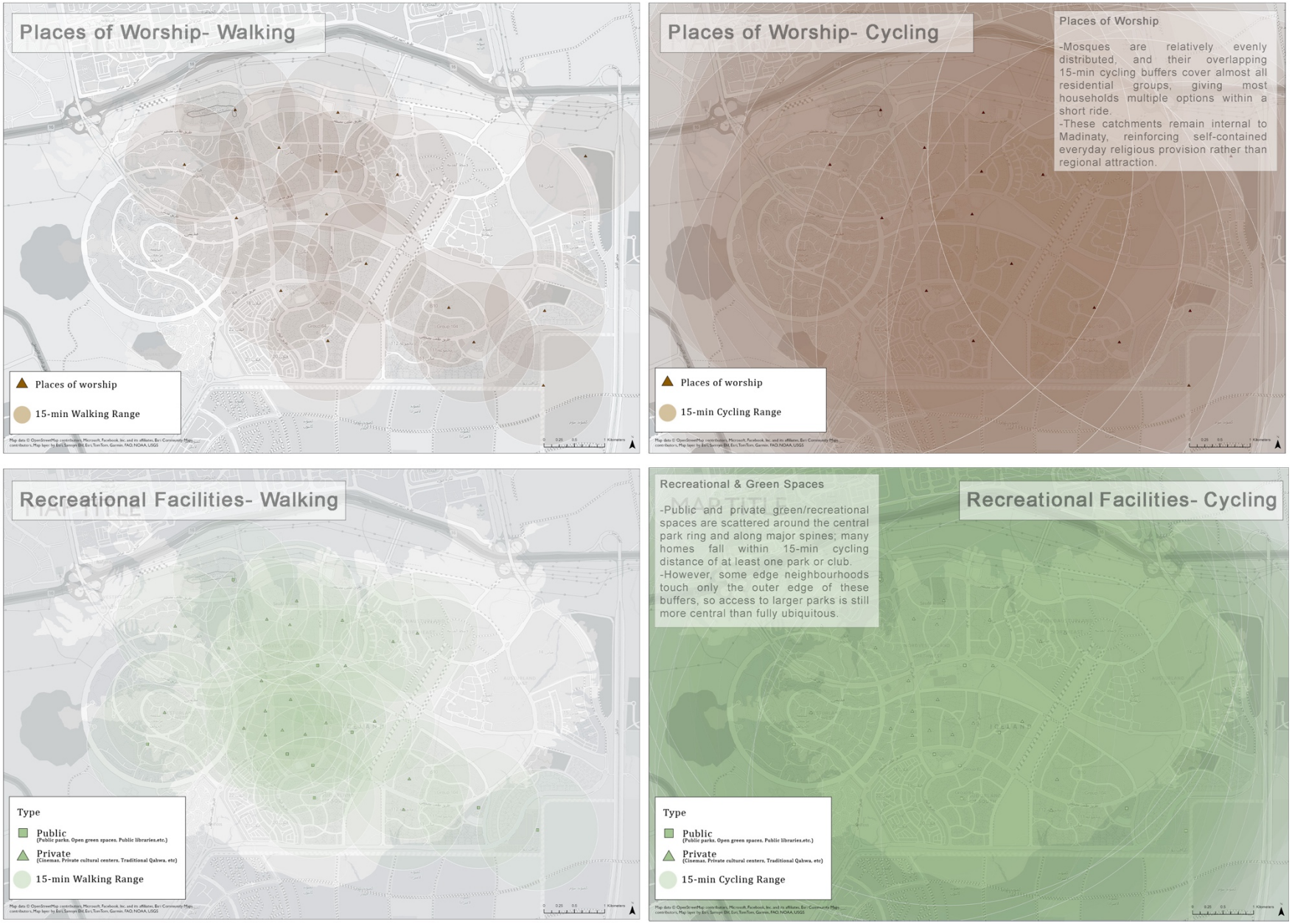


Figure 63 Distribution of recreational and places of worship facilities in Madinaty- Walking and cycling range

In Madinaty, participants described a range of recreational activities, most of which centred on the sports club or the nearby green areas. Many said they were involved in sports at least once a week, and for some, this was their only form of recreation. Others added leisure walks in the surrounding parks and gardens to their routines.

A noticeable group mentioned the Open Air Mall as their main recreational spot, where they could meet friends, eat out, and shop for home goods or clothes. At the same time, many participants highlighted visits to local ahwa (traditional cafés) as one of their main ways of spending free time. Most participants said their favourite recreational spots, such as gardens and parks, were only a short walk away. One woman participant pointed out, “I take the children for a walk in the park near their building, usually when the weather is nice or after school. The kids play on their skateboards or bikes, and this is the only time I go for a leisure walk, typically about once a week.” The sports club, however, was less evenly accessible: for some it was nearby, while for others it required a noticeably longer walk. Many of those who regularly went to ahwa preferred traditional cafés in older neighbourhoods, especially Nasr City, where they had family or social ties and felt a sense of familiarity. Participants who did not engage much in recreational activities often cited their demanding work schedules or a preference for indoor socialising. Several participants also highlighted the limited recreational diversity in Madinaty, noting that cinemas were confined to the mall and that there were no nearby bars or pubs in Madinaty area, the closest one being quite a distance away in New Cairo. For many families in Madinaty, visits to the sports club were not just about exercise but also about supporting their children’s physical and social development. Sundays were another important moment of leisure for some residents, who spent the day visiting nearby places of worship, including mosques and churches. These visits often extended into informal social gatherings, such as meeting new neighbours or sharing coffee with friends. While mosques were generally close by, churches were less common, so some participants had to walk a considerably longer distance to reach one.

5.4 Distribution of 15-minute city Radius Facilities in Badya

Through the service area analysis of Badya, hierarchical distribution emerges as the primary way facilities are organised around residential areas in the city. The specific organisational structure will be examined in detail in the following sections.

Badya, through the four analytical metrics used, cumulative opportunities-based accessibility, land use mix (entropy), functional redundancy, and space syntax (integration), reveals a spatial distribution that is hierarchically organised. It has strong connectivity along its main corridors, a balanced residential fabric providing accessibility to facilities across district, neighbourhood, and city levels, and emerging potential for greater diversity and resilience in service provision. However, walking remains oriented toward meeting only immediate daily needs, which helps preserve the district's relatively moderate-density and quiet character. By contrast, cycling emerges as the real integrator, multiplying access by a factor of four to six and connecting clusters to the wider city-level service network, while also maintaining the settlement's green structure. Land-use diversity and functional redundancy reveal a 'patchy' pattern: mixed-use and resilient hubs anchor the city, complementing the residential belts and offering potential for more balanced, resilient service provision. The specific results of the four analyses will be discussed in detail.

Supply, Food and Businesses Proximities in Badya

In the master plan of Badya, and as observed in the completed phase, basic supply needs and businesses are evenly distributed across the residential districts (Figures 64 and 65). Around eight supermarkets are planned for each district, as outlined in the case studies context chapter. Large-sized hypermarkets are located within the central service and commercial zone. Ready food outlets are also concentrated in this central area, though in considerably smaller numbers (Figures 64 and 65). The businesses identified in both the master plan and the completed phases primarily provide essential services. Additionally, small and mid-sized industries such as wellness and fitness, cultural, hospitality, and personal care services are included. However, as in Madinaty, there is a notable absence of dedicated spaces for businesses in cultural industries.

Office buildings in Badya are relatively few and generally situated on the periphery, with some in the central area as well (Figure 66). Like Madinaty, Badya lacks governmental buildings. Smaller-scale supermarkets, such as kiosks, have yet to be implemented in Badya.

Similarly, while there are restaurants serving ready-made food, there is a noticeable absence of smaller establishments, such as bakeries, which are more common in other case study areas, such as Agouza.

Cumulative-opportunities accessibility indicates constrained walking access compared to Agouza: most residential areas fall within the lowest opportunity ranges (0–3 and 4–8). Some locations reach 30–40 opportunities, and in a few cases 41–49, primarily around neighbourhood- and city-level service hubs. This pattern indicates a hierarchical service structure, where concentration emerges around multi-level hubs rather than continuous local mixing. For most residents, walking supports only basic needs within the immediate district, while broader access depends on cycling.

Cycling transforms the picture. Many residential zones reach 67–93, 94–111, or even 132–149 opportunities, while the highest band reaches 150–162 opportunities within a 15-minute cycling range. Within the same 15-minute threshold, cycling expands access several-fold relative to walking, effectively linking districts to higher-order hubs. Cycling, therefore, functions as the main integrator of Badya's hub-based structure, connecting residential clusters to multi-level service centres; the next sections examine how infrastructure and lived practice shape this potential.

In testing street networks that mediate the proximity and density of facilities, a space syntax-integration analysis of Badya's reveals an urban fabric that illustrates a new-town model with a clear hierarchy of movement. highly integrated central spine structure, movement, and potential service concentration, while low-integration interior streets and cul-de-sacs preserve residential privacy.

At local scales (R3/R5), the highest values cluster at axis intersections and along central spines, reinforcing the hub logic, while interior streets remain deliberately less connected. Overall, Badya combines strong central connectivity with extensive low-integration interior streets, balancing metropolitan relevance with residential privacy and cohesion.[58]

[58] The Figures below are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.



Figure 64 Types of supply facilities in Badya



Figure 65 Distribution of supply and food facilities in Badya- Walking and cycling range

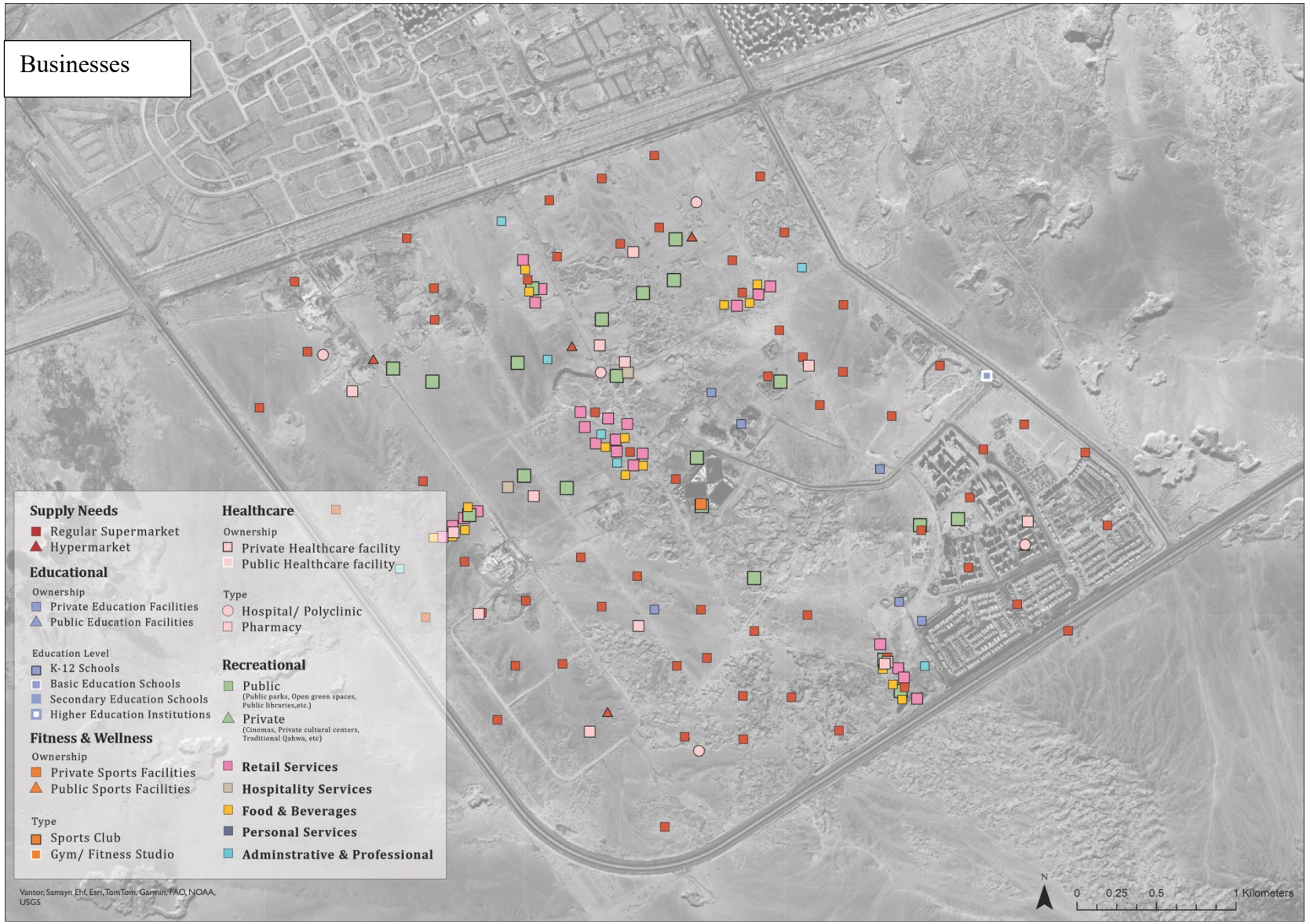


Figure 66 Distribution of Businesses in Badya

Reconsidering the participants' experiences in accessing the network of supply and business facilities in Badya, participants described different ways of working. Some[59] followed a hybrid pattern, while others went to the office every day. One participant described, "I usually move to work daily. Some days involve fewer meetings, while others are busier, but most of the time I am out to meet clients, visit companies, or attend industry events." A very small number were working entirely from abroad. Most people were employed in private companies, either their own or others, mainly in real estate, finance, and technology. Only a few worked in arts and culture.

When it came to shopping, participants were divided. Some preferred delivery apps, while others relied more on hypermarkets. One participant described her usage of the supply facilities as, "Sometimes, I go to Hypermarket or Carrefour. There's also a small supermarket branch next to my house, but it doesn't always have everything, so I only use it for simple, everyday items. Going to the bigger hypermarkets is usually a weekly trip." As the area is still developing, only a few planned retail stores have opened, shaping reliance on a mix of nearby small branches, weekly hypermarket trips, and delivery. Some participants valued in-person shopping to build familiarity with shopkeepers, especially as newer residents.

[59] In this text, given the total number of participants in Badya is 10, qualitative expressions are used in place of exact proportions: "a noticeable share" refers to roughly a quarter of participants (around 2–3), "some" indicates around a third (around 3), "most" corresponds to a majority (around 5), "few" refers to a small minority (1–2), "a very small number" suggests only isolated cases (1), and "none" indicates absence.

Healthcare, Education, and Sports Local Services in Badya

The educational and sports facilities in Badya are generally accessible, with most residential units within a 15-minute walk and adequately covered within a 15-minute cycling range (Figures 67, 68 and 69). Healthcare facilities, varied in scale and size, particularly smaller clinics, are sufficiently accessible within walking range.

The master plan includes six schools and one high-level educational facility (Figure 67), with four of these, including the university, already completed and operational. The remaining educational facilities are planned for future phases of the project. Healthcare services consist mainly of neighbourhood clinics, while larger-scale hospitals are located in the urban core of Badya. The city also has a designated sports club in the centre, although no gyms have opened yet.

All healthcare, educational, and sports facilities in Badya are privately owned. Public-sector equivalents (hospital/school/university) lie beyond the 15-minute cycling range, with travel times extending to ~1 hour (hospital), ~40 minutes (school), and ~2 hours (university).

The land-use mix entropy results for Badya range from 0.00 to 1.25, with higher values indicating a more balanced land-use mix. While much of the city currently falls within the lower range (0.00–0.48) and is primarily residential, the current phases reflect a predominantly residential fabric. Within this structure, several areas already demonstrate moderate diversity (0.59–0.69), usually the main service corridors and neighbourhood-level service hubs, where housing is complemented by schools, sports facilities, and supply facilities, allowing residents to meet all daily needs within the same area.

A smaller number of areas achieve high entropy values (0.95–1.25), representing mixed-use hubs where supply, education, healthcare, business and other services overlap. These hubs are usually the city-level service hubs. As discussed in the results of the cumulative opportunities-based analysis, the accessibility remains heavily mode-dependent, as cycling can provide 15-minute access to the high entropy values from any residential area in Badya. The following part will discuss the insights of experiences of accessibility to healthcare, educational, and sports facilities from the analysis of the interviews.



Figure 67 Badya's university



Figure 68 Distribution of healthcare and educational facilities in Badya- Walking and cycling range

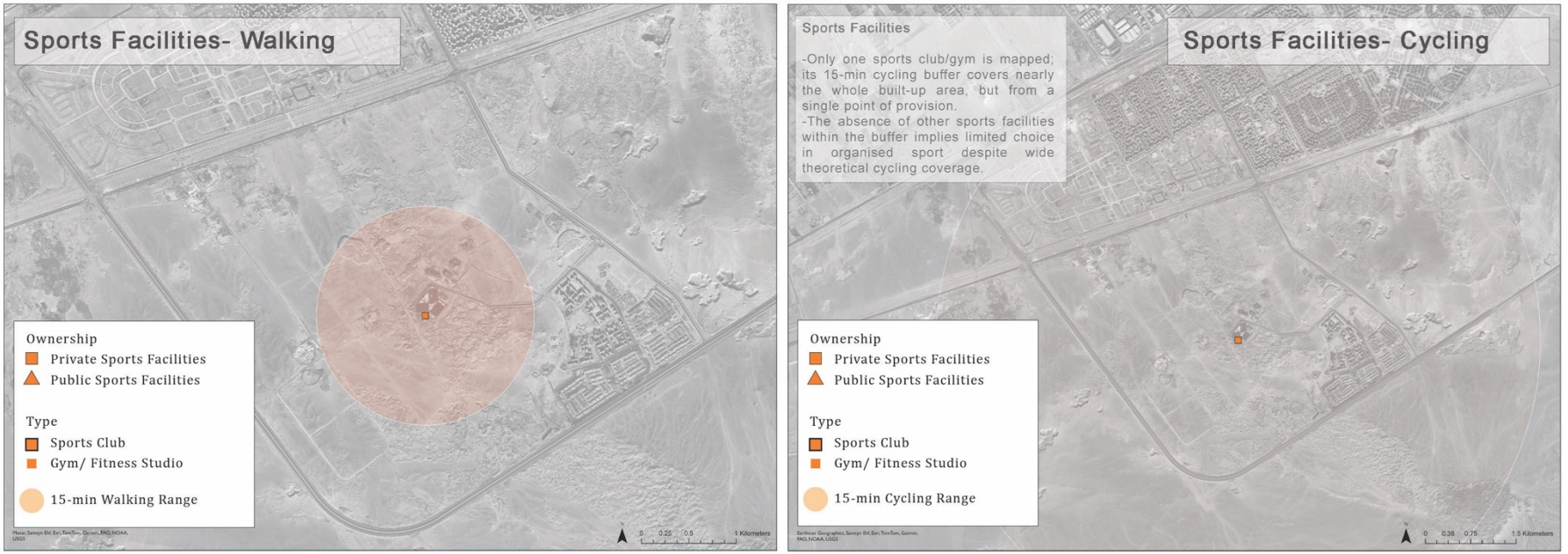


Figure 69 Distribution of sports facilities in Badya- Walking and cycling range

In Badya, participants showed different patterns in their healthcare access. Many preferred visiting pharmacies in person, while others either relied entirely on healthcare apps or used a mix of both. Many continued to visit medical centres in previous neighbourhoods due to recent relocation, “my daughter used to go to his dentist there, I couldn’t change it to a nearby clinic,” one new resident noted. Others began using nearby clinics for routine needs (e.g., dentistry) but still relied on Sheikh Zayed for specialised care. This reliance was explained by the limited number of operating clinics, established follow-up routines, and familiarity with former care networks. A small number of participants also explained that their choices were influenced by the scope of their medical insurance. Pharmacies were typically walkable, while clinics often involved longer trips.

In Badya, as previously noted, all participants were parents, with only a couple identified as young parents. Many continued to send their children to schools outside the community, with relocation plans tied to the school calendar. “The problem is that we are in the middle of the year, so we have to wait to make the move smoother for her,” a new resident elaborated. These families often preferred to wait until the summer break to transfer their children to schools within Badya. Where children were enrolled locally, schools were described as moderately walkable, often for younger children with fewer attachments to previous schools. By contrast, families with children in higher levels of education, particularly at university, continued to send them to institutions located much farther away. Parents explained these choices were largely due to the quality of education available at the universities. More broadly, schooling choices reflected quality preferences and continuity considerations (including international-system aspirations).

In Badya, only a minority of participants reported including physical activity in their weekly routines. Among those committed to sports, some regularly travelled to the Palm Hills Club in Sheikh Zayed, despite the long journey, because the Badya Club was still in its early stages of development. Others preferred walking near their homes, as discussed in detail in chapter 9, often connecting this practice to caring for their younger children. A participant said, “For example, I can buy juice or small things while walking, and that really helps me. I also feel that walking gives us time to come together as a family.” On the other hand, participants who avoided walking explained their decision by citing ongoing construction in the area, the presence of workers, or simply the perception that walking was no longer necessary once their children had grown older.

Places of Worship and Recreational Local Services in Badya

Recreational areas in the form of green spaces are adequately distributed across the residential areas in Badya (Figure 70), providing broadly accessible outdoor leisure space across districts, including villa areas. In contrast, places of worship are scarce, with only three within the city (e.g., Figure 71). This scarcity contrasts with Agouza and Madinaty, where worship spaces often operate as community anchors.



Figure 70 Courts in Badya at the left and clubhouse at the right

Similar to Madinaty, there is a noticeable lack of diversity in the types of recreational facilities available (Figure 71). Most existing facilities focus on leisure, socialisation, or sports, resulting in a more limited range of options for residents seeking different recreational activities. These spaces, however, are strategically distributed across the city (see maps below), including within the villa areas.

Redundancy results indicate limited alternative options across most districts. Large residential districts fall within the lowest class (0–1 alternative), meaning residents in these zones rely on just one nearby facility for basic needs. This reduces resilience relative to Agouza, where multiple alternatives allow substitution when a facility is unavailable. Moderate redundancy (2–3 alternatives) appears mainly near neighbourhood-level service centres.

Only a few concentrated spots achieve high redundancy (4+ alternatives). These correspond to Badya's planned commercial hubs, city-level service centres, where retail, education, or service facilities are clustered together. These hubs provide the highest flexibility through co-located options within the same catchment



Figure 71 Places of worship in Bayda on the left and walking spaces on the right



Figure 72 Distribution of recreational and places of worship facilities in Badya- Walking and cycling range

Reconsidering insights from residents' interviews on the lived experience of accessibility to recreational facilities, one of the findings in the case study of Badya was that residents spent much of their leisure time within their residential buildings and immediate surroundings. Recreational facilities in these areas primarily served to entertain children and provided spaces for social interaction among new community members.

Participants described two main forms of recreation: walking around their homes a few times a week, or joining weekly workshops at the Badya clubhouse. A participant reflected, "we can go for a walk once or twice a day, either for the girl to ride her bicycle or for us to unwind from work." Since its establishment, the clubhouse has functioned as the central community facility, hosting organised events, cultural programming, and fitness activities. A smaller group travelled to Sheikh Zayed malls/cinemas despite the longer commute. For most residents, the clubhouse was accessible within a short walk, though some needed a slightly longer walk to reach it. Occasional trips to New Cairo for cafés or malls were also mentioned.

Overall, residents expressed satisfaction with the available recreational spaces. The main limitation, at present, is the need for residents to continue relying on sports clubs outside Badya until the city's own club is established. Residents also reported frequently visiting the newly built places of worship during major religious celebrations, particularly Eid. These were typically reachable on foot.

5.5 Summary

This chapter has examined how the distribution of services and facilities in Agouza, Madinaty, and Badya reflects different spatial logics and design intentions. Using service-area analysis and four complementary metrics (CLFS): cumulative opportunities, land-use mix, functional redundancy, and space syntax (integration), it has shown how proximity, density, and diversity are achieved unevenly across the three sites (findings are summarised in Table 7). This is also presented from the thematic analysis of interviews. Agouza represents an embedded form, where services are interwoven into the neighbourhood fabric and walkability is largely achieved, though inequalities in accessibility persist. Madinaty illustrates a clustered form, where facilities are concentrated in hubs and residents depend on cars or, occasionally, bikes to connect otherwise disconnected residential areas. Badya reflects a hierarchical pattern, with district, neighbourhood, and city-level hubs forming a multi-tiered structure, but everyday accessibility remains fragile in its early stages.

While each case is distinct, several common insights emerged. Cycling consistently acted as the key equaliser, bridging the gaps left by low walkability in the suburban new towns and levelling edge deficits in the inner city. The coupling of land-use mix and redundancy was also evident: where both were high, as in Agouza's markets, street 12 and street 6, and mobility corridors like 6th of October bridge and 5th of May bridge, residents enjoyed reliable access; where both were low, as in many of Madinaty's and Badya's residential areas, accessibility was fragile and contingent. Space syntax (integration) further clarified how integrated corridors attracted services, while low-integration interiors helped preserve residential calm but often thinned out everyday options.

These findings underline the importance of governance and provision in shaping accessibility. In Agouza, plural ownership and micro-scale urban interventions supported diversity and resilience. In Madinaty and Badya, by contrast, access to education, healthcare, and recreation was dominated by private providers, limiting redundancy and conditioning who could participate in the services on offer. Residents' own practices, whether hybrid work, reliance on delivery apps, or attachment to older neighbourhood services, added another layer, softening some of the spatial gaps while reinforcing others.

Overall, the chapter demonstrated how design and planning choices decisively shape the geography of access, and how the ideals of the 15-minute city concept are interpreted differently across Cairo's inner city, master-planned suburbs, and emerging new cities. These patterns set the stage for the next chapter, which shifts the focus from spatial configurations to lived experiences, exploring through interviews and thick maps how residents navigate, negotiate, and make sense of these urban forms in daily life.

Table 7 Summary of chapter 5's service area analysis findings

Service Area Analysis						
Analytical Meters						
	Meter	**Measurement**	**Importance**	**Findings Summary**		
				Agouza	**Madinaty**	**Badya**
Cross-Functions Distribution	**Cumulative-opportunities based analysis**	Number of reachable destinations within time threshold	Overall "how many can you reach?" across multiple functions	Most residential areas are able to reach 70-125 facilities in a 15-min walk, and 150-200 facilities in a 5-min bike ride, and >230 in a 15-min bike ride.	Most residential areas are able to reach between 10-40 facilities in a 15-min bike ride, and 60-185 in a 15-min bike ride.	Most residential areas are able to reach between 10-50 facilities in a 15-min walk, and 110-160 in a 15-min bike ride.
	Functional Redundancy	Availability of multiple facilities of same type	resilience and reliability: backup options	Reaches up to 12 supply facilities in Agouza in the same 400x400m, whereas none is observed in Madinaty or Badya		
	Land-use Diversity (Entropy)	Mix of land-uses activities in an area	Supports trip-chaining & local living (less need to travel far)	Agouza high entropy > 1.5 – Madinaty lowest values < 0.14 – Badya < 1.25 0 = single-function dominance; 2 = balanced multi-functions		
	Space Syntax (Integration)	Street networks' through-movement.	Permeability and "natural" flow that supports walking access	Agouza: R3 16.6–66.2 –R5 34.4–113 Madinaty: R3 1–94.6 - R5 1–96.5 Badya: R3 1–37.6 - R5 1–74.6 R3= Inner streets, R5= Outer streets - Bigger number = more connected street		
findings of Cross-function distribution are provided in the text; maps are not included given scope limits. Single-function distributions of the 15-minute city are shown in both text and heatmaps in this chapter.						
	Service Area Coverage analysis and presented maps					
	Services	**Measurement**	**Importance**	**Findings summary**		
Distri	**Supply facilities coverage**	Supermarkets with different scales, restaurants	Availability of basic functions mentioned in the	Wide mix: kiosks, hypermarkets, souqs; well spread, all 15-min walk.	Supermarket per apartment cluster; villas lack walkable	~8 supermarkets/district planned; hypermarkets and ready-food in central zone;

		location and coverage.	15-Minute City Concept		but OK by bike, ready-food mostly in malls.	15-min walk largely covered.
	Businesses facilities coverage	Small and mid-sized businesses location and coverage.		Essentials plus wellness, culture, hospitality, childcare, personal care dispersed.	Most services cluster in malls; exceptions: supermarkets, childcare, some restaurants/personal care; culture mainly mall cinemas; less than Agouza.	Mainly essentials, and small/mid wellness, culture, hospitality, personal care; few cultural venues; few offices (some central); no government buildings.
	Healthcare facilities coverage	Large hospitals, smaller clusters of clinics/medical centres		Hospitals → clinic clusters well distributed; within 15-min walk/bike.	Clinics/medium centres within 15-min walk (villas excluded); nearest public hospital ~30-min bike; private ~20-min.	Clinics within walk; larger hospitals in urban core; all private; adequate overall.
	Education facilities coverage	Schools from primary to secondary levels, and higher education level.		Primary–secondary inside neighbourhood; higher ed outside 15-min walk but within cycling.	Primary–secondary within 15-min walk (villas excluded); nearest university (private) ~25-min bike.	Plan: 6 schools + 1 higher-ed; 4 (incl. university) already open; rest future; all private.
	Sports facilities coverage	large venues (clubs) and smaller gyms		Large club (Shooting Club) & scattered gyms; broad options.	Barely within 15-min walk (villas excluded); fully within cycling; all private.	Central sports club; barely covers all areas within 15-min walk.
	Recreational facilities coverage	Locations & coverage of parks, coffee shops, *Ahwa*, bars, cinemas & theatre		Parks, ahwa, bars, cinemas/theatres; full coverage, varied density; many options.	Mixed types; no ahwa or bars; cafés in craft malls; green spaces evenly spread, some central clustering; mostly open/public.	Green spaces well spread; limited variety (mainly leisure/social/sport); strategically placed.
	Places of worship facilities coverage	Mosques and churches locations & coverage		Few (~5) mosques/churches; key landmarks.	Many; full coverage; masterplan uses them as community hubs/vistas.	Scarce (~3).

Chapter 6: 'Their Own 15-Minute City': Participants' Mobility Experiences, Digital Facilities Usages, and Social Networks

6.1 Introduction

Chapter 5 focused on the tangible urban form of the 15-minute city concept by analysing the spatial organisation of facilities. Findings include three distinct patterns of distribution, examined using service-area spatial analysis, and assessing their proximity, density, diversity, and ubiquity across the case study using four complementary spatial analyses. This is also passing through the different building typologies of these local services, and limited insights were drawn regarding participants' lived experiences of accessing them across the three case studies.

Building on this, the present chapter turns to the intangible dimension of the 15-minute city concept, often overlooked as discussed in the literature review, offering a more in-depth exploration of participants' experiences of mobility, social connectivity, and their digital usages to reach their daily needs using thematic analysis to residents' interviews in the three case studies. This includes exploring the extent to which the ideals of the 15-minute city are manifested not only in the physical urban form and fabric, but also in the realities of personal experience (see Lynch, 1960; Saadallah, 2020).

To fully capture these dynamics, the chapter will consider multiple dimensions of accessibility: the mobility experiences for daily needs, the navigation of their social networks within local circles and beyond, and the use of digital services to access the necessary services. Mobility experiences include the types of activities undertaken, such as work, supply, and recreation, the modes of transportation used, and the rhythms of daily movement. Social networks encompass different forms of connection, including personal, community, and organisational ties, as well as varying strengths of these relationships; while digital usage refers to services accessed, such as e-commerce, retail, and healthcare.

As elaborated in the methodology chapter, this analysis draws on Kevin Lynch's (1960) framework to make sense of participants' experiences in relation to the urban form. While originally developed to interpret urban form, Lynch's five elements have since been applied in diverse contexts (Wessel et al., 2019; Patel, 2023; Qiu, 2025). In this chapter, each element is examined in turn. Paths are read through the rhythms of daily movement, edges through the barriers people face in circulation, districts as the zones of everyday life, nodes as points

of decision and convergence, and landmarks as sites of memory and belonging. These dimensions are also reinterpreted in relation to participants' social networks: paths as channels of interaction, edges as limits to social ties, nodes as meeting points, and landmarks as symbolic sites of collective memory. Districts, in both spatial and social analysis, define the boundaries of each case study.

Taken together, this framework enables the discussion to move beyond the physical city and into its intangible layers, capturing not only spatial accessibility but also its emotional, relational, and digital dimensions. By grounding the analysis in lived experience, the chapter shows how accessibility in the 15-minute radius is shaped less by fixed models and more by adaptation, context, and memory (Lynch, 1960; Appleyard, 1981; Saadallah, 2020).

Rather than limiting the maps to the built form, the analysis weaves together insights from interviews through 'thick mapping' to show how daily movement, social connections, and digital practices influence how residents access nearby services and amenities. The detailed methods used to produce the data and the analysis steps in this section are further outlined and elaborated upon in the methodology (Chapter 3); however, a brief overview is provided in each section to contextualise the findings that follow.

6.2 Participants and Mobility Experiences across the Case Studies

The following mobility experience maps group routes according to their main 15-minute city activity types (paths), integrating them into Lynch's framework of the image of the city, districts, edges, nodes, and landmarks (Figure 73). Activity types include work, education, supply needs, healthcare and recreation to show the various reasons people travel daily. They are central to the research as they translate individual narratives into a spatial and temporal representation of a 15-minute radius. The maps differentiate between active travel (walking and cycling) and public transportation networks and private vehicle use. This differentiation highlights the level of dependency on motorised transport versus non-motorised alternatives to understand different mobility choices. This framing is important because it allows the study to connect personal experiences gathered through interviews with the broader questions of urban form and accessibility discussed in Chapter 5.

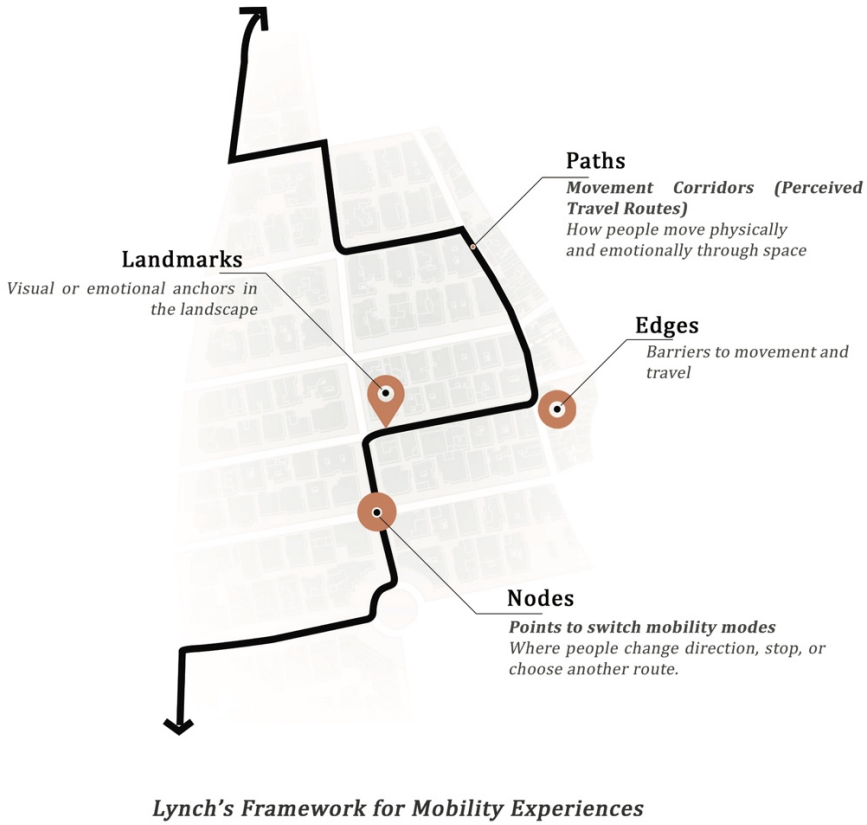


Figure 73 How lynch's framework is used in participants' mobility experiences, thick maps in their own 15-minute radius

These mobility experience maps together provide a complete view of urban movement (it will be elaborated in the next part of the in-depth sketches of experiences) of how different layouts, infrastructure, and transport options affect mobility behaviours. They also highlight potential disparities in accessibility. Different demographic groups are shown in appendixes 4,5, and 6.

Using Kevin Lynch's elements to analyse mobility experiences enriches the maps by connecting personal accounts to the city's spatial structure. Paths reveal the routes taken on foot, by bike, or by car, allowing assessment of how far the urban fabric supports or undermines efforts to reduce car dependence and encourage healthier modes of travel. Edges, such as highways, dark spots, or large empty lots, highlight the perceived barriers to mobility, both physical and perceptual, that shape mobility choices and impose hidden costs on everyday movement. Nodes, as points of convergence, markets, schools, or transport hubs, illustrate the places where decisions are made, rhythms of activity are anchored, and mobility networks intersect. Landmarks, whether visual icons or emotionally charged sites, reveal how movement is tied not only to function but also to memory, orientation, and

belonging. Finally, districts capture the zones people identify with, such as Agouza, Madinaty, and Badya, and show how these areas structure daily routines.

Together, these elements provide a grounded way of testing how the principles of the 15-minute city align with lived realities. They make visible both the opportunities and the frictions between planning ideals and everyday practices, while also emphasising the role of place in shaping mobility and routine within a 15-minute radius or beyond.

The findings indicate, in summary, that for participants, the majority of frequent daily mobility journeys were driven primarily by work, recreation, or education, with variations based on demographic factors/participants with children (which will be further detailed in the in-depth experience analysis). In contrast, shorter trips were typically made for supply needs or minor healthcare services, such as visits to pharmacies. In Agouza, most mobility journeys for these purposes were conducted through active travel modes, primarily walking or cycling, while private vehicles were the least utilised, particularly for short trips. This pattern suggests a high level of accessibility to daily needs within the local urban fabric as the distribution of facilities suggests as well. In Madinaty, modes of transport varied significantly, with participants relying on a mix of active travel, public transportation, and private vehicles. However, findings indicate a strong preference for private vehicles, even for short-distance trips, reflecting a more car-dependent urban structure, as previously suggested. In Badya, preliminary findings suggest a heavy reliance on private vehicles for most mobility needs. While some active travel trips were reported, these were primarily for leisure purposes rather than for daily essential trips.

Mobility experiences across the city also revealed some stark contrasts. In older, more walkable areas like Al Agouza, people favoured walking or cycling because essential services were nearby. On the other hand, in newer, sprawling areas like Madinaty or Badya, private cars were the go-to mode of transport due to the lack of public transit options and the greater distances between services. Public transport was primarily used for leisure and sports purposes, but recreational activities often required a car. These findings point to the different challenges residents face depending on where they live. This difference is highlighted in the maps below.

In Agouza, active travel is primarily used to reach recreational destinations or obtain essential daily needs within the immediate surroundings. Most participants leave the neighbourhood boundaries only for work-related purposes. Recreational activities are

diverse and dispersed rather than concentrated in specific locations such as malls or parks. Healthcare and supply-related activities are largely localised for most participants. The map illustrates a variety of transportation modes, with active travel playing a significant role within localised areas, while private and public transportation are utilised for longer trips.

In Madinaty, most people choose private transportation for their daily commutes, even for short distances. The city's recreational activities mainly take place in malls, parks or clubs, which could indicate insufficient mixed-use urban planning. All participants need to travel outside the city boundaries for their jobs and they mostly use private vehicles for this purpose. A significant portion of the routes within city bounds—journeys that start and end within Madinaty—are dedicated to recreational purposes. This trend can be attributed to Madinaty's design as a suburban, gated community with a strong focus on providing a high-quality lifestyle. The city's numerous recreational facilities, including parks, sports clubs, lakes, and golf courses, naturally encourage more local leisure trips. Furthermore, the clear concentration of recreational routes (coloured green) reflects the city's planned nature, where recreational activities are intentionally centralised in designated locations.

In Badya, participants rely on private transportation, utilising either their own vehicles or using mobility apps.

Agouza

In Agouza, as shown in Figure 74 below, the difficulty of using active travel and public transport arises when people rely on cars or private transport to access essential and daily services within their 15-minute radius. This is evident when they are pressed for time or when the process of active travel takes longer than expected. The participant shared that saying, "One day I have to go to the Opera house for work, but when I've been very late, I took a taxi because it's faster than walking… if I've got to get there quickly, I'll pay the extra cost."

Regarding edges, people in Agouza often spoke of walking as a struggle against both visible and invisible barriers, which is identified in the maps below as 'edges.' Uneven pavements, broken sidewalks, and narrow walkways made movement discontinuous and sometimes unsafe. The loss of trees was mentioned repeatedly, not only for shade but also for the street's comfort. One resident put it simply: "They removed the trees to widen the sidewalk for cars, but this made walking more difficult… the street has become more crowded and hotter in the summer." Large structures such as the 6th of October Bridge or the widened Gamet El-

Dowal Street stood as hard edges that people avoided altogether while walking, making the experience fragmented and tiring.

Time and car parking can be tricky, especially when moving to facilities that are somewhat distant. “Sometimes I choose to walk rather than drive even if the destination is not close, to sidestep the hassle of finding parking for the car”, another participant said. Many reported using taxis or public transport for outbound trips and walking back when conditions allow.

The metro was consistently described as the most reliable public transport option for trips beyond Agouza because of route clarity and predictability: “For me, the metro is the most comfortable form of transportation. The route is clear… I’m always sure I’ll reach my destination.” Walking to and from the metro station was framed as enjoyable when the weather permits, associated with “thinking,” “relaxing,” and “releasing stress.” Detailed walking/cycling practices are discussed in the next chapter.

Agouza’s landmarks and nodes shape how residents orient and attach meaning to movement. Local shops and businesses create rhythm and familiarity “In the morning, you smell the falafel and hear people greeting each other,” while the Nile Corniche functions as both a leisure edge and a calming landmark: “I enjoy spending time by the Nile, as it helps clear my mind from work stress.” Markets, squares, and long-standing shops were described as everyday anchors, though some residents felt newer commercial insertions (e.g., food courts and ‘Street 306’) disrupted street character and a sense of belonging.

Agouza’s dense service distribution supports trip chaining and facilitates activities undertaken at other destinations. Additionally, the lack of dedicated office space in certain industries has supported the growth of mass and shared mobility in the area.

The recently introduced shared mobility apps like Uber and Swvl, as well as traditional modes of transportation like company transportation and school buses, make commuting to office jobs in new cities outside old neighbourhoods like Agouza easier. But, “sometimes, the transportation is an additional charge, so that you feel like you need a car, it will be cheaper," one of Agouza’s residents said. However, this option will not work for people who need immediate mobility. One of the challenges of these systems is that they are based on fixed schedules, which inherently limits flexibility for individuals who require immediate mobility.

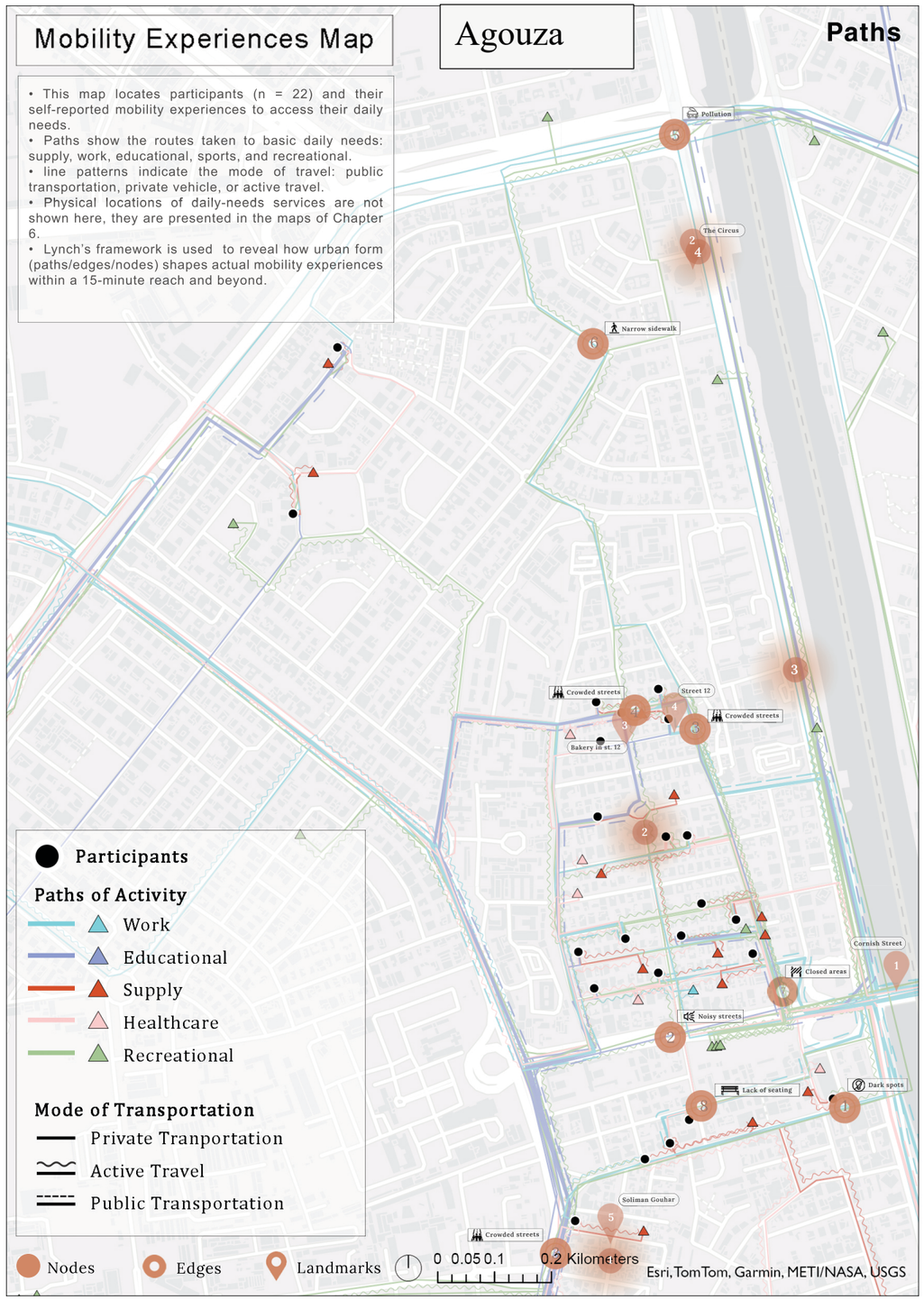
The availability of supply facilities in close proximity to services is part of the experience of the 15-minute city concept, as one participant framed it. A participant explained the value of "useful" streets: "I prefer walking to the market street in Soliman Guhar… because I can look at things, buy things, and find nice vegetables and fruits."

Walking was repeatedly described not only as a transport mode but as a recreational and productive practice: "walking was an opportunity to see places and discover new views… I would take pictures… like the sky or even the cats." Another participant described walking as an energy boost and a way to "accomplish something," especially on busy days when moving between activities.

Regarding nodes, residents identified certain points as natural gathering places for daily activities. Shaded streets like Shahin Street, the Corniche, and local markets were mentioned as comfortable places to linger and meet others. For some, these spaces carried ritualistic meaning; as one woman explained, "I really like to walk in a square… as if it divides the rituals of my life." Newer forms of mobility added to these nodes, from Midan El-Thawra to app-based bike and scooter services, though safety concerns often limited who used them.

Overall, these accounts show a layering of familiar circuits with experimental mobility, where residents hold on to what feels safe while cautiously testing new options. One participant reflected on it as "For me, entertainment is tied to the surrounding atmosphere. I enjoy the noise and life on the street, like a child playing, a cat wandering, someone riding a motorbike, or a horse passing by. Agouza feels like a circus to me in a good way, and it's very stimulating for my mind, though it can be overwhelming. I don't need "traditional entertainment" like going to the cinema because I work in the film industry." However, limited cycling infrastructure and safety concerns continue to constrain everyday bike use; participants emphasised the need for continuous, protected lanes rather than occasional initiatives (see maps[60] below for the exact trips that used active mobility).

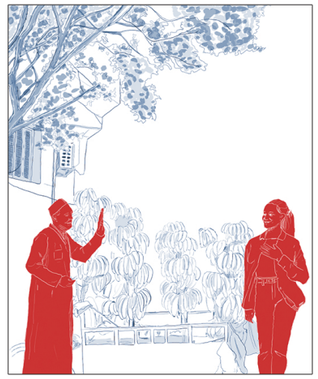
[60] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.



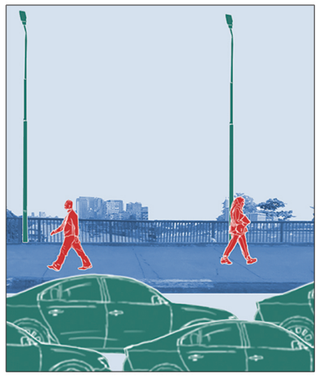
Nodes:



1 Soliman Gouhar Street



2 Shaheen Street



3 Cornish Street

4 Area around the Circus
(Green areas for active travel and waiting)

Edges:



1 Dark Spots



2 Noisy Streets



3 Crowded Streets
"the street is crowded. There's no space for cyclists."



4 Unshaded Streets
"The trees are removed to widen the street for cars."

5 Polluted Streets

6 Narrow Sidewalks
"The sidewalk is very narrow, it's very stressful."

7 Closed Areas for Repairs

8 Lack of Seating Areas
"I like walking, but it's challenging to find a place to rest on the street."

Landmarks:



1 Cornish Street



2 The Circus



3 The bakery in street 12



4 Street 12



5 Soliman Gouhar

Figure 74 Agouza's Mobility Expereinces Map

Madinaty

In Madinaty, the hidden costs of time and productivity are major concerns for active travel, leading residents to increasingly depend on cars for short trips within their 15-minute radius, as shown in the collective maps below (Figure 75). The flexibility the car gives, and the differences in the walking experience between new cities like Madinaty and older neighbourhoods like Agouza or Dokki, are framed by one of the participants saying, "We need the car because everyday walking-and-errand routines are less visible than in Dokki. In Dokki everything was immediately available; here, even when the supermarket is close, I would still drive, especially early in the morning. The walking experience is different; we used to walk in Dokki for half an hour and then come back without feeling bored." This is particularly relevant to residents who do not work remotely and need to reach the office at a specific time and who prioritise controlling time and energy. A resident added, "the car gives me the flexibility to move whenever I want, whether it's hot or cold, I'm busy or not, I feel it's more convenient."

Although carefully planned, Madinaty's 'edges' shaped mobility in restrictive ways. Residents noted that infrastructure was not designed with cyclists in mind: "The infrastructure isn't designed to support cycling as a safe mode of transportation." High sidewalks created difficulties for mothers with strollers or people with limited mobility, while the absence of continuous shade made summer walking uncomfortable. Cycling was possible inside parks and clubs, but outside these zones, unsafe intersections and reckless driving turned streets into exclusionary spaces: "They often have to ride on the main streets outside the compound, which is very risky." Monotony and distance also acted as "soft edges": key destinations such as "The Strip" and "Craft Zone" were widely described as car-dependent. Overall, edges reflect fragmented active-travel infrastructure that privileges cars over pedestrian permeability.

The mass transportation system in Madinaty was introduced as part of the city's broader mobility experience. Those who used it, mentioned in chapter 5, formed a sense of familiarity with it, making it convenient for people with fixed work schedules. "I usually use Madinaty's buses, and I know the exact timetable because I travel every day at the same time and return at the same time." It is, however, less applicable to residents who prefer flexibility or work at different times of day, as with the company buses mentioned previously in Agouza. It also provides a sense of security compared to other private transports like Uber or a taxi, especially for women residents. A woman resident elaborated, "For me, the bus

ride is very comfortable and safe, allowing me to avoid some issues that might arise with Uber. It reduces the tension that could come up with other private transportation options, and I feel safer while using it."

The recent personal transport facilities are increasingly gaining traction in Madinaty, especially in kids' trips to school or for supply deliveries. Mobility applications like Rabbit, which will be discussed in detail in the next sections, are evolving rapidly. Many participants saw it as a useful option for navigating the city. However, safe/separated lanes remain limited and are concentrated around the sports club and central parks.

Regarding the landmarks in Madinaty, they were largely tied to planned recreational facilities. Central Park and South Park were frequent points of reference, used for walking, cycling, and orientation: "You can ride a bicycle inside Central Park, you can ride a bicycle in the club, not outside." Overall, landmarks were less about spontaneous street encounters and more about managed leisure spaces.

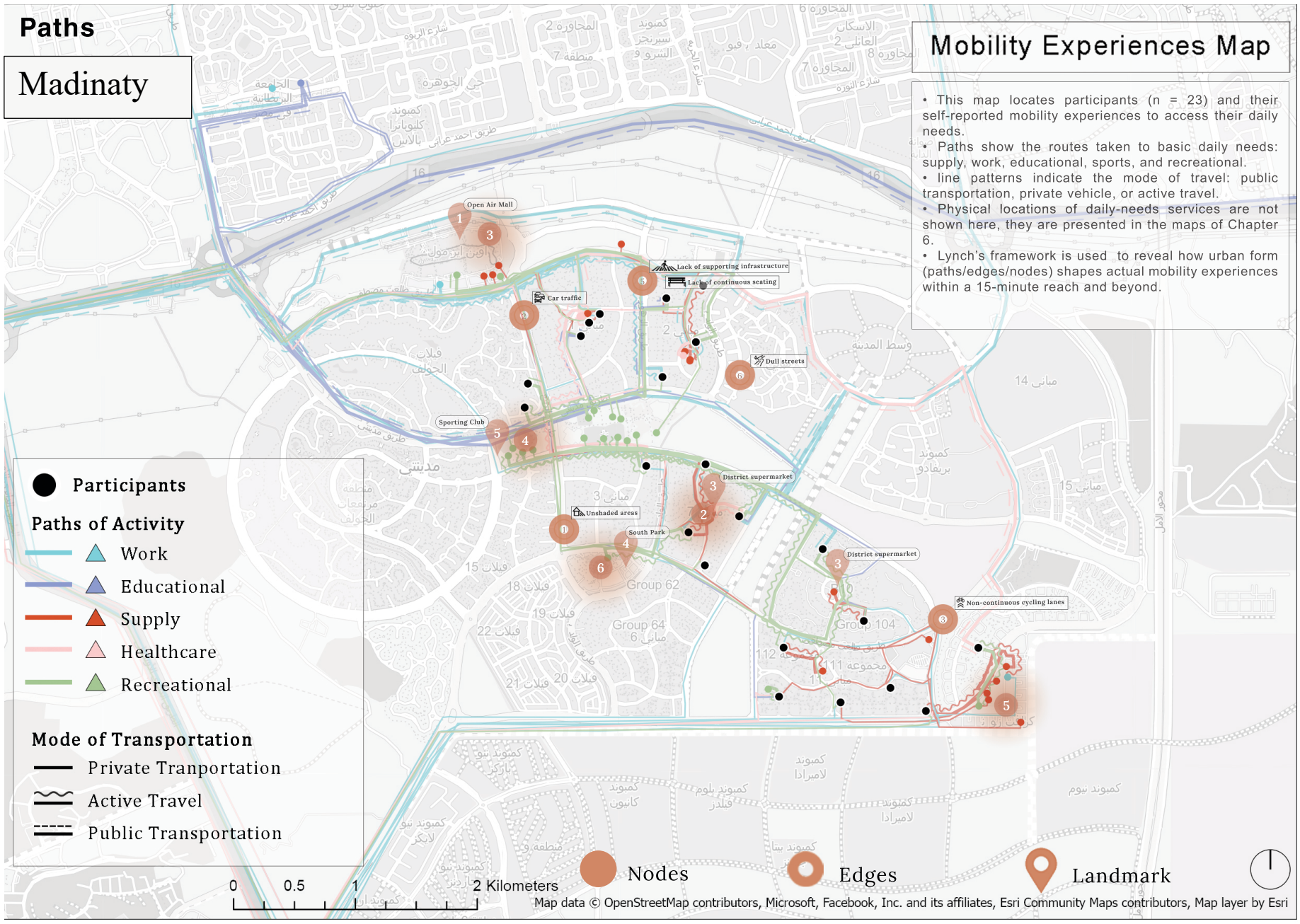
The nodes were closely linked to the planned service clustering. Parks and malls functioned as central destinations: "I walk from my house to South Park, which is about 4 kilometres… sometimes I buy coffee and return walking." Everyday needs formed smaller nodes (supermarkets, mosques), yet key destinations such as "Craft Zone" and "The Strip" remained car-dependent; bus timetables also structured routines.

The walking and cycling experiences in Madinaty are different from Agouza. Participants related walking more to' physical' and 'mental' activity, and the reasons for walking were to 'exercise,' 'clear the mind,' 'organise ideas,' and 'enjoy the scenery.' A resident said, "Walking helps me clear my mind, and sometimes I listen to podcasts or think about work-related matters." The surveillance cameras help evoke a sense of safety among women residents and give them 'peace of mind.'

Walking related to kids' activities, recreational activities, and sports activities[61]. As mentioned, walking is part of daily recreational activities, family gatherings, and bonding with kids. In contrast with Agouza, walking is rarely used to access daily services; even when distances are long, it is mostly framed as exercise rather than functional access.

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[61] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.



Nodes:



1 District Garden



2 District Supermarket



3 Open Air Mall

4 Central Park

5 Craft Zone

6 South Park
"Sometimes I go to South Park, buy coffee, take rest and return walking."

Edges:



1 Unshaded Areas



2 Traffic & many road crossings



3 Non-Continuous Cycling Lanes



4 Lack of infrastructure to support cycling or long-distance walking

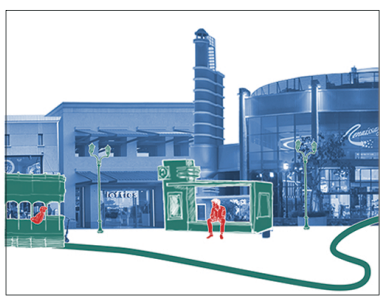


5 Lack of Continuous Public Seating



6 Dull Streets

Landmarks:



1 Open Air Mall



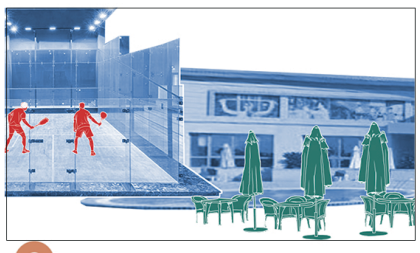
2 District Places of Worship



3 District Supermarket



4 South Park



5 Sporting Club

Figure 75 Madinaty's Mobility Experiences Maps

Badya

In Badya, child caregiving responsibilities were the most frequently cited reason among participants for limiting their reliance on active travel within their 15-minute radius to reach daily facilities (Figure 76). A woman stressed this, “We had to take the car, especially when the kids were young. It was very difficult to manage and supervise the kids while walking. Even if there is suitable infrastructure in Badya for walking and cycling, and surveillance cameras that make me feel safe, the burden of keeping an eye on a toddler and going to a specific destination on time is giving me anxiety.” The hidden cost of time and productivity. The commute to work outside the city, which takes approximately 30 to 40 minutes by car, intensifies time pressures, leaving little room for walking or cycling to nearby destinations. In contrast, residents who maintain remote or hybrid work arrangements typically do not hold this perception and regard walking or cycling to facilities as work breaks.

Badya, as still under development, produced a different type of edge condition, as mapped below. Residents did not describe sharp infrastructural or social barriers, but rather the unfinished and transitional nature of the environment itself. Construction zones, workers, and incomplete infrastructure created an atmosphere of discomfort and insecurity: “I didn’t feel comfortable because there were still workers working.” Everyday cycling was dismissed as impractical, not only because of family responsibilities but also because the streets were not yet perceived as safe or accommodating: “A bicycle. I do not think I will ride a bicycle. Because I have a small baby.” In this sense, Badya’s edges are temporal as much as spatial: they reflect the incomplete stage of the settlement.

Still in its early development, offered fewer formal landmarks. Instead, residents recalled small-scale, informal features that punctuated daily life. One participant pointed to the presence of a street vendor as a memorable anchor: “There is a truck. There is coffee on the first street. There are people who sell it on the street.” Such informal nodes of activity provided familiarity and convenience in an otherwise incomplete environment, functioning as early landmarks in the emerging urban fabric.

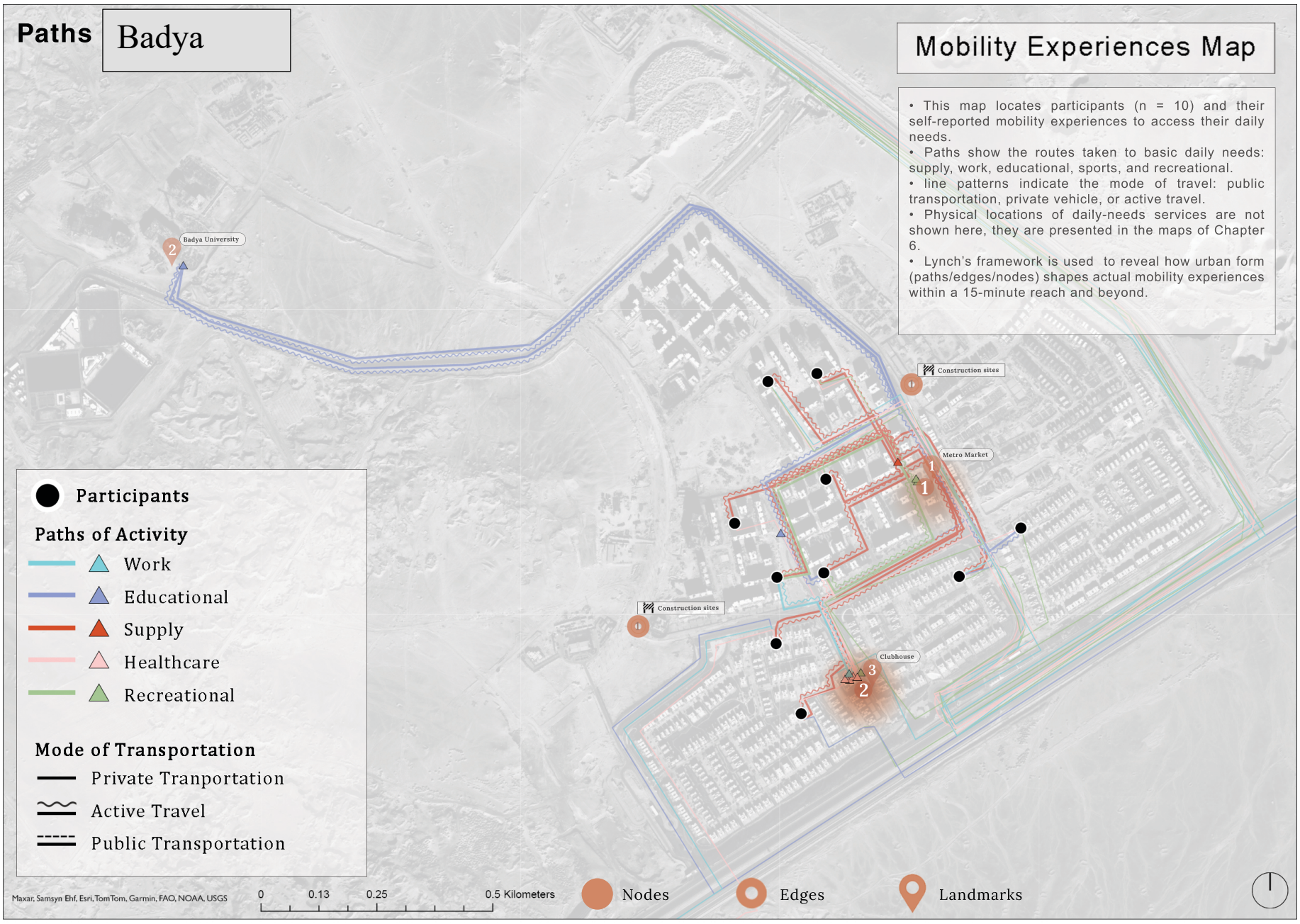
Nodes were modest and often improvised, reflecting the limited infrastructure available. Everyday interactions centred on informal activities and family routines, as mentioned above in the landmarks. Others mentioned how children’s activities became focal points: “She was walking with a bicycle. We sat next to her. And there were a lot of children.” Similarly, Hossam noted, “Our daughter sometimes plays with a bicycle.” These accounts suggest that

in the absence of large-scale planned nodes, small, spontaneous encounters with vendors or play areas served as provisional centres of social and spatial life.

The active travel infrastructure in Badya, with full coverage of separated walking and cycling lanes, creates a sense among participants that they should use them. “What didn't encourage me at first was that the place was still under construction, so I didn't feel comfortable because there were still workers working. But now that phase 1 is over, I feel like I can do this, I can again include walking in my daily schedule, especially since I can have frequent rests under the newly-constructed shaded seats,” a participant elaborated. The street furniture around the shopping area square is located, as are the pathways between residential apartments, which are intended to encourage residents to consider walking for supplies and recreational purposes, or to accompany kids to school. One resident expressed this through their words, “I can get juice or other things while walking. It helps me a lot. I feel like we get together as a family while walking, coffee for me and juice for the kids.”

The walking experience is often described as ‘family bonding activity,’ ‘good time with kids,’ ‘exercise,’ ‘enjoying oneself,’ ‘breathing fresh air,’ and a ‘space for social connection.’ Two insights stood out. First, residents are trying to reduce their reliance on supply digital services (which will be addressed in the next section). One woman resident drew on this saying, “ I didn't go out of the house at all, especially during the pregnancy and birth period. It was very difficult to follow this stage in life, so the delivery application was a lifesaver. But now that I've passed this stage, I decided to get my groceries in person. I knew that going out on the street gave me energy, and I feel like I can support my kids better with a clearer mind.”

Walking, in particular, feels easy and open space to casually meet neighbours. It creates room for spontaneous connection. One resident said, “I prefer not to over-organise it, just saying, ‘let’s go for a walk,’ anytime, and allowing the meeting to happen naturally while we’re moving, and even doing work meetings.”



Nodes:

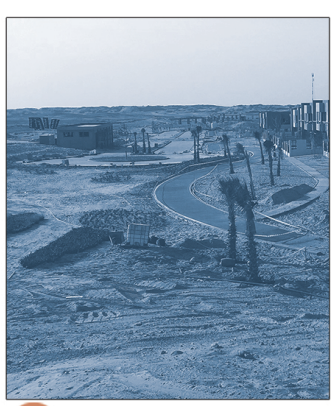


1 District Center



2 Clubhouse

Edges:



1 Construction Sites

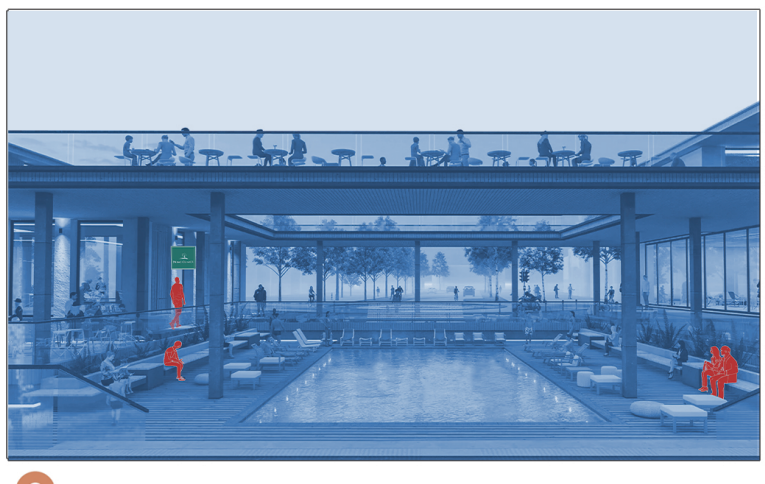
Landmarks:



1 Metro Market



2 Badya University



3 Clubhouse

Figure 76 Badya's Mobility Experiences Maps

6.3 Participants and the Usages of Digital Services across Case Studies

The Figure below illustrates the spatial distribution of the use of digital basic facilities, including digital mobility, the level of reliance on them, and whether they are public or private. The most commonly used services include e-commerce, grocery or retail, e-mobility, healthcare (including pharmacies), payments via digital applications, and e-governance via applications or websites.

Each point represents a participant, with a range of rings indicating the types of services they use in layers and their level of reliance on them (Figure 77). The maps also include the levels of reliance: low, if used only for emergencies; moderate, when digital services primarily complement physical facilities in the case study; and high, when they entirely replace traditional methods.

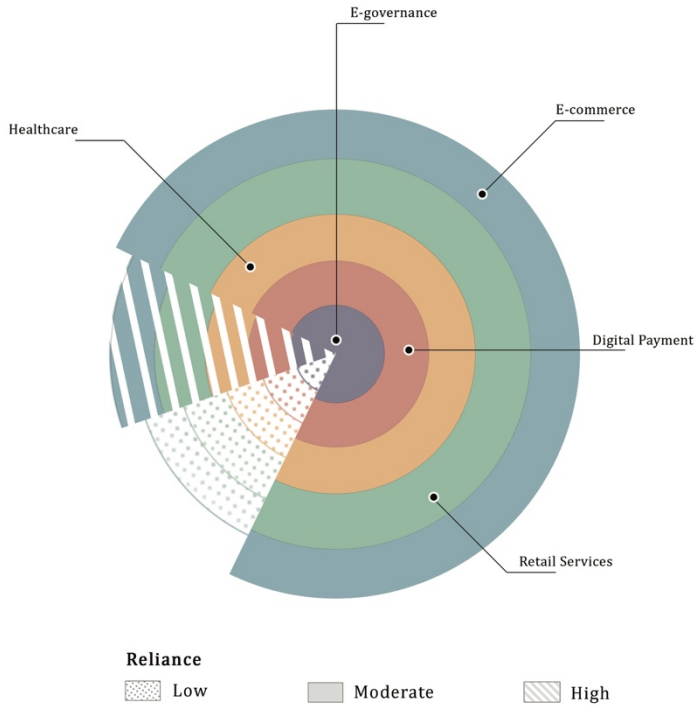


Figure 77 Indicator rings used for the participants' digital usage maps

For participants, the role of digital services in replacing or complementing local 15-minute facilities varies across the three case studies, as shown in appendices 7, 8, and 9 for different demographic groups. Most participants reported that digital services serve as substitutes for nearby physical facilities, yet the extent of this reliance varies by location, socioeconomic factors, and levels of digital literacy/tech hesitancy. People can easily access basic services through multiple digital platforms operated by both public and private organisations.

Accessibility and mobility patterns are influenced by platforms that operate at local, city, and national levels. The first map in Figure 78 shows that Agouza residents use digital services at a moderate to low level because they mostly depend on physical infrastructure to reach essential facilities. The participants in Madinaty and Badya show moderate to high dependence on digital services because digitalisation enables the fulfilment of everyday needs through physical alternatives, as explained in the 15-minute city concept's facilities distribution section. The adoption rate of digital payment services remains consistently high across all case studies, as the Figure below demonstrates, even though digital facility usage varies.

The central and outlying areas show distinct differences. The residents of Madinaty and Badya neighbourhoods felt at ease with digital tools, including e-governance platforms, transportation apps, and online payment systems, which improved their daily routines and connectivity. The residents of Agouza faced challenges because they lacked internet access and digital literacy, and preferred traditional markets and Souqs to these services. Despite these barriers, digital tools continued to play a crucial role, particularly in helping people navigate supply needs and connect with community groups. This difference is highlighted in the maps below.

In Agouza neighbourhood, the reliance on e-commerce services ranges from low to moderate, with notable exceptions that could be linked to individual work circumstances. For instance, individuals engaged in remote work may undertake fewer daily trips and, as a result, exhibit a reduced inclination toward in-person activities such as grocery shopping. Dependence on mobility applications is relatively low to moderate, which could be reflecting a stronger preference for public transportation and active modes of travel over e-mobility options (Figure 79).

In Madinaty, reliance on e-commerce generally ranges from moderate to high among participants. Although many participants report making trips to supermarkets, they still depend on digital services for their needs. Dependence on e-mobility services is also low to moderate, though for different reasons. The car-dominated nature of the city does not stop people from owning personal vehicles, which limits their use of e-mobility platforms.

In Badya, the completed phases have accessible markets within walking distance, which reduces the need for e-commerce services and prevents it from reaching a high level.

Agouza

For nearly five years, the dependence on digital services in urban areas has drastically increased since the emergence of the local ‘Otlob’ big application, which turned into the regional ‘Talabat’ application, meaning order or orders in Arabic. It was evident that the COVID-19 pandemic had played a role in accelerating reliance on big apps. Subsequently, it now covers a wide range of facilities and needs. This varies from E-commerce regular groceries (e.g., Breadfast, Rabbit, Talabat Mart, Noon Daily) to fresh products and meat delivery (e.g., Carrefour app, InstaShop) to restaurant food delivery (e.g., Talabat and Elmenus). The list also includes retail shopping (e.g., Noon, Amazon, etc.).

Healthcare, education, and sports facilities are also included in the digital landscape, such as online pharmacies and doctor appointment apps (e.g., Yodawy, Vezeeta), tutoring, and school and parents’ support (e.g., Tyro, Orcas). Also, workout, fitness, and court booking apps are available (e.g., ElCoach, DietandCheat, Padel House).

A wide range of shared mobility and personal transport apps is also available (e.g., Uber, Careem, InDrive, Swvl, and Mwasalat Misr). This has been facilitated by the recent introduction of a government-supported peer-to-peer money transfer application, Instapay, launched in 2022. There are also government-supported E-services for occasional services such as ID and driving license renewal, paying utility bills, and paying traffic fines.

The emergence and reliance on this digital platform for everyday needs and services have driven the rise of the local ‘all-in-one experience’ super app, Botit, in 2023. Such “super-app” models consolidate multiple retail and service categories into a single interface.

Different perceptions and behaviours exist in dealing with the facilities' digital availability (as shown in the maps below), which serve many purposes in each case study. In Agouza, as mentioned previously, some residents tend to order the weekly necessities and keep light items for everyday visits to the nearby kiosk or supermarket. A long-term resident shared this saying, “I order things online because they are not easily available, or due to their heaviness and weight. Overall, delivery is used to manage weight, availability, and time constraints, while nearby kiosks/supermarkets remain part of routine trips.”

The seamlessness these applications provide without the need for direct interaction was a recurring practice among participants. Some mentioned the process of in-person grocery shopping as ‘leaving them entirely exhausted.’ For healthcare applications, the availability of multiple pharmacies on one screen was an added feature. Another resident said, “The app.

provides everything that is not available in one pharmacy at one location, so you do not need to visit multiple pharmacies; the app has all the prescriptions in one place."[62]

A tension between the two experiences gives rise to distinct patterns. One resident joked, saying, "Even if you find a pharmacy between every two pharmacies here in Agouza. Sometimes I just go for a walk if I'm in the mood, but other times, if it's too hot or I'm too busy, I don't walk at all. I just ordered everything to my home. Sometimes it takes 15 minutes from picking to ordering to receiving the order." In retail shopping, some residents mentioned the convenience of not being pressured or surrounded by store staff, which can cause shopping fatigue in the in-person experience.

"I have been buying clothes online more often. I have a job that makes it hard for me to dedicate time to going to the shops and malls. I find online shopping more convenient and efficient, as I can choose what suits me at my own pace without the pressure of traditional shopping, such as rushing to make a decision or being influenced by a salesperson. I find online shopping to be comfortable and smooth," a female resident said.

As discussed in the previous chapter, familiarity and trust were the main reasons for healthcare facilities' choices in Agouza. Those who relied on digital healthcare services found the review system to make it easier for them to select clinics based on trust and experience. This finding is particularly valid for residents in their newcomer stage. Additionally, as previously discussed, digital e-payment and finance apps facilitate a seamless process.

As detailed in the description of work modes in the previous section, the long trips to work offices, usually in New Cairo, are supported by shared mobility applications. In contrast, personal transporters apps are used for shorter trips. They offer an efficient and affordable way to navigate traffic and access nearby areas, making them a practical alternative to taxis or private vehicles. However, they tend to be less comfortable over longer distances, often causing physical strain as some residents reported.

[62] It is worth noting that a full comparison of participants' experiences by age, gender, and family circumstances is presented below in Tables 17, 18, and 19.



Figure 78 Agouza Digital Usage Map

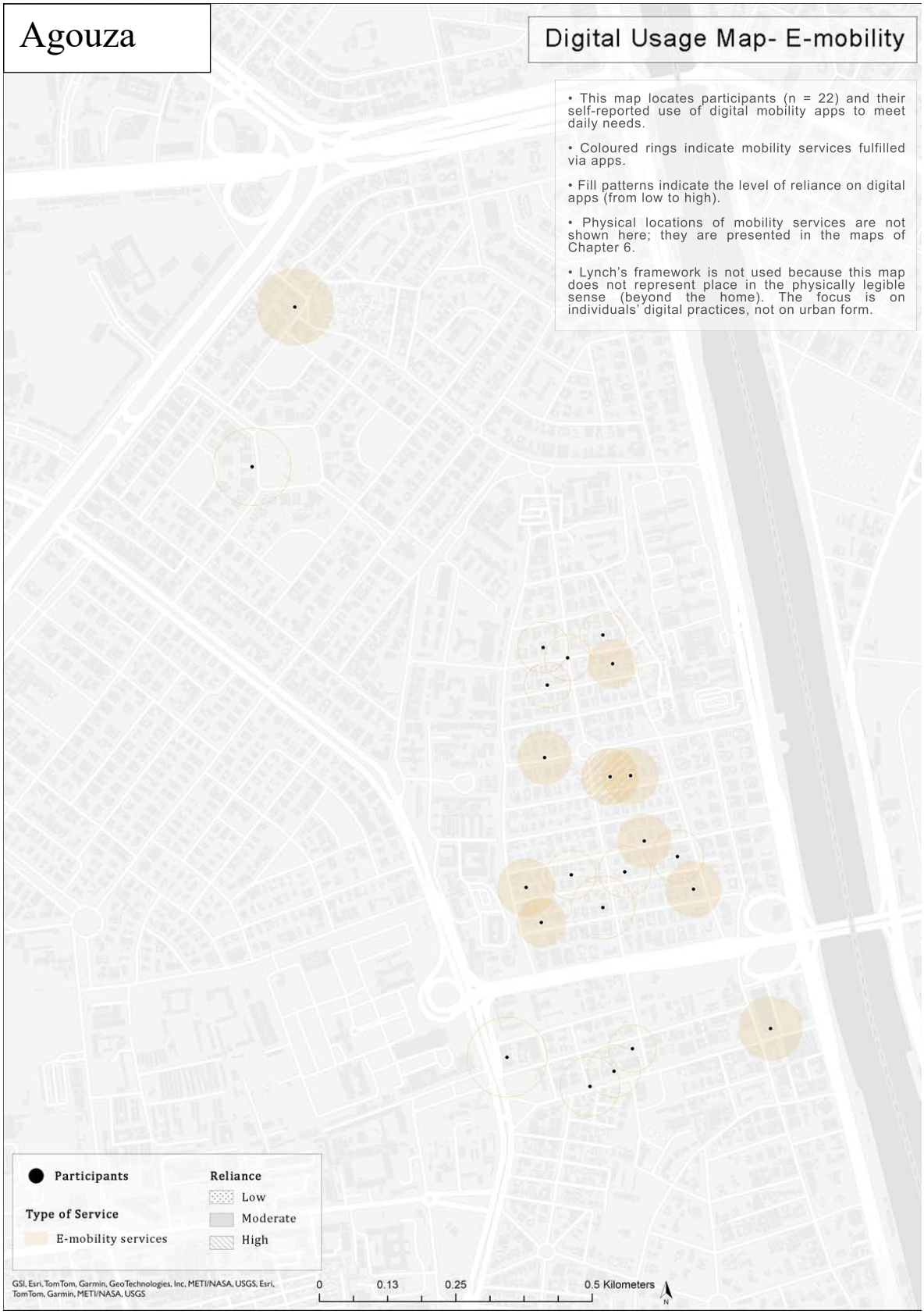


Figure 79 Agouza's Digital Mobility Apps Usage

Madinaty

The perceived experience of functional walking in Madinaty has led to greater reliance on digital services than in older neighbourhoods such as Agouza, as shown in the maps below (Figure 80). Convenience and flexibility were reasons for choosing them, especially in daily grocery shopping. A resident made this observation in their interview, “I love the flexibility that apps give me. I can edit orders, choose delivery speed and drop-off options, and request replacements, avoiding repeated walking trips or reliance on others,” a woman participant said.

Long commutes to workplaces outside Madinaty further increased reliance on delivery services. “I usually order medicines and healthcare services online. It saves me time and effort, especially since I spend so much time at work, which makes it hard for me to do these things myself. So I rely on delivery services to bring what I need to my doorstep,” one resident said. For many, apps also supported planning weekly/monthly household needs.

There are other ways to engage with digital services in balance with in-person interactions, but limiting it, like ordering from supermarkets and picking it up themselves after returning from work. This was relevant as a social activity as well for remote workers who seek balance and a change of environment.

Even before the late rise of the digital landscape, some online practices, such as sending lists to supermarkets via WhatsApp, were common in Madinaty. The participant frames this as, “I used WhatsApp to communicate with the supermarket and request what I needed. I’d send a list, and they’d deliver, which helped me avoid queues and seasonal crowds.”

As discussed in detail in the last section, personal transporters are capitalising on the moment in Madinaty. They are often used for children’s school trips and light errands. The city's existing public transportation system remains more popular than Swvl and similar shared mobility apps (Figure 81). Daily transportation services from companies reach the city gates to pick up their employees.[63]

[63] The Figures below are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

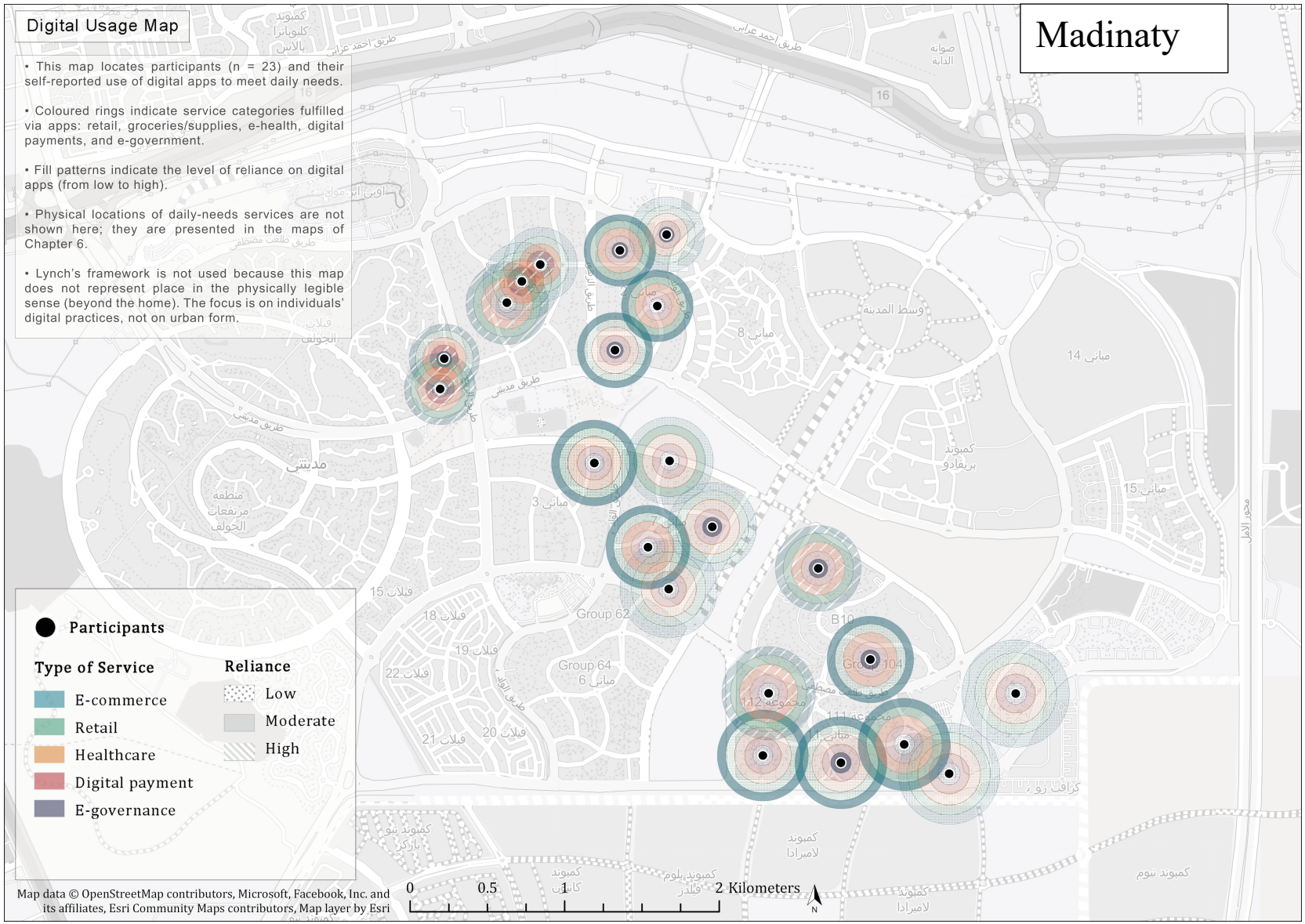


Figure 80 Madinaty's Digital Usage

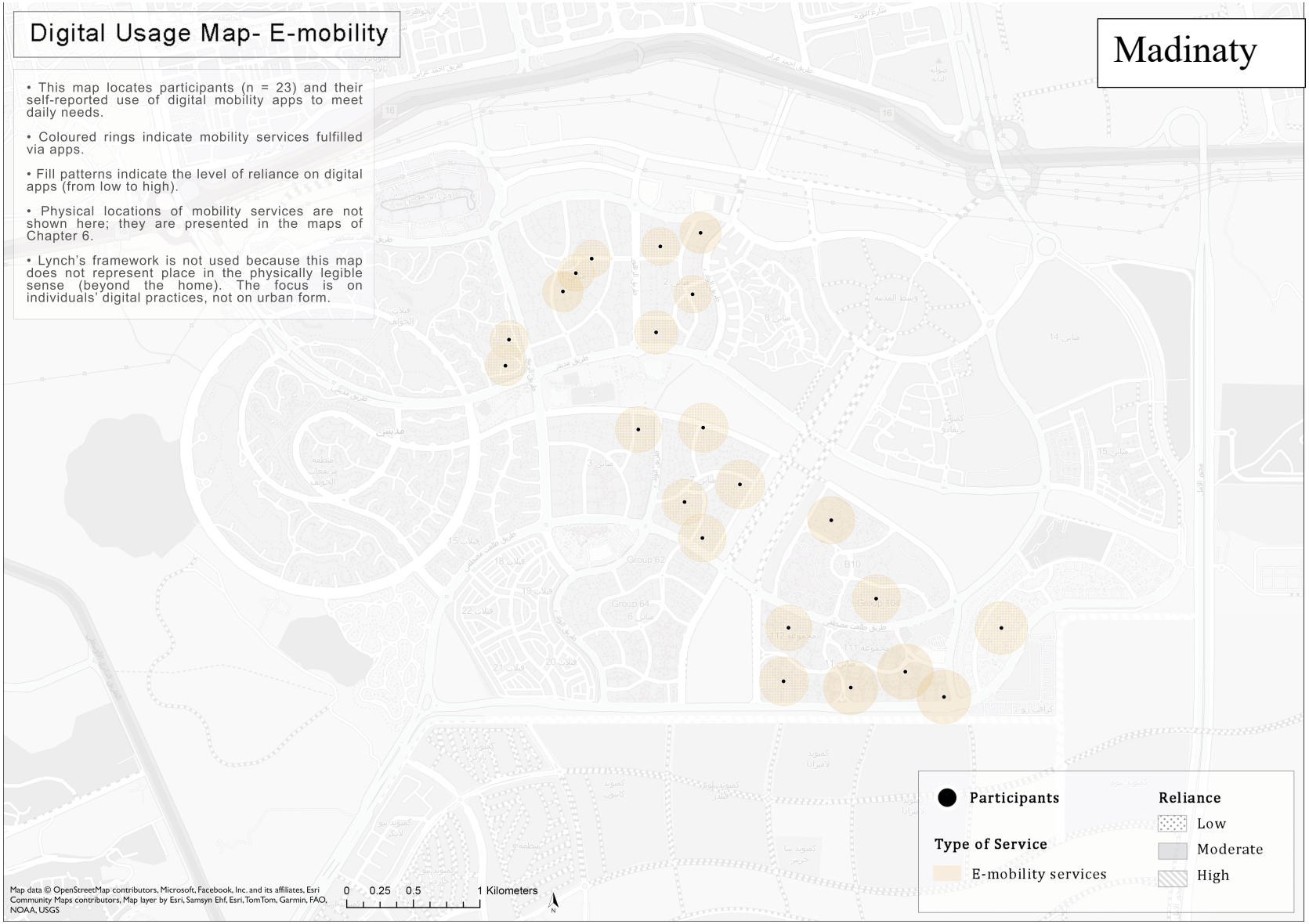


Figure 81 Madinaty's Digital Mobile Apps Usage

Badya

The reliance on digital services in supply, retail, and even government services is common in Badya, as the maps show (Figure 82). As detailed, only the essential services have opened in the city, and the remaining will be opened, so residents usually rely on apps for more advanced and specialised daily or weekly needs. Some participants also reported using tailored education and fitness apps for children and household routines.

Nevertheless, perceptions about usage differ. New residents described a mindful balance between in-person grocery/retail shopping and delivery apps. “I'm a little bit out of the delivery culture. Of course, I use them; they were useful in busy phases in my life. I do not prefer full reliance. I felt detached from the external world around me, and I do not want my kids to feel the same, they need to learn some social skills,” a resident said. This reflects negotiation over frequency of use, not a rejection of apps. In-person errands were described as opportunities for social connection (“seeing familiar faces”), countering feelings of isolation. So some ordered heavy items online while buying fresh products in person.

The reasons for using digital apps for 15-minute essential facilities often revolved around managing work and household responsibilities, saving time and energy, and easing the purchase of weekly and monthly needs (Figure 83).

One participant said, “I’m the only caregiver to my kids. My family is in another city, and my husband’s work demands travel, so most of the time I take care of the kids. Being able not to do time-consuming shopping and being able to reserve a monthly stock is very important to me so I can have time to play, keep up with schoolwork and progress.”

As mentioned, sports and educational support applications have become common. Participants valued these apps for structured guidance and convenience, especially where facilities and routines are still stabilising.

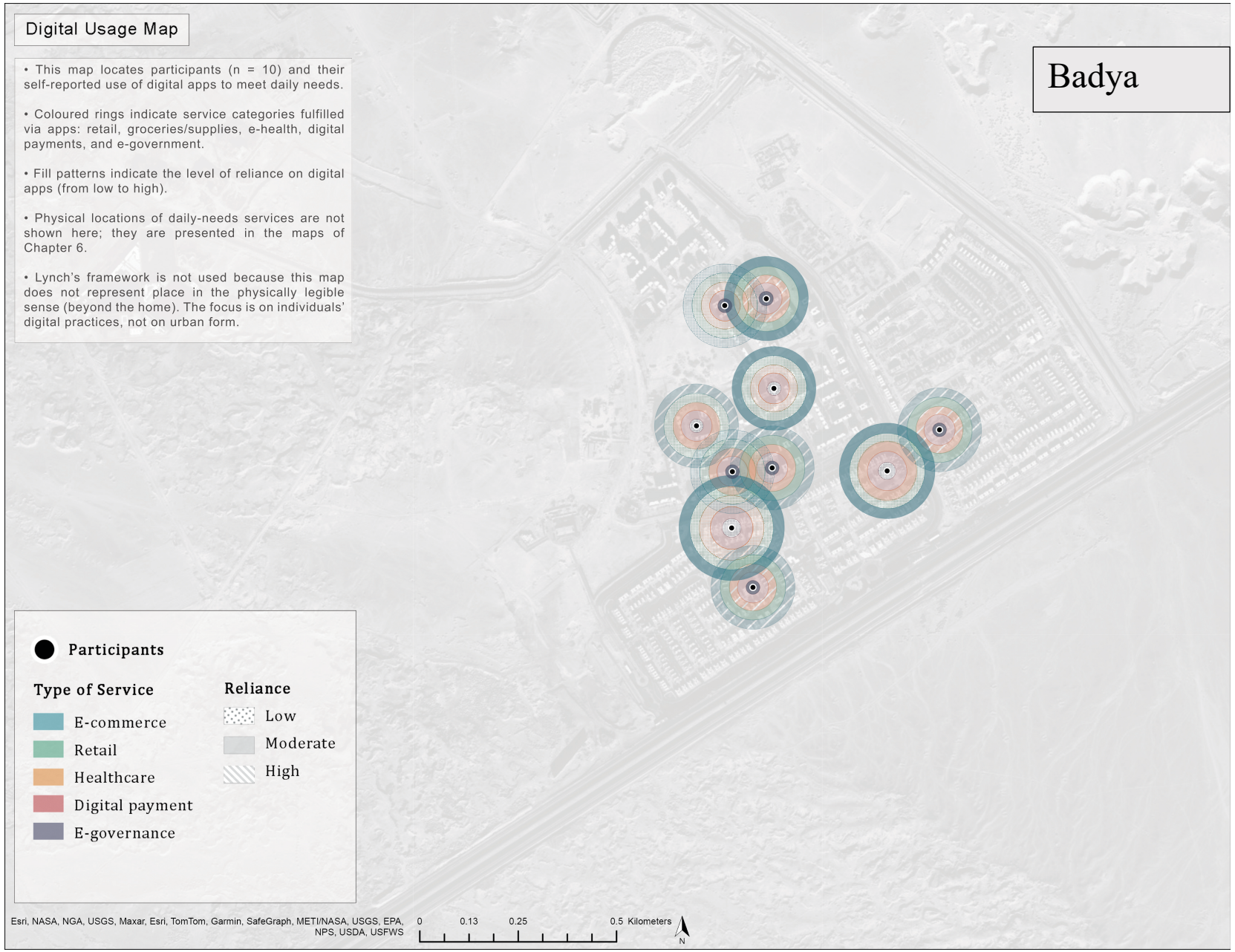


Figure 82 Badya's Digital Usage

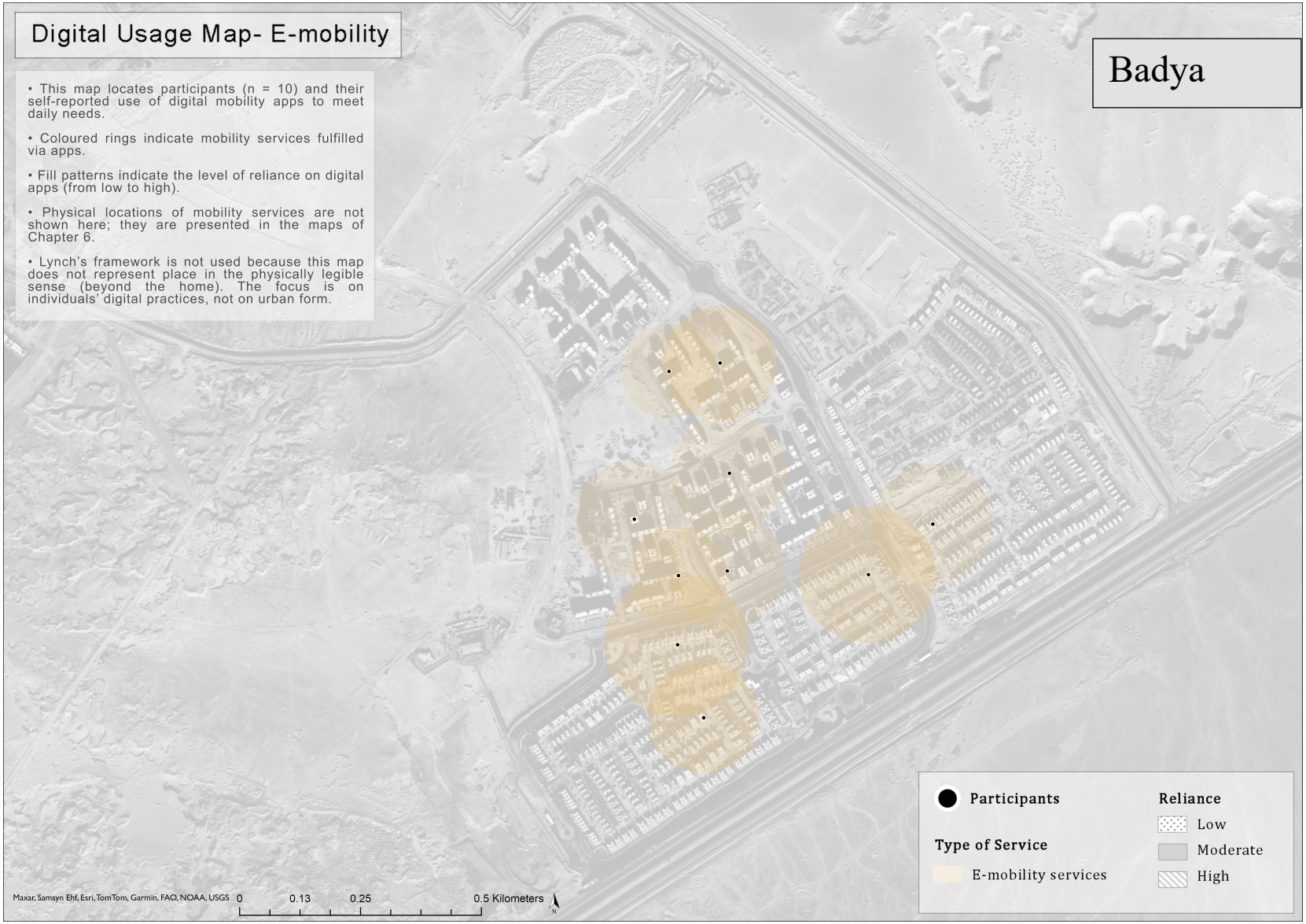


Figure 83 Badya's Digital Mobility Apps Usage

6.4 Participants and the Social Network across the Case Studies

The Figure below examines the spatial dimensions of social networks across the three case studies: Agouza, Madinaty, and Badya, categorizing them into three primary types: personal, community-related, and work- or organization-related ties. It reveals the spatial foundations of social life in different urban contexts. Personal connections were found to contain relationships with family, friends, and close acquaintances, while community-related ties involve interactions within local neighbourhoods and its facilities such as participation in social, sports or cultural activities. Work- or organization-related networks refer to professional and institutional affiliations. The spatial distribution of these social networks varies across the studied locations, influencing the extent to which they are covered within a 15-minute radius. The findings also highlight the extent to which spatial integration and/or segregation, including social and potential emotional support resulted from the closeness of this network, is maintained throughout the participants' own receptive 15-minute cities. This analysis matters because proximity shapes not only convenience but also the resilience of everyday support systems whether emotional, practical, or professional. Different demographic groups are shown in appendixes 10,11, and 12.

Bringing Lynch's image of the city into this study allows the social dimensions of urban life to be read through its spatial form (Figure 84). Paths, in this sense, are the journeys people make to visit friends, attend gatherings, or reach services. Edges appear where barriers, whether high walls, wide roads, or even subtle social boundaries, interrupt these movements and limit contact. Nodes capture the cafés, squares, or mosques where social life gathers. Landmarks, hold memory and emotion, acting as fixed points that anchor people's sense of place. Finally, districts describe the areas where people feel at home, where a sense of belonging takes shape. What this translation makes clear is that social networks do not float free from the city's urban form, but they are constantly being reinforced or undermined by it.

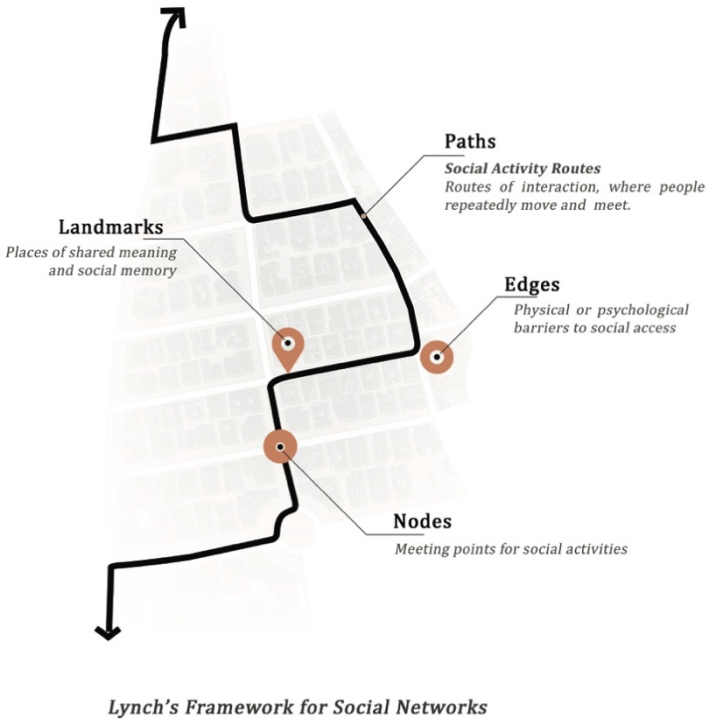


Figure 84 How lynch's framework is used in participant's social networks thick maps in their own 15 minute radius

The findings show, in summary, in Agouza people interact socially both personally and communally within a 15-minute walking or cycling range as shown in Figure 84. In Madinaty, the high degree of local connectivity becomes evident through this finding. The 15-minute radius contains most community-related connections but personal networks extend only partially throughout this area. Some personal ties extend beyond a 30-minute cycling distance, indicating a greater reliance on longer travel times to maintain social relationships. Moreover, work-related social networks are predominantly situated outside the 15-minute threshold (as shown in Figure 84), reflecting the spatial separation between residential areas and the actual employment hubs. The pattern reveals that people need to travel further than their immediate neighbourhood to connect with their professional contacts. The initial interviews in Badya show that most social connections reach further than a 15-minute radius while no community-related trips have been detected yet. The results show a weak local social structure which may result from the city's recent establishment and its developing community.

In older neighbourhoods like Agouza, it is shown that the residents who maintained compact social networks that focused on local connections. The residents maintained strong bonds with their local communities because they had easy access to nearby services and locations.

The social networks in Badya's newer developments were more dispersed while people relied on digital connections instead of local ones (this will be explained in more detail in the next part of the in-detail sketches of experiences). This difference highlighted in the maps below.

In Agouza neighbourhood, the majority of participants maintain some level of connection with their neighbours, though these ties are generally weaker compared to other types of social relationships. Most personal and community interactions occur within Agouza or its neighbouring districts, such as Mohandesin, Dokki, and Zamalek. Participants primarily remain within the neighbourhood and its immediate surroundings, venturing farther only for work-related purposes. The social networks in Agouza are clustered and overlapping. The lack of extended routes outward implies a localised social system.

In Madinaty, the majority of personal social interactions occur either within malls or entirely outside the city limits, often in locations requiring a 30-minute car journey or more. Social networks seem to follow a pre-designed grid rather than organic or incidental meeting points. The vast majority of participants report either weak or non-existent relationships with their neighbours.

In Badya, due to the city's incomplete development, residents primarily maintain social connections within their pre-existing networks located in their previous places of residence, rather than forming new social ties within the city itself.

Agouza

Participants in the three case studies define community differently, and the social ties and trips used to maintain it differ in frequency, scale, and distance, within a 15-minute radius or beyond. In Agouza, the scale of participants' social ties extends to encompass different layers built over different stages of life (Figure 85). The gatherings are sustained due to long-term relationships, neighbourhood routines, and repeated life stages in the same area. This has resulted in dense, nearby networks that provide social and emotional support within (and beyond) a 15-minute radius.

This includes sports clubs and places of worship for seniors in the community. One senior participant explained the social circle formed after years of attending Friday prayer, saying, “We used to see each other weekly after Friday prayer, and we got to know each other. I used to ask them about their life. Sometimes we go buy groceries or have tea afterwards in

Ahwa. After retirement, these ties expanded into daily volunteering (blankets, fundraising, urgent medical support)."

Also, seniors get involved in building maintenance activities to interact with their old and new neighbours, as a participant said, "we've been living here for a long time. I like to go down, say hi, and check what the building needs."

Regarding edges, in Agouza, social networks were described as deeply rooted in long-standing traditions of neighbourly interaction. Older residents emphasised the importance of keeping ties alive, even as younger generations were seen as distant. One explained: "The new generation is no longer brave, they don't have the initiative… but I like to communicate with my neighbours, and there's always love." Here, the edge was less about physical distance than about generational shifts that shaped how people related to one another.

The social networks also include old friends from school or college who usually gather in surrounding areas like Dokki or Zamalek, a 20-minute walk, or going to the Maadi neighbourhood by metro (≈20 minutes), to meet cross-neighbourhood college friendships. Work-based ties sometimes extend to New Cairo. As demonstrated, the social networks of participants in Agouza are defined by school, college, sports clubs, communities, or by long-lasting neighbour relations. Family proximity often strengthens these networks, though meeting frequency fluctuates.

Regarding landmarks, residents identified socially meaningful landmarks that structured everyday life. Community organisations in mosques and churches became moral anchors, offering spaces of solidarity. Commercial and leisure venues also anchored social ties, often stretching beyond Agouza to nearby districts: "A large part of my social life was in Dokki and Mohandessin, so I also go to my friends' homes there, or we go together to clubs." Even shop owners operated as micro-landmarks of familiarity and trust.

Social nodes emerged at the intersection of community practices, family proximity, and shared spaces. Charitable initiatives and cafés offered places for routine encounters and cooperation, while family networks reinforced proximity: "My brother lives on another street nearby, and we keep in touch regularly. If anyone needs anything, we help each other." Long friendships added stability, with gatherings often centred at home or around enduring circuits of trust: "My relationship with my college friends has spanned over forty years, and we always meet during social events." Buildings themselves became small-scale nodes of interaction through routine coordination and shared responsibility. Squares like Midan Abu

el-Karamat also remained part of everyday routines. Taken together, Agouza's nodes were dense and layered, sustained by rhythms of care, friendship, and responsibility.

The short distance to the local *Ahwa* and its surrounding areas made it simple to meet friends while interacting with different social groups, including both long-time friends and neighbours (*welad elhaii*). The close proximity enabled people to engage in multiple social interactions. Regarding this, a participant described it as follows: "We communicate with the neighbours as we usually check the building's condition, and we communicate if anything is needed. Many deliverymen were in the streets, and the building door wasn't closed properly, so we decided to keep it under surveillance. We organise a gathering every Friday for water and electricity bills collection, and during special occasions for decorating the street."

The multiple recreational facilities within Agouza residents' 15-minute radius, including cultural events, arts venues, coffee shops, traditional *Ahwa*, and places of worship, offered various opportunities for socialising. The regular visits helped people become familiar with the staff members at the places they frequently visited.

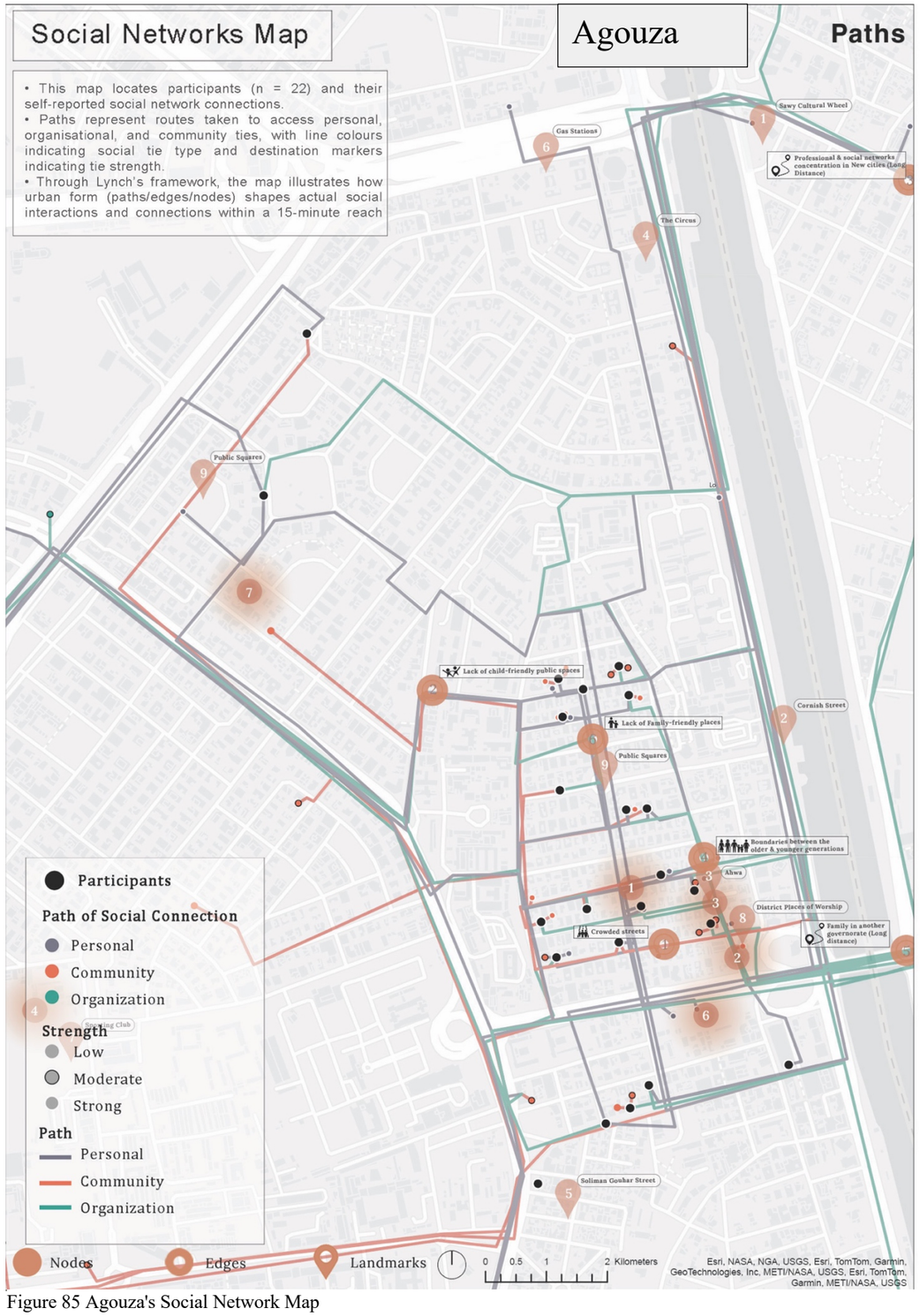
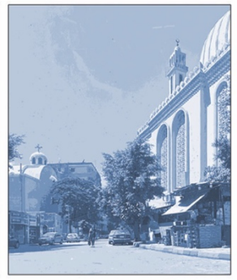


Figure 85 Agouza's Social Network Map

Nodes:



1 Morning Shopping *(Casual greetings between neighbours and shop owners)*



2 Charity organisations in places of worship



3 Ahwa



4 Shooting Club

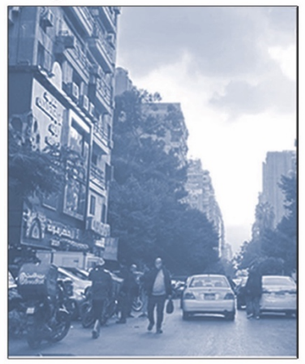
5 Home Gatherings

6 Cultural & Arts Hubs

7 Gym

8 Building Maintenance Meetings
"We're in charge of the building's maintenance, particularly because it's an older structure. We keep an eye on its condition and maintain regular communication with the neighbors."

Edges:



1 Crowded streets (Inability to meet friends and walk)



2 Lack of child-friendly public spaces



3 Professional & social networks concentration in New cities (Long Distance)

4 Boundaries between young and old generation of neighbours
"Back then, neighbors were there for each other, we communicated, supported one another, and shared a real sense of community. But the new generation doesn't seem to be like that anymore."

5 Family is in another governorate (Long Distance)

6 Lack of family-friendly places

Landmarks:



1 Sawy Cultural Wheel



2 Cornish Street



3 Ahwa



4 The Circus



5 Soliman Gouhar

6 Gas Stations

7 Sporting Club

8 District's places of worship

9 Squares (Abu El Karamat) and main streets (Shahen)

Madinaty

The transition from older neighbourhoods to Madinaty creates a larger geographical range, making it harder to sustain social connections across various life stages. The transition often weakens friendships formed during school and university years. Participants typically keep some of their personal friendships, but many lose the tight-knit groups created by school/university (Figure 86). The social connections to extended families who live in older neighbourhoods or different cities tend to become fragmented as well. Another definition of community, based mainly on work and sports facilities, eventually forms.

Residents described social edges in Madinaty as shaped by distance and commuting. Family and friends often lived in other districts, making the car essential: “Most of my family-related errands are outside of Madinaty since my family lives in Nasr City or the Fifth Settlement, so I use the car to visit them.” Long trips limited interaction and left some feeling cut off: “Family visits have become less frequent because of the difficulty in commuting… Sometimes I rely on calls or virtual meetings as an alternative.” While some reported isolation, informal micro-meeting points (kiosks, gas stations) and nearby Tagamoa helped maintain proximity-based ties.

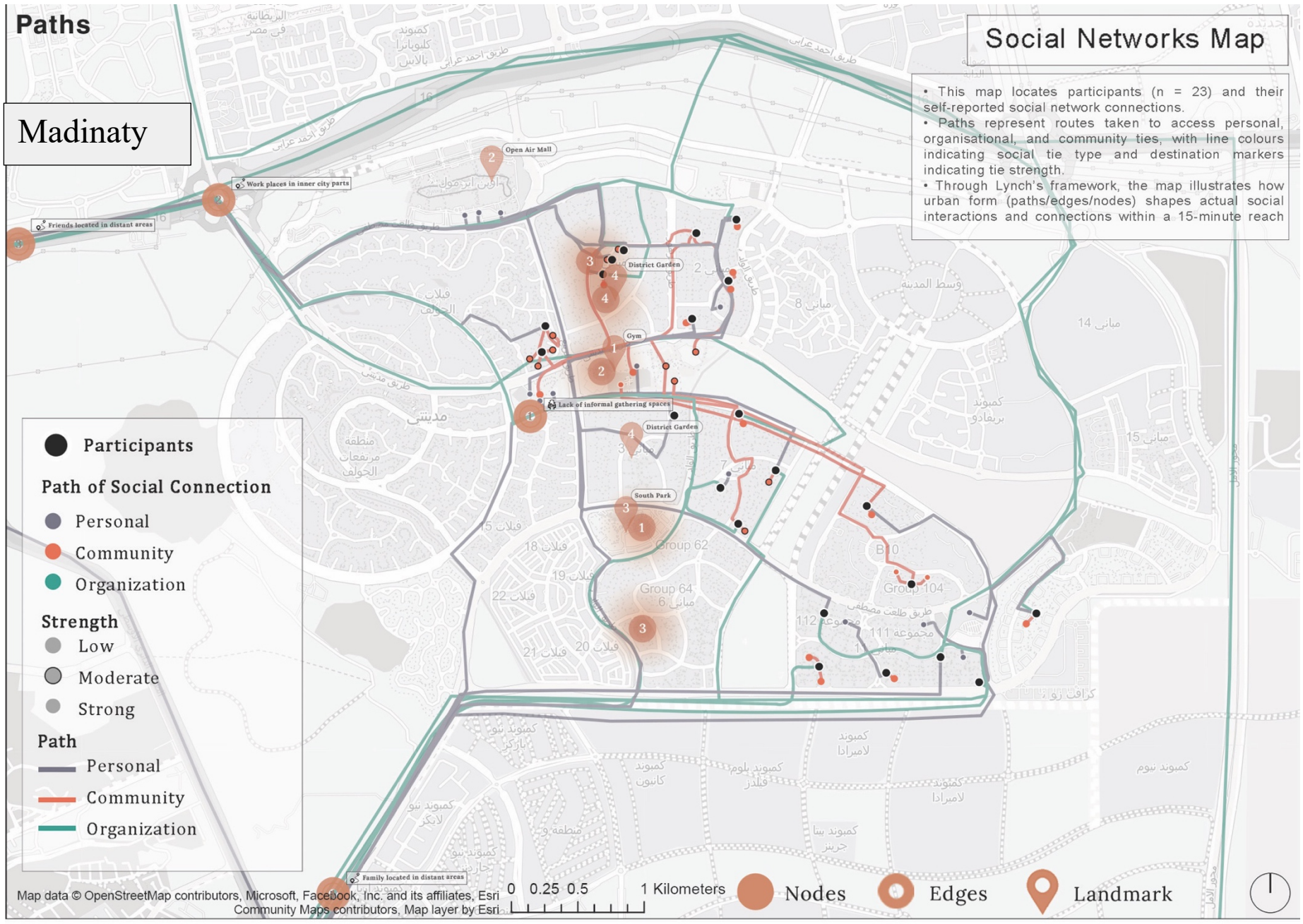
One participant framed this “cost” of proximity as social contraction: “After some years of moving, I’ve become less involved in social activities that require travelling long distances. Leisure, therefore, shifts toward nearby, low-effort options. Even meetings with friends have become very limited. Sometimes I rely on calls or virtual meetings as an alternative to in-person interaction.”

Social landmarks were often commercial or leisure venues rather than traditional community hubs. Everyday amenities such as kiosks and gas stations became informal gathering points. Cafés were central to sociability, from casual visits to established routines: “There was a coffee shop 10 minutes away from my house. There were many kinds of coffee.” For some, public parks provided alternatives: “Some people love coffee, and others enjoy going to public parks.” In this sense, landmarks in Madinaty reflected a planned, consumption-oriented landscape that offered predictable but limited opportunities for connection.

The ‘child-centred’ social circle emerges among participants with children through activities connected to children, such as schools and sports clubs. The social spaces enable children to meet new people and sometimes organise joint social events, such as picnics and park visits, with other families with children.

Nodes reflected both planned facilities and everyday practices. Clubs, gyms, and cafés created structured spaces for sociability. Informal nodes formed also around kiosks and gas stations, while parks became safe gathering spaces for families: “When my sister comes with her child… we go to the park and spend time together. The park is right in front of the house, providing a safe space for the kids.” Family visits beyond Madinaty (e.g., grandparents) extend this nodal landscape outside the settlement, producing a hybrid fabric across in-compound routines and external kinship ties.

Friendships become more compact and routine-based, often maintained through shopping, cafés, gyms, and mall-related trips, while work becomes a major source of regular social time. This stands in stark contrast to long-distance family gatherings, where physical distance often limits regular social engagement, as one participant emphasised, “I understand the struggle of travelling to see your family on the weekends. It's tough. I go back to my family’s city only on Thursday night, and then I return early Saturday morning for work.”



Nodes:



1 Coffee Shops



2 Gyms



3 District garden

4 Morning walks - Casual greetings around the house

Edges:



1 Lacks informal familiar gathering spots (like kiosks and gas stations)



2 Work groups are in inner city

3 Friends groups located in distant areas

4 Family located in distant areas

Landmarks:



1 Gym



2 Coffee Shops in Open Air Mall



3 Trucks in South Park & Central Park



4 District Garden

Figure 86 Madinaty's Social Network Map

Badya

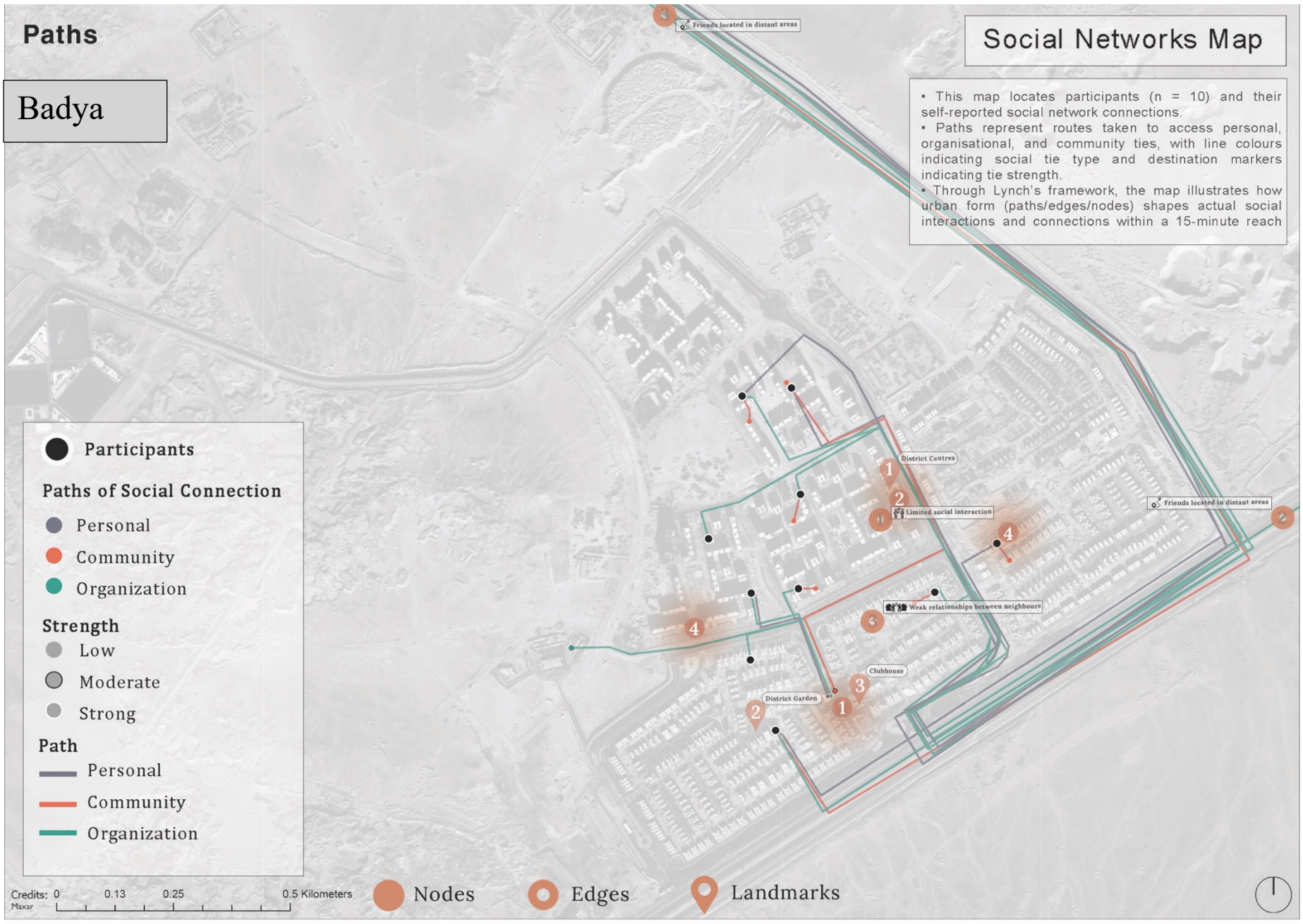
The newly formed community of Badya bases its social networks on four main anchors, as the trips mapped below in Figure 87 indicate and as the analysis details. These anchors are (1) child-centred routines (schools, clubhouse, sports), (2) casual outdoor encounters (streets/parks), (3) management-organised events, and (4) "external" sociability in nearby ahwa in surrounding districts.

One participant illustrated this by saying, "Gatherings often occur casually and spontaneously… The casual interactions mainly consist of brief encounters and small talk… If I am meeting close friends, I usually go to *Ahwa* in October." A community leader added, "I also go to *Ahwa* with my old friends… it is half an hour from here… No place around offers this cosy atmosphere." Distance from extended family reduces weekly visits and pushes social life toward nearby routines or planned meetups.

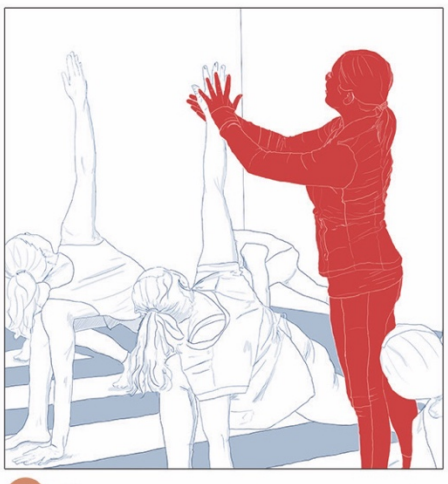
In Badya, the newness of the settlement produces social "edges" that are relational as much as spatial. As one resident explained: "We thought it would be better to live in a place where we can go every day and come back every day… but it is still disconnected." Many admitted they had yet to form close bonds with neighbours: "We don't have a strong relationship yet, but sometimes the company organises gatherings in Eid or Ramadan." For others, the absence of family nearby intensified isolation: "My family is abroad. When we moved, I felt isolated, far away." Here, "edges" are experienced as the fragility of new ties and the effort required to convert proximity into belonging.

With few established venues, homes became the primary landmarks of social life. One participant put it plainly: "Someone's house" was where gatherings happened. Domestic space, therefore, substitutes for missing public "third places."

Social nodes in Badya were equally provisional, often tied to everyday routines. Gyms acted as important anchors, blending exercise with friendship: "I prefer to go to the gym to meet my friends there. We have breakfast together and take the kids to school." Weekend meetups were often improvised around convenience and "midpoint" locations. Alongside these, digital platforms such as Facebook and WhatsApp groups emerged as vital nodes, sustaining interaction when face-to-face contact was limited. Overall, Badya's community-making relies on a hybrid of child routines, managed events, domestic hosting, and digital coordination while the settlement's public social infrastructure matures.



Nodes:



1 Gym



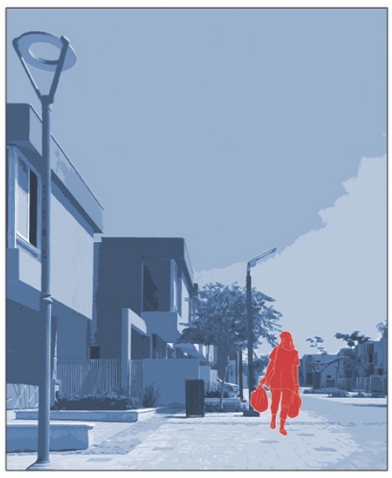
2 Coffeeshops

3 Clubhouse

4 Neighbours Social Events

5 Online & Social Media groups

Edges:



1 Limited social interactions
"Community is still growing, and the social life is limited"



2 Friends groups located in distant areas

3 Lack of strong relationship with neighbours

Landmarks:



1 Coffeeshops and Trucks in district centres



2 District Garden



3 Clubhouse

Figure 87 Badya's Social Network Map

6.5 Summary

This chapter has taken up the second research question, "In which ways are the ideals of the 15-minute city concept reflected in the urban form, social fabric, and mobility experiences of Agouza, Madinaty, and Badya?" through an analysis of lived access across the three cases. The analysis drew on interviews and thick maps to trace how everyday mobility, social ties, and digital tools shape residents' ability to access nearby services and facilities. The findings show that the 15-minute city is lived as much through routines, habits, and workarounds as through the planned design of streets and land uses.

The cases highlight this in different ways. In Agouza, the dense street grid, mixed services, and public transport availability make walking and short trips a normal part of daily life, even if edges/burdens like bridges or heat still interrupt comfort. In Madinaty, most activities are drawn toward large planned hubs as the experience of residents shows, leaving many areas dependent on cars or Madinaty's buses, while walking and cycling remain limited. Badya shows a city still in formation: residents improvise with temporary amenities, rely on digital platforms, and balance between cars for essentials and small walks or rides for leisure.

The cross-case analysis highlights several shared dynamics. Cycling emerges as a latent equaliser, with the capacity to transform spatial separation into functional proximity when safe, continuous networks exist. Entropy and redundancy together explain access: diversity without multiple options produces fragile accessibility, while service overlap generates resilience. Nodes, whether spontaneous, planned, or provisional, define the rhythms of everyday sociability, and edges, whether physical, temporal, or social, condition how and when trips occur. Digital platforms act as an "intangible infrastructure," complementing strong local form in Agouza and substituting for weak or emerging provision in Madinaty and Badya. Across all three sites, questions of care, time, and gender shape viable modes and reachable services.

Taken as a whole, the findings demonstrate that the 15-minute city is neither a single morphology nor a fixed template, but a hybrid configuration of form, networks, and practices. It is achieved where short paths, frequent nodes, and redundant services converge, and where digital infrastructures smooth gaps without displacing active mobility. These insights provide the bridge to Chapter 7, which draws together the spatial and experiential findings to trace the developmental trajectories of Cairo's 15-minute city models and to examine how different groups encounter and experience urban space in distinct ways.

Table 8 Summary of chapter 6's thematic analysis and thick mapping findings

Thematic analysis and thick mapping				
Metrics		**Findings Summary**		
	key criteria (Lynch's framework)	**Agouza (inner-city, layered fabric)**	**Madinaty (master-planned, suburban)**	**Badya (master-planned, suburban)**
Mobility Experiences	**Mobility paths: (everyday mode choice)**	Active travel is functional: walking (and some cycling) is viable for daily needs; cars used mainly for exceptions/time pressure and longer commutes.	Car-first for function: even short trips often shift to cars; walking is more recreational/optional than necessary.	Car use dominates daily needs; walking exists but often framed as leisure/family routine rather than essential access.
	Edges: barriers & hidden costs	Physical and perceptual barriers: bridges, broken sidewalks, heat, crowding; parking/time trade-offs still matter.	distance, monotony, discontinuous shade, unsafe intersections; cycling seen as risky outside parks/clubs; high curbs affect strollers/mobility.	Temporal edges: construction, workers, incomplete links, "unsettled" environment; caregiving and time scarcity reduces active travel even when infrastructure exist.
	Nodes & landmarks: where movement concentrates	Dense everyday nodes: markets, local streets, Corniche, long-standing shops; landmarks tied to memory/belonging and street life.	Nodes are planned and clustered: malls, parks, club, "Strip/Craft Zone"; landmarks are managed leisure spaces rather than street encounters.	Nodes are emerging/provisional: clubhouse as central anchor; small informal anchors (vendors) and new worship sites; many leisure trips still external (Sheikh Zayed).
	Walking vs cycling	Cycling expands reach but walking already supports the core spatial logic; cycling adds speed for some gaps.	Cycling can improve reach on paper, but experience/infrastructure limits everyday use; walking/cycling often not interpreted as "functional access."	Cycling can connect hubs, but mode-dependence remains strong; active travel grows as construction ends and comfort/safety increases.
Digital usages	**Digital services (overall reliance)**	Used as selective substitution: heavy/late/rare items ordered; still strong in-person routines due to dense supply and street convenience.	Used as default convenience strategy: delivery compensates for distance/time and supports weekly/monthly planning;	Used as gap-filler and relocation support: compensates for incomplete on-ground services; also tailored use for kids/fitness/education.

			functional walking is perceived as inefficient.	
	Digital–physical negotiation (why people still go out)	In-person shopping/walking valued for choice, rhythm, social interaction; digital reduces friction (time/effort) when needed.	Hybrid patterns exist (pickup after ordering), but apps reduce dependency on family/time costs; in-person often linked to enjoyment or combined errands.	Strong "negotiation" narrative: some resist full reliance to avoid isolation and build familiarity; in-person errands used to create social connection.
Social Networks	**Social network structure (where community comes from)**	Layered, accumulated ties across life stages: neighbours, long friendships, family nearby, worship/sports/ community organisations.	Fragmentation and re-formation: distance weakens old ties; community re-forms around work, club, kids' activities, consumption/leisure spaces.	New ties still forming: community built through kids' routines, casual encounters, management events; older friendships maintained outside (ahwa).
	Social "edges" (what limits belonging)	Less spatial, more generational/pace-of-life; some tension around change/new commercial forms.	Distance and commuting fatigue reduce visits; isolation common; reliance on cars and planned nodes narrows spontaneous sociability.	Relational fragility and newness; fewer third places; dependence on digital groups to coordinate and maintain contact.
Justice and inclusion (who is constrained)		Vulnerable users face barriers where crossings/sidewalk quality fails; heat and infrastructure gaps shape who can walk/cycle comfortably.	Parents with strollers and non-drivers face friction (curbs/shade/distance); women value "safety" but still limited by car-oriented structure.	Caregivers (especially mothers) most constrained by time, supervision, and construction uncertainty; inclusion improves as public realm matures.
Comparative takeaway		Mapped proximity is lived access through dense mix, redundancy, and street sociability, despite infrastructural frictions and street tensions.	Mapped proximity is planned but not lived on foot: car-dependence and clustered services make walking optional; digital fills the time gap.	Access is transitional and mode-dependent: digital bridges service gaps; community and mobility improve as the city "settles."

Chapter 7: The 15-Minute City Models in Cairo: Urban Form and Lived Experiences

7.1 Introduction

As discussed in the previous findings chapters, the three case studies have developed distinct models of the 15-minute city concept, with varied historically shaped backgrounds and three categories of facility distribution. Building on the previous analysis of how urban services are spatially distributed, how they are accessed by residents and how these formations align with or diverge from the ideals of the 15-minute city concept, this chapter moves toward a deeper reading of participants' lived realities in 'their own 15-minute cities' (Relph, 1976; Cullen, 1961), including interpretation of space through participants-generated maps (e.g. Degen, M. and Rose, G., 2012; Hussein, 2020, and Abbassy et al., 2025).

As discussed, the distribution produced different types of urban fabric across the three cases: in Agouza, a layered urban fabric has developed through time, in Madinaty, planning centred around established 15-minute service hubs shaped by global suburbanisation trends; while in Badya, the principles of the 15-minute city concept were directly adopted, supported by a hierarchical network of services and connected by streets and green spaces networks.

As also explored, mobility experiences are equally shaped by the availability and accessibility of the distribution of 15-minute services across the three case studies. Social networks, often an underappreciated element of the 15-minute city concept, were central in providing emotional support to participants within the local radius. The different proximity levels of these networks took different forms and reflected varying degrees of personal and communal ties across the three case studies. All these dynamics exist within the larger landscapes of digital services and mobilities. Consistently, the three case studies emerged from different cultural, political, and economic contexts that shaped their growth.

In this chapter, the analysis of documents and interviews with government and industry stakeholders focuses, in its first part, on the intertwining of these contexts with the produced urban form. This emphasis links the stakeholder and document insights directly to the shaping of urban form. In its second part, this chapter examines the extent to which participants' lived experiences reflect inclusive access to and inclusion in different services within a 15-minute reach by walking and cycling.

The first section undertakes an analysis of stakeholders' interviews, supported by a content analysis of secondary documents. The second section elaborates how the case studies have evolved, a four-part analytical lens was used (MTSC framework): morphology, typology, space-syntax (integration), and community character together.[64]

The second part of this chapter presents a broader categorisation of the analysis of participants' interviews. It presents first a cross-demographic assessment of walking, cycling, and public transport across the three case studies. Drawing on the thematic analysis of resident interviews, it highlights how gender, age, and family roles shape everyday mobility, and to what extent the different models of the 15-minute city succeed, or fail, in creating just and inclusive experiences. Then, another layer of meaning of urban space emerged through the systematic analysis and coding of participants' responses, supported by analysis of interviews with industry stakeholders and content analysis, resulted in three main themes related to the lived experience of 15-minute city proximities: (1) sense of belonging and community ties, (2) sense of place and personal attachment, and (3) lifestyle and urban life aspirations, considering the experience based on age, gender and family status.

7.2 Vision and Planning of 15-minute City Models

Firstly, Table 9 below summarises the development of the initial phase of vision and planning for the three case studies, considering the dominant policy narrative, the political and economic contexts, governing bodies, planning and design bodies, managerial and construction bodies, and design and planning narratives.

Table 9 The development of the vision and planning of the three case studies

	Agouza	**Madinaty**	**Badya**
Policy Narrative	A state-led policy vision to transform state-owned agricultural estates into a planned suburban area for the middle and upper-middle classes	A state-led policy vision to build new urban expansions in the form of new cities to accommodate the middle and upper-middle classes relocating from	A policy vision to expand new cities aims to address overpopulation and promote sustainable urbanisation as part of Egypt Vision 2030

[64] The detailed procedures are set out in Chapter 3 (Methodology).

		overcrowded inner-city areas	
Political and economic context	Post-independence period, during the Nasser period and the rise of Pan-Arabism. There was widespread nationalization of industries and key sectors.	It began during Mubarak's period with some neoliberal reforms and continued into the post-revolution period.	Post-revolution period, under neoliberal policies, and macroeconomic stabilization. This is in agreement with the UN's SDGs and the African Union's Agenda 2063.
Initial masterplan year	1934/35 (updated in 1948)	2000 (updated in 2005)	2018
Construction years	1948-1955 (initial phases)	2000s and 2010 (initial phases)	2019- 2030 (initial phases)
Land ownership	The Ministry of Awqaf (or Ministry of Endowments), then divided into lands owned by the Syndicate of Engineers and Cairo Municipality	Arab Company for Projects and Urban Development (ACPUD), a subsidiary of the Talaat Moustafa Group Holding (TMG) and New Urban Communities Authority (NUCA)	Palm for Urban Development, Palm Hills Developments and NUCA
Governing body	Cairo Municipality	Approvals by NUCA guided by the Ministry of Housing, Utilities and Urban Communities	Palm for Urban Development, Palm Hills Developments and NUCA
Developing body	Cairo Municipality (Public-local)	ACPUD (Private-local)	Palm Hills Developments (Private -local)
Managerial body	Agouza District Administration guided by the Ministry of Local Development (Formerly Cairo Municipality, guided by the Ministry of Municipal and Rural Affairs)	Madinaty City Hall, guided by TMG	Palm Hills Developments, Badya office

Planning, Design, and construction	Cairo Municipality (Public-local) with contributions from Engineering office in the ministry of Awqaf (public, local)	ACPUD (local), with contributions from Dar-El Handasa (regional, Lebanon), HHCP (global, US), SWA (global, US), and Sasaki (global, US)	AS+P Albert Speer + Partner (global), and constructed by Redcon, Dorra and United Engineering for construction (local)
Design logic	The plan was developed by architect Mahmoud Riad during his time at the Cairo Municipality. It reflected British modern urban ideals as local adaptation of the principles of the Garden City model, localized by adding elements of Fatimid architecture and urban planning.	Developed by ACPUD with contributions from US firms, the plan reflected American modern urban ideals as local adaptation of the principles of New Urbanism, localized by adding mixed uses services areas.	Designed by the German firm AS+P Albert Speer + Partner, the plan reflected European urban ideals, with a local adaptation of the 15-minute city concept. Initially envisioned as a creative city in the early masterplan, it later turned into a 15-minute city in the final version.

Within Greater Cairo, the "15-minute city" cannot be read as a uniform model because its meaning shifts with urban positioning, whether a neighbourhood is centrally embedded in the metropolitan fabric or developed as a planned satellite on the urban periphery. This positional difference also echoes longer planning genealogies: the Garden City movement's satellite logic of contained communities and mixed-use land uses, and New Urbanism's emphasis on walkable, mixed-use units and services centres, both of which continue to inform how proximity is imagined and packaged in contemporary developments.

In this thesis, Agouza represents a centrally located district building on the Garden City movement and shaped by postcolonial practices where proximity is largely inherited through historical layering, dense mixed uses, and diverse services. Madinaty and Badya, by contrast, exemplify contemporary planetary urbanism, where proximity is more explicitly planned and packaged through designated service nodes. At the same time, highways separate them and broader metropolitan functions often remain distributed elsewhere across the megacity. Read through the lens of planetary urbanism, these are not separate "cities" but interdependent urban processes: central districts, new towns, and infrastructures co-produce Cairo's urbanisation, reorganising where daily needs are met and how mobility is structured at multiple scales. This has a direct implication for planning a "network" of 15-minute areas

in Cairo: this structure creates self-sufficient cells, but to reduce compulsory everyday travel while ensuring system-wide connectivity between neighbourhoods, so that local proximity is complemented by reliable public transport and safe active-travel links that connect residents to cross-city opportunities, rather than producing internally walkable but externally dependent areas.

To ground this positioning empirically, this section briefly recalls the distinct formation trajectories and morphologies of the three case studies (as detailed in Chapter 4), because these trajectories shape what "15 minutes" can mean in practice. The gradual development of Agouza, Madinaty, and Badya resulted in distinct urban forms. As discussed in Chapter 4, the morphology of Agouza originally consisted of low-rise villas (2-3 stories) with two main '*Souq'* streets and other essential services distributed across the area. Over a span of 70 years, it became denser, with the introduction of local densification policies, most villas replaced by 4–5-story apartment buildings, and only a few low-rise buildings remaining. Office buildings, both public and private, were later introduced. Major transport corridors were opened (see relevant policies in chapter 3), and the area experienced partial gentrification driven by regional capital, mainly from the Gulf. Also, several waves of migration over the past two decades have followed regional political instability. In parallel, some locally led governmental regeneration projects were initiated, protecting the neighbourhood from potential spatial and economic deterioration. However, it is not yet included in any specific overall development plans at the regional or metropolitan level.

The area contains a wide range of facilities, most of which are within a 15-minute walk of almost all residential units. These facilities are both public and private, particularly in education and sports. The area has evolved into a mix of both large governmental institutions, business offices, and small businesses and workshops. It offers various recreational and cultural venues that reflect a broad range of cultural tastes.

Facilities are distributed across the streets (Figure 88), but, by design, are more dense on two primary Souq streets. However, they are not limited to these; numerous facilities, either commercial or basic services, are located within residential buildings that serve multiple purposes. The area's morphology offers a few purely residential zones. The area has also seen the development of small artisan shops, contributing to the local urban morphology with features like compact storefronts, some informal extensions, and street-facing workshops.



Figure 88 Small business in Agouza, a crafted local furniture shop on the left on the left, and Sudanese fashion shop on the right

However, Agouza experienced prolonged underinvestment in its deteriorating infrastructure and insufficient maintenance and public improvement activities (Figure 89). These conditions contribute to ongoing challenges in accessibility and walkability, as expressed by participants living there for years. Streets are often overcrowded with an overstimulating soundscape resulting from the continuous presence of street vendors. Also, the lack of car parking slots discourages many residents from using their cars for short trips within the area, which, in some cases, encourages walking. However, poor pedestrian infrastructure, overcrowded sidewalks, and the lack of continuous shaded seating often make walking within a 15-minute radius feel fragmented. The experience is also shaped by other factors, such as gender and age, making the 15-minute walking range less accessible to women, children, and the elderly. Additionally, the scarcity of extensive green areas limits opportunities to simply rest and chill, which is important for overall well-being, especially for children, as participants in the interviews noted.



Figure 89 Walking environment in Agouza

Development in Madinaty has progressed in a planned sequence, with the large land plot divided into sections built sequentially. Although it carries the same population as Agouza, the phased development allows for a more organised growth. The extensive city-level commercial zones have supported the creation of varied commercial experiences, including two ground-spread malls, the Arabesque Mall, featuring traditional Fatimid architecture and ventilation techniques (Figure 90). The other commercial centre is within the Open Air mall, designed to encourage walking and outdoor socialising through ground-level retail spread across open spaces.

Unlike the mall culture borrowed from Gulf countries and the multi-story malls found in places like Nasr City, which often focus on enclosed spaces to avoid extreme weather, Madinaty's malls are designed with walkability and ground-level access in mind, better suited to Egypt's moderate climate. The hierarchy of services introduced city-level, concentrated commercial centres, somewhat similar to the Souq culture in Agouza, but in a more modernised form, that gather the necessary 15-minute services in one place.





Figure 90 Horizontal shopping centres in Madinaty

However, Madinaty still lacks some key facilities, including an adequate number of educational and medical services. The lack of affordable services within the city forces residents to seek services beyond their 15-minute radius, which is, in most cases, beyond the city limits. It is not surprising, though, as a city envisioned as a fully private development.

Unlike Agouza, these city-level and minimal district-level facilities allowed for a complete land plot with residential-only land uses. This changed the morphology of the areas, also reshaping the experience of the compact 15-minute radius. As previously noted, the walking experience in Madinaty differs significantly from that of Agouza, primarily due to the lack of spatial compactness, despite the presence of mixed land uses.

Also unlike Agouza, the city includes large green spaces and recreational facilities (Figure 91). However, it lacks cultural richness and depth, often resulting in a sense of placelessness, contributing to streets that feel generic and disconnected, with limited character or local identity.



Figure 91 Active travel environment inside and outside of designated areas in Madinaty (Photo on the left by the author; on the right, by a Google Maps user)

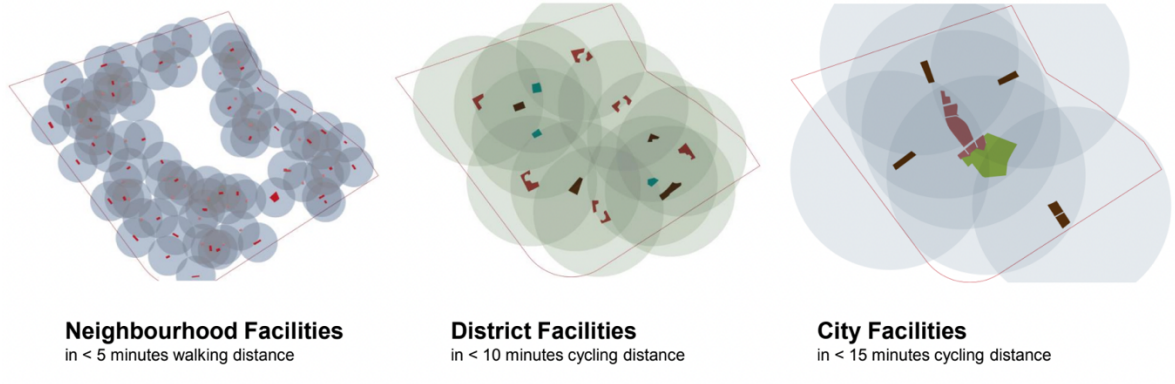
Significantly, the abundance of green areas contrasting with the compactness of the inner city was one of the media narratives branding the city. Due to its brand positioning in the 90s, media narratives have promoted it as ‘an international city on Egyptian soil’, emphasising its large plots of greenery and the clear contrast with the compact inner city. These messages were heavily reinforced through large-scale marketing campaigns, particularly television advertisements featuring well-known Egyptian actors and athletes, supported by billboards and, later, digital media platforms. It is worth noting that flexible payment plans were also a key part of the development’s appeal, attracting a broad range of buyers and investors while supporting its market-driven expansion.

Challenging the previously mentioned media narrative, Madinaty has attracted a significant number of Syrian, Iraqi, Sudanese, and Palestinian migrants in the last decade, which is seen as a gradual reshaping of its premise and image. This has triggered mixed reactions among established residents who notice its fast-paced, unfamiliar changes through community forums.

Despite this, as indicated by the thematic analysis, the area faces several other spatial challenges that affect the experience of 15-minute radius accessibility. The sense of repetition and the presence of long, clearly gridded streets make the walking experience feel detached from the city's spatial vibrancy. Although located within New Cairo, it is distant from major regional employment hubs, and the lack of continuous active travel infrastructure connecting the city to these hubs further limits active travel accessibility.

Badya followed a phased approach, starting with the construction of major facilities in its initial stage. Much like the model used in Madinaty, the plan centres on a large commercial and service core, but in Badya's case, it is surrounded by another hierarchy of services within the residential zones, including both apartment blocks and low-rise villa clusters. Its development was guided by design strategies to support the implementation of the 15-minute city principles in Cairo.

The morphology consists of a multi-layered layout with visual permeability. It is reported in one of the interviews with PHD's design team that it is intended to support a more pleasant and sustainable walking experience. As mentioned, a hierarchy of services is embedded within the plan: neighbourhood-level services are within a 5-minute walk, district-level within 10 minutes, and city-level within 15 minutes (see Figure 92). Larger, regional-scale facilities are located beyond the city boundaries. These layers are interconnected through a green mobility network that runs through the residential blocks.



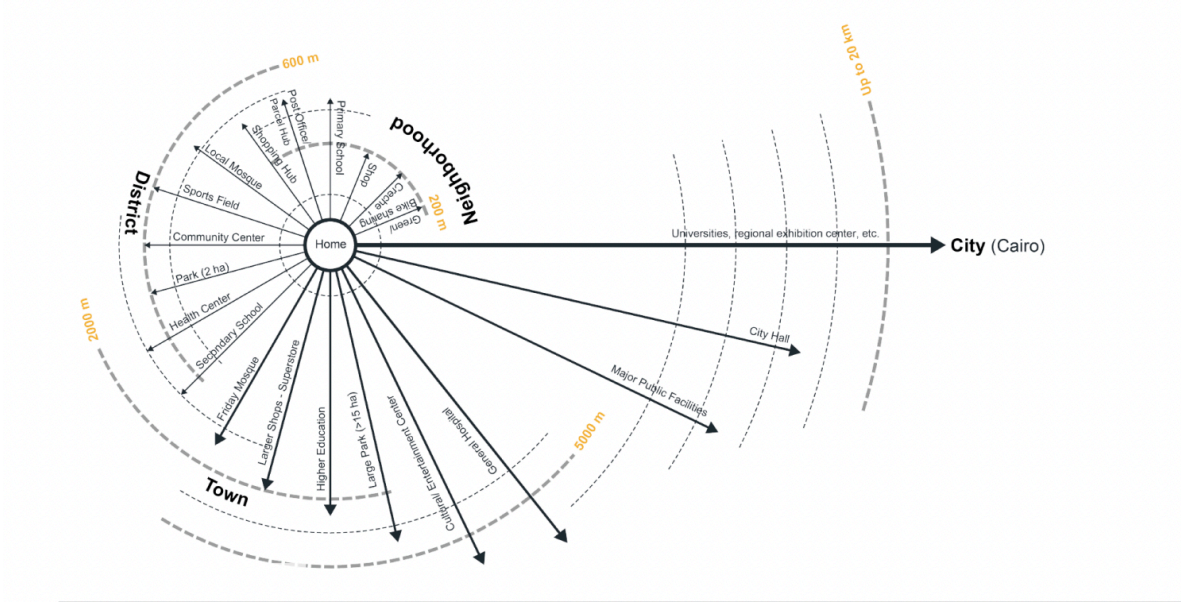


Figure 92 Badya's planning for hierarchy of services

In the same interview, an engineer from the development said about environmental sustainability, as illustrated in the development's design guide: “Water recycling systems are integrated into the apartment blocks to reduce water consumption and reuse greywater, an important consideration in a country facing increasing water scarcity.”

The ‘living street’ concept (Figure 93) has been adopted to enhance the quality of the public realm while reducing traffic speed to encourage parents with children to walk. Furthermore, the designed skyline described in the previous chapter features low-rise buildings along the edges of the development, while taller buildings are concentrated in the core to support natural ventilation, thereby contributing to overall environmental sustainability. Visibility analysis was used to ensure that major parks remain visually accessible from across the neighbourhood, aided by unobstructed views and green pathways.

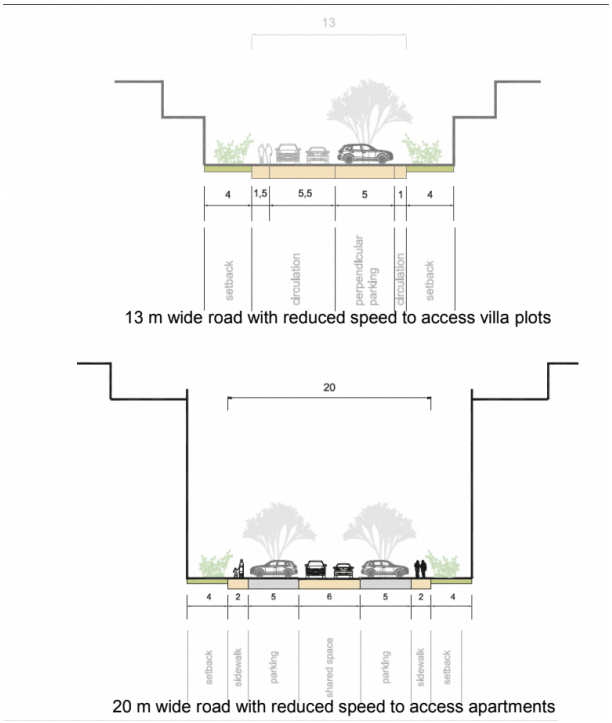


Figure 93 Living street concept planning in Badya

As mentioned before, from its inception, Badya was marketed under the slogan of 'a city of new worlds' and branded as Egypt's first 'creative city' at the beginning. This branding strategy relied heavily on media narratives that aligned with aspirational lifestyles, which are slowly being grounded in post-revolution urban realities. High-profile cultural campaigns, such as sponsorships at events like the Cairo Film Festival, and curated stories on YouTube channels projected this image of innovation and cultural vibrancy. However, this was changed just before construction of the initial phase, to shift the design strategy to the '15-minute city' model.

Such portrayals tended to appeal to a limited segment of society, thereby narrowing the scope of investment opportunities by emphasising specific creative and cultural industries. Although this approach had the potential to introduce an important element of cultural richness, often lacking in suburban contexts, there remains no concrete plans to meaningfully cultivate and integrate this cultural dimension into the city's development.

It should be highlighted that Badya's development has been shaped by Egypt's National Agenda for Sustainable Development, Vision 2030, issued in 2018, which promotes inclusive growth, environmental sustainability, and improved urban connectivity. In line with these goals, Bayda is being integrated into broader regional transportation networks,

including the planned monorail and the Bus Rapid Transit (BRT) system along the Ring Road.

Concurrently, as evident from participants' interviews, the city has undergone notable changes. Shifting work patterns, new employment geographies, and the increasing reliance on remote work have created the need for a more flexible and accessible urban environment, especially for parents with children, as shown in the planned and constructed areas below (Figure 94 and Figure 95). Many young families have begun to establish themselves there, often at a considerable distance from their extended families and old friends. This leads to broader shifts in traditional support systems and shifts the fabric of everyday social life, and new forms of community are still in the making (this will be discussed in the detailed lived experiences).



Figure 94 Planned walking environment in Badya



Figure 95 Walking environment in Badya

7.2.1 Typologies of the 15-Minute City Models

To synthesise and understand how the case studies have developed, and to examine urban fabrics, street patterns, block structures, and building types across multiple scales, while evaluating the extent to which they align with the ideals of the 15-minute city, the research applies a four-layer analytical framework. Building on the integrated morphological approach (Monteiro and Pinho, 2021), the study combines morphology[65], typology[66], space syntax (integration)[67], and community character[68] (MTSC framework). The analytical steps are detailed in Chapter 3 (Methodology), and summary tables and results are presented below.

[65] Morphology here refers to the physical form and structure of the urban fabric, the layout of streets, plots, buildings, and open spaces, and how they set together as a whole.
[66] Typology refers to the classification of urban elements into recurring types (building types) based on their form and function.
[67] Space syntax is a method for analysing the street network as a system of connected spaces. Integration is a key measure within this method that expresses how easily a street or segment can be reached from all other streets in the network: the more integrated a space is, the more central and accessible it is, and the more likely it is to attract movement, please refer to the methodology section for more details.
[68] Community character describes the overall feel and identity of an area as experienced by residents and visitors, shaped by its social composition, everyday activities, local uses, and the look and layout of the built environment.

Morphology-Typology Layer

Agouza (CS1A[69])

In the first phase of the analysis, the morphological units in Agouza demonstrate the dense, layered nature of a traditional inner-city fabric, as described in Chapter 3. The sequence of MU1A[70] to MU7A, in Table 10, reveals a fine-grained structure of irregular street blocks and tightly packed plots, where mixed use dominates at every scale. Along the highway frontages and Nile corniche (MU1A, MU3A), the built environment is defined by mid- to high-rise blocks that combine residential, commercial, and administrative functions within the same parcels. These units benefit from strong accessibility to the river edge and to major arteries, yet they are also constrained by traffic congestion and limited public realm continuity. In the interior, units such as MU2A and MU6A exhibit a more intimate scale, with small plots and narrow streets hosting clusters of mixed-use buildings. These areas sustain proximity and diversity through vertical layering, residential above, commerce below, reflecting a lived adaptation to density pressures through different development stages as demonstrated in Chapter 3. The presence of main street corridors (MU7A), in table 8, anchors economic and social activity but also reveals tensions between local and central accessibility through traffic.

Madinaty (CS2A)

Madinaty's morphological units`, in Table 11, display the most controlled and segregated structure among the three cases. From MU1M to MU7M, the organisation of space reflects a zoning rationale in which residential, commercial, industrial, sports, and transport functions are carefully demarcated. Main street corridors (MU2M, MU6M) accommodate clusters of residential and commercial activities, but the building forms are repetitive and arranged in wide blocks with looped or cul-de-sac street patterns. Services such as sports facilities (MU3M) or transport hubs (MU5M) are placed as stand-alone facilities, however, in the centre of residential clusters. The street and plot networks reveal large parcels with limited permeability, a feature that reduces the likelihood of spontaneous everyday mixing

[69] Codes such as CS1A are used as shorthand for the case studies. "CS" stands for Case Study, the number identifies the specific case, and the final letter refers to the neighbourhood (for example, "A" for Agouza).

[70] Codes such as MU1A refer to specific morphological units within a case study. "MU" stands for Morphological Unit (or mixed-use unit), the number identifies the unit, and the final letter refers to the same neighbourhood code used in the case study (for example, "A" for Agouza).

across functions, as seen in Agouza. Green areas (MU7M) provide open space, which is, in Madinaty case, interwoven with the built fabric. While Madinaty embodies a model of designed proximity, every cluster lies within reach of services by car or shuttle; the low level of street integration challenges the idea of walkability as a default mode. Compared to Agouza's fine-grained or Badya's semi-planned flexibility, Madinaty represents a controlled and top-down interpretation of the 15-minute city, where accessibility is achieved more through planned allocation than through the lived adaptability of its residents.

Badya (CS3A)

The units in Badya reflect a markedly different logic, shaped by its nature as a newly planned satellite city under the framework of Egypt Vision 2030. Here, MU1B and MU4B anchor main street frontages with a clear zoning of residential, commercial, and service functions as previously detailed. Unlike Agouza, where mixed use arises organically, in Badya it is programmed into large plots and consolidated blocks. The educational cluster (MU2B) and the sports-residential zone (MU5B) demonstrate how specific functions are concentrated in distinct enclaves, resulting in a form that supports accessibility through proximity but limits diversity within each unit. Buildings are larger in footprint and more uniform in typology, ranging from apartment towers to educational buildings and separated villas. Public spaces, visible in MU3B and MU6B in Table 8, are framed as part of the design logic of district centres, which is noticeably different from Madinaty's residual spaces. While this creates an orderly and legible structure, it also produces a mono-functional environment but with a 'leisure centre', where walkability and informal adaptations are less evident. The character of Badya resonates with the 15-minute city ideals of having key services within reach, but the rigid zoning dilutes the richness and spontaneity seen in older fabrics like Agouza.

Table 10 Agouza's morphological units

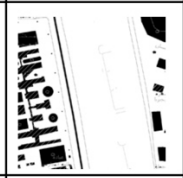
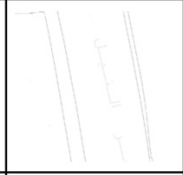
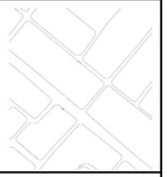
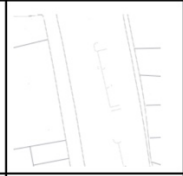
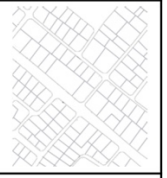
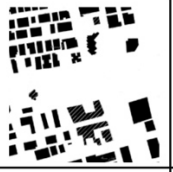
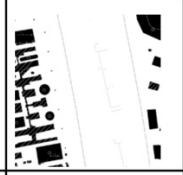
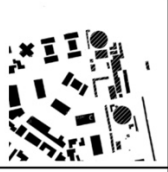
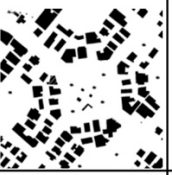
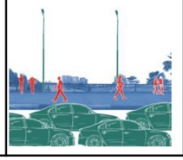
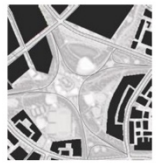
		Agouza- CS1A – Morphological Units- Typologies						
CS1A- Different types of residential units		MU1A- Mixed use – high way	MU2A- Mixed use	MU3A- Mixed-use – Nile front	MU4A - Mixed use	MU5A - Mixed use	MU6A- Mixed use	MU7A - Mixed use – Main street
	Street/street block							
	Plot							
	Building							
								
								

Table 11 Madinaty's morphological units

		Madinaty- CS2A- Morphological units - Typologies						
Different types of residential units		MU1M - Commercial, Industrial and residential, main street	MU2M - Residential, commercial, main street	MU3M - Sports (services), residential, main street	MU4M - Residential, services	MU5M - Residential, Transportation hub, park, main street	MU6M - Residential, commercial, main street	MU7M - Residential
	Street/street block							
	Plot							
	Building							
								
								

Table 12 Badya's morphological units

		Badya - CS3A- Morphological units - Typologies					
Different types of residential units		MU1B - Residential, office, commercial, main street	MU2B - Educational, main street	MU3B - Residential, services	MU4B - Residential, services, main street	MU5B - Sports, residential	MU6B - Residential, services
 	Street/street block						
	Plot						
	Building						
							
		plan 	constructed 	constructed 	constructed 	plan 	plan 

Morphology- Space Syntax Layer

Agouza (CS1A)

In the second phase of analysis, the integration results in Agouza show a clear contrast between the main corridors and the inner fabric of the neighbourhood. Along the highway edge and the Nile front (MU1A, MU3A), global integration[71] values are consistently high (199.7–225.7), which confirms their role as metropolitan connectors, as shown in Table 13. At the local scale, however, local integration[72] drops to medium and low ranges, suggesting that while these spaces are crucial for city-wide movement, they do not easily translate into comfortable, fine-grained pedestrian accessibility. Inside the district, the more compact mixed-use areas (MU2A, MU6A) show medium levels of local integration, sustaining everyday circulation through narrow, interconnected streets. The main street cluster (MU7A) is particularly significant, combining high values of both local and global integration and helping to explain its role as a vibrant commercial and social corridor, including the market streets. What emerges is a neighbourhood where integration supports diversity and proximity, yet the heavy flows along its most connected axes expose residents to congestion and uneven walkability.

Madinaty (CS2A)

Madinaty's results, shown in Table 14, present the clearest contrast between global and local integration. Major corridors (MU2M, MU5M, MU6M) record very high global values, reflecting their role as the city's principal arteries. They stitch together residential clusters, service areas, and the wider metropolitan framework in an efficient way. Inside the residential and service units (MU4M, MU7M), however, integration drops to consistently low to medium levels, shaped by looped and cul-de-sac street networks that reduce permeability and limit natural pedestrian flows. Specialised facilities such as the sports complex (MU3M) or the transport hub (MU5M) also perform strongly in terms of global integration, yet they remain relatively detached from the everyday circulation of surrounding housing. What emerges is a system that secures accessibility at the level of planned vehicular

[71] Global integration shows how easy it is to reach a street from the outer main streets network. It is a city-scale measure: high global integration means the street works as a main route or connector across the wider area.

[72] Local integration shows how easy it is to reach a street from other streets nearby. It is a neighbourhood-scale measure: high local integration means the street is well connected for short, everyday walking trips.

movement but weakens the continuity of pedestrian life. Compared with the more layered accessibility of Agouza, or even the linear corridors of Badya, Madinaty reveals a more rigidly zoned structure in which efficiency is prioritised over lived permeability.

Badya (CS3A)

Badya presents a very different spatial logic, reflecting its status as a master-planned satellite city. The main street units (MU1B, MU4B) register high global integration values, as shown in Table 15, highlighting their deliberate role as the city's structural spine. However, local integration is considerably weaker, meaning that while these corridors link different districts efficiently, they do not provide the same level of permeability for short, everyday trips. Institutional clusters, such as the educational unit (MU2B) or the sports-residential unit (MU5B), are well connected at the metropolitan scale but remain internally fragmented, with low local integration values that restrict spontaneous movement within and across their plots. Residential service areas (MU3B, MU6B) have medium local values but lower global accessibility, reinforcing their position as quieter, more inward-looking areas. Taken together, these findings suggest that accessibility in Badya is achieved through carefully designed routes. The city is well connected in design terms, yet its spatial logic offers predictability rather than the adaptive permeability that characterises older urban fabrics.

Table 13 Agouza's morphological units with space syntax (integration) analysis

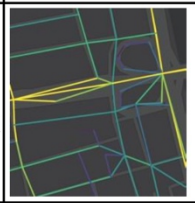
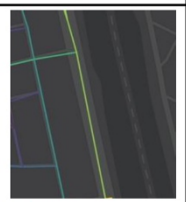
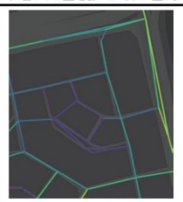
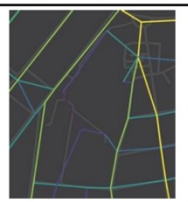
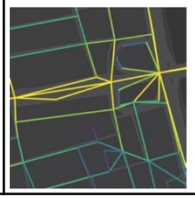
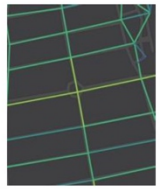
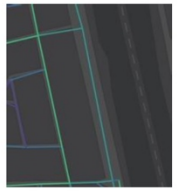
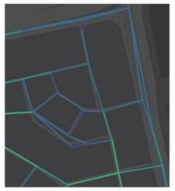
		CS1A – Morphological Units- Spacer Syntax (Integration) - Typologies						
Different types of residential units		MU1A- Mixed use – high way	MU2A- Mixed use	MU3A- Mixed-use – Nile front	MU4A - Mixed use	MU5A - Mixed use	MU6A- Mixed use	MU7A - Mixed use – Main street
	Global integration							
	Local integration							
								

Table 14 Madinaty's morphological units with space syntax (integration) analysis

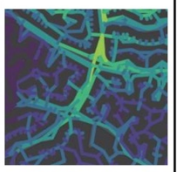
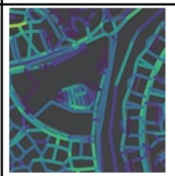
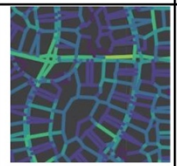
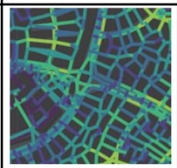
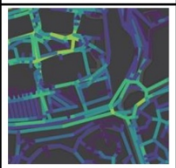
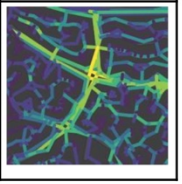
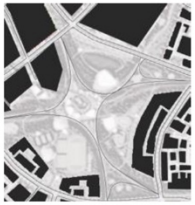
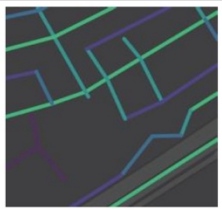
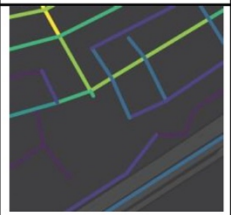
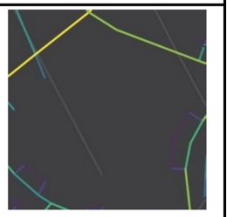
		CS1A – Morphological Units- Spacer Syntax (Integration) - Typologies						
Different types of residential units		MU1M - Commercial, Industrial and residential, main street	MU2M - Residential, commercial, main street	MU3M - Sports (services), residential, main street	MU4M - Residential, services	MU5M - Residential, Transportation hub, park, main street	MU6M - Residential, commercial, main street	MU7M - Residential
	Global integration							
	Local integration							
								

Table 15 Badya's morphological units with space syntax (integration) analysis

		CS1A – Morphological Units- Spacer Syntax (Integration) - Typologies				
Different types of residential units		MU1B - Residential, office, commercial, main street	MU2B - Educational, main street	MU3B - Residential, services	MU4B - Residential, services, main street	MU5B - Sports, residential
	Global integration					
	Local integration					
						

Typology-Community Character Layer

Agouza (CS1A)

As shown in Agouza, 15-minute city facilities are characterised by diversity at almost every level, as demonstrated by the functional redundancy analysis in Chapter 6, contributing to the dense street edge and active façades. Villas, low-rise blocks, and dense apartment buildings of five to twelve storeys stand side by side with taller towers, reflecting a population that spans income, age, and nationalities. The district carries a particularly visible presence of Sudanese families and a large share of elderly residents, adding to its social complexity, which is observed as a community character of the area. Employment remains tied to Cairo's long-standing public sector and government offices, which have historically anchored the area's role in the city. Everyday supplying is woven into the street itself, balcony basket deliveries, weekly markets, and small vendors on the sidewalks continue to define daily rhythms and are also observed as community character. Education and healthcare are present through neighbourhood schools, clinics, and hospitals, but these are reinforced by informal care networks sustained by neighbours, as discussed in chapter 6 by the analysis of residents' interviews. Sport and play take place not only in clubs and gyms but also directly on the street, where children gather, and local football tournaments are usually organised and are part of some streets, especially on a seasonal basis. Recreation is similarly embedded in the ordinary urban fabric. Coffeehouses, libraries, art hubs, and places of worship serve as both social and cultural anchors, while walking and gathering in the street remain central practices. Agouza's form and community life together sustain a dense and accessible neighbourhood, though one that is also under pressure from crowding and congestion.

Madinaty (CS2A)

In the third layer of analysis, Madinaty tells a very different story, building typologies tend more to repetition and standardisation in a more homogeneous urban form. There, residential typologies shift from villas to mid-rise apartment blocks, inhabited by a relatively homogeneous demographic of middle- and upper-middle-class families, many of them young, as observed in the several field visits. The community is closely tied to employment opportunities in nearby New Cairo, with a strong commuter profile shaping everyday movement in and outside of Madinaty. Supply is organised through supermarkets, kiosks, and hypermarkets, complemented by delivery apps and scooters that dominate the daily delivery workforce. At the same time, community kitchens and organised bazaars provide

collective points of interaction, though these are structured events rather than spontaneous encounters. Education and healthcare are readily available, with schools, polyclinics, and hospitals integrated into the plan, yet these services feel more institutional than locally rooted. Sport and leisure are channelled almost exclusively into designated facilities, sports clubs, green parks, and malls' cinemas, while the street is used mainly for circulation. Coffee shops and malls serve as social gathering places, displacing the more informal sociability associated with traditional Cairo neighbourhoods. Madinaty's urban life is therefore one of access and provision, but also of control and surveillance: the plan ensures services within reach but restricts the role of the street as a stage for everyday collective life.

Badya (CS3A)

Badya sits somewhere between these two worlds of Agouza and Madinaty, with building typologies aimed to bridge suburban and metropolitan identities and social practices. Its residential areas include villas, mid-rise, and high-rise buildings, but the fabric is distinguished by its reliance on smart technologies such as energy-efficient lighting, positioning it within new cities' sustainable agendas. The community profile is shaped by transnational mobility, with a noticeable share of households whose livelihoods are tied to employment abroad. Observed from the interviews conducted in the city. Supply is structured through supermarkets and delivery systems, but informal souqs and bazaars still punctuate the landscape, ensuring that local markets remain part of the community's character as in the other case studies, but in different shapes. Education is provided through schools and Badya University, the latter introducing a younger student population and contributing to a more dynamic demographic mix. Healthcare provision follows a structured model of pharmacies, clinics, and hospitals, ensuring access but also standardising care. Recreational life, however, is closely tied to planned facilities, district centres, coffee shops, and clubhouses, while sport is practised in designated outdoor courts or inside sports clubs, with cycling being one of the few activities that still takes place in the street. Badya therefore illustrates a hybrid condition: technologically advanced and shaped by global flows, yet still carrying traces of designated spaces that used to be perceived as informal practices that characterise older parts of Cairo.

Table 16 Typologies and community character insights across the three case studies

	CS1A-CS2M-CS3B- Typologies - Community Character		
Essential functions	CS1-Agouza	CS1-Madianty	CS3-Badya
Residential & Community character insights	Villas 2-3Storey 5-12 storeys 12+  - Mixed income levels, wide age spectrum, and diverse nationalities, with a notable presence of Sudanese residents and a strong proportion of senior citizens.	Villas 2-5 storys 6+ storys  -Young families, with a relatively homogeneous middle- to upper middle-class demographic.	Villas 2-5 storys +12 storys  - Sensor-based technologies for energy efficiency, particularly in residential areas (e.g. night-time lighting control)
Work & Community character insights	Public sector buildings banks – small  - Higher share of governmental and public-sector employees	New Cairo offices – small businesses  -Many residents employed in industries and offices located in New Cairo	Offices mixed-use buildings small businesses  - A significant share of residents work outside Egypt
Supply & Community character insights	Kiosk Supermarket Vending Restaurants  - Everyday supply through balcony basket delivery - Weekly and daily souq visits - Strong presence of street vendors.	Kiosk Supermarket hypermarket  - Everyday supply relies heavily on scooters and delivery apps - Many community/indoor kitchens - Organised community bazaars	Supermarket  - Heavy reliance on delivery services - Informal souqs/bazaars within the community
Education & Community character insights	Schools 	Schools 	Schools universities  - Presence of student accommodation introduces a younger demographic

	CS1A-CS2M-CS3B- Typologies - Community Character		
Essential functions	CS1-Agouza	CS1-Madianty	CS3-Badya
Healthcare & Community character insights	Clinics Polyclinic Hospital  - Informal networks of care among neighbours	Pharmacies polyclinics & hospitals 	Pharmacies clinics hospitals 
Sports & Community character insights	Gym Youth center Sports club  - Children and youth frequently use streets as play spaces - Local football matches and neighbourhood tournaments	Sports club  - Streets are used for sports, and social life is instead channelled into designated facilities.	Open courts sports club  - Streets are used for sports - Cycling in streets is more common
Recreational & Community character insights	Green Spaces art hubs library places of worship  Walking Ahwa  - Strong reliance on Ahwa (coffeehouses) - The use of streets as social and recreational spaces for gathering, strolling, and informal interaction.	Green Spaces cinema (in horizontal malls) places of worship  Parks Walking Coffee shops  - Green areas within each district serve as the main recreational spaces - Streets are less commonly used as sites social gathering	Green Spaces district centers places of worship  clubhouse walking Coffee shops  - Recreational practices largely tied to planned facilities

7.3 Lifelines of Proximities and Mobilities: The Inclusiveness of the 15-minute city Concept Models

The previous chapters provided findings and detailed spatial mapping that highlighted the 15-minute proximities of key urban facilities: supply, healthcare, education, sports, and recreation. In addition to the proximities of facilities, the scales and diversities of businesses and residential units are presented. To contextualise these findings within the developmental phases of the case study areas, the previous section aimed to capture the key social, economic, political, and cultural conditions that shaped their development over time.

The spatial analysis in chapter 03 offered insights into the availability of commercial and service hubs, medical, educational, and sports-related densities, and distributions of recreational areas and places of worship across the three case studies. This was all within a broad portrayal of different typologies of spaces fulfilling these functions in the three historically distinct urban areas. This analysis also highlighted participants' mobility to these facilities, their surroundings, social networks, and the growing reliance on digital platforms that increasingly mediate and reshape these connections and proximities. Altogether, these elements reveal not only patterns of spatial organisation, but also consider relational dynamics that underpin urban availability and accessibility.

Beyond physical proximity, this section aims to provide qualitative insights into the in-depth use and lived proximities. To better understand this, three main themes emerged from the coding analysis and serve as lenses: sense of belonging, sense of place, and lifestyle. The first refers to personal trajectories related to community and place; the second to the personal emotional bond with places, and the third to present and future aspirations and patterns of living. All three themes are found to impact the choice of specific facilities within a 15-minute radius or beyond.

To develop a better understanding of the level of inclusivity of the lived experience offered by the three models of the 15-minute city concept, this section will highlight specific experiences of participant groups based on (1) age, (2) gender, and (3) family status. To link the results of the analysis with its spatial and temporal dimensions, a collage is used to illustrate specific spatial typology or context the quotations are related to (Figure 96) (Kim, 2015), and, at times, the timing is also collaged (the detailed description of methods used is in the methodology section).



Figure 96 A collage mapping, captured during analysis.

7.3.1 Walking, cycling and using public transportation across different groups

Regarding walking, Agouza's walking experience as it appears in Table 17 of findings is the most lived-in and socially mixed. Participants describe calmer, tree-lined side streets that feel "suburban/quiet" and are repeatedly used in ritual loops for errands and browsing. Women, in particular, anchor walking routines around street markets and ground-floor shops, while men mention late-night walking to avoid traffic. This everyday choreography points to a dense web of nearby nodes, waterfronts, open green spaces, small squares, stitched together by short blocks and multiple route options. In terms of landmarks, Nile Corniche and corner bakeries (noted for their morning smells) serve as both orientation points and social cues.

Yet the same fabric is not universally benign. Edges frequently interrupt equitable movement: highway bridges, uncomfortable crossings, and parked cars/kiosks pushing pedestrians into the carriageway. Women explicitly flag crowded front streets (e.g., *Ahwa*) with noise and smoke, and seniors point to narrow sidewalks/ramps, cracks/level changes, and a lack of continuous benches and public toilets (except cafés). Families with children emphasise high-speed traffic on outer streets, noise/heat on inner streets, and uneven surfaces for strollers; their coping strategies include seeking shade and gravitating toward small green pockets.

Agouza gives coverage (destinations close at hand) and meaningful choice (side streets vs. waterfront promenades), which is a strong step toward inclusion. But safety, comfort, and

dignity aren't evenly distributed: women and older adults shoulder more risk and inconvenience, and parents with strollers meet persistent micro-barriers. In short, spatial proximity outperforms spatial justice. The model is partially successful: it democratises access through mixed-use and fine-grained zoning, but fails to guarantee overall safe and comfortable walking.

In Madinaty, as Table 17 of the findings shows, residents prefer garden loops and internal paths, often avoiding streets. Walking is associated with pleasant views (small lakes) and proximity to parks, and light errands to the hypermarket occur. At night, walking is acceptable for both genders, suggesting that enclosure, lighting, and surveillance provide a sense of security. Seniors appreciate paths with minimal crossings and open malls that break up longer distances.

Where inclusion falters is in the edges and the network logic. Participants note daytime walking is very difficult in summer (heat stress), dull frontages/low diversity in some areas, reckless driving, and crucially a lack of infrastructure for long walking/cycling. Non-drivers (including many seniors and women) feel disadvantaged when distances exceed the garden cluster. Families use open malls and green areas, yet often default to cars for loads or longer trips, and report weather-limited walking because the sidewalks on outer streets are poor.

Madinaty excels at micro-scale walkability within compounds, parks, and malls, creating comfort bubbles. But beyond these bubbles, distance, frontage monotony, and exposure to heat erode inclusion. The design delivers islands of excellent pedestrian experience, but lacks a continuous, citywide walking network to support those who do not or cannot drive. Thus, this model is selectively successful, inclusive within districts but exclusionary between them.

In Badya, as shown in Table 17, residents walk mainly inside district gardens. Edges are dominated by unfinished streets and construction sites, making walking uncomfortable, especially for women. Even landmarks and nodes (clubhouse events, district markets) indicate occasional destinations rather than a dense, everyday mesh. Families attend street vendor events or clubhouse activities, but the fabric between districts is not yet pedestrian-ready.

At this stage, Badya is least successful for inclusive walking. Residents with higher tolerance for unfinished conditions can improvise short walks; everyone else is nudged toward cars.

The presence of gardens is promising, but continuity, safety, shade, and surface quality, the basics of dignified walking, are not yet achieved at scale.

Regarding cycling, in Agouza, as shown in Table 18, participants identify some wide outer streets where men can cycle, and scooters for longer distances, but the dominant narrative is risk. No bike lanes, broken streets, lack of separators, and reckless drivers render cycling impractical, particularly for women (even as they increasingly *see* girls riding motorcycles or bikes) and for seniors. Families describe crowding/time pressures that make cycling with children unworkable. While Cairo's Bike stations and certain squares serve as landmarks, the protected network that turns them into a usable system is missing.

Cycling in Agouza is structurally exclusionary: the road culture and infrastructure select for confident, risk-tolerant riders, disproportionately men without dependents. Everyone else is priced out by safety concerns.

In Madinaty, cycling is possible inside Central Park/club and through corridors between buildings, mostly as recreation/play. Outside those areas, participants, especially women, deem cycling impractical due to reckless drivers, heat stress, long waits to cross, and lack of long-distance infrastructure. Seniors rarely ride and find it hard due to age. For families, cycling is seasonal (linked to summer play); beyond parks, it’s limited. The most vivid nodes and landmarks are parks, gates, and bus stops, again reinforcing a contained, campus-like geography.

Cycling is permitted but not enabled. The model tolerates leisure cycling but fails to normalise it as transport, especially for women, seniors, and caregivers. Inclusion is therefore low once trips extend beyond park loops.

In Badya, bike lanes between districts are notable, which in principle signals a 15-minute ambition. Yet residents report a lack of peer cyclists and that cycling is not common culturally, particularly for women. Even with lanes, people rely on cars for practicality, and heat stress is a recurring barrier for seniors. Families describe cycling as child play (“daughter sometimes plays with a bicycle”) rather than an everyday mode; caregiving demands make riding hard, with women noting they rely on kids cycling beside them rather than riding themselves.

The supply-side gesture (lanes) is ahead of the demand-side culture and network completeness. Without connected, shade-rich, low-stress corridors that serve real

destinations (schools, markets, clinics) and social uptake, the lanes sit underused. For now, Badya's cycling inclusivity is aspirational rather than achieved.

Regarding public transportation, in Agouza, as shown in Table 19, residents balance between time-saving transport and enjoyable walking. Women use the metro when destinations are within reach, while men talk about time pressure and trade-offs between modes. The network's nodes and landmarks, Opera and Dokki metro stations; bus stations along Nile Corniche and El Batal Street, are legible and central to daily life. What undermines justice are service decline, coordination hassles, and indirect time costs, which weigh more heavily on people with tighter schedules (e.g., women managing care, shift workers, seniors). Still, company shuttles appear for men and seniors, expanding options.

Agouza performs best on coverage and affordability among the three, offering a real alternative to the car. The injustices that remain concern declining quality, first- and last-mile discomfort, and temporal costs borne unevenly by the time-poor.

In Madinaty, public transport comprises internal buses, ride-hailing apps, carpooling, and company shuttles, as shown in Table 19. The movement centre acts as a hub/landmark. However, participants report long-distance trips, high costs, and areas outside the coverage of internal buses. Morning crowding is common, and families rely on school buses, with fees as an additional burden.

The system provides some options, but at higher monetary and time costs. Non-drivers, women with care responsibilities, and lower-income residents face price exposure (ride-hailing/school buses) and coverage gaps. The design tilts toward those who can pay or access shuttles via employers, limiting universality.

In Badya, future orientation is Table 17, residents express a willingness to use the planned network and practice carpooling in the interim. Yet the city's transportation network is under construction, with irregular commuting patterns (especially for women) and time burden (men) reported. Families depend on school buses; morning time pressure is salient.

At present, Badya offers the fewest viable public options. Until the network is built and integrated, routes, schedules, pricing, and first/last-mile walking, the car remains the de facto mode, which excludes non-drivers and cost-sensitive households.

Across the three case studies, several cross-cutting patterns emerge that highlight how mobility experiences are stratified by gender, age, and family roles. Women consistently adjust their mobility practices to avoid unsafe or uncomfortable environments, steering clear of noisy, crowded edges and reckless traffic, and instead favouring shorter loops, nearby markets, gardens, and particular times of day when streets feel less threatening. Cycling, in particular, remains almost entirely inaccessible to women across the sites, pointing to a persistent gendered exclusion. Older residents confront a different but equally significant set of barriers. In Agouza, the absence of benches and public toilets makes long walks difficult, while in Madinaty and Badya the challenge of heat stress effectively restricts walking and cycling during large parts of the year. This creates a hidden inequity in which only those with strong physical tolerance or flexible schedules can move actively in hot months. Families with small children are also at a disadvantage. They need smooth, shaded, and safe routes to everyday services, but too often they are forced into cars because sidewalks are cracked or unfinished, crossings are unsafe, or outer streets are poorly designed. Looking across the three sites, the contrasts are also telling: Madinaty delivers polished but isolated pockets for walking, Agouza offers a dense though uneven network of routes, and Badya is still in the process of building one. The inclusivity of mobility, therefore, depends less on the quality of isolated places than on the continuity and legibility of the overall system. Finally, cycling stands out as the clearest litmus test: without shaded, protected, and connected corridors and without broader social acceptance, its benefits remain confined to a narrow group of confident users, excluding most women, seniors, and caregivers.

Table 17 Inclusivity of walking experiences across different groups in the three case studies

Sustainable Mobility Inclusivity of Different Models														
			Agouza (Inner-city)				**Madinaty (East, New Cairo)**				**Badya (West, New 6th of October)**			
			Paths/Routes	**Edges**	**Nodes**	**Landmarks**	**Paths/Routes**	**Edges**	**Nodes**	**Landmarks**	**Paths/Routes**	**Edges**	**Nodes**	**Landmarks**
15-min city concept's modes of transportation	**Walking**	Gender	- Prefer calmer, tree-lined side streets for walking/leisure; feel suburban/quiet (mixed) -Regular loop for browsing, errands, 'rituals' (women) - Prefers walking late night for calm, less traffic (men)	-Highway bridges connecting Agouza/Zamalek /Elsewhere (mixed) -Uncomfortable crossings (women) -parked cars & kiosks push people to walk in roadway (mixed) -crowded front street Ahwa, causing noise and smoke (women)	-Proximity to waterfronts (mixed) -Open green spaces with mixed gender presence (mixed) -Street markets (women) -Convenient nearby square (men)	-Street 12 and street 6 markets (mixed) -Nile Corniche (mixed) -Bakeries at the corner of streets and their morning smells (women)	-Often walk within gardens around the house; avoid streets; pleasant views incl. small lakes (mixed) -closer garden loops preferred, quite side streets (women) -Light errands to hypermarket (men) -Night use acceptable for both genders (mixed)	-Daytime walking very difficult in summer (mixed) - Some areas dull with low frontage diversity (mixed) -Cars drive recklessly; neat but dull streets (women) -Lack of infrastructure for long walking/cyclin g (men)	-District's Supermarket (mixed) -South and central part (mixed) -Open mall (women) -Bus stop (men)	-District's Supermarket (mixed) -South and central part (mixed) -Open mall (mixed) -Bus stop (mixed)	-Walk in district gardens (mixed)	-Unfinished street, Not comfortable to walk during construction (women) -Local bazaars at the clubhouse (women)	-Truck, coffee vendo, vending spot became recognizable (women) -Districts' market (mixed)	-Districts' market and center (mixed) -Clubhouse (mixed)
		Age	-Prefer continuous sidewalks (mixed) - Market streets used for strolling, communication, and nostalgia (Women seniors) - crossing access harder after widening (mixed seniors)	-Narrow sidewalks/ramps (mixed- seniors) -Lack of continuous benches (mixed-seniors) -Cracks, level changes (mixed) -No seating or toilets except in coffee shops (mixed)	-Street markets and ground floor shops (mixed)	-Street markets and ground floor shops (mixed)	-paths with minimal crossings (mixed-seniors) -Open malls to manage walking distance (women seniors)	-Lack of continuous benches (mixed-seniors) -Non-drivers disadvantaged (mixed – seniors) -Heat stress (mixed – seniors)	-District's waiting areas (mixed)	-District's center	-Walk in district gardens (mixed)	-Construction sites (mixed)	-District gardens (mixed)	-District gardens (mixed)
		Family condition	- Solo walking is less preferred (wome n with children) -Shade for the thermal comfort of kids (mixed with children)	-High-speed traffic on outer streets, noise & heat on inner streets (families with children) -uneven surfaces for strollers (families with children)	-Green pockets preferred for strolling (families with children)	-Green areas (mixed with children) -Street markets and ground floor shops (families with children)	-Family-friendly; used with children; solo women report comfort (women with children) -Open malls (families with children)	-Prefer car for loads/kids if longer distance (families with children) -Weather-limited; poor sidewalk design in outer streets (families with children)	-Small lakes inside the garden paths (families with children)	-Green areas in the open mall (families with children) -South and central part (families with children)	- Walk with children to play on street; wanted kids to experience street life (women with children) -Walk with children at night to sleep	-Even with lanes/paths, family uses cars most of time (families with children)	-Streets with vendors (families with children) -Events at clubhouse (families with children)	-Districts' center (mixed) -Clubhouse (mixed)

Table 18 Inclusivity of cycling experiences across different groups in the three case studies

Sustainable Mobility Inclusivity of Different Models													
			Agouza (Inner-city)				**Madinaty (East, New Cairo)**				**Badya (West, New 6th of October)**			
			Paths/Routes	**Edges**	**Nodes**	**Landmarks**	**Paths/Routes**	**Edges**	**Nodes**	**Landmarks**	**Paths/Routes**	**Edges**	**Nodes**	**Landmarks**
	Cycling	Gender	-Some outer streets are wide and suitable for cycling (men) -Used scooters in longer distances (mixed)	-No bike lanes, broken streets, unsafe for scooters/bikes (mixed) -Lack of separators (women) -Recently sees girls riding motorcycles/bikes; still feels cycling impractical (women) -Road quality, device maintenance (men)	-Quite areas with fewer cars (mixed) -Wide, tree-lined streets (mixed)	-Cairo Bikes stations (mixed) -Squares (men)	-Cycling possible only inside Central Park/club; corridors between buildings used (mixed) - Corridors/ gardens to bike between buildings (mixed) -Certain paths on the right side of the road (mixed)	-Bikes not practical outside; reckless drivers; only for confident riders (women) -Lack of infrastructure for long walking/cycling (men) -Heat stress (mixed) -Cars from every direction; long waits to cross (mixed)	- South and Central Park (mixed)	- South and Central Park (mixed) -Gates (men) -Bus stop (men)	-Bike lanes between districts (mixed)	- lack of peer cyclists; not common culturally (women) -Even with cycling lanes, residents rely on cars due to practicality (mixed)	-Shaded areas (mixed)	-Cycling events (mixed)
		Age	- Cycling is impractical (mixed- seniors)	- Reckless car drivers (mixed-seniors)	-N/D	-N/D	-Hard to bike due to age (mixed-seniors)	-Rarely rides (mixed)	-N/D	-N/D	-Hard to bike due to age (mixed-seniors)	-Heat stress (mixed-seniors)	-N/D	-N/D
		Family condition	- Cycling is impractical with kids (families with children)	- Crowding/time pressures (families with children)	-N/D	-N/D	-Corridors/ gardens to bike between buildings or in open mall for kids to play (families with children)	- Seasonal use; cycling linked to summer play for children; limited beyond parks (families with children)	-District's garden, open mall (families with children)	-District's garden, open mall (families with children)	-Daughter sometimes plays with a bicycle (families with children)	-Hard to cycle due to childcare; rely on kids cycling beside me (women with children)	-District's centers and between districts (families with children)	-District's centers (families with children)

Table 19 Inclusivity of public transportation experiences across different groups in the three case studies

Sustainable Mobility Inclusivity of Different Models													
			Agouza (Inner-city)				Madinaty (East, New Cairo)				Badya (West, New 6th of October)			
			Paths/Routes	**Edges**	**Nodes**	**Landmarks**	**Paths/Routes**	**Edges**	**Nodes**	**Landmarks**	**Paths/Routes**	**Edges**	**Nodes**	**Landmarks**
Public transportation		Gender	-Balance between time-saving transport and enjoyable walking (men) -Metro usage when destination fits (women)	-Service decline (mixed) -Time-pressure, modal tradoffs (men) -Coordination hassle, indirect time costs (women)	-Metro stations (Opera and Dokki) -Bus stations (Nile Cornishe and El Batal Street)	-Metro stations (Opera and Dokki) -Bus stations (Nile Cornishe and El Batal Street)	- Madinaty's internal buses (mixed) -Ride-sharing applications (mixed) -Carpooling (women)	-Long distance trips (mixed) -High costs (mixed) -Outside coverage of internal buses (mixed)	-Madinaty's movement center (mixed)	-Madinaty's movement center (mixed)	-Willingness to use future Badya's network (mixed) -Carpooling (women)	-City's transportation network is under construction (mixed) -Irregular commuting patterns (women) -Time burden (men)	-N/D	-N/D
		Age	-Company shuttle (men, seniors)	-Distance, effort (mixed – seniors) -Indirect costs (mixed – seniors)	-Metro stations (Opera and Dokki) -Bus stations (Nile Cornishe and El Batal Street)	-Metro stations (Opera and Dokki) -Bus stations (Nile Cornishe and El Batal Street)	-Company shuttle (men, seniors)	-Crowded streets in the morning (mixed, seniors)	-Madinaty's movement center (mixed)	-Madinaty's movement center (mixed)	-Willingness to use future Badya's network (mixed)	-N/D	-N/D	-N/D
		Family condition	-Ride-sharing applications (women with children)	-Care burden (women with children)	-App. Gathering points	-App. Gathering points	-Ride-sharing applications (women with children) -School bus for children (families with children)	-Heavy shopping and kids care (women with children) -High school bus fees (families with children)	-Madinaty's movement center (families with children) -District's center (families with children)	-Madinaty's movement center (families with children) -District's center (families with children)	-School bus for children (families with children)	-Morning time pressure (families with children)	-N/D	-N/D

7.3.2 Sense of Belonging Across Spatial and Social Diversities

This theme refers to the personal trajectories related to community and place, and how participants identify with and feel connected to their local environment through communal ties and shared experiences, whether within their own 15-minute radius or beyond it for particular reasons. According to the literature, belonging is frequently defined as both an intimate feeling of being "at home" in a place and a socio-spatial boundary-making process of inclusion/exclusion (Antonsich, 2010). Meanwhile, the 15-minute city is often linked to social sustainability advantages like cohesiveness and connectedness (Allam et al., 2022) and to enhancing social interaction and belonging by being close to everyday services and local living (Moreno, 2024). In the interviews and mapped routines findings, "belonging" emerged not as a single condition but as a set of everyday practices, anchor places, and mobility-dependent routines that vary across age, gender, and life stage.

For young and mid-adults, particularly men, recreational and leisure activities are often maintained through 'usually gendered' spaces such as '*Ahwa*,' the traditional neighbourhood coffee shop. These spaces operate as third places: they are not home or work or task-related spaces, but familiar and emotionally resonant sites where old friendships are sustained and support is exchanged. Over time, the *Ahwa* becomes a space of continuity, where different classes, generations and life stages intersect, and where emotional anchoring takes place in older neighbourhoods through routine interactions, shared conversations, and mutual presence.

The *Ahwa* usually exceeds the 15-minute radius for this sense of communal belonging they create. Most participants' reasons for travelling beyond their immediate 15-minute radius are driven not by need but by the desire for familiarity and social recognition in this form of recreational space (refer to Figure 97)

In contrast to newer urban environments like Madinaty and Badya, where urban management is largely institutionalised, these third spaces are increasingly absorbed into places designed around common interests, such as gym or yoga classes or shopping events. While this systematisation, which does not allow the formation of the *Ahwa* in its traditional form in new cities, contributes to the sense of order and family orientation, it also narrows opportunities for such class-crossing social settings.

Nevertheless, a sense of belonging continues to take shape in other ways. For families, spaces designed for children's play, such as parks, clubs, or playgrounds, become nodes of

belonging (see Figure 97). These spaces provide both physical infrastructure and social reassurance, especially for parents navigating urban life with young children. In these contexts, belonging is tied to places that recognise and accommodate care work. In other words, having children becomes a strong driver of the sense of belonging, as parent participants value environments that recognise and accommodate the needs of families with children. They do not offer just functionality but safety, visibility, and a shared rhythm of care that reinforces belonging and makes the place liveable and fun.

Just as places of worship function as weekly social anchors, sites of spiritual continuity, and community visibility for the elderly, the *Ahwa* remains a generational anchor, particularly for those in midlife. Each age group may gravitate toward different third spaces, yet the presence of such anchors remains essential. They offer more than leisure: they support emotional well-being, sustain social ties, and provide a sense of rootedness within the fluid and often fragmented rhythms of contemporary urban life.

Yet for many, another insight is that the sense of belonging once anchored in frequent family visits has shifted. In new cities, residents are often physically distant from their extended families, whether due to relocation from other older areas of Cairo or from entirely different cities. As a result, traditional extended-family social rhythms give way to new patterns of community-making based on proximity, shared routines, and common life stages, at least for daily and weekly routines. Recreational and sports spaces become a new anchor, a quiet substitute for older forms of relational continuity.

For older adults, long-term familiarity with their surroundings and relationships with local service providers shape their daily mobility and comfort within their 15-minute radius. These sustained interactions built a subtle but meaningful form of neighbourhood support, often described as minor favours, moments of recognition, assistance, or ease that collectively build their experience of place and create a sense of security and belonging.

Another notable insight from older adult groups is that although maintenance services in planned developments such as Madinaty and Badya are efficiently managed by the city authority (*Gihaz el-Madina)*, residents still express a sense of ownership over their living environments in neighbourhoods like Agouza by participating in maintenance issues. This is particularly evident among active elderly individuals, who often undertake small maintenance tasks in their free time. Such engagement contributes to a sense of co-producing

the urban environment, builds their emotional connection to place and community, and makes it easier for them to meet new neighbours, as many elderly residents narrated.

Taken together, the findings show that "belonging" under the umbrella of the 15-minute city in Cairo was narrated through (1) anchor third places (Ahwa, worship, parks/clubs), (2) life-stage routines (youth leisure, caregiving, older-age familiarity), and (3) mobility-conditioned reach (staying within or travelling beyond the 15-minute radius for social recognition). These patterns align with 15-minute city literature, which links proximity to social interaction and cohesion (Moreno, 2024; Allam et al., 2022), while also reflecting Antonsich's (2010) distinction between belonging as feeling "at home" and belonging as socio-spatial inclusion/exclusion.

7.3.3 Sense of Place Across Spatial and Social Diversities

This theme refers to the personal emotional bond with places, highlighting the attachment participants develop towards specific walking or cycling spatial environments that contribute to or limit their ability for active travel mobility to access basic needs within their 15-minute radius. As discussed in the literature, "sense of place" is commonly conceptualised as multidimensional, often discussed through place dependence (functional capacity), place identity (cognitive self–place relationship), and place attachment (emotional bonds) (Davis and Wagner, 2024; Jorgensen and Stedman, 2001). In this study, participants' accounts of walking and cycling environments reveal these dimensions empirically, through what streets allow people to do (dependence), what places mean for self and social life (identity), and how movement becomes emotionally resonant or avoided (attachment).

Across all ages, walking or cycling was not perceived as only a means of mobility, but a deeply embedded practice through which people come to know, feel, and relate to their urban environments. Across the three case studies, Madinaty, Agouza, and Badya, participants' reflections on active travel reveal how emotional attachment, safety, and spatial memory shape the experience of streets, often in gendered and generationally distinct ways. These insights point toward a broader reading of the sense of place as a central dimension in how people inhabit active travel environments to access their own 15-minute radius.

In Madinaty, participants, particularly women, described the street environment as 'predictable,' 'clean,' and 'easy to navigate.' This predictability was often positively associated with feelings of 'comfort,' 'safety,' and 'independence.' This was notable for women responsible for children's mobility or those seeking to walk or cycle alone (see

Figure 98). The uniform design of the built environment and the clear delineation of pedestrian routes contribute to a calm atmosphere, which enhances functional mobility. Yet this same clarity and control also reduced the streets' capacity to evoke memory or emotional attachment. Instead, the sense of place in Madinaty tended to centre around specific destinations; parks, clubs, or retail zones, rather than being felt organically through everyday movement across space.

By contrast, the streets of Agouza were consistently remembered and described by participants as emotionally textured and socially alive. People of different ages shared strong attachments to the spaces they walked or cycled through daily, which encouraged them to walk to the facilities they needed. The density of activity, sensory variations, and social familiarity enabled what Doreen Massey describes as a "throwntogetherness" of place (Massey, 2005): an urban fabric dense with encounter, routine, and meaning (see Figure 97). However, this richness has its challenges. Women, in particular, spoke of specific nodes within the neighbourhood, such as overcrowded sidewalks or informal market spots, as sites of discomfort or tension that made walking difficult. These concerns reflected a gendered experience of active travel, where public space is both a source of connection and a space of negotiation.

In Badya, the street environment is still in the making, yet its design already reflects a hybrid approach. Participants discussed the shaded walkways, seating, and recreational infrastructure, which encouraged slower movement and more embodied engagement with the space (see Figure 99). While this is still emerging in Badya, often linked to new routines in clubs or community spaces, the design gestures toward a more emotionally supportive active travel environment. These streets invite residents to linger, observe, and, over time, anchor memories.

Across the three contexts, what becomes clear is that active travel is not just a question of infrastructure but of emotional and relational geographies. Streets acted as sites of belonging or alienation, depending on how they are designed, inhabited, and remembered. For women in particular, safety, visibility, and a sense of control over movement were vital in shaping not only the decision to walk or cycle, but the emotional resonance of doing so. For all residents, including both younger and older adults, streets that allow spontaneity, familiarity, and sensory variety contribute to a richer sense of place, making the choice to walk or cycle easier.

Across cases, participants' accounts show how place dependence, identity, and attachment can align or diverge: Agouza's streets were narrated as deeply storied and identity-rich yet uneven in comfort and gendered safety. Madinaty's streets were narrated as highly dependable yet less affectively "layered." Badya's streets were described as comfortable and supportive of slow movement, while still fostering identity and attachment through emerging routines. This framing, however, remains descriptive rather than evaluative, and helps situate Cairo's lived 15-minute mobilities within established sense-of-place dimensions.

The maps presented in the following pages illustrate the themes and complement one another.

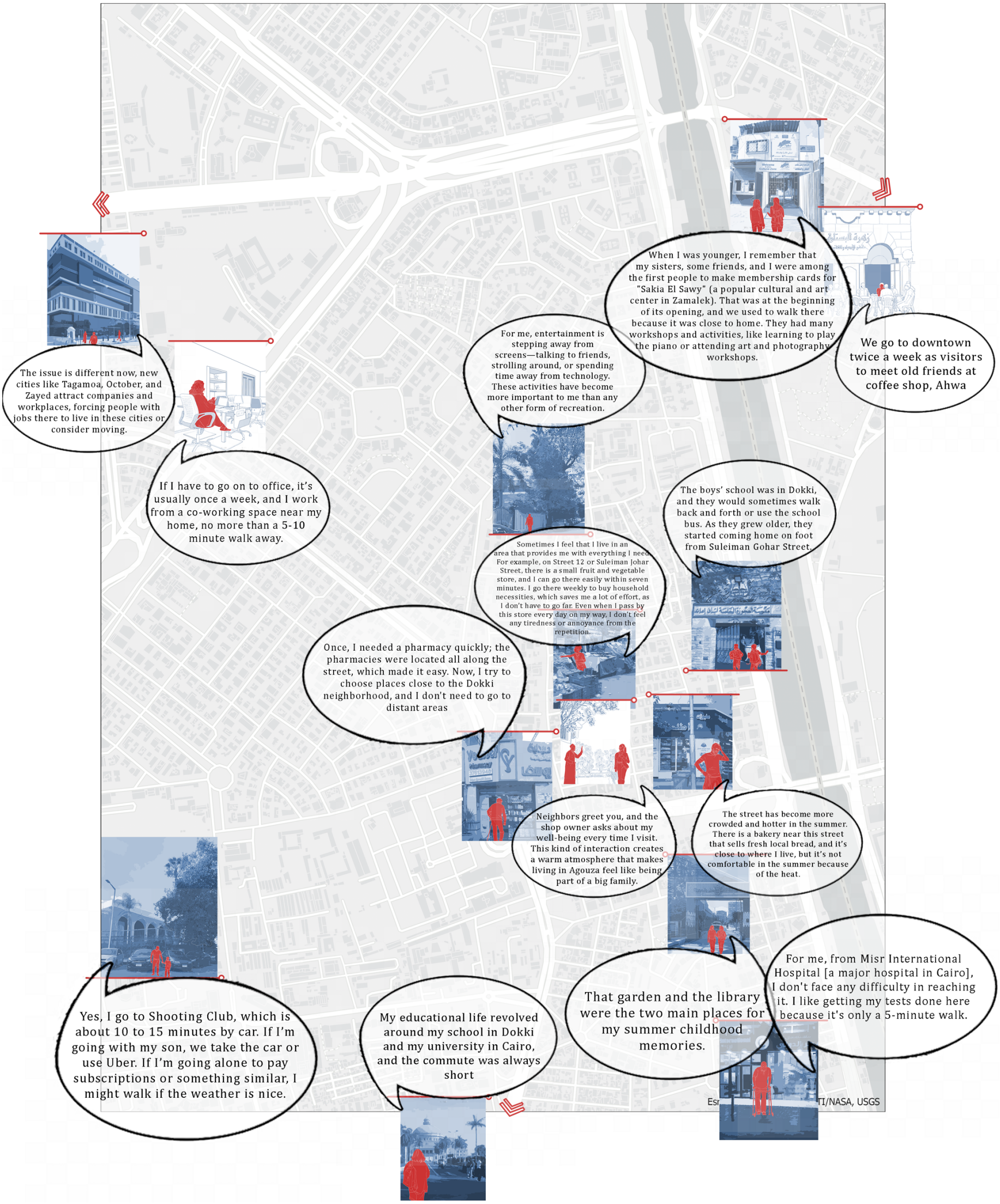


Figure 97 Participants' collages in a thick map of Agouza

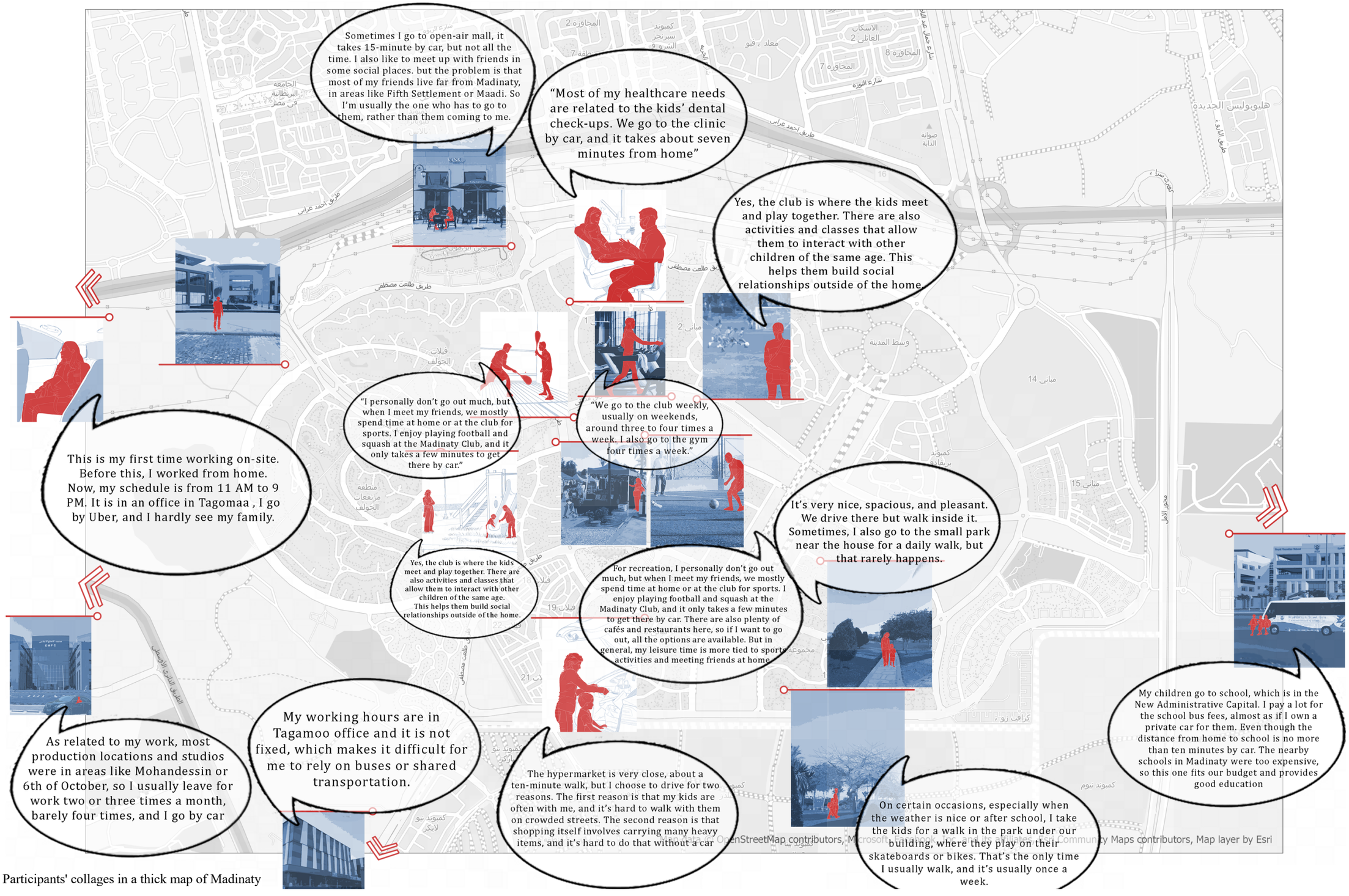


Figure 98 Participants' collages in a thick map of Madinaty

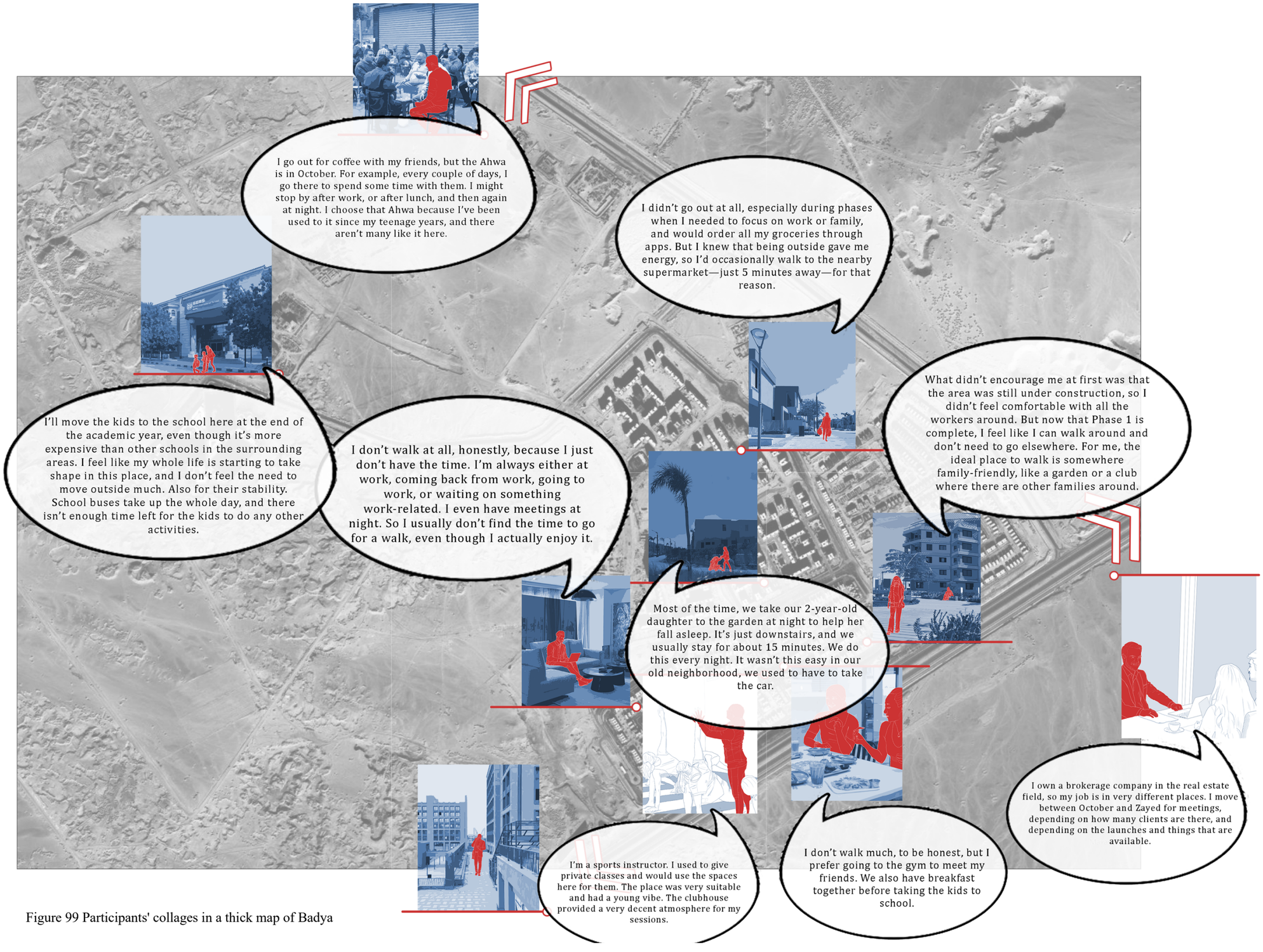


Figure 99 Participants' collages in a thick map of Badya

7.4 Aspirations of Proximities: Marketing Narratives and Aspired Lifestyles

This theme refers to present and future aspirations and patterns of living, communicated through media and design narratives, and to how participants relate to them and perceive living in a place that reflects and supports their rhythms, needs, and identities.

The marketing narratives of Madinaty and Badya, whether communicated through official media campaigns or expressed in stakeholders' interviews, offer a lens through which to examine the construction of lifestyle promises in 15-minute city models as a broad theme. This is enriched by the lived experiences and personal aspirations shared by residents themselves in the interviews. In both models of the 15-minute city concept, the curated experience of residential living, access to basic facilities, and mobility within it are deeply intertwined with the premise and vision of an ideal way of life.

Madinaty's vision, as communicated in its media campaigns, is rooted in a technocratic, practical promise of efficient access to services, comfortable living, and seamless mobility. The campaign presents the city as a 'world-class suburban experience.' This can be read in contrast with Cairo's overstimulating urban core. It achieved the vision through the spatial buffers between apartment buildings, providing a private living experience. This is where all essential services are accessible within five minutes, regardless of one's location within the development (see TMG, 2017, 0:40). Such features are paired with previously mentioned unobstructed, low-traffic streets that provide quick access between residential areas and essential services, with curated green spaces designed to be visible from all buildings across the city. An integrated surveillance system is also implemented to ensure security. These visual and verbal cues construct a suburban imaginary in which quality of life is defined by spatial distance, visibility of green areas, controlled mobility, and infrastructural convenience.

However, in practice, many public green areas, for example, in Madinaty, appear more ornamental than lived-in. The greenery lining the streets often functions more as an aesthetic than as an active public realm, and social life tends to be directed toward centrally designated areas such as the Open Air Mall or the South and Central Parks. As previously illustrated, these service centres are designed as semi-public spaces, with ground-floor shops and services spread out horizontally and connected by internal streets. These streets serve as intermediate spaces that encourage social interaction, balancing private and fully public

environments. In this sense, the lifestyle aspiration projected in Madinaty as a 15-minute city model is one of managed leisure and supply, individualised mobility, and a prioritisation of security and predictability over community entanglement.

This stands in contrast to Badya, where the narrative leans more strongly into ideals of social cohesion and emotional belonging. The development launched with a campaign set to "Dreams" by The Cranberries, an iconic 90s Irish rock classic (see PHD, 2017), channelling a nostalgic sense of renewal and generational change. This is followed by a campaign set to "*El Donia El Helwa*" by Amr Diab, the Egyptian pop star, that conveys a promised sense of a relatable, emotionally fulfilling everyday urban life grounded in the rhythm of busy, local experiences close to home (see PHD, 2019). This is all deeply rooted in the Egyptian popular sentiment of neighbourliness.

This nostalgic 90s Badya's tone was deeply affective, resonating with a post-revolution generation navigating a period of economic and social transition. Later media portrayals continued this emotional thread, sharing stories of friendship, love, and everyday moments among residents, inviting a return to a more connected and communal way of urban living. The lifestyle promise is underpinned by a vision of community as central to the place-making of the 15-minute city concept. It draws inspiration from the social fabric of Cairo's inner-city and Fatimid urbanism. It is presented as a place where the street is not just a seamless corridor of movement, as in Madinaty, but a site of organic encounters and shared life, with designated spaces to serve this purpose. The previously analysed master plans show evidence of how those narratives shape not only marketing strategies but also distinct forms and functions of the spaces and streets in each city.

Residents' lived experiences also reveal how their daily routines reflect and respond to the premises and aspirations of the 15-minute city concept. Agouza, an inner-city neighbourhood with a dense fabric and a layered set of facilities, as shown in Chapter 04, offers a particularly strong ground for non-digital accessibility that does not rely on digital services. The presence of diverse and long-established facilities, ranging from local sports clubs to informal communal spaces, supports a wide spectrum of non-digital engagements as a lifestyle. These spaces have accumulated meaning over time, offering a non-digital 15-minute city living.

Residents, particularly seniors, described a deep sense of familiarity that encourages them to maintain their daily activities on the streets, including visits to physical stores. This

absence of such lifestyles in Madinaty or Bayda, in part, reflects their relative newness; the first generations to be raised in these settings are still coming of age, and the forms of life rooted in familiarity, shared memories, and collective routines are only beginning to take shape.

Education and work patterns further illustrate these lifestyle divergences. In Agouza, public universities are within easy reach, and participants frequently mentioned pursuing postgraduate education while living in the area. This proximity enables hybrid routines, part-time study and work, and engagement in community life without long commutes. Such fluidity is less accessible in Badya or Madinaty. Women residents, whose mobility can at times be more limited, often feel these limitations more acutely.

In many cases, the appeal of lifestyle aspirations based on delivery services and car-based commuting in new cities is not a reflection of a preferred lifestyle but of constrained choice. While they offer convenience, as many residents explained, they also interrupt the fabric of daily social interactions that, in places like Agouza, contribute to a sustained sense of belonging and place. It is also fair to acknowledge that the affective dimension of place, memory, and familiarity of one's own 15-minute radius cannot be replicated overnight; newer areas will undoubtedly develop their own textures of meaning over time.

7.5 Summary

This chapter has answered the third research question by tracing how different models of the 15-minute city have taken shape in Greater Cairo and by assessing how far they support just and inclusive mobility. What becomes clear is that the three case studies are not simply variations on a single idea but represent distinct paths shaped by their own histories and modes of delivery. Agouza grew out of a mid-20th-century experiment in adapting garden-city principles to Cairo, and over time, it has thickened into a dense fabric where markets, small blocks, and mixed uses sustain everyday proximity. Madinaty, by contrast, is the product of a developer-led new-town regime inspired by the new urbanism principles in the 2000s, a clustered form that delivers access through large hubs while making residents dependent on cars and membership-based services. Badya is the newest, launched under Egypt Vision 2030, and while its tiered hubs and mobility spines are designed with the 15-minute idea in mind, with inclusion depending on how quickly redundancy (a reserve of options) and walkable and cyclable connections are delivered.

Read through the lens of morphology and typology, these cases show how physical form directly conditions the realisation of the 15-minute ideal. Agouza's fine-grained blocks and redundant small-scale premises allow services and third places to be embedded in walkable catchments, even if public realm quality lags. Madinaty's typology provides predictability and open space but weakens everyday walkability, as interiors remain mono-functional and access depends on cars or fee-based membership. Badya's layout, with its tiered and planned hubs, is meant to bring services together, but the reliance on large, uniform construction blocks and the slow pace of delivery means that for now, everyday access feels fragmented and will only improve as smaller amenities and more choices are added and integrated.

Read together, the cases underline that Cairo's 15-minute city is not a single form but a set of genealogies, each shaped by wider political economies and design paradigms. The embedded model demonstrates how an accumulated mix and reservoir of diverse services can sustain lived proximity but also reveals the risks of under-investment in public realm quality. The clustered model shows the appeal of planned amenities and open space, yet highlights how reliance on cars, controlled access, and cost barriers narrows inclusivity. The hierarchical model signals the ambition of a deliberately designed 15-minute city, but its ability to deliver justice depends on whether everyday functions are multiplied and connected beyond showcase hubs.

Regarding the inclusivity of the different models, when walking across the three models, patterns of inclusion and exclusion are clearly evident. In Agouza, women benefit from the closeness of shops and everyday destinations but still face harassment and unsafe crossings; older people are hindered by cracked pavements and the absence of benches, while parents with strollers struggle with uneven sidewalks and traffic. The area allows mobility in terms of coverage, yet comfort and dignity are not equally secured. In Madinaty, gardens and malls offer women and families safe and comfortable spaces, but longer trips almost always require cars. Seniors and caregivers find distances and outer street conditions especially difficult, making walking an uneven privilege. In Badya, where construction dominates, walking is restricted to gardens and clubhouses. Women avoid unfinished streets, seniors face severe barriers, and families cannot rely on safe links between districts. Here, walking is minimal and largely dependent on private transport.

Cycling, in all three places, highlights exclusion even more starkly. In Agouza, some young men cycle, but women are almost entirely absent from the streets, and both seniors and families see it as unsafe or impractical. Madinaty contains cycling within parks and internal corridors, making it a form of play for children rather than a viable mode for adults, especially women and older residents. Badya provides bike lanes, but cultural norms, heat, and weak connections mean that cycling is symbolic rather than functional, confined to a minority of confident riders. Cycling, then, is the least inclusive mode, reflecting unresolved structural and cultural barriers.

Public transport is the most telling contrast. Agouza's metro and bus networks provide real alternatives to the car, and while women, seniors, and families still face crowded stations, long waits, and last-mile challenges, it remains the most broadly inclusive system of the three. Madinaty, on the other hand, relies on internal buses and company shuttles, which offer some relief but are often costly and patchy, leaving seniors, caregivers, and those on tighter budgets at a disadvantage. In Badya, the lack of an operating network means that almost everyone depends on cars or school buses, with women and families carrying the heaviest burdens.

Taken together, these patterns suggest that the 15-minute city idea unfolds very differently across the three models. Agouza comes closest, where density and proximity allow for real choices, even if safety and comfort are uneven. Madinaty offers enclaves of comfort and accessibility but fails to connect them into a wider, equitable system, producing islands of inclusion amid a car-oriented structure. Badya, as yet incomplete and with many areas under

construction, remains aspirational: until its networks are finished and socially embedded, it sustains car dependency across demographics. What emerges is that proximity alone does not ensure justice; continuity, safety, comfort, and affordability are the conditions that decide whose mobility counts.

In short, the chapter demonstrates that the success of the 15-minute city in Greater Cairo cannot be measured only by proximity on a map. It is contingent on how mobility systems, governance arrangements, and social access interact with spatial form. These reflections set the stage for the final chapter, which brings the different findings together and proposes a framework for moving towards a more integrated, equitable, and context-sensitive vision of the 15-minute city in Greater Cairo.

Chapter 8: Discussions and conclusions

This chapter brings the thesis to a close by setting out its main conclusions and contributions. It returns to the research questions and objectives and synthesises the study's core elements, its theoretical framing, empirical evidence, and the analysis that connects them. At the outset, the chapter also clarifies the position of justice in the thesis, treating it as the umbrella concept and overarching evaluative lens through which proximity-based planning is assessed in Cairo. The three research questions are brought together to assess the conceptual foundations of 15-minute city models in Cairo, whether in existing neighbourhoods or in planned, from-scratch developments. They also test how practical these models are in real terms, focusing on justice, mobility, and land use. In doing so, the chapter confirms the achievement of the three research objectives and shows how they align as a coherent whole.

8.1 Proximity-based and multifunctional planning and the layering of the city

The first research question guiding this study was:

"How have governance-driven land use and mobility development patterns in Greater Cairo evolved, and how do these trajectories relate to the ideals of the 15-minute city concept?"

The central aim of this research question was to critically examine how different planning policies have shaped spatial configurations of land use, density, and mobility. These policies range from interventionist, state-led upgrading in inner districts to market-driven public–private partnerships in new towns. It also examines how different design processes have done the same, from densification and service placement in the inner city to master-planned zoning and centrally clustered mixed-use core designs in new cities. By placing these patterns within the 15-minute city framework, the study assesses how residential, supply, work, healthcare, education, and recreational facilities are distributed. It examines the extent to which proximity, density, diversity, and digitalisation have been achieved. It also explores how these policies and design processes have enabled or constrained these outcomes.

The results presented in Chapter 4 addressed key aspects of this question and are derived from a combination of document and literature analyses, including planning documents, policy frameworks, and previous academic work. They also draw on thematic analysis of multistakeholder interviews and field observations from the three case studies, as detailed in

the methodology (Chapter 3). These layers of evidence are discussed at length in Chapter 3, where the methodological choices, sources, and interpretive approach are elaborated.

As a background, regarding the governance-driven and historical trajectories and the production of land-use and mobility patterns, Greater Cairo's urban form and mobility have been repeatedly reorganised by shifting historical urban layers. This point, elaborated long ago by Abu-Lughod (1987) and later reframed through AlSayyad's (2011) idea of "many Cairos", shaped over time by changing regimes and urban projects. In summary, the Fatimid core (969 CE) established an early urban and architectural grammar of proximity: human-scale neighbourhoods, narrow passages, and intrinsically mixed uses. Within this fabric, architectural tools such as the mashrabiyyah mediated climate and privacy while supporting comfortable walking, as described in the architectural histories of Behrens-Abouseif (1989). This fabric functioned as a lived, everyday proximity that resonates with what Moreno (2020) later formalised as the "15-minute radius," long before the term, embedding everyday needs into fine-grained streets and small parcels.

In addition, another layer of Greater Cairo's fabric emerged during the colonial era, introducing a counter-model: monofunctional, Western-planned districts such as Zamalek, Heliopolis, and Maadi. Their ordered plots, program separation, and classed landscapes displaced the organic co-location of uses with modernised urban ideals.

In the post-colonial period, the state reframed modernisation through large-scale regional planning, the expansion of new towns, and suburbanisation, localising urban ideals of the time, such as the Garden City ideals. An approach that, as Sutton and Fahmi (2008) show, was explicitly intended to divert growth away from the "green land" and toward the "desert", and that later became central to the new towns and satellite cities policies in Greater Cairo. It later constructed mega-corridors linking the urban areas produced by these policies (e.g., 6th of October, 15th of May, 26th of July).

In later periods, policy imaginaries such as "depopulating the centre" and visions akin to Cairo 2050 were coupled with the NUCA apparatus and, increasingly, private developer delivery, which localised urban ideals at this time, such as New Urbanism. The most recent cycle reimports proximity into the design brief, Moreno's (2020) "15-minute city" ideals, smart-city infrastructure (Kitchin, 2015; Ali, 2022), and lifestyle branding (Kavaratzis and Ashworth, 2005), yet within satellite and master-planned contexts. Each period is illustrated in detail in Chapter 4.

In this sense, the study confirms the literature that situates the 15-minute city within a longer genealogy of urban ideals, from Garden City and the Neighbourhood Unit to New Urbanism (Khavarian Garmsir et al., 2023; Kissfázekas, 2022; Pozoukidou and Chatziyiannaki, 2021). It also shows, as Hakim (1986) and Abu-Lughod (1987) argue, that non-Western traditions of compact, walkable life anticipated many of these principles.

Across this trajectory, the mechanism of delivering proximity changes: from vernacular proximity (Fatimid) to zoned dispersion (colonial modernity) to designed proximity (new towns under state–private programs). The discussion below shows how this plays out across the three case studies: Agouza, the inner-city district built in the post-colonial period; Madinaty; and Badya, the two new cities built as public-private partnership projects.

From the secondary data, findings on Agouza demonstrate how an inner-city neighbourhood accumulates proximity, density and diversity through densification, mixed ground floors, and embedded ‘souqs’ while absorbing successive governance projects. The transformation sequence, from royal/agricultural land (1947), to a planned suburban villa district (1958), through 1980s–2000s vertical densification and mega-infrastructure insertions, yields a radial core with a grid-like periphery, two main Souqs nodes, and large institutions on bigger plots. Everyday retail, services, banking, and logistics (notably delivery-app fleets) are woven into the street level.

In Madinaty, a form of designed proximity with constrained diversity, proximity is formalised through standardised district service centres (supermarket, places of worship, bakery, pharmacy, library, kindergarten, administration). These are set within a gated green buffer and complemented by city-scale clubs and parks. This hierarchical service logic reduces distances to routine needs within the district by planning commercial nodes and centres rather than street-level mixing. The latter sustains street-level vitality in older urban fabrics, a contrast long emphasised in classic literature (Jacobs, 1961).

This aligns with wider recent discussions of Cairo’s suburbanisation and the political economy shaping its new communities (Kadry and Husain, 2025). The overall land-use pattern is deliberately mono-residential, with commercial activity concentrated in malls and “craft zones,” rather than dispersed street-level mixed use as in the older fabric of Agouza. Mobility infrastructure privileges a city’s public transportation fleet with routes to core Cairo, while private car use is prevalent; active travel infrastructure is mostly fragmented lanes rather than dedicated facilities.

Governance is state-regulated (NUCA) and developer-delivered, aligned with national visions with phased approvals; social-housing commitments exist at the agreement level. Against the 15-minute city pillars, Madinaty shows partial proximity, limited diversity, and moderate density (higher around commercial strips, low in villa sectors). This echoes the 15-minute city literature, which treats proximity as inseparable from mixed-use, density, and walkable environments (Moreno et al., 2021). In this context, Arias-Molinares et al. (2025) recently argue for 15-minute city interventions tailored to similar low- to mid-density areas, which aligns with the findings from Madinaty and Badya. The outcome in Madinaty is a safe, green, and legible environment where daily errands are short, yet street life is thin and active mobility is under-supported. Proximity is largely achieved within planned centres, not along everyday paths, which dampens spontaneous encounters and reduces the redundancy of options that typically strengthen 15-minute ecologies.

Badya, a branded 15-minute city concept of urbanism, explicitly adopts the ideals, organising six residential districts around a central service hub and articulating 5/10/15-minute access and desirability. The programmatic mix is broader than Madinaty in certain respects, including a private university, multiple international schools, a distributed set of business/office plots, extensive green areas, and a Downtown core intended to internalise higher-order consumption and leisure. Technological narratives, solar integration, EV charging, autonomous bus lanes, positioning mobility and energy as smart infrastructure problems.

Relative to the 15-minute city concept's ideals (Moreno, 2020), the analysis shows that proximity is strong in the plan, and density is calibrated (taller in the core, lower at the edges) to sustain services and ventilation. Diversity is mixed: education and retail are well-represented, but public/cultural venues (cinema, theatre, arts centres) are under-represented, and there is no indication of public education or social housing, which narrows inclusivity. The mobility proposition emphasises eco-smart systems, yet the degree to which these are operational and shift mode choice away from the car is not evidenced in the current material. Badya thus crystallises a central tension of contemporary satellite urbanism: the branding of proximity and creativity versus the institutional and cultural infrastructures needed to make them socially thick and habit-forming.

8.2 Urban Form and Patterns of Functional Distribution

The second research question guiding this study was:

"In which ways are the ideals of the 15-minute city concept reflected in the urban form, social fabric, and mobility experiences of Agouza, Madinaty, and Badya?"

In Chapter 5, findings from spatial analysis of service areas using the CLFS framework and service area coverage maps are elaborated. The CLFS framework (cumulative opportunities-based accessibility, land-use mix/entropy, functional redundancy, and space syntax integration) provides detailed insights into this part of the first research question. It traces the distribution of residential, supply, work, healthcare, educational, and recreational facilities, and assesses the extent to which proximity, density, diversity, and ubiquity (digitalisation) have been achieved. Besides, it links these findings to the first part of the second research, addressing how the ideals of the 15-minute city concept are reflected in the urban form of the three case studies. Findings here align with recent discussions in the literature, particularly Biraghi et al. (2025), on the "classic 15-minute city," suggesting that it needs more context and user-based understanding to travel across different urban forms.

Across the three cases, service-area analysis reveals three recurrent spatial arrangements, embedded, clustered, and hierarchical, each encoding a different governance and design logic that conditions proximity, accessibility, and everyday mobility.

From the primary data, findings on Agouza revealed an embedded distribution that approximates the 15-minute ideal most closely on foot. The cumulative-opportunities analysis shows a strong centre–edge gradient: central blocks can reach ~170–200 destinations within a 15-minute walk, while peripheral blocks reach fewer than 100. Yet the embeddedness of small- and mid-scale services, F&B, personal care, childcare, wellness, and shops, means daily needs are genuinely reachable. Space syntax clarifies the mechanism: globally integrated corridors along the east–west and southern routes (linked to the Nile Corniche) concentrate commerce and services, while locally integrated market spines (e.g., Street 6, Street 12) anchor neighbourhood life; quieter interiors maintain residential intimacy. Entropy is patchy: high-mix corridors (entropy > 1.5) sit next to low-mix pockets near edges. Crucially, redundancy is high in several zones (multiple pharmacies, clinics, grocers, and leisure options), which builds resilience when a single outlet is closed or crowded.

Lived experience aligns with the kind of neighbourhood-scale access described in the 15-minute city literature as "chrono-urbanism," where the quality of urban life is tied to time-based access to essential functions (Moreno et al., 2021). Hybrid work is common; most

essentials are procured nearby (in person or via delivery apps); healthcare is widely available locally; higher education is bike-reachable (≈10 minutes) but rarely walkable. This aligns with how 15-minute city studies distinguish between walking catchments and broader cycling-enabled access (Moreno et al., 2021). Recreation is plural and proximate, from *Ahwa* and parks to gyms, clubs, and cinemas, reflecting both diversity (entropy) and choice (redundancy). In short, Agouza's fine-grained, retrofitted morphology delivers walkable completeness in many places and bike-enabled parity for edges, even as unequal centrality persists. Most recent wider debates argue that spatial proximity gains can coexist with uneven access and differentiated "who gets what" within the same city (Mahmoudpour, 2026).

Drawing on Jacobs' (1961) emphasis on the vitality of fine-grain diversity, Agouza illustrates how proximity can grow out from incremental change rather than from deliberate master planning. This will be clearer in the next section, which discusses the results on social networks and mobility experiences. This resonates with debates on the longer genealogy of the 15-minute city (Howard, 1902; Perry, 1929; Duany et al., 2000), showing that Cairo's inner-city fabric demonstrates a localised continuation of these ideals. At the same time, it adds to postcolonial critiques (Robinson, 2006; Roy, 2011) by showing how embedded proximity emerges from different layers of policies, regulations, and localised planning interventions rather than from Eurocentric masterplans. In this sense, it pushes back against the assumption that dense inner-city districts have been rendered obsolete by motorisation, showing instead how overlapping services and redundant options continue to sustain 15-minute practices. Actionably, what this case adds is a view of how successive governance interventions, from early municipal schemes to later infrastructure expansions, layered together to produce a form of embedded proximity that much of the current literature has yet to fully acknowledge.

Madinaty (clustered distribution) clusters services in hubs (malls, district centres), leaving large residential fabrics with very low walking accessibility, an outcome repeatedly flagged (Arias-Molinares et al., 2025). Many locations reach ≤3 opportunities within 15 minutes walking, while only zones near centres reach ~35–46. Cycling reconfigures the picture: 15 minutes by bike yields ~78–184 opportunities, effectively reconnecting separated land uses without disturbing low-density layouts. This is consistent with accessibility research that treats cycling as a key "range extender" for neighbourhood access where walking catchments are structurally limited (Vale et al., 2018). Space syntax (integration) explains why: very

high global integration on boulevards (the Central Road spine and radial connectors) and very low integration on cul-de-sacs, intentionally channelling movement to arterial frames and keeping interiors quiet. Entropy is predictably low across housing tracts (0.00–0.69), rising only around hubs (up to ~1.66). Redundancy is correspondingly limited in most residential clusters (often ≈ 0), with multiple options available mainly in the central hubs. Redundant or multiple choices can typically deepen "15-minute ecologies" and everyday accessibility resilience (Moreno et al., 2021).

Interview material mirrors this structure: daily supplies are split between delivery apps and trips to hubs; clinics are often walkable, but specialist care pushes people to larger centres outside; schooling and universities frequently require long commutes or bus systems; recreation concentrates in the sports club, green corridors, and the Open Air Mall. The upshot is a mobility regime that is cycling- and car-contingent for completeness, with walkability largely intra-cluster rather than city-wide.

The evidence from Madinaty supports critiques that developer-led models often produce fee-mediated access and limited diversity (Florida et al., 2020; Yeung, 2021). This finding also speaks to the debates in the literature review around New Urbanism. While Madinaty borrows its emphasis on planned neighbourhood centres (Duany et al., 2000), its mono-functional interiors contradict the ideals of mixed-use proximity and Jacobs' (1961) call for active street life. Instead, it highlights the risks flagged in critiques of the 15-minute city's universality (Pozoukidou and Chatziyiannaki, 2021), where standardised service nodes do not guarantee inclusion. In other words, it also unsettles more optimistic planning claims that standardised service centres automatically guarantee inclusion. Proximity here is largely confined to planned nodes, while the absence of redundancy leaves everyday access fragile and diminishes opportunities for spontaneous encounters. This means that the contribution of this case is to show that while planned proximity can meet routine needs, it tends to create thin sociability and a fragile version of the 15-minute city.

Badya (hierarchical distribution) materialises a multi-level hierarchy: neighbourhood hubs for basics and city-level centres for higher-order services. This reflects classic literature of hierarchical centrality (Berry, 1967). On foot, most residential zones have access to 0–8 opportunities within 15 minutes, with 30–49 only around service hubs, insufficient for a full 15-minute life on walking alone. With 15-minute cycling, however, catchments multiply to ~67–162 opportunities, stitching isolated pedestrian pockets into a coherent network, consistent with Pucher and Buehler's (2010) argument. Space syntax (integration) shows the

logic: central cross-axes (high global and R5 integration) promise metropolitan relevance; secondary grids provide continuity; low-integration interiors maintain residential calm. Entropy is low to moderate overall (0.00–1.25), with high-mix islands at city-level hubs. Redundancy is generally very low across residential tracts (0–1 alternative), rising to moderate/high only at major hubs, leaving everyday accessibility fragile, with a single shop or clinic as the only nearby option.

Interviews reveal transitional behaviours typical of new towns. Residents rely on specialists from previous neighbourhoods, stagger school relocations to align with academic calendars, and use stopgap recreation (e.g., local walks, clubhouse workshops) until the full set of facilities (e.g., club facilities) is constructed. These confirm the claims of planetary urbanisation (Brenner and Schmid, 2015) that regional infrastructures and mega-corridors stretch everyday life beyond any single neighbourhood, making proximity fragile when not tied to broader systems, as in Badya's phased constructions. Pharmacies are often walkable; broader health and leisure needs frequently entail longer trips (Sheikh Zayed, New Cairo). Here, cycling emerges as the practical integrator of the planned hierarchy.

This pattern is consistent with broader observations worldwide that smart-city initiatives often promise ambitious eco-smart solutions. However, to date, it tends to deliver far less in practice (Allam and Jones, 2020), with promises of eco-infrastructure and branding proximity yet to be implemented. It also addresses postcolonial urbanism discussions (King, 1990; Robinson, 2006), demonstrating the "imported" planning models and the way they are rebranded through political visions but remain socially shallow until cultural anchors emerge.

The case also challenges the notion that branding alone can deliver inclusion. Proximity and smart infrastructure, while important, are insufficient without cultural venues and institutional anchors that give everyday life depth and resilience. What this study adds is the recognition that the "15-minute city" has become a governance tool in its own right, marketed as a promise of inclusion, yet in practice still risks producing a socially thin environment until redundancy and broader institutions are fully established.

This reflects how widely the idea of the 15-minute city has travelled (C40 Cities, 2020; Moreno et al., 2021). However, the Cairo cases also echo concerns about equity: in places like Madinaty and Badya, access to many services is tied to fees and private cars (Florida et al., 2020; Yeung, 2021). At the same time, the evidence unsettles some of the sceptical

claims. The fear that the model simply recreates “village life” or parochialism (Ratti and Florida, 2021) does not hold in Agouza. A dense fabric of markets and cafés supports everyday sociability, while public transport and integrated corridors keep the neighbourhood well connected to the wider metropolis. Nor does the model necessarily fragment the city: the space syntax analysis shows that when integration is graduated, strong and carefully designated regional axes balanced with quieter interiors and residential areas, urban form can sustain both local walkability and regional connectivity.

Cross-case synthesis:

1. Mode dependence: in all cases, cycling is the key equaliser. It dramatically amplifies cumulative opportunities in Madinaty and Badya and levels the edge deficit in Agouza. Where walking alone under-delivers completeness, bike networks convert planned separation into functional proximity.

2. Redundancy coupling: high-mix areas (entropy) that also exhibit redundancy are where residents report the richest, most reliable access (Agouza’s markets and mixed corridors). Low-mix, low-redundancy tracts translate into fragile accessibility (most housing areas in Madinaty and Badya), where a closed facility forces time-consuming detours.

3. Transitions between inner and outer streets as mediators: integrated corridors attract and sustain service concentrations; low-integration street interiors protect residential calm but thin out walkable options. The most 15-minute-like outcomes arise where a graduated integration structure brings services close to interiors without overwhelming them (Agouza’s dual system).

4. Governance and provision: in the suburban new towns, private provisioning dominates healthcare, education, and sport, with few public counterparts within a 15-minute threshold. This shapes who can access what, at what price, and with what backup options (redundancy). In Agouza, plural ownership and incremental retrofits underpin both entropy and redundancy.

Moreover, another layer of the comparison is lived practice: hybrid work, app-mediated supplies, club-centred recreation, and selective attachment to older neighbourhoods’ services all modulate how spatial configurations are actually used. These practices can soften spatial deficits (apps, bikes) or reinforce them (long commutes to preferred schools/clinics).

Beyond simply confirming or contesting existing debates, the study offers several contributions. It develops a typology of models, embedded, clustered, and hierarchical, that allows the 15-minute city to be examined through its morphology, modes of governance, and sequencing of delivery. It also shows that land-use mix, or entropy, is not enough on its own: reliable access emerges only where diversity is paired with facilities redundancy, where residents have more than one option for essential services. This extends earlier approaches to accessibility (Batty, 2005; Neuman, 2005).

Hence, answering the first research question, as elaborated, planning policies and design processes decisively shape the evolution of land use and mobility in Greater Cairo, and in relation to 15-minute ideals by structuring where, why, and how services are designated and used within the spatial network.

8.3 Relating the urban form to the intangible 15-minute practices

The objective of the second research question was "to analyse how urban form, social networks, and mobility networks and experiences in Agouza, Madinaty, and Badya relate to the accessibility of nearby 15-minute facilities." Urban form is fully analysed in Chapter 5. Chapter 6 uses thematic analysis of residents' interviews and thick mapping to examine how these different urban forms mediate mobility experiences and social networks. It also examines how digital platforms and services (e.g., supply delivery, online healthcare appointment booking, e-mobility apps) further shape access, time costs, and everyday reliance on nearby 15-minute facilities. This approach builds on wider debates about how 15-minute ideals move from abstract planning into lived practice, where accessibility is shaped as much by infrastructures of care and digital mediation as by morphology alone (Moreno et al., 2021; Pozoukidou and Chatziyiannaki, 2021).

Regarding the mobility experiences analysis, in Agouza there is walkable access with public transport backstops. Paths show a dense mesh of short active trips for supply, small healthcare, and dispersed recreation. Edges (bridge, wide arterials, heat from tree loss) mark places of friction but do not overturn overall walkability. Nodes/landmarks (market streets, Corniche, squares) structure trip-chaining and orientation. Private cars are a last-resort accelerant under time pressure; the metro supplies clarity for longer, out-of-district trips. Result: 15-minute ideals are lived for many daily purposes, with PT and occasional taxi buffering time-critical journeys.

In Madinaty, car-first convenience in a clustered fabric, routes cluster toward parks, clubs, malls; most short trips default to car due to perceived time/productivity costs and a walking experience that feels monotonous, unshaded, and discontinuous outside green corridors. This was recently noted by Arias-Molinares et al., (2025), who point out that 15-minute city discussions have largely centred on urban cores, with less attention to peripheral areas where car dependence is typically higher. Cycling is recreational (inside parks/club) rather than functional; PT buses work well for fixed schedules (comfort/safety, esp. for women) but are less flexible for variable days. As a result, 15-minute goals are only partially met, either by car or bicycle or inside designated nodes. They are not usually met on foot through interiors and inner streets. This aligns with critiques that planned service hubs can provide proximity on paper but fall short of street vitality and spontaneous encounters (Florida et al., 2020; Yeung, 2021). It also illustrates the limits of applying New Urbanist ideals (Duany et al., 2000) in a suburban Egyptian context, where monofunctional interiors undermine local diversity.

In Badya, the findings indicate that transitional mobility sits within an emerging hierarchy. Temporal edges (construction, partial provisioning) and caregiving strongly shape choices. The car anchors most trips. Walking/cycling appear as family bonding/leisure, with growing comfort where shaded seating, furniture, and kiosks punctuate routes. Micro-nodes (e.g., coffee truck) act as early anchors; as phase one finishes, participants report readiness to re-include walks into daily schedules. Result: 15-minute ideals are incipient, promising where infrastructure and small amenities soften time/comfort costs, but mode shift hinges on maturation and redundancy.

Cross-case synthesis (mobility experiences)

- Mode dependence: Cycling is the latent equaliser in suburban fabrics; where street-level protection and end-of-trip support are missing, it defaults to leisure.

- Time and productivity: The hidden cost of time is the strongest predictor of car use for short trips in suburban cases; in Agouza, trip chaining and sensory richness make walking feel productive/pleasant.

- Edges matter: In Agouza, edges are hard physical (bridges/arterials) and micro-comfort (shade/surface); in Madinaty, they are design-structural (discontinuous shade, unsafe crossings); in Badya, they are temporal (construction/unfinished), as previously evidenced by Ewing and Handy (2009).

- Nodes define behaviour: Spontaneous, fine-grained nodes (Agouza) support functional walking; planned nodes (Madinaty) centralise leisure but weaken door-to-door walk access; provisional nodes (Badya) enable early community routines, previously stated as “switch points” by Lynch (1960).

Regarding the social networks analysis, the findings show that Agouza has dense, overlapping local networks, the kind of embedded social infrastructure that Putnam (2000) would associate with everyday social capital. Embedded services and fine-grained venues produce short-radius sociality: neighbour committees, worship charities, market/Ahwa circuits, and intergenerational routines. Nodes are many and redundant, so ties are resilient and easily refreshed. This echoes Oldenburg’s (1999) literature of “third places” as repeatable anchors of local life and Klinenberg’s (2018) argument that social life depends on accessible gathering spaces. Edges or barriers are less physical than generational, yet as evidenced, proximity keeps everyday support within 15 minutes. This aligns with the literature, which highlights that lived sociability, rather than formal design, sustains inclusivity in urban neighbourhoods (Jacobs, 1961; Abu-Lughod, 1987).

Madinaty, with planned nodes, fragmented legacy ties, social life concentrates in managed, consumption-oriented nodes (parks, clubs, malls), where sociability is curated rather than street-produced (Crawford, 1992). Neighbour ties are typically weak; many personal ties sit beyond 30’ by car. Digital contact substitutes for some trips. Child-centred routines create new local circles, but the costs of distance and time thin extended-family networks (as argued previously by Karsten (2003)).

Badya, a provisional community, digital scaffolding, with the city still maturing, homes and gyms act as primary landmarks; micro-kiosks and management events seed encounters. Many strong ties remain outside Badya; WhatsApp/Facebook groups bridge gaps. Caregiving/time pressures and a still-forming public realm keep many social trips car-based. This resonates with critiques of privatised public space (Low, 2006) and the risks of consumption-led sociability, where inclusion is mediated by access fees and distance.

Cross-case synthesis shows that where urban form yields many, near, low-cost nodes (as in Agouza), social networks become close-radius and redundant. Where form centralises into few planned nodes (as in Madinaty), or is emergent (as in Badya), networks spread out, rely on cars, and lean on digital mediation. In 15-minute terms, social redundancy (multiple places to meet within 15’) is as critical as land-use redundancy for everyday resilience. This

extends debates on the “just city” (Fainstein, 2010) by showing that resilience is not only about infrastructure but also about sustaining multiple, accessible third places that reduce social vulnerability.

In chapter 6, the answer to the second research question is supported by examining the digital services as an ‘intangible infrastructure’ that mediates proximity, time costs, and reliability, showing when the 15-minute city is achieved physically, substituted digitally, or realised as a hybrid. This points to a new conceptualisation of digital platforms as “intangible infrastructures.” It extends current 15-minute city concept debates, which tend to privilege physical design (Moreno et al., 2021) while underplaying platformed mediation, with the exception of limited recent literature (e.g. Allam et al., 2022; Cugurullo, 2021; Curtis and Mont, 2020; Karvonen, 2022; Hasselwander et al., 2024).

Agouza, digital as a complement to dense, nearby supply, reliance is low–moderate overall: e-commerce and health apps supplement rich local options, smoothing heavy/bulky purchases and specialist searches (reviews build trust for newcomers). Mobility apps backstop longer work trips; e-payments are near-universal. Net effect: digital reduces friction without displacing walking/PT; it amplifies trip-chaining rather than replacing it.

Madinaty offers digital convenience in a car-first, clustered form, with moderate to high reliance. Delivery and click-and-collect offset the time/productivity costs of car-based routines and long office commutes. Estate bus apps fit fixed schedules, and personal transporter services grow for kids and light errands. Digital substitutes many short functional trips (especially groceries/medicines) and standardises access within planned nodes. Net effect: digital stretches the practical 15-minute radius and temporalises it (on-demand), but tends to reinforce car primacy for non-routine trips.

Badya, digital scaffolding in an emerging hierarchy, with services phasing in, reliance is moderate–high across supply/retail and public e-services; fitness/education apps add tailored content. Residents consciously balance screen-mediated convenience with in-person outings to counter isolation, often splitting purchases (heavy items online; fresh items in person). Net effect: digital accelerates settlement and cushions early deficits, while small in-person errands serve social reconnection as the public realm matures.

Cross-case synthesis:

- Function: Digital serves as a substitute when walkable mix/redundancy is weak (Madinaty/Badya interiors) and as a complement when it is strong (Agouza).
- Mode choice: Apps lower the threshold for car avoidance in some cases (e.g., delivery instead of short drives), but can also displace active trips if fees/convenience dominate.
- Equity: Universal e-payments mask uneven digital literacy, device access, and fee sensitivity; substitution benefits are not uniform.
- Governance: Public e-services (IDs, fines, utilities) de-friction rare but time-intensive trips; private platforms set cost/availability rules that shape everyday proximity.

This research answers RQ2 by reading the four lenses together. These are urban form (cumulative opportunities, entropy, redundancy, space syntax), mobility experiences (paths, rhythms, durations), social networks (mapped through Lynch's paths/edges/nodes/landmarks/districts), and digital services (as intangible infrastructure). Taken as a whole, the evidence shows that the 15-minute city is not a single morphology but a configuration of network structure, land-use diversity, choice sets, and lived practices that can be achieved physically, digitally, or, most commonly, as a hybrid.

Regarding mobility experiences, the 15-minute city is achieved in practice through short paths, softened edges, and fine-grained, frequent nodes. Agouza demonstrates this most clearly. In Madinaty and Badya, the designed separation and low everyday redundancy push residents toward cars for short trips; where cycling/walking exist, they are recreational unless comfort, safety, and time efficiency are engineered into door-to-door routes. Small, sensory and service interventions (shade, crossings, micro-amenities, protected cycle links, end-of-trip parking) convert potential into lived proximity, especially for caregivers and women, who face the sharpest time/safety constraints.

Regarding social networks, the 15-minute ideal is strongest where many near, low-cost third places sustain frequent, layered encounters, markets, *Ahwa*, worship spaces, and small squares in Agouza, producing dense, resilient local ties. In Madinaty, sociability recentres on planned nodes (parks, clubs, malls), and neighbour ties are typically weak. Legacy ties lie beyond the settlement, making social life more car-dependent. In Badya, provisional micro-nodes (homes, gyms, kiosks, management events) and digital groups scaffold a

community still in formation. Seeding everyday third places every 300–400 m (pocket cafés, shaded seating, play pockets) and linking them with comfortable walk- and cycle-friendly routes concentrates sociality within the 15-minute radius.

Regarding digital usage, platforms operate as an intangible infrastructure that can complement proximity when form is strong (Agouza) and substitute for deficits when interiors are thin or emerging (Madinaty, Badya). Urbanism scholars describe the growing role of platform ecosystems in organising everyday urban life and convenience (Barns, 2020). E-payments are near-universal, but benefits vary with digital literacy, device access, fees, and reliability; without care, substitution can reinforce car-first routines. Locating lockers/click-and-collect at neighbourhood nodes, integrating pick-up points with shade and seating, and adding protected cycle spurs can convert digital convenience into short active trips, as most recent literature also debates (Campisi et al., 2025). This helps stitch the physical and platformed 15-minute city together, in line with Moreno et al.'s (2021) intent.

Cross-case synthesis (how ideals are realised):

1. Integration attracts services; interiors protect calm. Space syntax (integration) clarifies where services thrive (integrated spines) and where walk access thins (low-integration interiors), similar to what classic literature discussed (Hillier et al., 1993). The best 15-minute outcomes appear where graduated integration brings services close without overwhelming residential life (Agouza).

2. Entropy and redundancy predict reliability. High mix alone is insufficient; where diversity coincides with multiple options, people report the richest and most reliable access. Thin mix with single-point dependence produces fragile accessibility (many interiors in Madinaty/Badya).

3. Cycling is the practical equaliser. It multiplies opportunities in suburban areas and reduces edge deficits in Agouza, converting designed separation into functional proximity.

4. Digital services mediate proximity, time, and reliability. They complement strong local form (Agouza) and substitute for deficits (Madinaty/Badya), reshaping the lived 15-minute radius via ordering windows, fees, and pick-up routines; e-payments are ubiquitous, but digital literacy, device access, fees, and trust unevenly distribute the gains.

5. Edges are physical, temporal, and social. Arterials/bridges and heat (Agouza), discontinuous shade/unsafe crossings (Madinaty), and construction/newness (Badya) all add time/comfort costs that steer mode choice and trip timing.

6. Care and gender matter. Caregiving intensifies time constraints (especially visible in Badya) and amplifies the value of safe, shaded, continuous active links; fixed-schedule estate buses in Madinaty are prized for safety/comfort.

These findings speak directly to Lynch's (1960) theorisation of paths, nodes, and edges, but extend it by showing how temporal and social edges (construction phases, gendered safety concerns, caregiving pressures) also determine mobility patterns. This adds a critical layer to debates on urban legibility, situating Cairo's case within broader calls to adapt canonical planning theories to non-Western contexts.

Additionally, the analysis contributes to a reworking of Lynch's (1960) idea of edges. It shows how not only physical barriers, such as arterials and heat, but also temporal conditions, like ongoing construction, and social factors, including caregiving, gender, and safety, shape mobility choices. A further contribution is framing digital platforms as "intangible infrastructure." In Agouza, such platforms complement strong local provision, while in Madinaty and Badya, they substitute for gaps in everyday access. Their effects, however, depend on design details such as the placement of lockers, pick-up points, and links to walking or cycling. Finally, the study highlights how care and gender shape the lived reality of mobility, echoing feminist critiques of urban design (e.g. Kwan, 1999; Fenster, 2005; Huskinson, 2025; Kern, 2021 globally, and Cherif and Wahdan, 2023 locally) and showing that time pressure and safety are decisive in determining whether the 15-minute city can function equitably in practice.

8.4 Evolving Typologies and the Making of the 15-Minute City

The third research question guiding this study was:

"How have different models of the 15-minute city concept developed over time, and to what extent have they been successful (or not) in creating just and inclusive sustainable mobility experiences?"

Its objective was to explore how socio-cultural, economic, and political urban transformations shape distinct 15-minute city models and typologies and to develop a framework for just and inclusive sustainable mobility within them.

Findings in chapter 7 trace the temporal formation (plans, actors, governance, branding, build-out) of three distinct models: embedded (Agouza), clustered (Madinaty), and hierarchical (Badya). They also evaluate their mobility justice. Agouza delivers a sense of lived proximity but needs inclusive public-realm upgrades. Madinaty offers hub-based access yet remains car-centred and fee-mediated. Badya is on a hybrid, emergent path, with inclusion contingent on rapid delivery of redundancy and protected links.

Agouza emerged from a state-led transformation of Awqaf lands (1930s–50s), from a municipal garden-city adaptation to an embedded 15-minute fabric. In terms of origins and governance, it was planned in the 1930s–40s under the Cairo Municipality. Agouza localised British garden-city ideas with Fatimid references and a fine grain of small plots and streets (architect Mahmoud Riad). Construction through the late 1940s–50s established low-rise villas and two primary souq corridors as civic/commercial anchors.

Long arc of change. Over ~70 years, incremental densification (villas to 4–5-storey apartments; selective high-rise on arterials and the Corniche), the insertion of public/private offices, and the opening of metropolitan connectors produced today's dense, mixed, embedded service mosaic. Recent decades brought under-investment in the basic public realm, moments of regional-capital gentrification, and repeated migration inflows that diversified community life without dislodging the everyday retail/service base.

Morphology and syntax.

- MU1A/MU3A [73] (arterials/Corniche): high global integration (≈200–226), since metropolitan access and strong retail pulling power, but congestion and discontinuous pedestrian comfort.
- MU2A/MU6A (interiors): fine-grained blocks, vertical mixing (residential above, commerce below), medium local integration, since short, routine foot trips.

[73] Please refer to the methodology chapter for codes illustration.

- MU7A (main market streets): high local and global integration, since persistent commercial/social corridors.

Typology formed is embedded/market-corridor urbanism, a tight mesh of small premises, mixed uses on nearly every block, and redundant options (pharmacies, grocers, clinics) within walkable catchments. Recent literature still emphasises the significant role of neighbourhood form, including supply typologies, in shaping walkability. Istrate (2025) shows this clearly by finding that small shops are strongly associated with higher pedestrian flows. The *souq* streets and squares act as multi-node spines; interiors preserve residential intimacy. The walking options that make short-distance living resilient (Carvalho et al., 2025). Strengths are proximity, diversity, and choice; vulnerabilities are uneven sidewalks/shade, heat exposure, and centre–edge walkability gaps that cycling helps equalise.

From the results of the MTSC analysis, in Agouza, the building typologies predominantly contain 4–5-storey mixed-use tenements with retail at grade and housing above, thickened along the two *souq* corridors; small workshops and artisan shops spill to the street edge. Offices (public and private) and larger hospitals cluster on the highly integrated arterials/Corniche, while schools, clinics, cafés/ahwa and cultural venues are embedded in converted or infill buildings within the interior grain.

Madinaty is a neoliberal-era new city (2000/05) delivered by ACPUD/TMG under NUCA approvals, and a developer-led, branded new town producing a clustered 15-minute city model, regarding origins and governance, conceived in the 2000/2005 plans under NUCA approvals and delivered by ACPUD/TMG, Madinaty reflects a neoliberal, large-parcel delivery regime with city-scale branding (“international city”) and phased build-out across the 2000s–2010s.

Sequencing and narrative. Phased land releases enabled rapid housing delivery and the development of city-level commercial hubs (Open-Air Mall, Arabesque Mall). Media campaigns, flexible payment plans, and, more recently, diversifying in-migration (Syrian, Iraqi, Sudanese, Palestinian households) reshaped the social profile. The provision of green parks, clubs, and road hierarchies entrenched a hub-and-spoke structure.

Morphology and syntax.

- Main corridors/hubs (MU2M, MU5M, MU6M)[74]: very high global integration, since efficient car/bus access to malls, parks, clubs.

- Interiors (MU4M, MU7M): loops/cul-de-sacs with low–medium local integration, since limited permeability; walking largely intra-cluster.

- Specialised facilities (MU3M): strong global reach yet detached from everyday pedestrian circuits.

The typology formed from the findings is clustered 'hub-and-interior' urbanism: access is concentrated in designed centres; interiors remain mono-functional and repetitively built, with long, legible streets but thin spontaneous mixing. This is not the typical form of street-level accessibility mentioned by Moreno et al. (2021). However, strengths are predictable access to planned amenities, generous open space, and perceived safety; weaknesses are car-first short trips, weak street sociability, low redundancy near homes, and fee-mediated participation that can exclude. This pattern is detrimental in shaping whether walking is chosen, as Mohamed et al. (2024) argue.

In Madinaty, building typologies are a repeatable palette of detached villas and mid-rise apartment slabs that feed into freestanding facilities: open-air malls/hypermarkets as retail anchors, school campuses and polyclinics/hospitals as stand-alone blocks, and large sports clubs set within fenced complexes; everyday kiosks/supermarkets exist but are subordinated to the hub typology.

Badya, a vision-2030 satellite coalescing into a hierarchical 15-minute system, regarding origins and governance, was launched in 2018 by Palm Hills Developments with NUCA under Egypt Vision 2030. Early branding as a "creative city" shifted to an explicit 15-minute city design logic before the initial phases. Regarding design logic and early delivery, a 5–10–15 tiered service hierarchy (neighbourhood/district/city hubs), living-street traffic calming, water recycling, visibility-led park access, and green mobility spines threading residential clusters. Early phases prioritised key facilities and central service cores; continuing build-out produces temporal edges (construction, partial provisioning).

Morphology and syntax.

[74] Please refer to the methodology chapter for codes illustration.

- Main spines (MU1B, MU4B): high global integration, since, clear structural backbone.
- Institutional clusters (MU2B, MU5B): globally connected but internally fragmented; local integration is weaker.
- Residential-service units (MU3B, MU6B): medium local integration, lower global, since, quieter interiors.

Typology formed in the findings is hierarchical, 'spine-and-hub' urbanism. Proximity is programmed via tiered hubs; building footprints are larger and more uniform than in Agouza; the public realm is deliberately furnished (shade, seating), and cycling is intended to stitch the tiers together. Strengths are clarity and future-proofed connectivity (planned BRT/monorail links, water/energy measures); vulnerabilities are early car dependence, mono-function within units, and a community still coalescing socially.

In Badya, building typologies comprise a tiered mix of villas and mid-/high-rise blocks, organised around district and neighbourhood centres, with consolidated mixed-use podiums. Schools/universities are planned as a campus, clinics sit in centres (with hospital capacity at the city core), and clubhouses/outdoor courts structure recreation. "Living streets" and shaded pocket spaces are integral public-realm typologies stitching these functions together.

The 15-minute city in Greater Cairo is not one model but three historically produced typologies. It includes an embedded inner-city fabric that achieves proximity through an accumulated mix of street markets. It also includes a clustered new-town fabric that provides access via hubs while diminishing everyday walkability. And it includes a hierarchical satellite fabric designed for proximity through tiered hubs and spines, maturing toward completeness as phases, redundancy, and local permeability are added.

Negotiating inclusivity in everyday mobility

Regarding the second part of the research question, the thematic analysis of resident interviews makes clear that the three neighbourhoods embody different degrees of inclusivity, and that these differences are most visible when mobility is examined through the lens of gender, age, and family roles. It speaks to recent studies such as Plaza-Herrera et al. (2025), who explicitly frame the "15-minute city" as an inclusion question, showing that accessibility can appear high on maps while still producing age-related gaps.

In Agouza, proximity and density sustain everyday walking and make public transport a real option, yet the quality of that experience is uneven. Women remain cautious of harassment and unsafe crossings, older residents are limited by the absence of benches and poor pavement conditions, and families with strollers struggle against traffic and narrow sidewalks. In Madinaty, residents enjoy walking inside gardens and malls where the environment feels safe and comfortable, particularly for women, families, and seniors. But these spaces are islands: once trips extend beyond them, long distances, poor sidewalks, and the summer heat make walking far less inclusive. Badya, still under construction, reflects more of an aspiration than a reality. Mobility is largely confined to gardens or clubhouses, while unfinished streets and missing networks leave most people dependent on cars.

Cycling tells an even clearer story of accessibility exclusion. In Agouza, a few men still take the risk of riding on busy streets, but for women, older people, and families, it is effectively out of reach. Significantly higher safety concerns for them have been argued in recent literature (e.g., Graystone, 2022; Khademi et al., 2024). In Madinaty, bicycles are mostly toys for children rather than a practical way to get around. Badya has lanes between districts, which encourage residents to use bikes as a functional mode of mobility, but without shade, continuity, or social uptake, they remain underused. Across all three sites, cycling has not been normalised as a practical or safe option. Read through mobility justice scholarship, they are the mechanisms through which everyday accessibility becomes stratified by gender, age, income, and care responsibilities (Sheller, 2018).

Public transport reveals the sharpest contrasts. In Agouza, despite its flaws, the metro and bus network make non-car mobility possible for a wide range of residents. Madinaty relies on internal buses, shuttles, and school buses, but these services often cost more, leaving lower-income households and caregivers at a disadvantage. In Badya, where the transport system is not yet in place, residents have little choice but to rely on private cars, a pattern Mattioli (2017) described as ‘forced car ownership.’

What emerges from these accounts is that proximity on its own does not guarantee fairness. Agouza shows how density can support mobility but also how safety and comfort remain unevenly shared. Madinaty highlights the comfort of well-designed pockets that lose their inclusivity once people need to move beyond them. Badya, for now, illustrates the risks of building new cities without complete networks, where car dependency takes hold from the start. Justice in mobility depends not only on how close destinations are, but on whether

routes are continuous, safe, and affordable for women, older people, and families as much as for young, able-bodied men.

The cross-demographic analysis shows that inclusivity has been partial and uneven across the three models. Agouza demonstrates the greatest degree of inclusivity, where density and proximity allow many residents to walk and use public transport in their everyday lives, aligning with Moreno et al.'s (2021) original formulation and its linkages to the garden city concept. Yet justice is compromised by the unequal burdens carried by women, seniors, and families with children, whose mobility is limited by safety risks, broken infrastructure, and lack of comfort. This echoes many arguments in the literature that sustainable mobility must also address questions of justice and accessibility (e.g., Lucas, 2012). Madinaty offers safe, pleasant walking in controlled environments, but this inclusivity breaks down once longer journeys are required, revealing an urban design that produces selective areas of comfort rather than a genuinely connected system, as Curtis and Mont (2020) describe. Badya, still under construction, remains the least successful, with aspirations for inclusivity through gardens, bike lanes, and future transit yet to materialise, leaving residents dependent on cars. Here, promises of bike lanes and transit illustrate the gap between symbolic adoption and everyday use. Taken together, these findings answer the research question by showing that while all three neighbourhoods claim elements of the 15-minute city ideal/its lineage of urban ideals, each displays varying degrees of inclusivity, yet all fall short of being holistic. Instead, each model exposes how proximity without continuity, safety, and affordability reproduces exclusion, even in contexts that promise accessibility. Across all three cases, the findings suggested that the 15-minute city models and other urban ideals must be understood not only as spatial forms but also as lived social practices shaped by gender, age, care roles, and bodily capacities.

Belonging, place and aspirations in the 15-minute city models

Another meaning of space is analysed through the emerging intangible themes. The interviews show that mobility in Cairo's three models of the 15-minute city is not simply about access to services but also about how people locate themselves socially and emotionally within place. A strong sense of belonging emerges in older districts such as Agouza, where informal third spaces like the *Ahwa* anchor everyday routines. As Oldenburg (1999) argued, these third places offer more than leisure; they sustain friendships, provide continuity, and nurture civic life. It can also be read that in Agouza, these spaces create what Massey (2005) describes as the "throwntogetherness" of place, where class, age, and gender

intersect in ways that produce both comfort and tension. Importantly, participants often commuted beyond their immediate 15-minute radius to reach their own familiar *Ahwas*, suggesting that belonging does not always map neatly onto the spatial ideal of proximity. Rather, it is shaped by the desire for familiarity and social recognition, echoing Amin's (2008) reminder that belonging is as much relational as it is spatial.

In contrast, the regulation of urban life in Madinaty and Badya modifies the construction of belonging. Here, social interaction and leisure are more frequently planned around clubs, gyms, or events, reflecting a controlled, consumption-driven model of community life. In other words, these settings offer safety, predictability, and order, but they also narrow the possibility for the more improvised social mixing that makes places like Agouza feel alive. Families with children, on the other hand, do describe a sense of belonging in parks and playgrounds, where the routines of care are visible and shared. This reflects critiques in the literature that new models of urban spaces tend to systematise sociability, narrowing the possibility for spontaneous, class-crossing encounters (Curtis and Mont, 2019). Families in these contexts find belonging instead through spaces explicitly designed for children, such as playgrounds and clubs, which provide both safety and reassurance. Care work, in this sense, becomes a central driver of belonging, supporting feminist urban arguments that everyday infrastructures of care are foundational to inclusive city-making (Kern, 2020; Power and Mee, 2020). For older adults, place attachment is maintained through familiarity with local service providers and the subtle networks of recognition and minor favours that build confidence in daily life, experiences that resonate strongly with Seamon's (2014) notion of place attachment as rooted in habitual, embodied practice.

The theme of sense of place also complicates the experience of active travel. In Madinaty, the predictability and clarity of the outer and inner streets created feelings of safety and independence, particularly for women, yet the very uniformity that enabled this reduced opportunities for memory and affective attachment to place. Streets were functional but not really rich in texture, with belonging tied more to the designed destinations than to the everyday journey itself. In Agouza, the reverse was true: streets were socially dense, sensory, and emotionally resonant, encouraging walking and cycling even as they also produced gendered tensions around overcrowding and informal markets. Badya, meanwhile, suggests an emergent hybrid model: shaded walkways and recreational infrastructure gesture towards an emotionally supportive environment, though it remains to be seen whether this will generate the layered attachments that grow over time. These contrasts illustrate that active

travel cannot be reduced to infrastructure provision; it is always mediated by safety, memory, and affective geographies (Cresswell, 2010).

Finally, the aspirations communicated through marketing narratives in Madinaty and Badya add another layer of complexity. Madinaty projects a suburban imaginary centred on order, security, and seamless mobility, with greenery often more ornamental than lived. Badya leans instead into nostalgia and affect, drawing on Egyptian pop culture and stories of neighbourliness to promise a return to communal life. These campaigns matter because they project the image that they do not just sell houses, they sell ideas of how life should feel, and those ideas seep into the design of streets and public spaces. Yet the lived experiences remind us that belonging and memory cannot be manufactured. Agouza shows how familiarity and layered histories create a deep sense of place.

Together, these findings point to an important extension of the 15-minute city debate. While much of the literature focuses on accessibility and proximity (Moreno et al., 2021), the Cairo cases suggest that emotional attachment, social recognition, and cultural memory are equally central to whether people actually inhabit their 15-minute radius. Agouza demonstrates how these layers build over time, even amid urban disorder; Madinaty highlights the limits of curated environments that prioritise comfort but reduce spontaneity; and Badya shows the risks of leaning on lifestyle narratives that remain aspirational until residents make them real. These insights echo critiques that the universalising discourse of the 15-minute city overlooks local histories and social practices (Sharifi and Khavarian, 2020), while also showing how a sense of belonging and place attachment shape the proximity-based planning in everyday life.

8.5 Research Contributions and Implications

This thesis contributes to scholarship on the 15-minute city by extending the literature, largely shaped by European perspectives, with findings from Greater Cairo, a rapidly expanding non-Western metropolis. By situating the analysis in Greater Cairo and comparing three historically and institutionally distinct urban fabrics and forms (Agouza, Madinaty, and Badya), it positions Cairo not only as a site for testing the model. It is also positioned as a site of contemporary knowledge production that can inform wider debates on proximity planning.

Table 20 presents the integrated assessment framework that emerged from the study, consolidating the key dimensions, criteria, indicators, and relative priorities for evaluating

15-minute city models in Cairo, Egypt and similar contexts. The table also clarifies that justice serves as the umbrella concept and overarching evaluative lens in this thesis, rather than a separate criterion assessed after spatial performance. In this framework, spatial metrics identify the potential for proximity, while the qualitative and thick-mapping findings show whether that potential is converted into reliable, practical, and inclusive everyday access under real conditions. It therefore highlights the highest-priority factors not only in terms of service presence and distance, but also in terms of redundancy, functional mobility, hidden costs, mode dependence, and the unequal constraints shaping access for different residents.

In the context of Cairo, justice and inclusion as the umbrella concept is important because access is shaped not only by the distribution of services, but also by uneven street conditions, heat exposure, congestion, affordability, care responsibilities, mode dependence, and the growing role of digital platforms in mediating daily needs. The study, therefore, shows that the key question is not simply whether services are "nearby," but for whom, under what conditions, and with what degree of reliability and practical usability, proximity can be experienced in everyday life.

Conceptually, the thesis advances how "proximity" is understood and evaluated. Rather than treating the 15-minute city as a single transferable model, it is understood as a plurality of proximity regimes shaped by history, governance structures, and everyday practices. While existing literature often equates proximity with distance or service coverage, this research demonstrates that proximity becomes reliable only when diversity is paired with multiple realistic alternatives. For example, it demonstrates that lived proximity is experienced as reliable only when diversity is paired with redundancy, when residents have more than one realistic option for essential services. The study further introduces proximity as a condition that can be fragile: when a key facility is closed, overcrowded, or too expensive, what appears "nearby" in principle may not function as such in practice for all social groups. In doing so, the research strengthens the four-pillar framework (proximity, density, diversity, digitalisation) by showing how these pillars interact with governance trajectories, socio-political processes, and everyday constraints in a context shaped by layered histories and ambitious city-building agendas.

Methodologically, the thesis advances an integrated comparative framework that links urban form with social practice and digital infrastructures. Responding to calls in the limited Cairo literature to move beyond proximity-only approaches, it combines spatial analysis with a

grounded reading of everyday accessibility, capturing not only the distribution of services but also how mobility modes, public-space conditions, and social routines shape what is actually reachable. This enables a more complete interpretation of accessibility in non-Western, fast-urbanising contexts where formal provision, lived use, and socio-economic filters do not neatly align.

Empirically and practically, the thesis provides evidence that the 15-minute city is best understood as a plurality of models rather than a single template. It shows how clustered "single-option" service arrangements in planned environments can produce fragile proximity, while layered fabrics can build resilience through accumulated alternatives, though at the cost of congestion and parking pressure. It also identifies mobility mode as a decisive lever: cycling, in particular, expands the lived 15-minute radius, but only when door-to-door comfort and safety are built into routes. Finally, it conceptualises digital platforms as an "invisible infrastructure" of proximity that can complement strong urban form or substitute for deficits in new towns, with implications for designing neighbourhood pick-up nodes and local systems that convert digital convenience into more active and inclusive everyday mobility.

Together, these contributions extend theoretical debates, offer a transferable analytical approach, and provide planners and designers with grounded insights into how proximity-planning can be adapted, critically and context-sensitively, toward more connected, just, and resilient urban life in Greater Cairo and comparable rapidly urbanising regions.

Regarding implications, the thesis has several implications for how the 15-minute city is theorised, evaluated, and implemented in rapidly expanding metropolitan settings. First, it suggests a shift in emphasis from proximity as a simple time–distance benchmark toward proximity as reliable access. The findings indicate that everyday accessibility depends not only on whether services are within a given radius, but also on whether residents have multiple viable options that remain usable under real conditions of cost, crowding, closure, safety, and comfort. This reframing supports a more context-sensitive understanding of the four pillars, proximity, density, diversity, and digitalisation, by highlighting that they operate as an interconnected system rather than a universal checklist.

Methodologically, the research implies that proximity-planning assessments should move beyond POI-based catchments and coverage maps as standalone evidence. In contexts where barriers, heat exposure, uneven sidewalk conditions, and socio-economic filters shape what

is practically reachable, accessibility metrics can overestimate what is “available” in everyday life. The thesis, therefore, points to the value of combining spatial measures with direct observation and routine-based evidence to capture usability, redundancy, and the “last stretch” conditions that determine whether walking and cycling are functional rather than recreational.

For planning, design, and policy, the findings imply that the most effective levers for achieving the 15-minute ideal may be modest, targeted interventions rather than relying solely on land-use mix. In planned environments where services are concentrated in a single main cluster, proximity becomes fragile; distributing everyday essentials through smaller, finer-grained micro-centres can strengthen resilience and reduce detours. The results also indicate that mobility mode is decisive: cycling, in particular, expands the lived 15-minute radius, but only when door-to-door routes are comfortable and safe. This points to the importance of “edge” design, shade, crossings, protected links, and end-of-trip support as core infrastructure for proximity planning. Finally, the thesis implies that digital platforms should be treated as part of the accessibility system: they can reduce unnecessary short trips and compensate for local deficits, but they can also reinforce car-first routines unless neighbourhood pick-up nodes and last-mile arrangements are deliberately designed to translate digital convenience into active, local movement and more socially inclusive neighbourhood life.

Table 20 Integrated framework for assessing 15-minute city models in Cairo/Egypt and similar contexts (emerged from this study)

The integrated framework					
Framework Dimension	**Key Criteria**	**How to Assess (Metrics / Evidence)**	**Why It Matters**	**Study findings (Agouza–Madinaty–Badya)**	**Priority in assessment**
1. Spatial availability of services	Basic service presence within proximity thresholds	Service area coverage maps (walking/cycling), single-function distribution (supermarkets, healthcare, education, sports, recreation, worship, etc.)	Establishes whether services are present and geographically reachable	All three cases show some degree of planned/reachable services, but coverage alone overestimates lived access in car-oriented or under-construction settings	High (nece-ssary but not suffic-ient)
2. Cross-Functional accessibility	Number of different destinations reachable across functions	Cumulative opportunities (e.g., reachable facilities within 15-min walk / 5-min bike / 15-min bike)	Captures practical everyday access and trip flexibility better than single-function maps	Agouza performs strongly in dense mixed contexts; Madinaty and Badya improve mainly with cycling and/or motorised support; mode matters greatly	Very High
3. Resilience of local services	Functional redundancy (multiple facilities of same type)	Redundancy counts per unit/grid (e.g., multiple supply facilities in same catchment)	Indicates backup options, reliability, and everyday resilience when one option fails/crowds	Agouza shows strong redundancy (e.g., multiple supply choices); Madinaty/Badya often have lower redundancy despite planned provision	Very High
4. Diversity of urban functions	Degree of land-use mix	Entropy / land-use diversity values	Supports trip-chaining, reduces dependence on long trips, strengthens local living	Agouza has highest mixed-use intensity; Madinaty has the lowest entropy (segregated zoning); Badya sits between but often in hierarchal mix	Very High
5. Network permeability and Street Logic	Through-movement potential and local permeability	Space Syntax integration (local/global), interpreted with morphology and routes	Distinguishes “connected in design” from “walkable in everyday life”	Main corridors in planned cities may score globally high, but local permeability remains weak; Agouza’s inner fabric supports everyday circulation despite congestion	Very High

6. Morphological Grain and Adaptability	Fine-grain vs large parcels; block/plot structure; zoning rigidity	Morphology-typology analysis of units, with plot/block/street reading	Shapes whether proximity can be adapted, intensified, or socially appropriated over time	Agouza's layered fine grain supports adaptive mixed use; Madinaty's controlled zoning limits spontaneous mixing; Badya shows hierarchal proximity with lower internal diversity	High
7. Lived Mobility Functionality	If walking/cycling are actually used for daily needs (not only recreation)	Thematic analysis and thick mapping (paths/routes), interview narratives	Tests whether mapped proximity becomes functional access	Agouza: active travel is functional; Madinaty: walking mostly optional/recreational; Badya: walking exists but often leisure and transitional	Very High (core corrective to map-based claims)
8. Hidden Costs and Mobility Edges	Physical, perceptual, temporal and care-related barriers	Lynch-inspired framework, interviews, and thick mapping	Reveals why reachable destinations may still be inaccessible to certain users	Agouza: crowding/sidewalk/bridges; Madinaty: distance/monotony/unsafe crossings; Badya: construction uncertainty, incomplete links, time scarcity	Very High (justice-sensitive)
9. Nodes and Landmarks as Everyday Social Anchors	Where movement and social life actually concentrate	Lynch-inspired framework, interviews, and thick mapping	Shows social-spatial concentration and practical orientation in daily life	Agouza has dense everyday street nodes; Madinaty relies on managed nodes (malls, club, parks); Badya has emerging anchors (clubhouse, vendors, district centres)	High
10. Digital Mediation of Proximity	Role of delivery apps/platforms in compensating, substituting, or reshaping access	Thematic coding of digital usage, interviews, and thick mapping	In Cairo-like contexts, shows the extent to which proximity is digitalised	Agouza uses digital selectively; Madinaty uses apps as default convenience/time strategy; Badya uses digital as gap-filler and relocation support	Very High (context-specific extension)
11. Social Infrastructure and Community Formation	How belonging, support, and sociability are produced	Social network themes, typology-community character layer and thick mapping	Shows 15-minute living is not only about facilities, but also social ties and everyday support systems	Agouza: layered ties and embedded sociability; Madinaty: fragmented/re-formed around clubs, kids, consumption; Badya: ties still forming, often mediated by management/events/digital groups	High

12. Justice and Inclusion	Who can use proximity, under what conditions, and where exclusion appears	Cross-case synthesis of gender/age/family condition findings, barriers, and mode dependence	Moves from “average access” to equitable access	Parents/caregivers, non-drivers, seniors, and women face different frictions across cases; shaped by design, infrastructure, and usage patterns	Highest Priority (umbrella criterion)
13. Maturity of Urban Development	Whether the area is settled, under construction	Thick mapping, field observations, and narrative interpretation	Explains transitional accessibility and evolving behaviour in new cities	Badya demonstrates that proximity performance changes over time as infrastructure, social anchors, and confidence in place mature	High (especially for new towns)

8.6 Research Limitations

The research has several limitations that shape how its findings should be interpreted. First, the comparative analysis is based on three case studies, Agouza, Madinaty, and Badya, selected to represent historically distinct urban fabrics in Greater Cairo. While this design enables analytical comparison across contrasting urban forms and governance conditions, it does not capture the full diversity of Cairo's metropolitan fabric. The findings should therefore be read as analytically transferable to similar contexts and dynamics rather than statistically generalisable to all Cairo neighbourhoods.

Second, the study is context-specific. Its conclusions are grounded in Cairo's historical layering, governance arrangements, mobility infrastructures, and everyday social practices. The contribution of the thesis lies not in proposing a universal 15-minute city model, but in showing how proximity-based planning ideals are reshaped through local socio-spatial conditions.

Third, one case study (Badya) remains under development and partly under construction. As a result, some observations are necessarily provisional: planned facilities, mobility networks, and patterns of everyday use are still emerging. The analysis therefore combines master plans, early resident accounts, and field observations to examine both the intended model and its initial lived adaptation, while recognising that future phases may alter current conclusions.

This study is best understood as methodologically replicable but contextually adaptive. The research design can be replicated in other neighbourhoods or cities through the same integrated comparative framework: (1) historical–policy analysis of land use and mobility development, (2) spatial analysis of urban form and service distribution, and (3) qualitative investigation of lived mobility, social practices, and digital mediation of access. The stepwise mixed-methods structure, case comparison logic, and triangulation strategy provide a clear basis for replication.

8.7 Future Research

Future research could extend this thesis in four main directions. First, it should broaden the comparative frame beyond three neighbourhoods by including additional Cairo urban types, particularly informal areas, peri-urban edges, and other new satellite cities, to test how the identified proximity dynamics vary across a wider spectrum of governance and urban form.

Second, longitudinal and seasonal research is needed to capture how "lived proximity" changes over time as services mature, prices shift, and mobility conditions vary across school terms, summer heat, and major disruptions.

Third, further work could deepen measurement by integrating door-to-door accessibility modelling that accounts for comfort and safety factors (shade, crossings, sidewalk continuity, perceived risk), alongside public transport reliability and trip-chaining for caregivers. Finally, research should examine digital platforms in the 15-minute city more directly by studying how delivery and pick-up practices reshape neighbourhood routines, labour geographies, and car dependence, and by evaluating whether designed pick-up nodes or small mobility and streetscape interventions measurably shift behaviour toward more active and inclusive forms of proximity.

8.7 Final considerations: Towards Hybrid Digital–Physical 15-Minute Neighbourhood: Nearness, Care, Belonging, and Everyday Access

These final considerations translate the thesis findings into recommendations that cities and developers can actually implement. It is evident that proximity on a map does not automatically become access in daily life. People's experience of the "15-minute city" is shaped by the quality of the walk, the safety of a crossing, whether there's a bench in the shade, if a cycle link is continuous, and whether services are duplicated or dominated by a single provider. Thick maps show exactly where women, seniors, and families are slowed down or pushed away, at bridges and arterials in Agouza, on long unshaded paths and sparse benches in Madinaty, and around construction edges and unfinished links in Badya. The recommendations in tables 21, 22, and 23 below keep that lived reality at the centre while using the available facilities.

Table 21 General cross-cases recommendations (Inclusivity-led, evidence-based)

01	Setting a clear standard	15-minute hierarchy, access and inclusivity standard: built essentials (pharmacy, primary care, kindergarten, grocery store, ATM/parcel) within 5 minutes (~400 m on foot and/or 1–1.5 km by bike) along priority routes that meet minimums for shade, seating, step-free crossings, and night safety. Then setting tiers for other facilities so they're reachable within:

		10 minutes: ~800 m on foot; 2–3 km by bike (e.g., fresh market, basic school, district garden). 15 minutes: ~1.2 km on foot; 3–4 km by bike (e.g., library, sports centre, clinic, post office). District/occasional: ≤30 minutes by transit/combined modes (e.g., hospital, major park, higher education). Redundancy: at least two different-scale providers for each essential within the catchment so access is reliable, not fragile.
02	Making walking practical and pleasant	Paths: deliver continuous shade and benches every 200–300 m on three priority loops per case, fix level changes and add tactile paving at every upgraded junction. Edges: install raised zebra crossings and refuge islands at bridge approaches and arterials (Agouza), along long, straight roads (Madinaty), and around construction fronts (Badya). Nodes: treat markets, bus stops, and district centres as comfort points, sufficient lighting, seating, toilets, stroller-friendly surfacing. Landmarks: adopt a “safe-late” frontage policy so at least one shop per block stays open, with façade lighting to support passive surveillance.
03	Build the cycling networks that makes the city smaller	Protected cycle spurs from residential interiors to hubs and schools (2–3 km typical), with intersection protection at every arterial crossing. Agouza: add low-traffic “quiet streets” using simple modal filters. Everywhere: secure bike parking at centres, clubs, and the university; school-street closures at drop-off and pick-up.

		Normalise use: women-led rides (Agouza), family cycling hours in parks (Madinaty), and activities like bike-library and first-ride days (Badya).
04	Tailoring public transport into daily life	First/last-mile corridors to metro/bus (Agouza) and movement centres (Madinaty/Badya): shaded, lit, traffic-calmed. Stops that work: shade, seats, real-time info, safe ride-hail/school-bus pockets. Affordability levers: negotiate off-peak discounts and school-bus fee caps where households face high costs.
05	Growing services where people actually need them	Ground-floor conversions on the few mono-use stretches, permit micro-retail, clinics, daycare; pair with small façade/signage grants. Temporary pop-ups/kiosks (markets, clinics) to cover gaps while permanent anchors open, especially in Badya.
06	Using digital to help, not replace, the city	Data-for-permits compact: monthly anonymised OD and delivery density in exchange for permits; Siting rules for dark stores: no school frontages, off-peak loading windows, rider safety standards, and a contribution to a "last-50 m" safety fund.
07	Keeping care, safety and community character visible	Women-and-kids night routes on the priority loops with lighting, overlooking, and call-points, can be audited with local groups. Street identity: guidelines and micro-grants for artisan shopfronts and cultural anchors on Souq/main streets.

Table 22 Case-specific recommendations and priorities

Area	Agouza Neighbourhood	Madinaty City	Badya City

Main Priority	-Strengthening what works and fixing the edges	- Stitching interiors to hubs, and reducing reliance on the car	- Turning the plan into lived access
Recomm-endations	- Upgrade Street 12 and Street 6: wider footways, organised vendor bays, raised crossings, safe-late frontage, links to Cairo Bike. - Bridge/arterial approaches: raised zebras, buffers, tactile continuity. - Transit stops on integrated corridors: shelter, and real-time info. - Green loops to the Nile with step-free access and pocket parks.	- Protected bike spurs to Open Air/Arabesque and schools; bench clusters every 300 m on long paths. - Green-grid links every 400–500 m to pull interiors toward hubs; convert two mono-use blocks to mixed ground floors. - Service quotas inside residential clusters and affordable slots in clinics/schools through simple inclusion agreements. - Plan regional active-travel connectors to New Cairo job areas and future BRT.	- Finish the green mobility network (wayfinding, lighting, protected junctions) and add bike parking at every district centre and the university. - Manage construction edges with protected pedestrian detours and night lighting; use temporary pop-ups to plug service gaps. - Roll out living-street design (30 km/h, shade, play-curbs) and create women-safe evening loops connecting gardens, clubhouse, and market. - Build first–last-mile hubs to monorail/BRT (bike share, secure parking, shaded waits).
How to know it is working?	At the first post-implementation review, at least 80% of residents should be within 800 m of everyday essentials. By the consolidation stage, average functional redundancy should reach approximately 1.8 providers per essential per catchment. By the second interventions cycle, cycling mode share on trips		

	≤3 km should increase by about 6–10 percentage points, with women's cycling increasing. On upgraded priority loops, perceived night-time safety for women should improve by around 20–25% by the second cycle, and provision of benches and shade should meet at least 80% compliance on priority links at the first phase. Public transport access should also meet an 80% threshold of households within 800 m by the consolidation stage. Monitoring should repeat the MTSC, service-area, and digital-reliance analyses at each evaluation cycle, complemented by short, stratified intercept surveys at fixed paths/edges/nodes/landmarks, so that results can be actualised.

Table 23 Risks to watch, and simple safeguards

Risk	Proposed mitigation
Rent pressure near upgraded streets, especially in Agouza.	Reserving a small number of essential-service units with capped increases, keep legacy tenants where possible.
Digital platform non-compliance	Tying data sharing to their permits and conditional on audited, privacy-safe data-sharing, fair work baseline, noise and night operations, and cap delivery zones if needed.
Heat and weather	Using mixed species for shade, high-albedo surfaces, and misting at key nodes.
Budget limits	Starting with the three highest-impact loops/corridors per case and expand once the interventions move.

Taken together, these recommendations argue for a modest but steady shift from "proximity on paper" to "access in practice" for basic needs within a 15-minute radius, delivered through small, repeatable upgrades to routes, edges, nodes, and services, and verified by simple, recurring checks. The approach is intentionally inclusive, prioritising women, seniors, and

families, while staying pragmatic: fix the obvious design frictions first (shade, benches, crossings, bike protection), stitch residential interiors to commercial hubs, and grow essentials where people actually are. Governance to this should be light but firm: publish clear access and safety standards, couple platform permits to basic data-sharing, and reserve some core street-level units for essentials, using protective measures to prevent displacement as the area gains value. Each improvement cycle should re-run the same MTSC and service-area analysis, as well as short surveys, so gains are visible and gaps are quickly targeted. If city authorities and developers hold that line, iterate, measure, and protect the most vulnerable users, then the “15-minute city” promise becomes a daily reality rather than a diagram.

References

Abbassy, N., El-Husseiny, M. and Shaker, S., 2025. ‘Smell-walking as a cognitive mapping tool: investigating the smellscape of Syrian food for placemaking in Cairo’s outskirts’, Urban Design International. Available at: https://doi.org/10.1057/s41289-024-00282-w.

Aboulnaga, M., Ashour, F., Elsharkawy, M., Lucchi, E., Gamal, S., Elmarakby, A., Haggagy, S., Karar, N., Khashaba, N.H. and Abouaiana, A. (2025). Urbanisation and Drivers for Dual Capital City: Assessment of Urban Planning Principles and Indicators for a ‘15-Minute City’. Land, 14(2), p.382. doi:https://doi.org/10.3390/land14020382.

Abu-Lughod, J.L., 1987. ‘The Islamic City—Historic Myth, Islamic Essence, and Contemporary Relevance’, *International Journal of Middle East Studies*, 19(2), pp. 155–176.

Adham, K., 2005. ‘Globalization, neoliberalism, and new spaces of capital in Cairo’, Traditional Dwellings and Settlements Review, pp.19–32.

Alagamy, S.F., 2023. ‘The influence of sustainable building of gated communities on the natural environment and the user: the case of Madinaty city’, Journal of Engineering and Applied Science, 70(1), p.90.

Ali, M.A., 2022. ‘Smart city policy in developing countries: case study of the new administrative capital in Egypt’, *Journal of Public Affairs*, 22(S1), e2774. doi:10.1002/pa.2774.

Allam, Z., Bibri, S.E. and Jones, D.S., 2022. ‘The “15-minute city” concept can shape a net-zero urban future: From minimising mobility to maximising accessibility’, *Humanities and Social Sciences Communications*, 9, Article 99.

Allam, Z. and Jones, D.S., 2020. ‘On the coronavirus (COVID-19) outbreak and the smart city network: Universal data sharing standards coupled with artificial intelligence (AI) to benefit urban health monitoring and management’, *Healthcare*, 8(1), p. 46.

Allam, Z. and Newman, P., 2018. ‘Redefining the smart city: culture, metabolism and governance’, Smart Cities, 1(1), pp. 4–25.

Allam, Z., Moreno, C., Chabaud, D. and Pratlong, F., 2021. 'Proximity-based planning and the "15-minute city": a sustainable model for the city of the future', in The Palgrave Handbook of Global Sustainability, pp. 1–20.

Allam, Z., Bibri, S.E., Chabaud, D. and Moreno, C., 2022. 'The "15-minute city" concept can shape a net-zero urban future', Humanities and Social Sciences Communications, 9, 126.

Allison, C.K. and Stanton, N.A., 2019. 'Eco-driving: the role of feedback in reducing emissions from everyday driving behaviours', Theoretical Issues in Ergonomics Science, 20, pp. 85–104.

Ali, M., Ali, T., Gawai, R. & Elaksher, A., 2023. Fifteen-, Ten-, or Five Minute City? Walkability to Services Assessment: Case of Dubai, UAE. Sustainability, 15(20), p.15176. doi:10.3390/su152015176.

AlSayyad, N., 2011. Cairo: Histories of a City. Cambridge, MA: Harvard University Press.

Al-Madaq, 2023. 'Maps: 1920'. https://www.almadaq.net/en/.

Ampudia-Renuncio, M., Guirao, B., Molina-Sánchez, R. and Engel de Álvarez, C., 2020. 'Understanding the spatial distribution of free-floating carsharing in cities: analysis of the new Madrid experience through a web-based platform', Cities, 98, 102593.

Angelidou, M., 2014. 'Smart city policies: a spatial approach', Cities, 41, pp. S3–S11.

Angelo, H. and Goh, K., 2021. 'Placing planetary urbanisation in other fields of view', Urban Geography, 42(3), pp. 325–334.

Angelo, H. and Wachsmuth, D., 2015. 'Urbanizing urban political ecology: A critique of methodological cityism', *International Journal of Urban and Regional Research*, 39(1), pp. 16–27.

Antonsich, M., 2010. 'Searching for belonging – An analytical framework', *Geography Compass*, 4(6), pp. 644–659.

Appleyard, D., Lynch, K. and Myer, J.R., 1964. The view from the road. Cambridge, MA: MIT Press.

Appleyard, D., 1981. Livable Streets. Berkeley: University of California Press.

Apollo Magazine, 2017. ‘An alternative vision of life in Letchworth, the world’s first garden city’, *Apollo Magazine*, 3 January.

Arefi, M. and Tayyebi, A., 2024. ‘Abduction, inculturation, and urban design thinking’, Design Studies, 95, 101278. doi:10.1016/j.destud.2024.101278.

Arias-Molinares, D. and García-Palomares, J.C., 2025. ‘Exploring the 15-minute city concept for the urban outskirts’, European Transport Research Review, 17(2), pp. 1–15.

Arthur, P. and Passini, R., 1992. Wayfinding: People, signs, and architecture. New York: McGraw-Hill.

Attia, A.S., 2021. ‘Traditional Islamic house (Ottoman house) architecture in old Fatimid Cairo and Rosetta cities, Egypt – an example of sustainable architecture’, International Journal of Sustainable Development and Planning, 16(8), pp. 1509–1517.

Azab, N., 2018. ‘Gated communities; images of sustainability: Al-Rehab and Madinaty’, MSc thesis, Cairo University.

Bae, C.-H.C., 2002. ‘Orenco Station, Portland: a new paradigm for transit-oriented development?’, Journal of the American Planning Association, 68(4), pp. 314–320.

Banister, D., 2008. ‘The sustainable mobility paradigm’, Transportation Policy, 15(1), pp. 73–80.

Banister, D., 2011. ‘The trilogy of distance, speed and time’, Journal of Transport Geography, 19(4), pp. 950–959.

Batty, M., 2005. *Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals*. Cambridge, MA: MIT Press.

Banzhaf, S., Ma, L. and Timmins, C., 2019. ‘Environmental justice: the economics of race, place, and pollution’, Journal of Economic Perspectives, 33(1), pp. 185–208.

Barns, S., 2020. *Platform Urbanism: Negotiating Platform Ecosystems in Connected Cities*. Singapore: Palgrave Macmillan. doi:10.1007/978-981-32-9725-8.

Basiri, A. et al., 2016. Quality assessment of OpenStreetMap data using trajectory mining. doi:10.1080/10095020.2016.1151213.

Bazeley, P. and Jackson, K., 2013. *Qualitative Data Analysis with NVivo*. 2nd ed. London: SAGE.

Behrens-Abouseif, D., 1989. Islamic Architecture in Cairo: An Introduction. Leiden and New York: E.J. Brill. (Muqarnas Supplements, 3).

Benedict, M. and MacMahon, E., 2002. 'Green infrastructure: smart conservation for the 21st century', Renewable Resources Journal, 20(3), pp. 12–17.

Berger, R., 2015. 'Now I see it, now I don't: researcher's position and reflexivity in qualitative research', *Qualitative Research*, 15(2), pp. 219–234. doi:10.1177/1468794112468475.

Berry, B.J.L., 1967. *Geography of Market Centres and Retail Distribution*. Englewood Cliffs, NJ: Prentice-Hall.

Biraghi, C.A., Ogut, O., Dong, T. and Tadi, M., 2025. CityTime: a novel model to redefine the 15-Minute city globally through urban diversity and proximity. *Urban science*, *9*(2), p.36.Black, W.R., 2010. Sustainable Transportation: Problems and Solutions. New York: Guilford Press.

Bodenhamer, D.J., Corrigan, J. and Harris, T.M. (eds.), 2010. *Deep Maps and Spatial Narratives*. Bloomington, IN: Indiana University Press.

Bodenhamer, D.J., Corrigan, J. and Harris, T.M. eds., 2021. *Making deep maps: Foundations, approaches, and methods*. Routledge.

Boeing, G., 2017. 'OSMnx: New methods for acquiring, constructing, analyzing, and visualizing complex street networks', Computers, Environment and Urban Systems, 65, pp. 126–139. doi: 10.1016/j.compenvurbsys.2017.05.004.

Bolleter, J. and Cameron, R., 2021. 'A critical landscape and urban design analysis of Egypt's new Administrative Capital City', Journal of Landscape Architecture, 16(1), pp. 8–19.

Bonfantini, G.B., Galimberti, B. and Ventura, E., 2025. There Are No ‘Solutions’ in Urban Planning: Against the Idea of a Ready-Made Urbanism and the 15-Minute City’s Uncritical Branding. Land, 14(10), p.2090.

Brockington, D. and Sullivan, S., 2003. ‘Qualitative research’, in Scheyvens, R. and Storey, D. (eds) Development Fieldwork: A Practical Guide. London: Sage, pp. 57–74.

Bruno, M., Melo, H.P., Campanelli, B. and Loreto, V., 2024. ‘A universal framework for inclusive 15-minute cities’, Nature Cities (preprint on arXiv).

Buder, S., 1990. Visionaries and Planners: The Garden City Movement and the Modern Community. New York: Oxford University Press.

Brenner, N. and Elden, S., 2009. ‘Henri Lefebvre on state, space, territory’, International Political Sociology, 3(4), pp. 353–377.

Brenner, N. and Schmid, C., 2011. ‘Planetary urbanisation’, in Gandy, M. (ed.) Urban Constellations. Berlin: Jovis, pp. 10–13.

Brenner, N. and Schmid, C., 2015. ‘Towards a new epistemology of the urban?’, City, 19(2–3), pp. 151–182.

Brown, C., Noulas, A., Mascolo, C. and Blondel, V.D., 2013. ‘A place-focused model for social networks in cities’, in *2013 International Conference on Social Computing (SocialCom)*. pp. 75–80. doi: 10.1109/SocialCom.2013.18.

Burke, M., Alomà, D., Yu, Y. and Kruguer, J., 2022. ‘A geospatial analysis framework for evaluating urban design typologies in relation with the 15-minute city standards’, *Journal of Business Research*, 151, pp. 651–667. doi: 10.1016/j.jbusres.2022.06.024.

Button, K., 1993. Transport, the Environment and Economic Policy. Cheltenham: Edward Elgar.

C40 Cities, 2020. ‘How to build back better with a 15-minute city’, C40 Knowledge Hub, July.

C40 Knowledge Hub, 2020. ‘Why a “just transition” is essential for advancing ambitious city climate action’, C40 Cities, October.

Cacopardo, C., 2022. ‘Climate change and the 15-minute city concept’, Times of Malta, 21 April.

Cairo Bike, 2023. Cairo Bike: Bike-sharing for a Sustainable City. Available at: https://www.cairobike.com

Calafiore, A., Dunning, R. and Nurse, A., 2022. ‘The 20-minute city: an equity analysis of Liverpool City Region’, Transportation Research Part D, 102, 103111.

Campisi, T. and Di Ruocco, I., 2025. ‘Accessibility and spatial location of parcel lockers in last-mile delivery: a literature review’, *The Open Transportation Journal*, 19, e26671212391037. doi:10.2174/0126671212391037250827100344.

Camporeale, R., Caggiani, L., Fonzone, A. and Ottomanelli, M., 2016. ‘Better for everyone: an approach to multimodal network design considering equity’, Transportation Research Procedia, 19, pp. 303–315.

Caniggia, G. and Maffei, G.L., 2001. *Architectural Composition and Building Typology: Interpreting Basic Building*. Florence: Alinea.

Carter, E., 1931. ‘The Garden City and the growth of cities’, Economic Geography, 7(2), pp. 130–142.

Carvalho, T., Farber, S., Manaugh, K. and El-Geneidy, A., 2025. ‘Assessing the readiness for 15-minute cities: a literature review on performance metrics and implementation challenges worldwide’, *Transport Reviews*, 45(5), pp. 801–827. doi:10.1080/01441647.2025.2513530.

Carvalho, T., Farber, S., Manaugh, K. and El-Geneidy, A., 2025. ‘Assessing the readiness for 15-minute cities: a literature review on performance metrics and implementation challenges worldwide’, *Transport Reviews*, 45(5), pp. 801–827. doi:10.1080/01441647.2025.2513530.

Casarin, G., MacLeavy, J. and Manley, D., 2023. ‘Rethinking urban utopianism: the fallacy of social mix in the 15-minute city’, Urban Studies, 60(16), pp. 3167–3186.

Clapson, M., 2017. *The Routledge Companion to Garden Cities*. London: Routledge.

Chaire ETI, 2019. Ville du ¼ d'heure, Territoire de la ½ heure. In: Le Livre Blanc: Transitions urbaines et territoriales.

Chaire ETI, 2020. La ville du ¼ d'heure, du concept à la mise en oeuvre. Livre Blanc n°2, IAE Paris – Université Paris 1 Panthéon-Sorbonne.

Charmes, É. and Rousseau, M., 2022. 'IT'S THE GEOGRAPHY, STUPID! Planetary urbanisation revealed', in Sugrue, T.J. and Zaloom, C. (eds) The Long Year: A 2020 Reader. New York: Columbia University Press, pp. 23–40.

Chau, H.-W., Gilzean, I., Jamei, E. and Palmer, L., 2022. 'Comparative analysis of 20-minute neighbourhood policies and practices in Melbourne and Scotland', Urban Planning, 7(4), pp. 13–24.

Chen, L., Liu, X., Sun, T., Ma, N. and Zhang, T., 2025. 'Compact urban morphology and the 15-minute city: Evidence from China', *Transportation Research Part A: Policy and Practice*, 196, 104482. doi: 10.1016/j.tra.2025.104482.

Cherif, R. and Wahdan, D., 2023. Gendered mobility in Greater Cairo Region: a spatial analysis of safety perceptions and behavioural differences in Giza mass transit nodes. Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 18(4), pp.668-691.

Chiaradia, F., Lelo, K., Monni, S. & Tomassi, F., 2024. The 15-minute city: An attempt to measure proximity to urban services in Rome. Sustainability, 16(21), p.9432. doi:10.3390/su16219432.

Christaller, W., 1933. Die zentralen Orte in Süddeutschland. Jena: Gustav Fischer. (English translation: Central Places in Southern Germany, 1966. Englewood Cliffs, NJ: Prentice Hall.)

Chow, A., 2022. 'Time to think 15-minute cities for health and equity', National Collaborating Centre for Environmental Health (NCCEH) blog, 14 February.

City Population, 2023. Egypt: Al-Jīzah (Giza) Governorate.

City Population, 2023. Egypt: Al-Qāhirah (Cairo) Governorate.

City Population, 2023. Egypt: Al-Qāhirah al-Jadīdah (New Cairo).

Clark, B.E., 2021. ‘Enabling density’, On Common Ground. National Association of Realtors, Washington, DC.

Climatalk, 2021. ‘Introducing the 15-minute city concept – moving towards sustainable living’, Climatalk, 17 April.

Coates, G.J., 2013. ‘The sustainable urban district of Vauban in Freiburg, Germany’, *International Journal of Design & Nature and Ecodynamics*, 8(4), pp. 265–286.

Congress for the New Urbanism, 1996. *Charter of the New Urbanism*. New York: McGraw-Hill.

Council of the European Union, 2006. Review of the EU Sustainable Development Strategy (EU SDS) – Renewed Strategy, 10917/06. Brussels.

Crawford, M., 1992. ‘The world in a shopping mall’, in Sorkin, M. (ed.) *Variations on a Theme Park: The New American City and the End of Public Space*. New York: Hill and Wang, pp. 3–30.

Cresswell, T., 2010. ‘Towards a politics of mobility’, Environment and Planning D: Society and Space, 28(1), pp. 17–31. doi:10.1068/d11407.

Cugurullo, F., 2021. *Frankenstein Urbanism: Eco, Smart and Autonomous Cities, Artificial Intelligence and the End of the City*. London: Routledge.

Cullen, G., 1961. The Concise Townscape. London: The Architectural Press.

Curtis, S.K. and Mont, O., 2020. ‘Towards a prescriptive framework of sharing platform models’, paper presented at *The 4th International Conference on New Business Models*, Berlin, Germany, 1–3 July.

Cuthbertson, G., 1979. ‘A new town at Uitvlugt: the founding and development of Pinelands 1919–1948’, New Contree, 6, pp. 5–11.

Daher, M., 2011. ‘Modern Egypt through Japanese Eyes: a study on intellectual and socio-economic aspects of Egyptian nationalism’, review of E. Nagasawa, International Journal of Asian Studies, 8(1), pp. 122–124.

Das, H.S., Rahman, M.M., Li, S. and Tan, C.W., 2020. ‘Electric vehicles standards, charging infrastructure, and impact on grid integration: a technological review’, Renewable and Sustainable Energy Reviews, 120, 109618.

Davis, A. and Wagner, B., 2024. ‘Understanding the role of “sense of place” in the production and consumption of innovation districts’, *Innovation: Organization & Management*.

Degen, M. and Rose, G., 2012. ‘The sensory experiencing of urban design: the role of walking and perceptual memory’, Urban Studies, 49(15), pp. 3271–3287.

Delaleu, A., 2020. ‘La ville du quart d’heure: utopie? fantasme? écran de fumée?’, Chroniques d’architecture, 25 August.

Denis, E., 2009. ‘Cairo as neoliberal capital?’, Papa Sartre, p. 47.

Descant, S., 2021. ‘Equitable urban planning may mean ditching the 15-minute city concept’, Government Technology, 9 March.

Dolowitz, D.P. and Marsh, D., 2000. ‘Learning from abroad: The role of policy transfer in contemporary policy-making’, *Governance*, 13(1), pp. 5–23.

Dominczak, M., 2021. ‘Ideological identity of New Urbanism’, Architectus, 2(66), pp. 59–66.

Doxiadis, C.A., 1968. *Ekistics: An Introduction to the Science of Human Settlements*. New York: Oxford University Press.

Duany, A., Plater-Zyberk, E. and Speck, J., 2000. Suburban Nation: The Rise of Sprawl and the Decline of the American Dream. New York: North Point Press.

Duany, A.R.S. and Steuteville, R., 2021. ‘Defining the 15-minute city concept’, Public Square, Congress for the New Urbanism, 8 February.

Dublin City Council, 2022. Dublin City Development Plan 2022–2028. Dublin: Dublin City Council.

Dunning, R., Calafiore, A. and Nurse, A., 2021. ‘20-minute neighbourhood or 15-minute city?’, Town and Country Planning.

Dún Laoghaire–Rathdown County Council, 2018. Cherrywood Access and Movement Strategy. Dún Laoghaire–Rathdown County Council.

Dún Laoghaire–Rathdown County Council, 2014. Cherrywood Strategic Development Zone Planning Scheme. Dún Laoghaire–Rathdown County Council.

Duranton, G. and Puga, D., 2020. 'The economics of urban density', in Duranton, G., Henderson, V. and Strange, W.C. (eds) Handbook of Regional and Urban Economics, Vol. 5B. Amsterdam: Elsevier, pp. 1455–1519.

D/O Architects, 2025. Layered City. [online] Available at: https://www.do-architects.com/portfolio-work/layered-city [Accessed 31 December 2025].

Edeisy, M., 2020. 'Environmental analysis of the residential sector in Cairo', in Shaping Urban Change – Livable City Regions for the 21st Century, REAL CORP 2020 Proceedings, pp. 261–272.

Edwards, S. et al., 2018. 'Quantifying the impact of a real-world cooperative ITS deployment across multiple cities', Transportation Research Part A, 115, pp. 102–113.

Elazzazy, M., 2019. The Garden Suburbs of Cairo: A Morphological Urban Analysis of Zamālik, Maʿādī and Heliopolis. PhD thesis, Bauhaus-Universität Weimar.

Elfadaly, A. and Lasaponara, R., 2019. 'On the use of satellite imagery and GIS tools to detect and characterize the urbanisation around heritage sites: the case studies of the Catacombs of Mustafa Kamel in Alexandria, Egypt and the Aragonese Castle in Baia, Italy', Sustainability, 11(7), 2110.

El-Husseiny, M., 2015. Urban Transformation in Cairo's Suburbs. PhD thesis.

El-Husseiny, M., 2022. 'Spaces of the maybe: fragments as new urban possibilities in Cairo's extended urbanisation', Journal of Urbanism: International Research on Placemaking and Urban Sustainability, pp. 1–21.

El-Husseiny, M., 2024. 'Urbanizing dreams: the struggles of attaining "new" social contracts for the middle and upper-middle classes at Cairo's desert edge', in Amar, P. (ed.) Cairo Securitized: Reconceiving Urban Justice and Social Resilience. Cairo: AUC Press, pp. 191–204.

El-Malt, A., Attia, S. and Khalil, H.A., 2017. ‘Investigating the evolution of informal urban pockets in Greater Cairo Region’.

Elmazzahi, D. and Shawkat, Y., 2024. ‘(Re)defining the Greater Cairo Region’, Marsad Omran, 23 April.

Elshater, A., 2016. ‘The ten-minute neighbourhood is [not] a basic planning unit for happiness in Egypt’, Archnet-IJAR, 10(1), pp. 344–359.

Elsheshtawy, Y., 2013. ‘City interrupted: modernity and architecture in Nasser’s post-1952 Cairo’, Planning Perspectives, 28(3), pp. 347–371.

European Commission, 1992. Green Paper on the Impact of Transport on the Environment: A Community Strategy for ‘Sustainable Mobility’. Brussels: Commission of the European Communities.

European Commission, 2021. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: New European Bauhaus—Beautiful, Sustainable, Together. COM(2021) 573 final. Brussels: European Commission, 15 September.

Ewing, R. and Handy, S., 2009. ‘Measuring the unmeasurable: Urban design qualities related to walkability’, Journal of Urban Design, 14(1), pp. 65–84.

Fahmi, W. and Sutton, K., 2008. Greater Cairo’s housing crisis: Contested spaces from inner city areas to new communities. *Cities*, *25*(5), pp.277-297.

Fainstein, S.S., 2010. *The Just City*. Ithaca, NY: Cornell University Press.

Flick, U., 2004. ‘Triangulation in qualitative research’, in Flick, U., von Kardorff, E. and Steinke, I. (eds.) *A Companion to Qualitative Research*. London: SAGE, pp. 178–183.

Florida, R., 2003. ‘Cities and the creative class’, City and Community, 2(1), pp. 3–19.

Florida, R., Moreno, C., Khan, J.S. and Murphy, P., 2020. ‘The rise of the 15-minute neighbourhood’ [webinar], 20 November.

Ford, L.R., 1999. ‘Lynch revisited: New Urbanism and theories of good city form’, Cities, 16(4), pp. 247–257.

Fenster, T., 2005. ‘The right to the gendered city: Different formations of belonging in everyday life’, Journal of Gender Studies, 14(3), pp. 217–231.

Fulton, W., 1996. The New Urbanism: Hope or Hype for American Communities? Cambridge, MA: Lincoln Institute of Land Policy.

Gaglione, F., Gargiulo, C., Zucaro, F. and Cottrill, C., 2021. ‘15-minute neighbourhood accessibility: a comparison between Naples and London’, in European Transport Conference proceedings.

Gallo, M. and Marinelli, M., 2020. ‘Sustainable mobility: a review of possible actions and policies’, Sustainability, 12(18), 7499.

Garden Cities NPC, 2019. Garden Cities Centenary Book. Cape Town: Garden Cities.

Garde, A., 2020. ‘New Urbanism: past, present, and future’, Urban Planning, 5(4), pp. 453–463.

Geertz, C., 1973. *The Interpretation of Cultures: Selected Essays*. New York: Basic Books.

Gehl, J., 2010. Cities for People. Washington, DC: Island Press.

Gehl, J. et al., 2020. ‘The “15-minute city”: why shouldn’t all you need be near where you live?’ [webinar], Tortoise Media, 19 November.

General Organisation for Physical Planning (GOPP), 2014. Egypt National Strategy for Sustainable Development 2052.

Gerring, J., 2008. ‘Case selection for case-study analysis: qualitative and quantitative techniques’, in Box-Steffensmeier, J., Brady, H. and Collier, D. (eds) The Oxford Handbook of Political Methodology. Oxford: Oxford University Press.

Geurs, K.T. and van Wee, B., 2004. ‘Accessibility evaluation of land-use and transport strategies: Review and research direwctions’, *Journal of Transport Geography*, 12(2), pp. 127–140. doi: 10.1016/j.jtrangeo.2003.10.005.

Glaeser, E., 2021. ‘The 15-minute city concept is a dead end — cities must be places of opportunities for everyone’, LSE COVID-19 blog, 28 May.

Gold, J.R., 1998. ‘Creating the Charter of Athens: CIAM and the Functional City, 1933–43’, *The Town Planning Review*, 69(3), pp. 225–247

Gota, S. et al., 2019. ‘Decarbonising transport to achieve Paris Agreement targets’, Energy Efficiency, 12(2), pp. 363–376.

Gower, A. and Grodach, C., 2022. ‘Planning innovation or city branding? Exploring how cities operationalise the 20-minute neighbourhood concept’, Urban Policy and Research, 40(1), pp. 36–52.

Grant, J., 2006. Planning the Good Community: New Urbanism in Theory and Practice. London: Routledge.

Graystone, M., Mitra, R. and Hess, P.M., 2022. ‘Gendered perceptions of cycling safety and on-street bicycle infrastructure: bridging the gap’, *Transportation Research Part D: Transport and Environment*, 105, p.103237. doi:10.1016/j.trd.2022.103237.

Growing Up Boulder, 2017. 15-Minute Neighbourhoods. growingupboulder.org.

Guest, G., MacQueen, K.M. and Namey, E.E., 2012. Applied Thematic Analysis. Thousand Oaks, CA: SAGE Publications.

Hakim, B.S., 1986. Arabic-Islamic Cities: Building and Planning Principles. London: KPI.

Haarstad, H., Kjærås, K., Røe, P.G. and Tveiten, K., 2022. ‘Diversifying the compact city: a renewed agenda for geographical research’, Dialogues in Human Geography.

Hall, P., 2002. Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century. 3rd edn. Oxford: Blackwell.

Hall, P. and Pain, K., 2006. The Polycentric Metropolis: Learning from Mega-City Regions in Europe. London: Earthscan.

Handy, S., 2022. ‘Bicycles will save the world’ [seminar], Trinity College Dublin, 2 September.

Han, H., 2017. ‘Singapore, a garden city: authoritarian environmentalism in a developmental state’, Journal of Environment and Development, 26(1), pp. 3–24.

Hasselwander, M., et al., 2024. ‘Local super apps in the 15-minute city: a new model for sustainable smart cities’, *Frontiers in Sustainable Cities*, 6, Article 1404105.

Harvey, D., 2014. ‘Cities or urbanisation?’, in Brenner, N. (ed.) Implosions/Explosions: Towards a Study of Planetary Urbanisation. Berlin: Jovis, pp. 52–66.

Herriges, D., 2019. ‘7 rules for creating “15-minute neighbourhoods”’, Strong Towns, 6 September.

Heffron, R.J. and McCauley, D., 2017. ‘The concept of energy justice across the disciplines’, Energy Policy, 105, pp. 658–667.

Heffron, R.J. and McCauley, D., 2018. ‘What is the “just transition”?’, Geoforum, 88, pp. 74–77.

Heffron, R., 2022. ‘Applying energy justice into the energy transition’, Renewable and Sustainable Energy Reviews, 156, 111936.

Hillier, B. and Hanson, J., 1984. The social logic of space. Cambridge: Cambridge University Press.

Hillier, B., Penn, A., Hanson, J., Grajewski, T. and Xu, J., 1993. ‘Natural movement: or, configuration and attraction in urban pedestrian movement’, *Environment and Planning B: Planning and Design*, 20(1), pp. 29–66.

Hinds, J. and Whittington, T., 2021. ‘The new localism and the 15-minute city concept’, in Re:Imagining Retail, Savills.

Holden, E., 2007. Achieving Sustainable Mobility: Everyday and Leisure-Time Travel in the EU. Aldershot: Ashgate.

Holden, E. et al., 2017. The Imperatives of Sustainable Development: Needs, Equity, Limits. Abingdon: Routledge.

Holden, E. et al., 2020. ‘Grand narratives for sustainable mobility: a conceptual review’, Energy Research and Social Science, 65, 101454.

Horizon Europe, 2020. Proposal for the European Partnership ‘Driving Urban Transitions’. European Commission.

Howard, E., 1902. Garden Cities of To-morrow. London: Faber and Faber.

Hughes, S. and Hoffmann, M., 2020. ‘Just urban transitions: toward a research agenda’, WIREs Climate Change, 11(3), e640.

Huskinson, M., Bernabeu-Bautista, Á. and Serrano-Estrada, L., 2025. Mapping caregiving support places: developing a taxonomy for sustainable and inclusive cities. Journal of sustainability research, 7(3).

Hussein, F., 2020. ‘Memory for social sustainability: recalling cultural memories in Zanqit Alsitat historical street market, Alexandria, Egypt’, Sustainability, 12(19), 8141.

Hyra, D., 2015. ‘The back-to-the-city movement: neighbourhood redevelopment and processes of political and cultural displacement’, Urban Studies, 52(10), pp. 1753–1773.

Iqbal, A., Nazir, H. and Qazi, A.W., 2025. ‘Exploring the 15-minutes city concept: global challenges and opportunities in diverse urban contexts’, Urban Science, 9(7), 252.

Inturri, G. et al., 2017. ‘Influence of accessibility, land use and transport policies on the transport energy dependence of a city’, Transportation Research Procedia, 25, pp. 3273–3285.

Intertraffic, 2021. ‘15-minute city: urban mobility solution to environment?’, Intertraffic, 9 March.

Isaac, C., 2024. ‘An integral sustainable design framework to evaluate transferability of the 15-minute city to developing cities: the case of Blantyre, Malawi’, in Battisti, A. et al. (eds) Greening Our Cities: Sustainable Urbanism for a Greener Future. Cham: Springer.

Istrate, A., 2025. ‘Street vitality: what predicts pedestrian flows and stationary activities on predominantly residential Chinese streets, at the mesoscale?’, *Journal of Planning Education and Research*, 45(1), pp. 66–80. doi:10.1177/0739456X231184607.

Jacobs, J., 1961. The Death and Life of Great American Cities. New York: Random House.

Jaad, A. and Abdelghany, K., 2021. ‘The story of five MENA cities: urban growth prediction modeling using remote sensing and video analytics’, Cities, 118, 103393.

Jain, M. and Korzhenevych, A., 2022. ‘The concept of planetary urbanisation applied to India’s rural to urban transformation’, Habitat International, 129, 102671.

Jazeel, T., 2012a. ‘Postcolonial spaces and identities’, Geography, 97(2), pp. 60–67.

Jazeel, T., 2012b. ‘Postcolonialism: Orientalism and the geographical imagination’, Geography, 97(1), pp. 4–11.

Jorgensen, B.S. and Stedman, R.C., 2001. ‘Sense of place as an attitude: Lakeshore owners’ attitudes toward their properties’, *Journal of Environmental Psychology*, 21(3), pp. 233–248.

Kadry, M.K. and Husain, H.R., 2025. ‘What do Egypt’s New Urban Communities need to outperform? A strategic framework for equitable population redistribution’, *Journal of Contemporary Urban Affairs*, 9(1), pp. 187–209. doi:10.25034/ijcua.2025.v9n1-10.

Kalia, R., 1999. Chandigarh: The Making of an Indian City. 2nd edn. New Delhi: Oxford University Press.

Kamal, R., Elsayed, N. and Gado, N., 2020. ‘Smart cities: sustainable and safety roads study model’, EAI Endorsed Transactions on Smart Cities, 4(12).

Karimi, K., 2012. ‘A configurational approach to analytical urban design: “Space syntax” methodology’, Urban Design International, 17, pp. 297–318. doi: 10.1057/udi.2012.19.

Karsten, L., 2003. ‘Family gentrifiers: challenging the city as a place simultaneously to build a career and to raise children’, *Urban Studies*, 40(12), pp. 2573–2584. doi:10.1080/0042098032000136228.

Katz, P., 1994. ‘Preface’, in Katz, P. (ed.) The New Urbanism: Toward an Architecture of Community. New York: McGraw-Hill, pp. ix–xviii.

Kavaratzis, M. and Ashworth, G.J., 2005. ‘City branding: an effective assertion of identity or a transitory marketing trick?’, *Tijdschrift voor Economische en Sociale Geografie*, 96(5), pp. 506–514. doi:10.1111/j.1467-9663.2005.00482.x.

Keller, T. and Polach, T., 2010. Mohandessin. ETH Studio Basel.

Keil, R., 2018. ‘After suburbia: research and action in the suburban century’, Urban Geography, 41(1), pp. 1–20.

Keil, R., 2020. ‘The density dilemma: there is always too much and too little of it’, Urban Geography, 41(9), pp. 1253–1257.

Keil, R. and Üçoğlu, M., 2021. ‘Beyond sprawl? Regulating growth in Southern Ontario’, in Keil, R. and Üçoğlu, M. (eds) Suburban Planet: Making the World Urban from the Outside In. Cambridge: Polity Press, pp. 181–200.

Kern, L., 2021. Feminist city: Claiming space in a man-made world. London: Verso.

Khademi, N., Naeinizadeh, M., Firoozi Yeganeh, S., Behmanesh, A., Ekramifard, A., Chaiyasarn, K., Zheng, Z., Arbabpour Bidgoli, M., Azarmi, H., Tarvirdizadeh, B. and Hadi, A., 2024. ‘Building a less intimidating cycling environment for women: a structural equation modeling analysis based on a VR-based laboratory experiment’, *Transportation Research Part F: Traffic Psychology and Behaviour*, 100, pp. 431–457. doi:10.1016/j.trf.2023.12.001.

Khan, D. and Karak, A., 2019. ‘Urban development by dispossession: Planetary urbanization and primitive accumulation’, *Studies in Political Economy*, 99(3), pp. 307–330.

Khavarian-Garmsir, A.R. et al., 2023. ‘From garden city to 15-minute city: a historical perspective and critical assessment’, Land, 12(2), 512.

Khavarian-Garmsir, A.R., Sharifi, A. and Sadeghi, A., 2023. ‘The 15-minute city: urban planning and design efforts toward creating sustainable neighbourhoods’, Cities, 132, 104094.

Kern, L., 2020. *Feminist City: Claiming Space in a Man-Made World*. London: Verso.

Kim, A.M., 2015. Sidewalk City: Remapping Public Space in Ho Chi Minh City. Chicago: University of Chicago Press.

King, A.D., 1990. *Urbanism, Colonialism, and the World-Economy: Cultural and Spatial Foundations of the World Urban System*. London: Routledge.

Kissfazekas, K., 2022. ‘Circle of paradigms? Or “15-minute” neighbourhoods from the 1950s’, *Cities*, 126, 103715.

Kitchin, R., 2015. ‘Making sense of smart cities: addressing present shortcomings’, *Cambridge Journal of Regions, Economy and Society*, 8(1), pp. 131–136. doi:10.1093/cjres/rsu027.

Kjærås, K., 2021. ‘Towards a relational conception of the compact city’, Urban Studies, 58(6), pp. 1176–1192.

Klinenberg, E., 2018. *Palaces for the People: How Social Infrastructure Can Help Fight Inequality, Polarization, and the Decline of Civic Life*. New York: Crown.

Klinsky, S. and Mavrogianni, A., 2020. ‘Climate justice and the built environment’, Buildings and Cities, 1(1), pp. 412–428.

Kugler, N.R. and Sariego, P.M., 2016. ‘Climate change damages: conceptualization of a legal notion with regard to reparation under international law’, Climate Risk Management, 13, pp. 103–111.

Kucharek, J.-C., 2021. ‘Carlos Moreno: 15 minutes to save the world’, RIBA Journal, 16 December.

Kwan, M.-P., 1999. ‘Gender, the home–work link, and space–time patterns of nonemployment activities’, Economic Geography, 75(4), pp. 370–394.

Lawton, P., 2020. Unbounding gentrification theory: Multidimensional space, networks and relational approaches. *Regional Studies*, *54*(2), pp.268-279.

Lawton, P. and Kayanan, C.M., 2023. ‘From edge city to city edge’, Built Environment, 49(1), pp. 58–74.

Lawton, P., 2026. Shifting Ideals of the Liveable City: From the ‘creative class’ to the ‘15-Minute City’. *Cities*, *170*, p.106598.

Letnik, T., Sagdic, M., Roso, V., Tavasszy, L. and Luppino, G., 2018. ‘Review of policies and measures for sustainable and energy efficient urban freight transport’, *Energy*, 163, pp. 245–257.

Lewicka, M., 2011. ‘Place attachment: How far have we come in the last 40 years?’, *Journal of Environmental Psychology*, 31(3), pp. 207–230.

Le Corbusier, 1935. La Ville Radieuse. Paris: Flammarion.

Lennon, M., 2021. ‘Green space and the compact city: planning issues for a “new normal”’, Cities and Health, 5(1), pp. 212–215.

Li, Z., Zheng, J. and Zhang, Y., 2019. ‘Study on the layout of 15-minute community-life circle in third-tier cities based on POI: Baoding City of Hebei Province’, Engineering, 11, pp. 592–603.

Libchaber, B., 2019. Building from Scratch: Egypt’s New Cities from the Colonial Era to the Present. BA thesis, McGill University.

Lieberman, B., 2019. ‘A brief introduction to climate change and transportation’, Yale Climate Connections, 22 September.

Litman, T. and Burwell, D., 2006. ‘Issues in sustainable transportation’, International Journal of Global Environmental Issues, 6(4), pp. 331–347.

Litman, T. and Brenman, M.A., 2016. ‘New social equity agenda for sustainable transportation’, paper presented at the Transportation Research Board Annual Meeting, Washington, DC.

Lucas, K., 2012. ‘Transport and social exclusion: Where are we now?’, *Transport Policy*, 20, pp. 105–113.

Liu, J., 2012. The New Urbanism as a theory and its contemporary application in China----Redesign a residential project in Beijing. MSc thesis. Blekinge Institute of Technology, School of Planning and Media Design.

Lui, B., 2021. ‘The “15-minute city” model: encouraging sustainable cities’, Earth.org, 10 February.

Luscher, D., 2020. ‘Introducing the 15-minute city concept project’, Medium, 17 June.

Lynch, K., 1960. The Image of the City. Cambridge, MA: MIT Press.

Macedo, A.C., 2016. ‘Learning from Seaside’s master plan’, Journal of Engineering and Architecture, 4(2), pp. 148–159.

Mahmoudpour, A. and Shirazi, M.R., 2026. ‘Critical debates on the 15-minute city: a systematic content analysis of the literature’, *Cities*, 169, p.106576. doi:10.1016/j.cities.2025.106576.

Mahmoud, R.A. and Rashed, R., 2016. ‘New Cairo’s urban paradox: all-inclusive urbanism vs. social exclusion’, in SBE16-Cairo Proceedings, pp. 96–109.

Malanga, S., 2004. ‘The curse of the creative class’, City Journal, pp. 36–45.

Marafi, S., 2011. ‘The neoliberal dream of segregation: rethinking gated communities in Greater Cairo’, case study of Al-Rehab City.

Mattioli, G., 2017. ‘“Forced Car Ownership” in the UK and Germany: socio-spatial patterns and potential economic stress impacts’, *Social Inclusion*, 5(4), pp. 147–160. doi:10.17645/si.v5i4.1081.

Massey, D., 2005. For Space. London: Sage.

McCann, E. and Ward, K., 2013. ‘A multi-disciplinary approach to policy transfer research: Geographies, assemblages, mobilities and mutations’, *Policy Studies*, 34(1), pp. 2–18.

Megahed, G., Elshater, A., Afifi, S. & Elrefaie, M.A., 2024. Reconceptualizing proximity measurement approaches through the urban discourse on the X-minute city. Sustainability, 16(3), p.1303. https://doi.org/10.3390/su16031303.

Megahed, N.A., Elshater, A., Elrefaie, A. and Afifi, S., 2025. ‘Chrono-Urbanism and liveable urban forms: A morphological analysis of alternative x-minute city models in Rosetta City, Egypt’, *Cities*, 167, 106313. doi: 10.1016/j.cities.2025.106313.

Meerow, S. and Newell, J.P., 2019. ‘Urban resilience for whom, what, when, where, and why?’, Urban Geography, 40(3), pp. 309–329. doi: 10.1080/02723638.2016.1206395.

Merrifield, A., 2013. *The Politics of the Encounter: Urban Theory and Protest under Planetary Urbanisation*. Athens, GA: University of Georgia Press.

Ministry of Communications and Information Technology (MCIT), 2025. Digital Egypt. Ministry of Communications and Information Technology. Cairo.

Ministry of Planning, Economic Development and International Cooperation (MPEDIC), 2016. Egypt's Vision 2030. Cairo.

Ministry of Transport, 2012. Misr National Transport Study (MiNTS): Master Plan for Nationwide Transport System in Egypt.

Mitchell, T., 2002. Rule of Experts: Egypt, Techno-Politics, Modernity. Berkeley: University of California Press.

Mocák, P. et al., 2022. '15-minute city concept as a sustainable urban development alternative: a brief outline of conceptual frameworks and Slovak cities as a case', Folia Geographica, 64(1), pp. 69–89.

Moeller, N., 2016. *The Archaeology of Urbanism in Ancient Egypt: From the Predynastic Period to the End of the Middle Kingdom*. Cambridge: Cambridge University Press.

Mohamed, A.N., El Mokadem, A., Ali, S.M. and Badawy, N.M., 2024. 'Modifying the walk score based on daily social activities: residential neighbourhood in Egypt as a case study', *City, Territory and Architecture*, 11, p.2. doi:10.1186/s40410-023-00218-0.

Monteiro, C. and Pinho, P., 2022. 'Comparing approaches in urban morphology', *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, 15(4), pp. 491–518. doi: 10.1080/17549175.2021.1936602.

Moreno, C., 2016. 'Ville du quart d'heure: pour un nouveau chrono-urbanisme', La Tribune, 5 October.

Moreno, C., 2020. Vie urbaine et proximité à l'heure du COVID-19. Paris: Éditions de l'Observatoire.

Moreno, C., 2021. 'Living in proximity in a living city', Glocalism: Journal of Culture, Politics and Innovation, 3.

Moreno, C., 2021. 'The 15-minute city' [TED talk], 25 January.

Moreno, C. et al., 2021. ‘Introducing the “15-minute city”: sustainability, resilience and place identity in future post-pandemic cities’, Smart Cities, 4(1), pp. 93–111.

Moreno, C., Missika, J. and Burdett, R., 2022. ‘The 15-minute city concept: a new urban model’ [webinar], LSE Cities, 26 April.

Moreno, C. and Veltz, P., 2022. ‘The “15-minute city”: the way forward or an ideological mirage?’, Mobile Lives Forum, 11 April.

Morris, H. and Windle, C., 2021. ‘The 15-minute city concept’, in On Common Ground. National Association of Realtors.

Mooney, J., 2021. ‘Transportation in the 15-minute city concept: making pedestrians the priority’, in On Common Ground. National Association of Realtors.

Mourad, M., 2018. ‘Urban space and politics of transition in contemporary Cairo’, MA thesis.

Murshed, S.M.A., 2022. ‘A community character approach to place-making in public spaces’, doctoral dissertation, Misr International University.

Muslim, N.H. et al., 2018. ‘Green driver: travel behaviours revisited on fuel saving and less emission’, Sustainability, 10(2), 325.

Mueller Redevelopment Office, 2019. Mueller: Community Profile and Design Principles. City of Austin.

Murray, M.J., 2013. ‘The quandary of post-public space: New Urbanism, Melrose Arch and the rebuilding of Johannesburg after apartheid’, Journal of Urban Design, 18(1), pp. 119–144.

Mwasalat Misr, 2023. Mwasalat Misr: Public Transport in Cairo.

Myers, G., 2011. *African Cities: Alternative Visions of Urban Theory and Practice*. London: Zed Books.

Næss, P., 2015. ‘Critical realism, urban planning and urban research’, European Planning Studies, 23(6).

Nasar, J.L., 1998. The evaluative image of the city. Thousand Oaks, CA: Sage Publications.

National Population Council, 2023. National Population and Development Strategy 2023–2030.

Neuman, M., 2005. ‘The compact city fallacy’, *Journal of Planning Education and Research*, 25(1), pp. 11–26.

Nieuwenhuijsen, M., 2021. ‘New urban models for more sustainable, liveable and healthier cities post-COVID-19’, Environment International, 157, 106850.

Njoh, A.J., 2009. ‘Celebration, Florida’, case study for UN-Habitat Global Report on Human Settlements.

NUCA, 2023. New Cairo. New Urban Communities Authority.

OECD, 2025. Five years of the OECD Principles on Urban Policy. OECD Regional Development Papers, No. 169. Paris: OECD Publishing. doi:10.1787/e1104359-en (Accessed: 3 January 2026).

Oldenburg, R., 1999. *The Great Good Place: Cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*. Rev. edn. New York: Marlowe & Company.

Omar, M. et al., 2025. ‘Adapting the 15-minute city model in Cairo: mobility challenges and opportunities’, Journal of Architecture and Urbanism, 49(1), pp. 72–86.

Orenco Station case studies, various years. Urban Land Institute/Congress for the New Urbanism reports on TOD and New Urbanism at Orenco Station.

Osborn, F.J. and Whittick, A., 1963. The New Towns: The Answer to Megalopolis. New York: McGraw-Hill.

O’Sullivan, F. and Bliss, L., 2020. ‘The 15-minute city — no cars required — is urban planning’s new utopia’, Bloomberg CityLab, 12 November.

Palinkas, L.A. et al., 2015. ‘Purposeful sampling for qualitative data collection and analysis in mixed method implementation research’, Administration and Policy in Mental Health, 42, pp. 533–544.

Palm Hills Developments (PHD), 2017. Badyã | by Palm Hills Developments [video].

Palm Hills Developments (PHD), 2019. Badyã: A City of New Worlds [video].

Palm Hills Developments, 2022. Palm Hills Development Corporate Brochure.

PDP London, 2021. ‘Is the 15 minute city having its 15 minutes of fame, or is it here to stay?’, PDP London, 30 March.

Peck, J. and Theodore, N., 2015. *Fast Policy: Experimental Statecraft at the Thresholds of Neoliberalism*. Minneapolis, MN: University of Minnesota Press.

Pelteret, P., 2016. ‘The garden city of Pinelands, South Africa’, in regional planning histories.

Perkins, C., 2014. Plotting practices and politics: (Im)mutable narratives in OpenStreetMap. doi:10.1111/tran.12022

Perry, C.A., 1929. ‘The neighbourhood unit’, in Regional Survey of New York and Its Environs, Vol. VII: Neighbourhood and Community Planning. New York: Regional Plan of New York.

Perry, M., 2011. ‘Finding space for the creative class: a review of the issues’, Urban Policy and Research, 29(4), pp. 325–341.

Perfect Circle, 2021. ‘How 15-minute neighbourhoods are key to tackling the climate crisis’, 16 August.

Patel, J., 2023. ‘Assessing applicability of Kevin Lynch’s framework of *The Image of the City* in the case of the walled city of Jaipur’, *International Journal of Urban and Civil Engineering*, 17(3). (World Academy of Science, Engineering and Technology).

Peverini, M. and Chiaro, G., 2020. ‘Questioni di scala: l’illusione della città dei 15 minuti’, Arcipelago Milano, 26 November.

PHD and AS+P, 2018. Badyã – Project Presentation.

Pinto Coelho, L.X. et al., 2025. ‘Decolonizing urban planning research in the Global South: a call for shifting the gaze’, Journal of Planning Education and Research.

Pitter, J., 2021. ‘15-minute city: hope or hype?’ [conference session], Bloomberg CityLab.

Pivo, G., 1992. ‘How do you define community character?’, Small Town, 23(3), pp. 4–17.

Plaza-Herrera, D. et al., 2025. ‘Inclusive 15-minute cities: an age-sensitive assessment of active accessibility to essential services in the Metropolitan Area of Barcelona’, Cities.

Porta, S., Crucitti, P. and Latora, V., 2006. ‘The network analysis of urban streets: A primal approach’, Environment and Planning B: Planning and Design, 33(5), pp. 705–725.

Pozoukidou, G. and Chatziyiannaki, Z., 2021. ‘15-minute city: decomposing the new urban planning eutopia’, Sustainability, 13(2), 928.

Power, E.R. and Mee, K.J., 2020. ‘Housing: an infrastructure of care’, *Housing Studies*, 35(3), pp. 484–505. doi:10.1080/02673037.2019.1612038.

Presner, T., Shepard, D. and Kawano, Y., 2014. *HyperCities: Thick Mapping in the Digital Humanities*. Cambridge, MA: Harvard University Press.

Pucher, J. and Buehler, R., 2010. ‘Walking and cycling for healthy cities’, *Built Environment*, 36(4), pp. 391–414. doi:10.2148/benv.36.4.391.

Putnam, R.D., 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster.

Raafat, S.W., 1994. Maadi 1904–1962: Society and History in a Cairo Suburb. Cairo: Palm Press.

Rabbat, N., 2018. ‘The hidden hand: Edward Said’s Orientalism and architectural history’, Journal of the Society of Architectural Historians, 77(4), pp. 388–396.

Radics, M., Christidis, P., Alonso, B. & dell’Olio, L., 2024. The X Minute City: Analysing accessibility to essential daily destinations by active mobility in Seville. Land, 13(10), p.1656. doi:10.3390/land13101656.

Rainwater, B., 2021. ‘The 15-minute city can make urban living more sustainable—and inspire the suburbs’, Fast Company, 11 November.

Rashed, M., 2015. Architectural Identity in Contemporary Cairo. Master's thesis, Politecnico di Milano.

Ratti, C. and Florida, R., 2021. 'The 15-minute city concept meets human needs but leaves desires wanting: here's why', World Economic Forum Agenda, 11 November.

Relph, E., 1976. Place and Placelessness. London: Pion.

RiadArchitecture, 2023. 'Projects', Riad Architecture website.

Robinson, J., 2006. *Ordinary Cities: Between Modernity and Development*. London: Routledge.

Robinson, M. and Shine, T., 2018. 'Achieving a climate justice pathway to 1.5 °C', Nature Climate Change, 8, pp. 564–569.

Roulston, K. and Choi, M., 2018. 'Qualitative interviews', in The SAGE Handbook of Qualitative Data Collection, pp. 233–249.

Rowley, J., 2002. 'Using case studies in research', Management Research News, 25(1), pp. 16–27.

Roy, A., 2011. 'Conclusion: postcolonial urbanism: speed, hysteria, mass dreams', in Roy, A. and Ong, A. (eds) Worlding Cities.

Qiu, B., Song, P., Tao, X., Zhou, Q. and Zhang, F., 2025. 'Construction of urban collective memory maps based on social media data: a case study of Nanjing, China', *npj Heritage Science*, 13, 259. doi: 10.1038/s40494-025-01806-8.

Saadallah, D.M., 2020. 'Utilizing participatory mapping and PPGIS to examine the activities of local communities', *Alexandria Engineering Journal*, 59(1), pp. 263–274. doi: 10.1016/j.aej.2019.12.007.

Salma, L., 2022. Thesis/study on Madinaty and gated new towns in Greater Cairo.

Santos, G., 2018. 'Sustainability and shared mobility models', Sustainability, 10(9), 3194.

Sassen, S., Moreno, C. and Bria, F., 2021. 'The city of the future: visions, projects and utopia' [webinar], ISPI, 18 March.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H. and Jinks, C., 2018. 'Saturation in qualitative research: exploring its conceptualization and operationalization', *Quality & Quantity*, 52(4), pp. 1893–1907. doi:10.1007/s11135-017-0574-8.

Scheer, B.C., 2010. *The Evolution of Urban Form: Typology for Planners and Architects*. London: Routledge.

Seamon, D., 2014. 'Place attachment and phenomenology: the synergistic dynamism of place', in Manzo, L.C. and Devine-Wright, P. (eds) *Place Attachment: Advances in Theory, Methods and Applications*. London: Routledge, pp. 11–22.

Selim, G., 2014. 'Instituting order: the limitations of Nasser's post-colonial planning visions for Cairo in the case of the indigenous quarter of Bulaq (1952–1970)', Planning Perspectives, 29(1), pp. 67–89.

Sennett, R., Burdett, R. and Sassen, S., 2018. *The Quito papers and the new urban agenda*. London; New York: Routledge, Taylor & Francis Group

Serin, B., 2016. 'The production of branded housing projects in Istanbul: emerging regimes of private urbanism in a neo-liberal context', Housing Studies, 31(7), pp. 843–859.

Shafik, R. and Salama, H., 2020. 'Modernization of Downtown Cairo', International Journal of Engineering Research and Technology, 9, pp. 340–343.

Shanghai Planning and Land Resources Administration, 2016. Shanghai Planning Guidance of 15-Minute Community-Life Circle. Shanghai.

Sharifi, A. and Khavarian-Garmsir, A.R., 2020. 'The COVID-19 pandemic: impacts on cities and major lessons for urban planning, design, and management', *Science of the Total Environment*, 749, p.142391. doi:10.1016/j.scitotenv.2020.142391.

Shaw, A., 2012. 'Social constructionism and the inner city: designing environments for social development and urban renewal', in Constructionism in Practice. London: Routledge, pp. 175–206.

Sheller, M., 2012. 'Sustainable mobility and mobility justice: towards a twin transition', in Mobilities: New Perspectives on Transport and Society. London: Routledge.

Sheller, M., 2018. *Mobility Justice: The Politics of Movement in an Age of Extremes*. London: Verso.

Sheller, M., 2021. 'Sustainable mobility futures', in Routledge Handbook of Social Futures. London: Routledge.

Silva, C. and Larsson, A., 2018. Challenges for Accessibility Planning and Research in the Context of Sustainable Mobility. Discussion Paper. Paris: International Transport Forum (OECD).

Sims, D., 2013. 'Urbanisation in Egypt', in The Egyptian Economy in the Twenty-First Century: The Hard Road to Inclusive Prosperity.

Simon, C., 2022. Portland's 20-Minute Neighbourhoods After Ten Years: How a Planning Initiative Impacted Accessibility. MA thesis, University of Washington.

Sinha, A. and Singh, J., 2011. 'Jamshedpur: planning an ideal steel city in India', Journal of Planning History, 10(4), pp. 257–276.

Soja, E.W., 2010. Seeking Spatial Justice. Minneapolis: University of Minnesota Press.

Song, Y., Merlin, L. and Rodriguez, D., 2013. 'Comparing measures of urban land use mix', Computers, Environment and Urban Systems, 42, pp. 1–13. doi: 10.1016/j.compenvurbsys.2013.08.001.

Steenbergen, F.V. and Schipper, K., 2017. 'Struggling with justice in transitions', DRIFT, Erasmus University Rotterdam.

Stefanou, J. and Mitoula, R. , 2003. Globalization, European Unification and the Physiognomy of the Greek City. Athens: Papazisi Publications. ISBN 960-02-1682-7.

Stein, C.S., 1951. Toward New Towns for America. Chicago: Public Administration Service.

Stern, R.A.M., Fishman, D. and Tilove, J., 2013. Paradise Planned: The Garden Suburb and the Modern City. New York: Monacelli Press.

Steuteville, R., 2021. 'The 15-minute neighbourhood gets its 15 minutes of fame', CNU Public Square, 25 January.

Stevenson, M. et al., 2016. ‘Land use, transport, and population health: estimating the health benefits of compact cities’, The Lancet, 388(10062), pp. 2925–2935.

Storper, M. and Scott, A.J., 2016. ‘Current debates in urban theory: a critical assessment’, Urban Studies, 53(6), pp. 1114–1136.

Suri, H., 2011. ‘Purposeful sampling in qualitative research synthesis’, Qualitative Research Journal, 11(2), pp. 63–75.

Swinney, J., 2021. ‘Will COVID-19 make the idea of the 15-minute city a reality?’, Centre for Cities podcast, 17 February.

Tadamun, 2024. Tadamun: The Cairo Urban Solidarity Initiative.

Talaat Moustafa Group (TMG), 2017. Madinaty – A City of International Standards in Egypt [video].

Talen, E., 2000. ‘New urbanism and the culture of criticism’, Urban Geography, 21(4), pp. 318–341.

Tan, P.Y., Wang, J. and Sia, A., 2013. ‘Perspectives on five decades of the urban greening of Singapore’, Cities, 32, pp. 24–32.

Tarbush, N., 2012. ‘Cairo 2050: urban dream or modernist delusion?’, Journal of International Affairs, pp. 171–186.

Temenos, C. and McCann, E., 2013. ‘Geographies of policy mobilities’, *Geography Compass*, 7(5), pp. 344–357.

Tight, M. et al., 2011. ‘Visions for a walking and cycling focussed urban transport system’, Journal of Transport Geography, 19(6), pp. 1580–1589.

Toppeta, D., 2010. ‘The smart city vision: how innovation and ICT can build smart, “livable”, sustainable cities’, The Innovation Knowledge Foundation, 5, pp. 1–9.

Toole, J.L. et al., 2015. ‘Coupling human mobility and social ties’, Journal of the Royal Society Interface, 12(105), 20141128.

Tracy, S.J., 2010. ‘Qualitative quality: eight “big-tent” criteria for excellent qualitative research’, *Qualitative Inquiry*, 16(10), pp. 837–851. doi:10.1177/1077800410383121.

Transport for Cairo, 2024. Transport for Cairo: Data for Mobility.

Tu, C.C. and Eppli, M.J., 1999. Valuing New Urbanism: The Impact of the New Urbanism on Prices of Single-Family Homes. Washington, DC: Urban Land Institute.

TUMI, 2021. The 15-Minute City. Transformative Urban Mobility Initiative.

Turgut, H., 2021. Istanbul: The city as an urban palimpsest. Cities, 112, p.103131.

Turner, A.. 2004. Depthmap 4: A Researcher's Handbook. London: Bartlett School of Graduate Studies, University College London. (June). Available at: https://archtech.gr/varoudis/depthmapX/LearningMaterial/depthmap4r1.pdf.

Tvaronavičienė, M., 2018. 'Towards sustainable and secure development: energy efficiency peculiarities in transport sector', Journal of Security and Sustainability Issues, 7(4), pp. 719–726.

UN-Habitat, 2022. World Cities Report 2022: Envisaging the Future of Cities. Nairobi: UN-Habitat.

Vale, D.S., Viana, C.M. and Pereira, M., 2018. The extended node-place model at the local scale: Evaluating the integration of land use and transport for Lisbon's subway network. *Journal of Transport Geography*, *69*, pp.282-293.

Viegas, J. and Martinez, L., 2017. Transition to Shared Mobility: How Large Cities Can Deliver Inclusive Transport Services. International Transport Forum, Paris.

Volait, M., 2001. 'Town planning schemes for Cairo conceived by Egyptian planners in the "liberal experiment" period', Annales islamologiques, 35, pp. 285–310.

Volait, M., 2022. 'Early experiments with subsidised housing: Mahmoud Riad's garden suburbs 1950–54', in Designing Modernity: Architecture in the Arab World 1945–1973, pp. 50–64.

Wessel, G., Karduni, A. and Sauda, E., 2018. 'The Image of the Digital City: Revisiting Lynch's principles of urban legibility', *Journal of the American Planning Association*, 84(3–4), pp. 280–283. doi: 10.1080/01944363.2018.1524716.

Waud, A., 2018. ‘The urban heart of a just transition: how cities plan for social justice in climate action’, Metropolitics, 3 April.

Whittle, N., 2020. ‘Welcome to the 15-minute city’, Financial Times, 16 July.

Wilmott, C., 2019. “Mapping-with”: The politics of (counter-)classification in OpenStreetMap. doi:10.14714/CP92.1451

Wright, H.M., 1972. ‘Returning to Radburn’, Journal of the American Institute of Planners, 38(6), pp. 369–380.

Wright, A.F., 1977. ‘The cosmology of the Chinese city’, in Skinner, G.W. (ed.) The City in Late Imperial China. Stanford, CA: Stanford University Press, pp. 33–73.

Wright, S., 2021. ‘The 15-minute city: old-fashioned compact, convenient, mixed-use development for a modern, post-pandemic, walkable world’, in On Common Ground. National Association of Realtors.

Wu, H. et al., 2021. ‘Analysis and optimization of 15-minute community life circle: a case study of Shanghai’, PLOS ONE, 16(9), e0256904.

Yeh, A.G.O. and Li, X., 2001. ‘Measurement and monitoring of urban sprawl in a rapidly growing region using entropy’, Photogrammetric Engineering & Remote Sensing, 67(1), pp. 83–90.

Yeow, L.W., Low, R., Tan, Y.X. and Cheah, L., 2021. ‘Point-of-Interest (POI) data validation methods: An urban case study’, *ISPRS International Journal of Geo-Information*, 10(11), p. 735.

Yeung, P., 2021. ‘How “15-minute cities” will change the way we socialise’, BBC Worklife, 4 January.

Yin, R.K., 2009. ‘How to do better case studies’, in The SAGE Handbook of Applied Social Research Methods, 2nd edn, pp. 254–282.

Yin, R.K., 2013. Case Study Research: Design and Methods. 5th edn. Thousand Oaks, CA: Sage.

Yunfang, J. et al., 2017. ‘A review of urban planning research for climate change’, Sustainability, 9(12), 2224.

Zhou, D., 2019. ‘Examination of the 15-minute life cycle program of a Chinese mega city: case study of Guangzhou’, WIT Transactions on Ecology and the Environment, 238, pp. 97–106.

Appendix 1: Summary of the information gathered from interviews

Data Collection: In-Depth Interviews with Industry/business Representatives

		Information	Position/role
Developers and designers	P01	Wider background on the stages of the project and transformations in Badya	Sales
	P02	Details of the marketing strategies and its alienation with the construction phases in Badya	Marketing
	P03	Planning and design processes and context	Development
	P04	Details on the planning and design processes and context	Development
	P05	Further details on the design and planning collaboration with international consultancies in Madinaty	Design
	P06	Details of the process of designing and the coordination with the government in Madinaty	Deputy design manager
	P07	Detailed process of design implementation on the ground including collaboration with other departments	Landscape engineer
	P08	Urban renewal projects in Agouza	Architect at design studio
	P09	Further details on the design and planning collaboration with developers in Madianty	Architect
	P10	Details of the process of designing and the coordination with the government in Badya	co-chief executive officer

Data Collection: In-Depth Interviews with Government Representatives (In-progress)

		Information	Position/role
Government	P01	An overview of the authority's role in funding sustainable development and mobility projects	General manager at UDF
	P02	An overview of the authority's role in urban planning on a regional scale in Greater Cairo	Architect at GOPP
	P03	An overview of the authority's role in urban planning, processes of infrastructure projects, sustainability initiatives, and partnerships with other stakeholders in the new city	Architect at New Cairo City Authority
	P04	Details of executing regulations on new cities scale	Architect at New Cairo City Authority
	P05	An overview of the authority's role in urban planning, processes of infrastructure projects, sustainability initiatives, and partnerships with other stakeholders	Deputy Chairman of October City Authority
	P06	Details of executing regulations on new cities scale	Architect at October Authority
	P07	Details of processes of infrastructure projects related to sustainable mobility	Architect at New October City authority
	P08	Details of partnerships with other stakeholders related to sustainable mobility projects	Architect at New October City authority
	P09	Details of urban renewal projects and collaboration with designers	Officer at Agouza Neighbourhood authority
	P10	Details of executing regulations on local neighbourhood scale	Officer at Agouza Neighbourhood authority

Appendix 2: The pre-sampling form used in participant selection

15-Minute City Models: Justice, Mobility and Land-Use in Cairo

Trinity College Dublin
The University of Dublin

You are invited to participate in a research study exploring 15-minute city concept and sustainable mobility in Cairo. This study focuses on three case areas: Agouza neighboruhood, Madinaty City, and Badya City, examining urban design, planning and mobility experiences.

This pre-selection form helps identify potential participants. If selected, you will receive an information leaflet and a consent form before participation.

General Information

1. **Age Group:**
   - ☐ 18–24
   - ☐ 25–34
   - ☐ 35–44
   - ☐ 45–59
   - ☐ 60+
2. **Gender:**
   - ☐ Male
   - ☐ Female
   - ☐ Non-binary
   - ☐ Prefer not to say
3. **Education Level:**
   - ☐ No formal education
   - ☐ Primary education
   - ☐ Secondary education
   - ☐ Technical or vocational education
   - ☐ Higher education (university degree or above)
4. **Family Status:**
   - ☐ Single
   - ☐ Married/Partnered
   - ☐ Married/Partnered with children
   - ☐ Single parent
   - ☐ Other: _____
5. **Annual Income Level (EGP):**
   - ☐ Below 60,000
   - ☐ 60,000 – 240,000.
   - ☐ 250,000 – 500,000
   - ☐ Over 500,000

Appendix 3: Interview guides of different stakeholders

15-Minute City Models: Justice, Mobility and Land-Use in Cairo

Trinity College Dublin
The University of Dublin

Interviews Guide

Participants Interviews

Welcome and introduction	-Introduction to myself -Introduction to the research topic, questions, and objectives - Emphasise to the importance of participants' insights and perspectives
Collection of informed consent and ask for permission to record	- Describe the voluntary nature of participation -Ask for verbal or written consent
Overview of background information	-Collect basic demographic information -Collect basic information on daily and weekly trips and mobility modes -Collect basic information on the responsibilities and duties
Interview questions	-Discussion of experiences with sustainable mobility within the 15-minute neighbourhood (employment of probing to explore specific situations) -Discussion of how intersectional factors (e.g. age, social, economic, and educational background, marital status, family situation, geographic location, housing situation) influence their mobility experiences (employment of probing to explore specific situations)
Closure of interview	-Encouragement to share any additional information or insights - Acknowledgment of participation - Ensuring confidentiality -Debriefing of key points -Reminder to the value of their thoughts, emotions, and perceptions - Providing contact details for inquiries and follow-up

Interview Questions and Themes

1. **General description of the experience in accessing daily basic urban functions by sustainable mobility modes within a 15-minute radius**:

1.1 How would you describe your experience with walking, cycling, or using public transportation (bus, Luas, or train services) on a daily or weekly basis?

This includes reaching the following urban functions:

- Work (either full-time or part-time (e.g. workplaces of offices, etc.), remote or flexible (e.g. workplaces of coworking spaces, public libraries, etc.)
- Supply needs (grocery shopping, etc.)
- Healthcare (such as GP, pharmacies, clinics, etc.)
- Education (for yourself or your children, if relevant to you)
- Entertainment (such as coffee shops '*Ahwa*', parks, etc.)

1.2 How many minutes does it typically take you to reach each one of them, and during which times of the day?

1.3 How would you describe the way in which responsibilities and duties (e.g. household and caregiving activities), if relevant to you, impact your experience?

1.4 If you noticed changes in the neighborhood/Agouza, how would you describe the way in which these changes impact your experience?

2. **In terms of the built environment and infrastructure**:

2.1 Do you use sustainable mobility facilities in your neighbourhood (e.g. sidewalks, crosswalks, pedestrian-friendly features, cycling lanes, and public transportation stops)?

Follow on questions if the answer is yes to at least one of them:

2.2 In your view, how well/easy-to-use they are? How it impact choosing or not choosing a short-distance (in a 15-minute radius) trips?

2.3 If relevant, to what extent you associate your experience with using them to your wellbeing (e.g. mental and physical health)? ..

2.4 If relevant, to what extent you associate your experience with using them to enjoyment and fun?

2.5 Do you feel some facilities tend to encourage or discourage you to use sustainable mobility in your neighbourhood?

2.6 How would you describe the ideal facilities for you to walk, cycle, use public transportation?

3. **In terms of affordability**:

3.1 In your view, do you think that the housing options available at your neighbourhood/Agouza suits your income level?

Follow on questions if relevant:

3.2 Do the costs of cycling and walking (e.g. owning, maintaining, or safety accessories, etc.), and public transportation (e.g. fares and passes, etc.) options available at your neighbourhood suits your income level? Do you experience any indirect costs for using them? (e.g. time, well-being, work productivity, etc.)

3.3 Will you be willing to use shared options of sustainable mobility in your neighbourhood, do you find them more affordable?

4. **In terms of belonging**:

Follow on questions if relevant:

4.1 Do you feel that you contribute to the sense of community in your neighbourhood/Agouza by using walking, cycling, or using public transportation?

4.2 Does your neighborhood/Agouza hold significance for you as a space offering complete 15-minute access within the entire Cairo region?

4. Do you have any additional insights to share about your experience with sustainable mobility in reaching basic urban functions within a 15-minute radius of your neighbourhood/Agouza? Additionally, as I plan to do follow up interview with you and other interviews other participants to inquire about their experiences, do you have any suggestions for additional questions or aspects to include, or any recommendations for modifying existing questions in the interview?

Interview Guide

1. Urban form and planning

1.1 What specific role does the New Cairo City Authority play in planning and developing infrastructure and amenities within neighborhoods?

1.2 How does the Authority approach transportation connections between neighborhoods within the layout of New Cairo?

1.3 From your perspective, how do current plans align with the 15-minute city model, particularly regarding:

- Accessibility and availability of essential services within each neighborhood
- Infrastructure that encourages walking or short-distance travel within neighborhoods

2. Policy and Governance

2.1 Are there specific regulations that influence current priorities regarding:

- Developing local services inside neighbourhoods
- Supporting short-distance travel within neighbourhoods
- Integrating various modes of mobility across New Cairo
- Encouraging shared mobility options across New Cairo

2.2 Could you describe some examples of partnerships or collaboration you have experienced (with private developers, local businesses, or other governmental authorities)?

2.3 Are there specific mechanisms to ensure that these regulations are implemented across different partners and projects?

2. Additional insights

3.1 Do you have any additional insights to share about your experience working with NUCA or New Cairo City Authority? Additionally, as I plan to do interviews with other stakeholders, do you have any suggestions for additional questions or aspects to include, or any recommendations for modifying existing questions in the interview?

Interview Guide

1. Sustainable Mobility and Land Use in Cairo:

1.1 Can you provide an overview of the TMG's vision in general and Madinaty project in particular and how it aligns with national and regional sustainability policies?

1.2 What are the current facilitators and challenges in building spaces and cities for sustainable mobility and living?

2. Madinaty as a 15-Minute City:

2.1 How does TMG define accessibility and proximity to services within Madinaty?

2.2 Do you think the it integrates aspects of the concept's ideals?

2.3 If so, how does Madinaty's masterplan support the following design aspects for a 15-minute city?

- Pedestrian and cycling infrastructure
- Public transportation infrastructure

2.4 How integrated and connected is the mobility infrastructure with other facilities like medical centers, sports clubs, and schools?

2.5 What factors have facilitated or hindered TMG's ambition to build a liveable 15-minute city? Consider:

- Current transportation and mobility infrastructure
- Real estate and housing market dynamics
- Government regulations and policies
- National, regional, and global collaborations -
- Industry events
- Financial bodies

2.6 How do you envision Madinaty contributing to the overall sustainability of mobility and living in Cairo?

3. Community Making:

3.1 How does the design of Madinaty accommodate residents from different socio-economic backgrounds? Are there plans in place to adapt to future growth or evolving resident needs?

3.2 How do you see Madinaty's role in contributing to inclusive access to daily facilities within the broader Cairo metropolitan region?

4. Additional Insights:

4.1 What advice would you give to other developers aiming to implement a 15-minute city model?

4.2 Do you have any suggestions for additional questions or aspects to include in interviews with other stakeholders?

Appendix 4: Groups Mobility Maps - Agouza

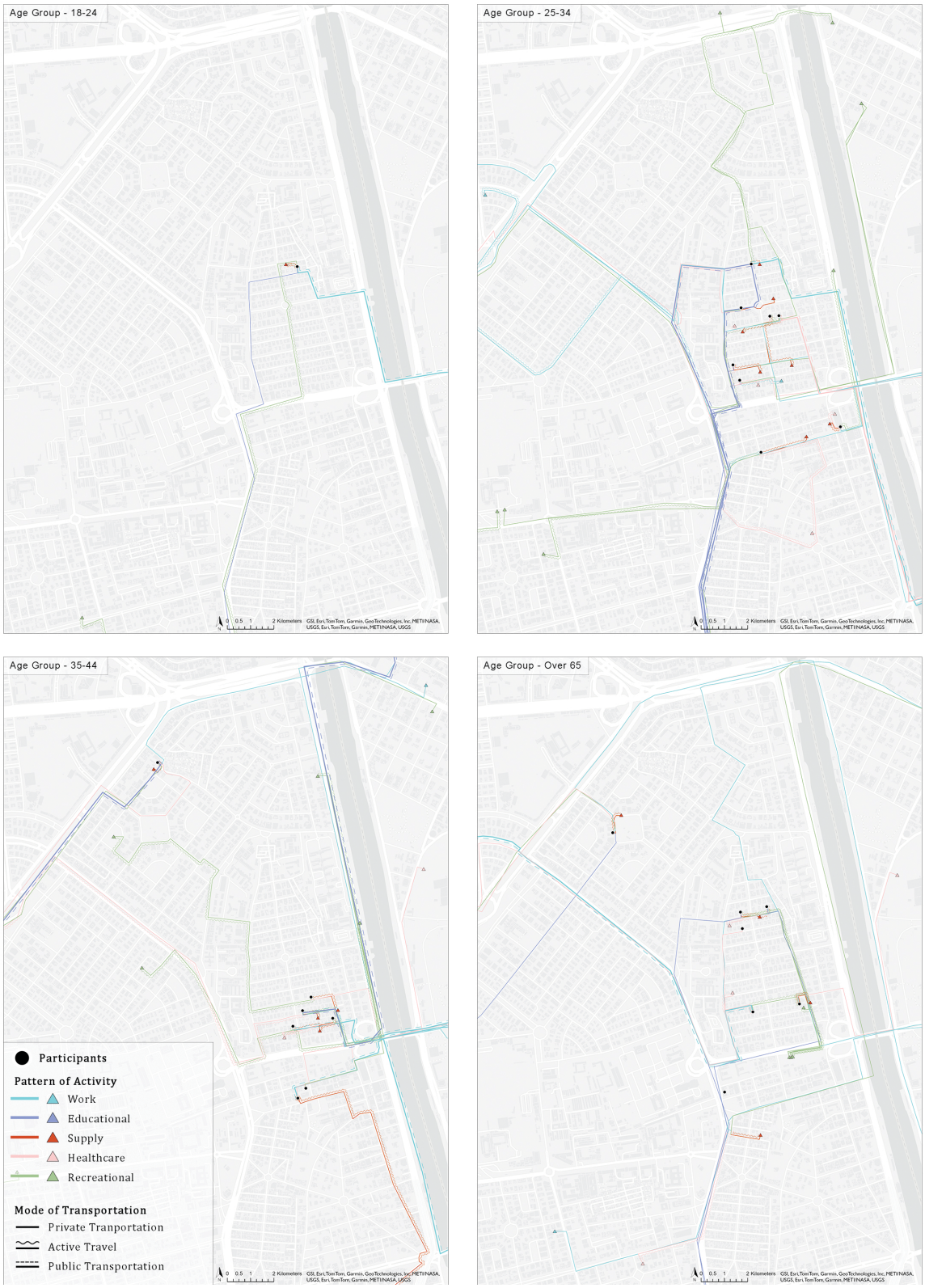


Figure 100 Mobility Experiences Maps by divided by participants' groups (patterns and modes)

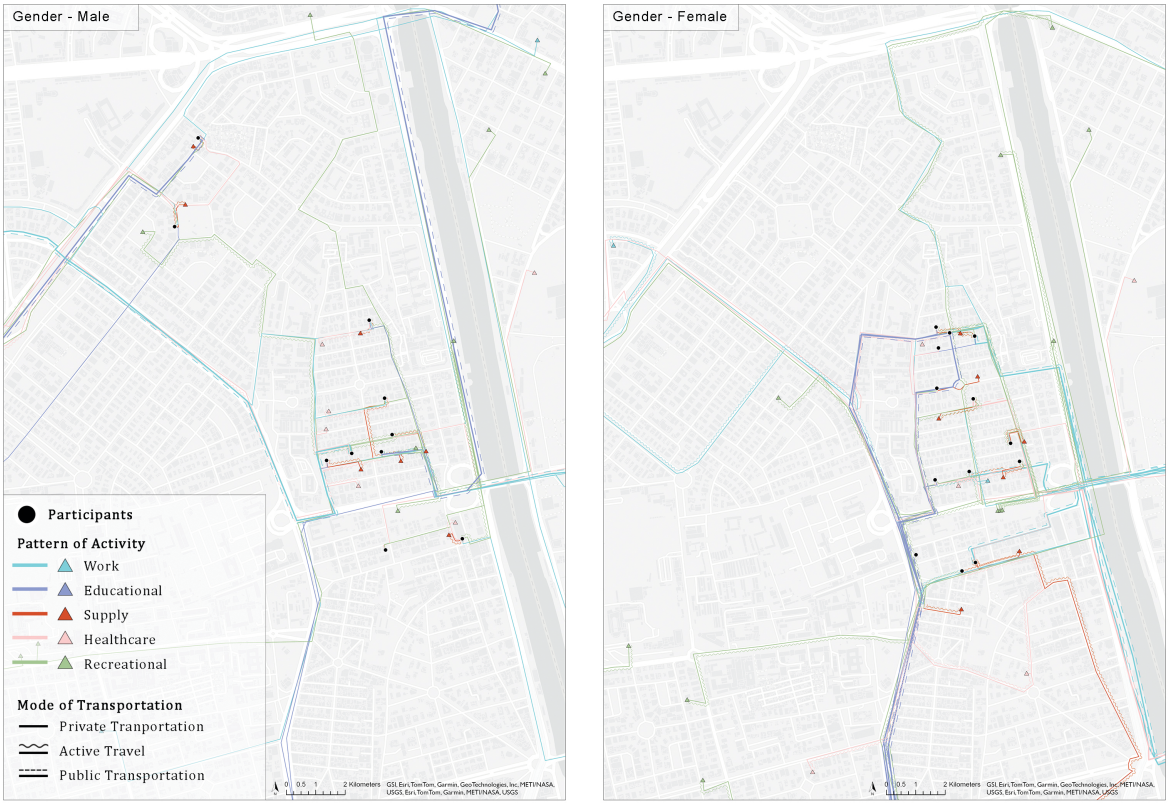


Figure 101 Mobility Experiences Maps (Divided by participants' groups)



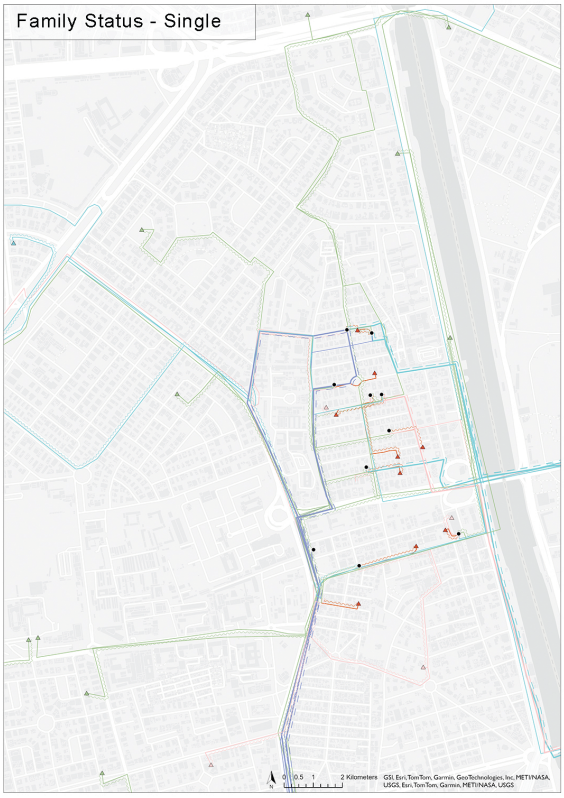
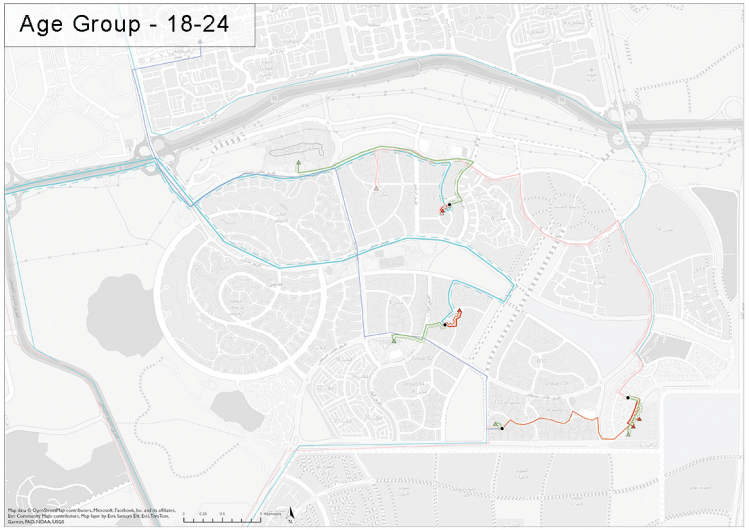
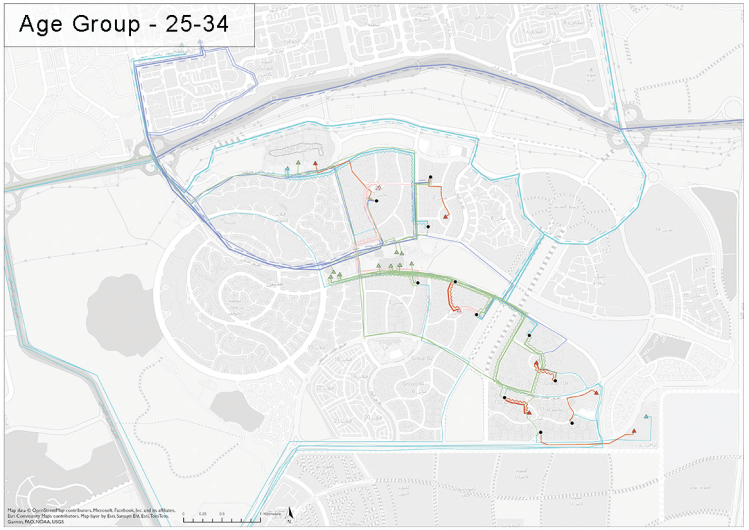
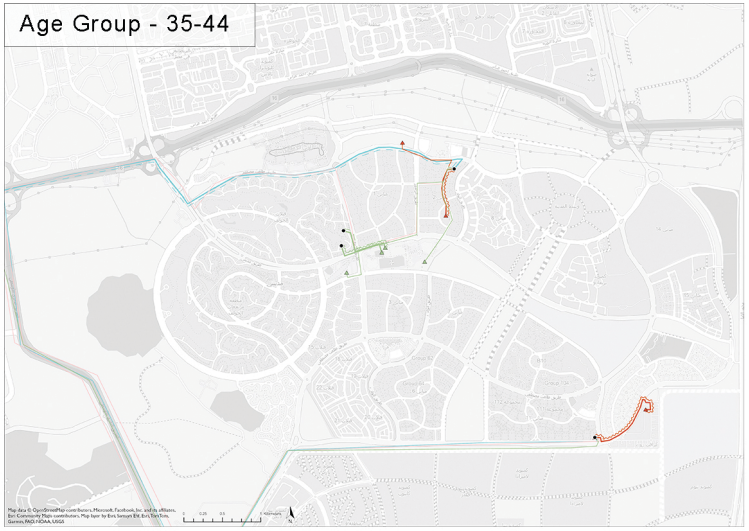


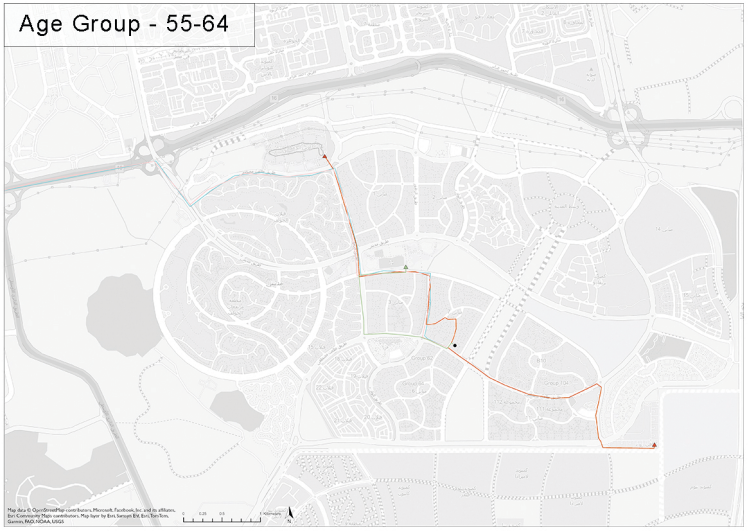
Figure 102 Mobility Experiences Maps (Divided by participants' groups)

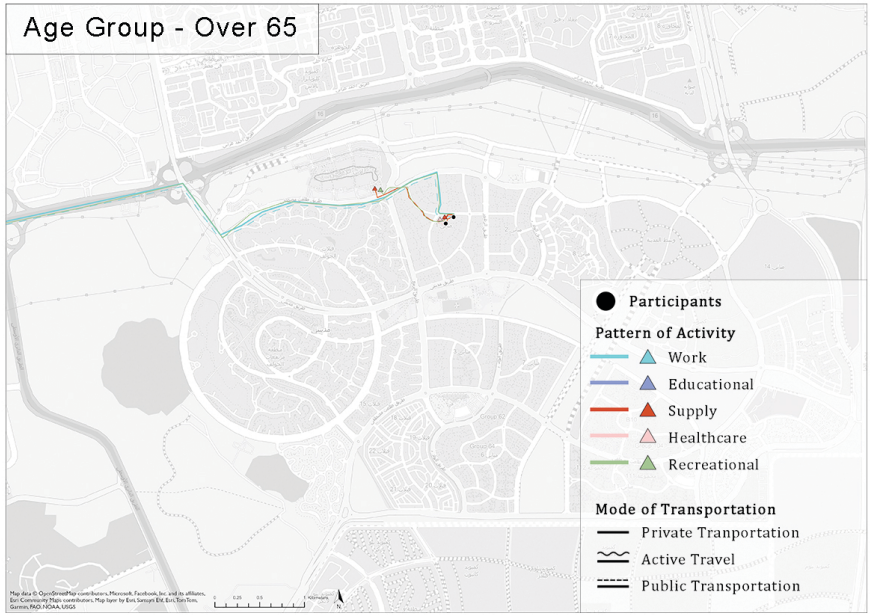
Appendix 5: Groups Mobility Maps - Madinaty











[75]Figure 103 Mobility Experiences Maps (Divided by participants' groups)

[75] The Figures are illustrative. The maps are drawn at a common fixed scale and placed within the A4 layout, with scale bars for reference.

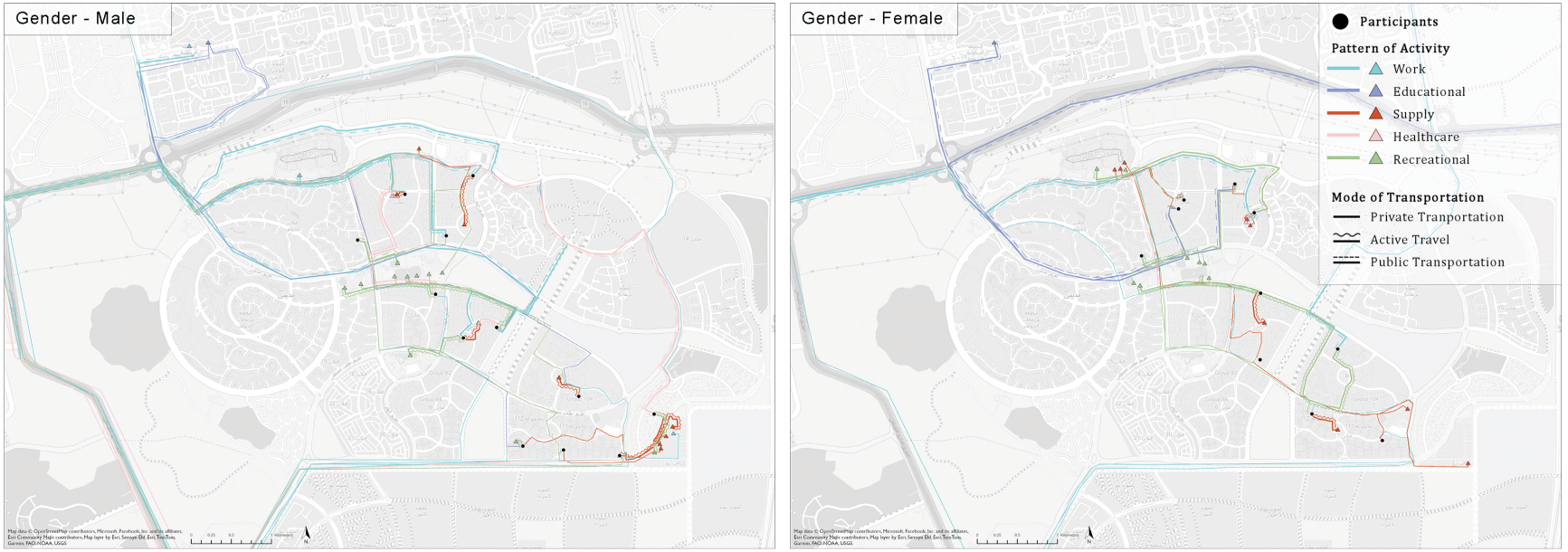


Figure 104 Mobility Experiences Maps (Divided by participants' groups)

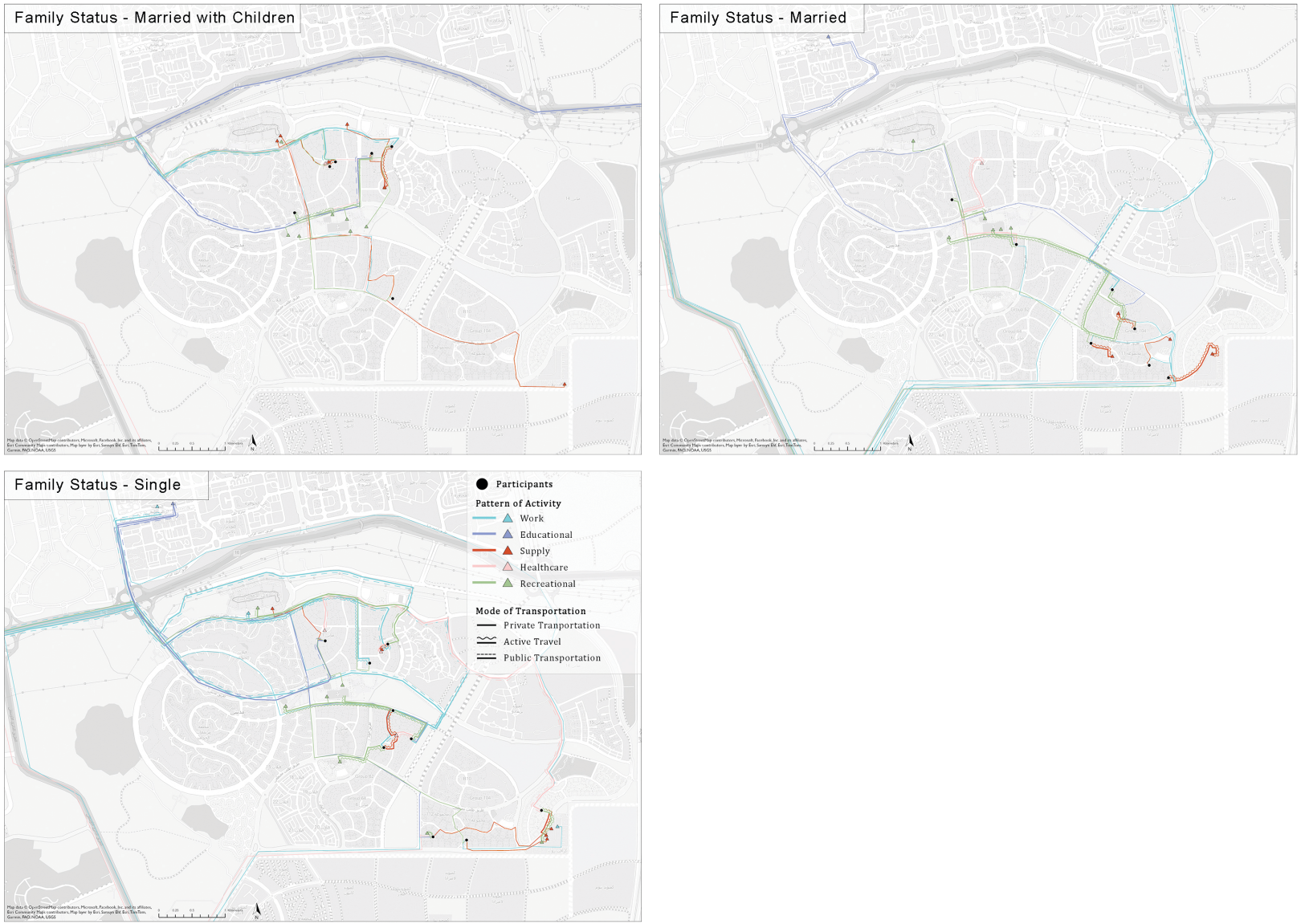


Figure 105 Mobility Experiences Maps (Divided by participants' groups)

Appendix 6: Groups Mobility Maps - Badya



Figure 106 Mobility Experiences Maps (Divided by participants' groups)

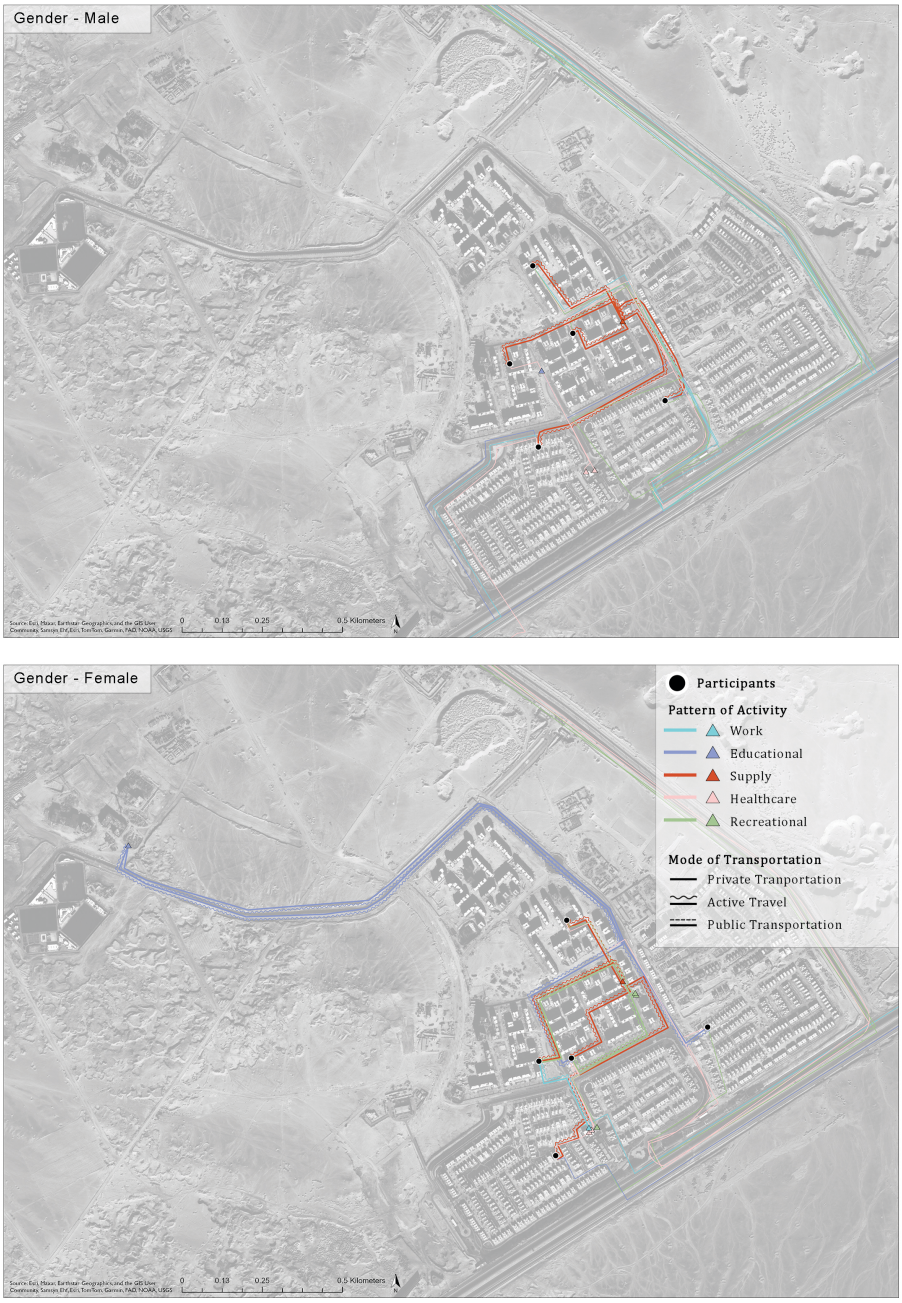


Figure 107 Mobility Experiences Maps (Divided by participants' groups)

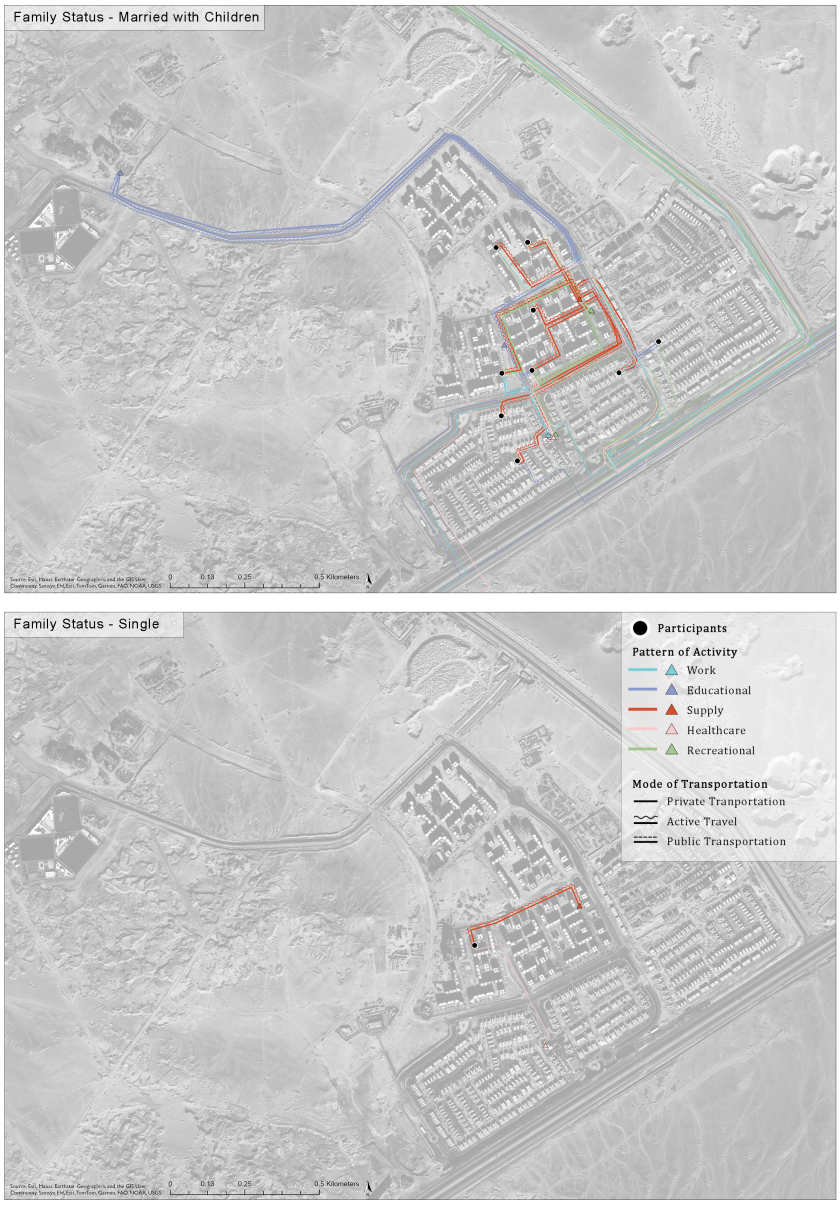


Figure 108 Mobility Experiences Maps (Divided by participants' groups)

Appendix 7: Groups Digital usage Maps - Agouza



Figure 109 Agouza's Digital Usage (Divided by participants' groups

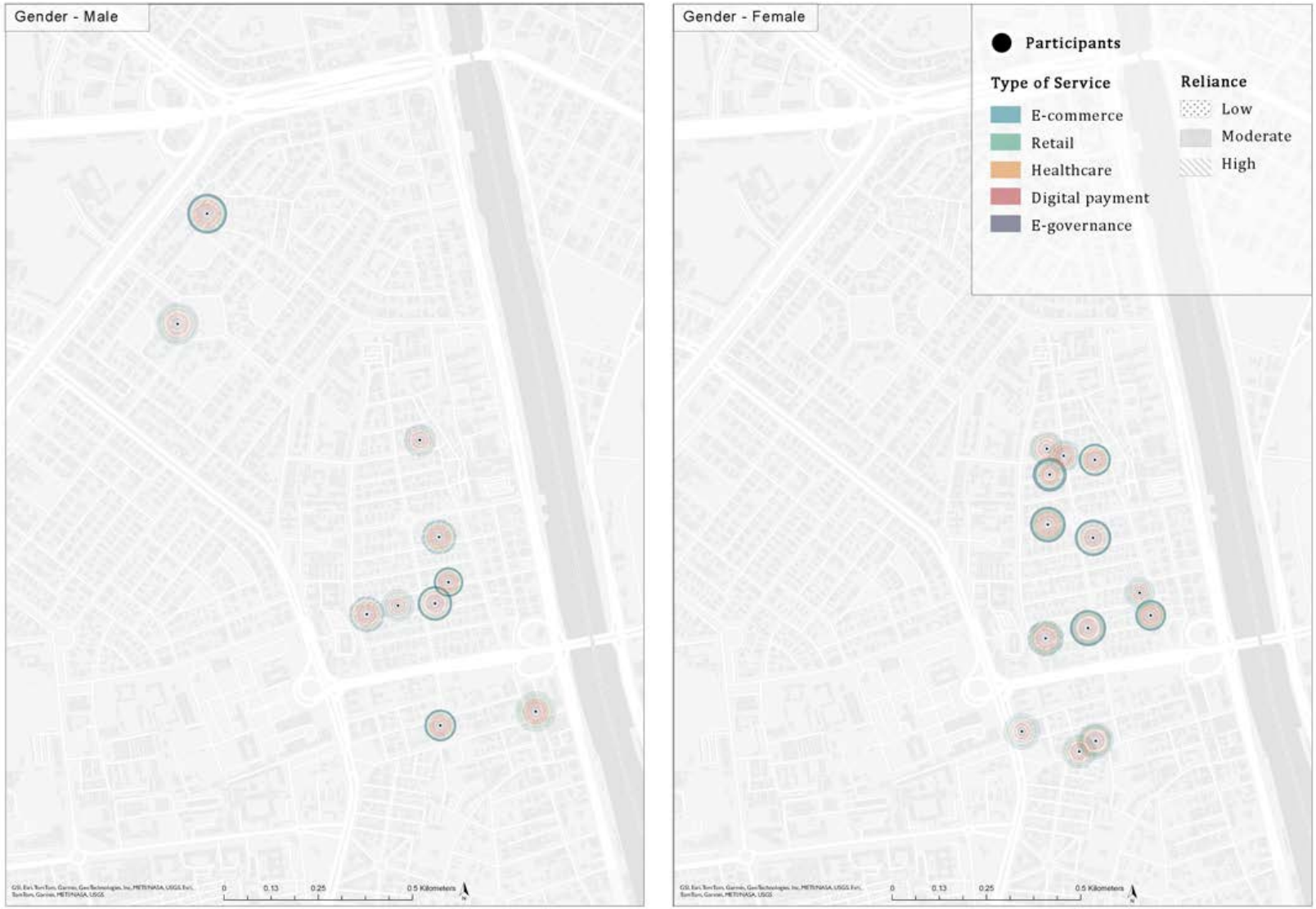


Figure 110 Agouza's Digital Usage (Divided by participants' groups)



Figure 111 Agouza's Digital Usage (Divided by participants' groups)

Appendix 8: Groups Digital usage Maps - Madinaty

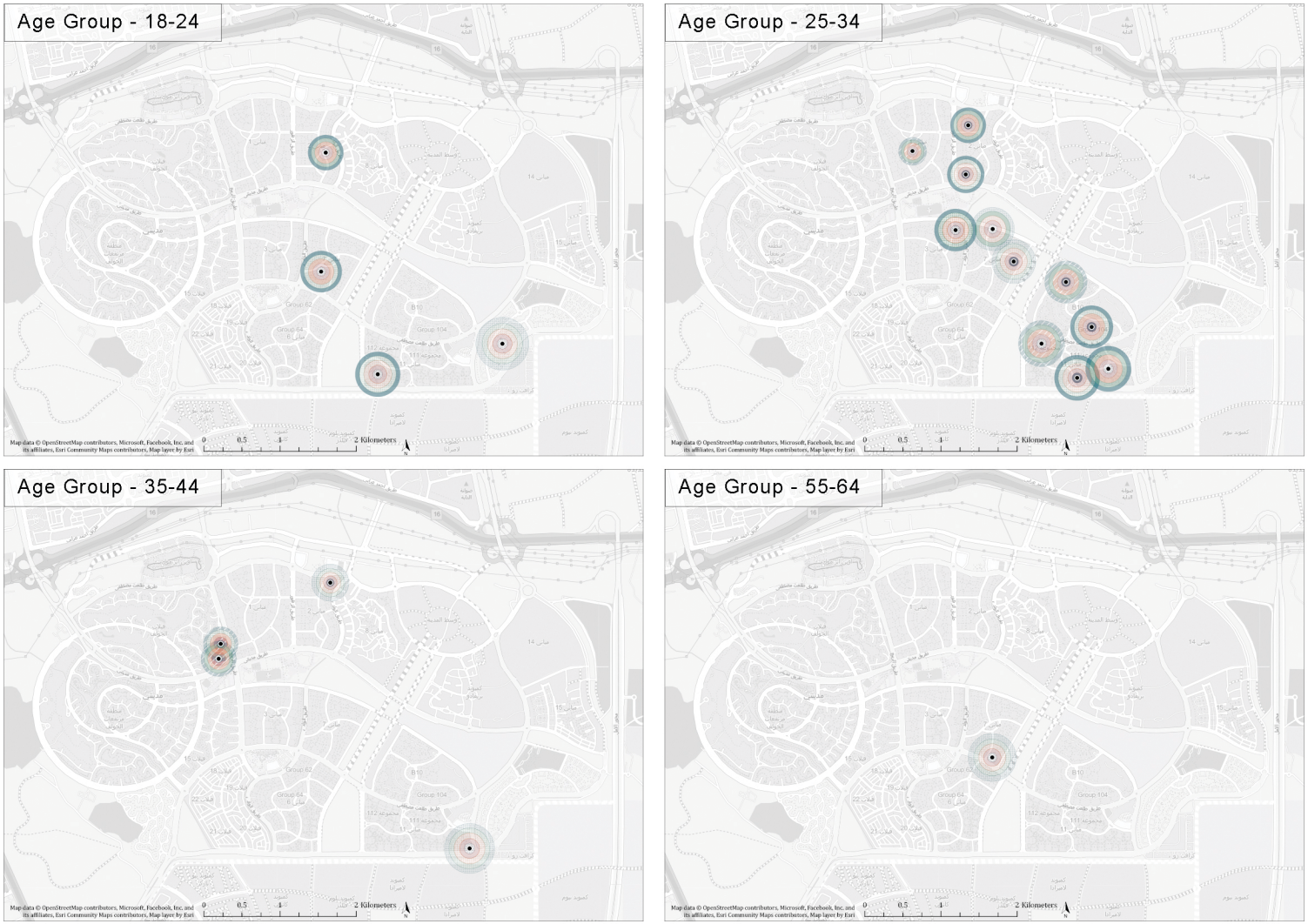


Figure 112 Madinaty's Digital Usage (Divided by participants' groups)

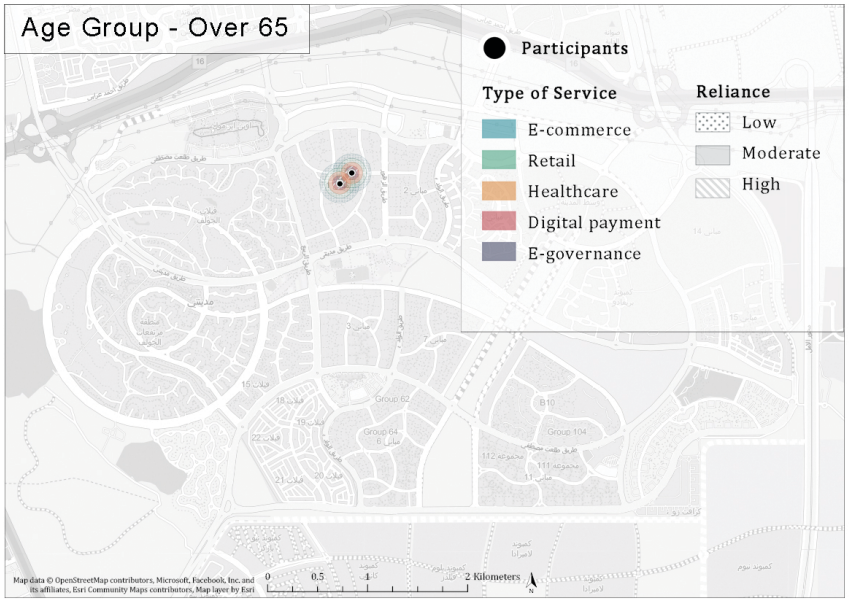
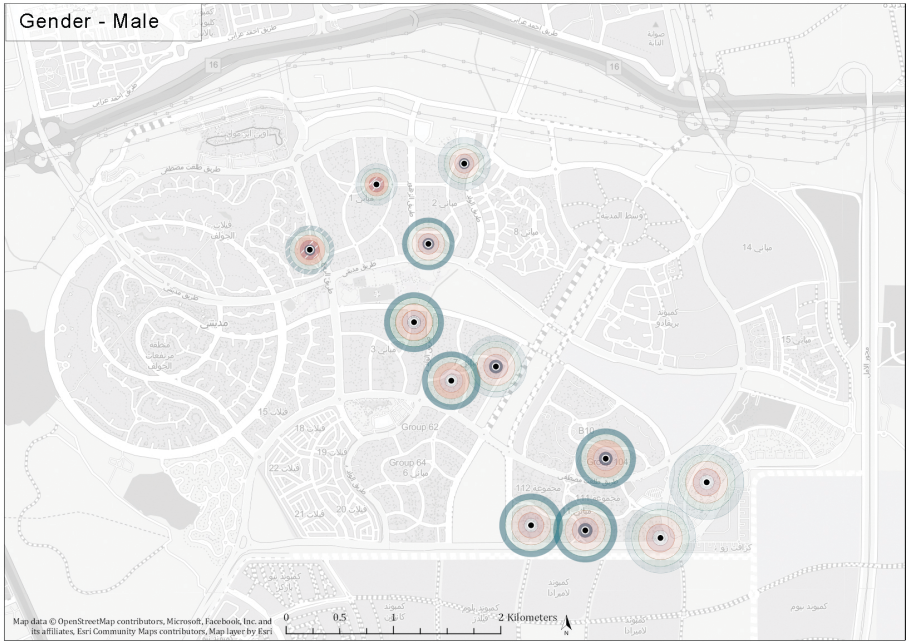
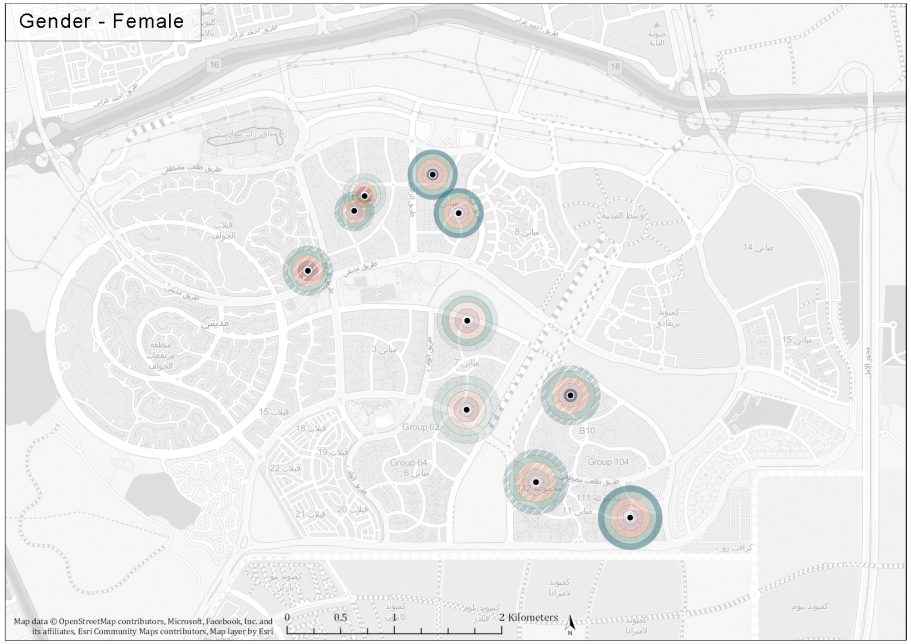
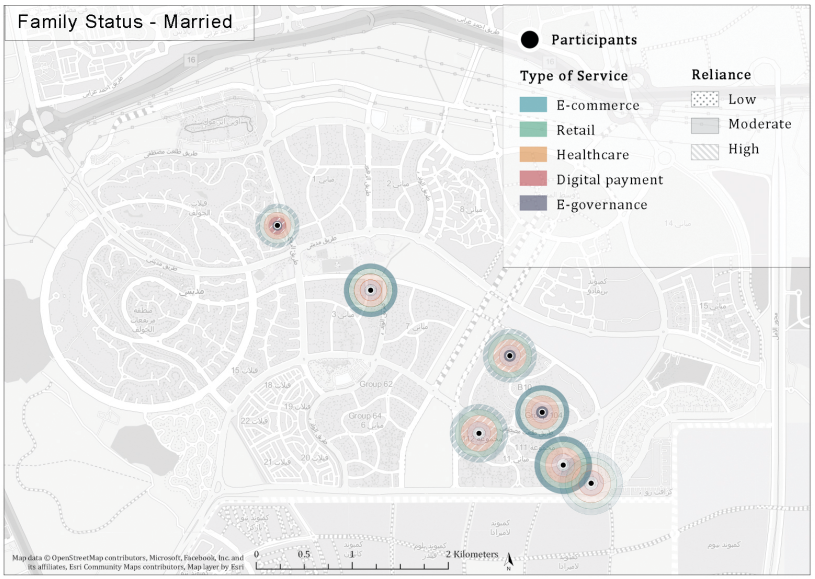


Figure 113 Madinaty's Digital Usage (Divided by participants' groups)


Gender - Male
Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri
0 0.5 1 2 Kilometers


Gender - Female
Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri
0 0.5 1 2 Kilometers





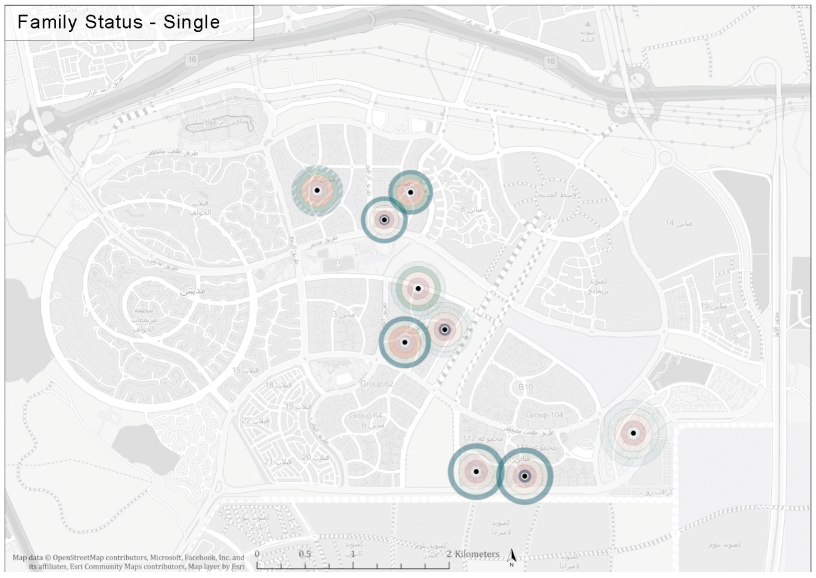
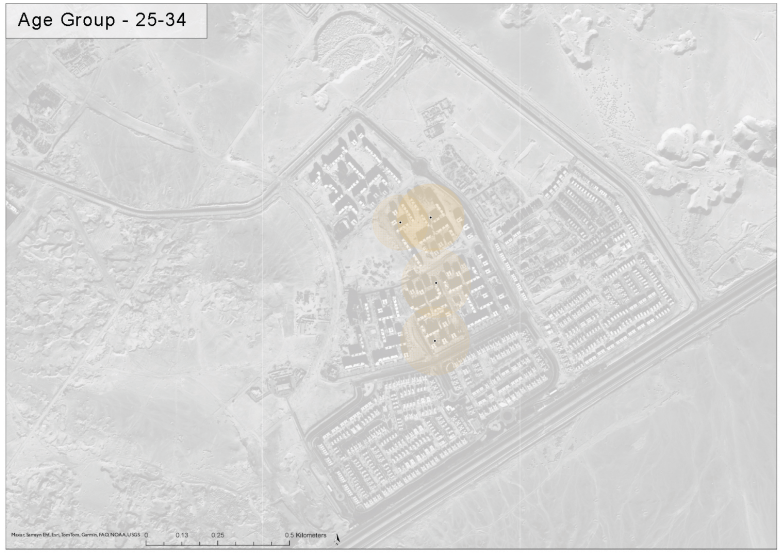
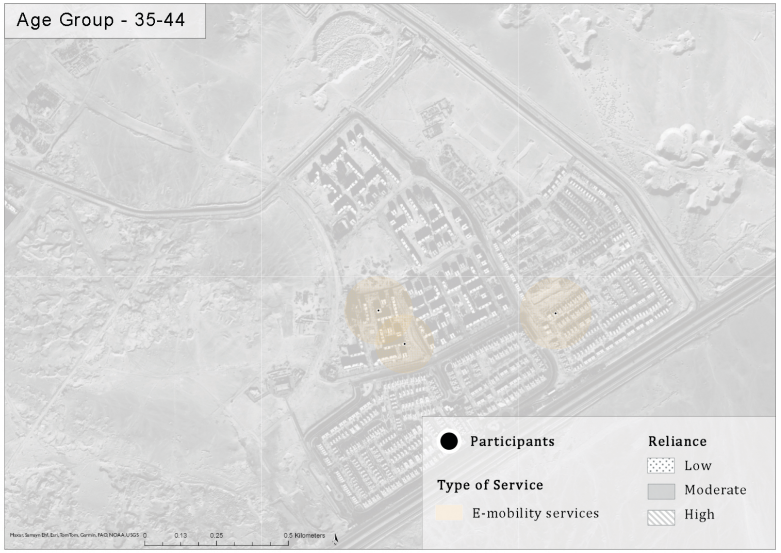
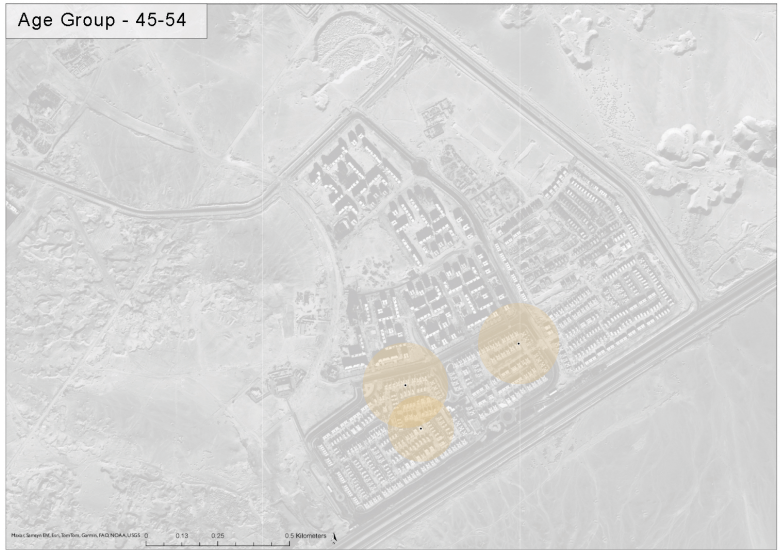


Figure 114
Madinaty's
Digital Usage
(Divided by
participants'
groups







Appendix 9: Groups Digital usage Maps - Badya

Figure 115 Badya's Digital Usage (Divided by participants' groups)

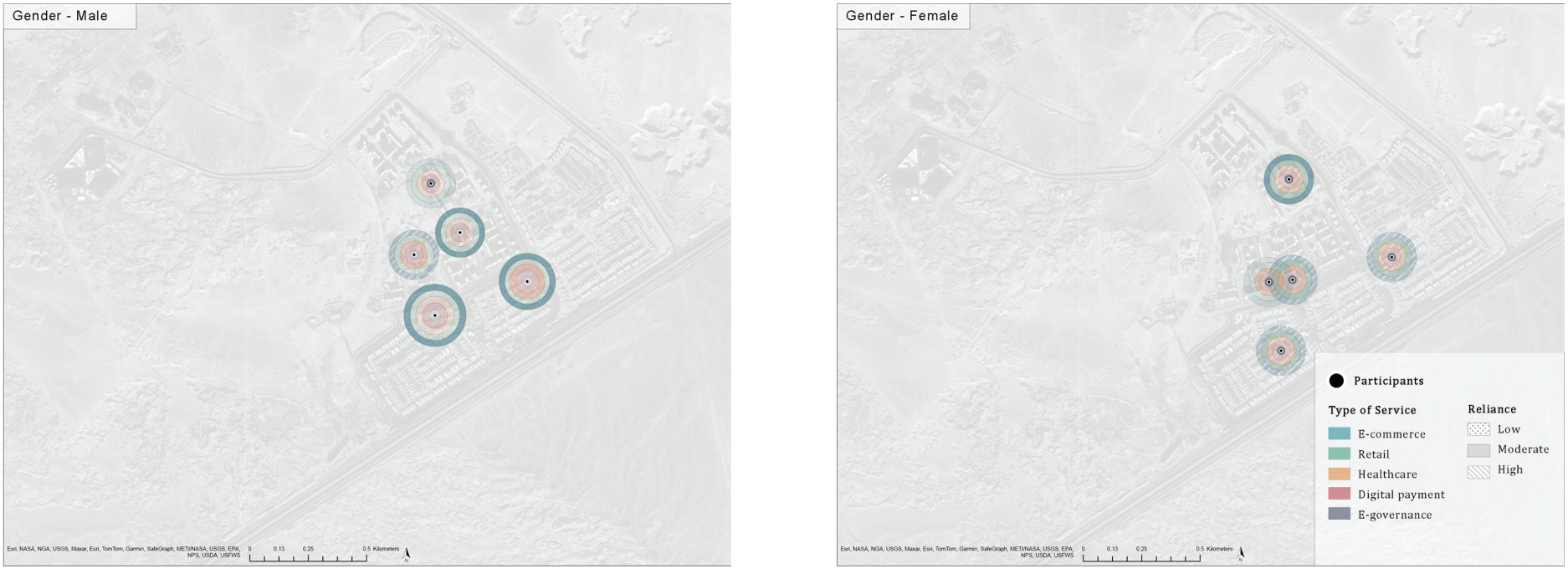


Figure 116 Badya's Digital Usage (Divided by participants' groups)

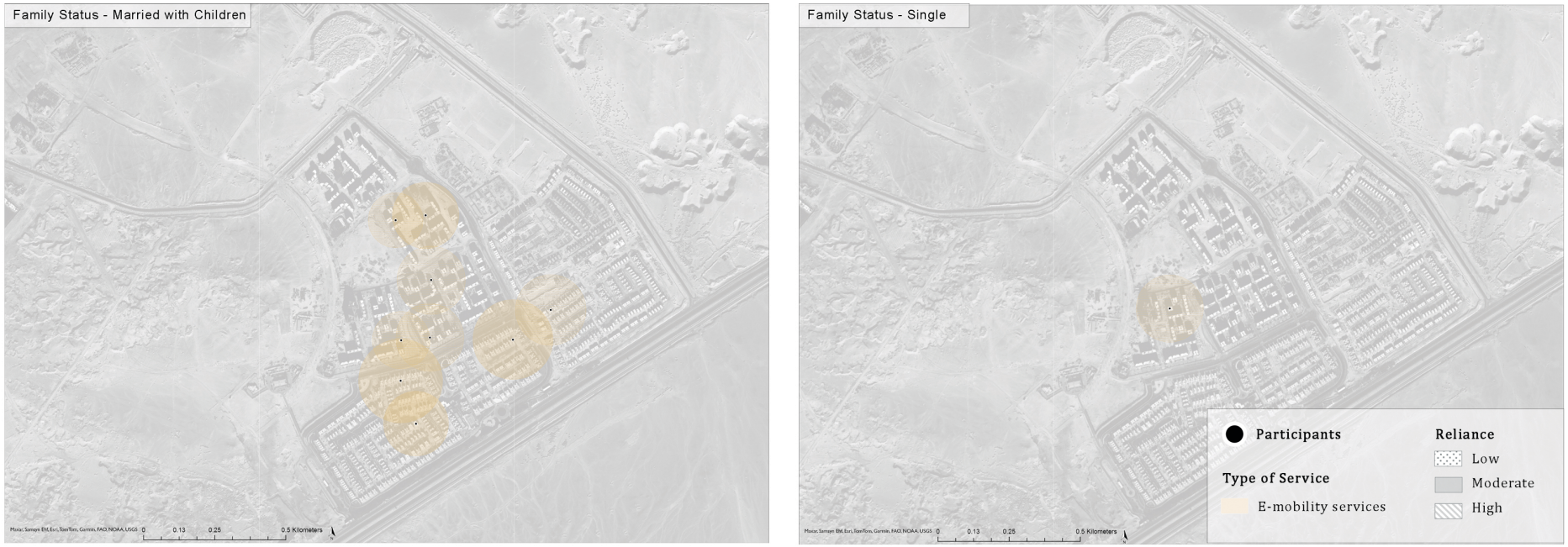


Figure 117 Badya's Digital Usage (Divided by participants' groups)

Appendix 10: Groups Social Network Maps - Agouza

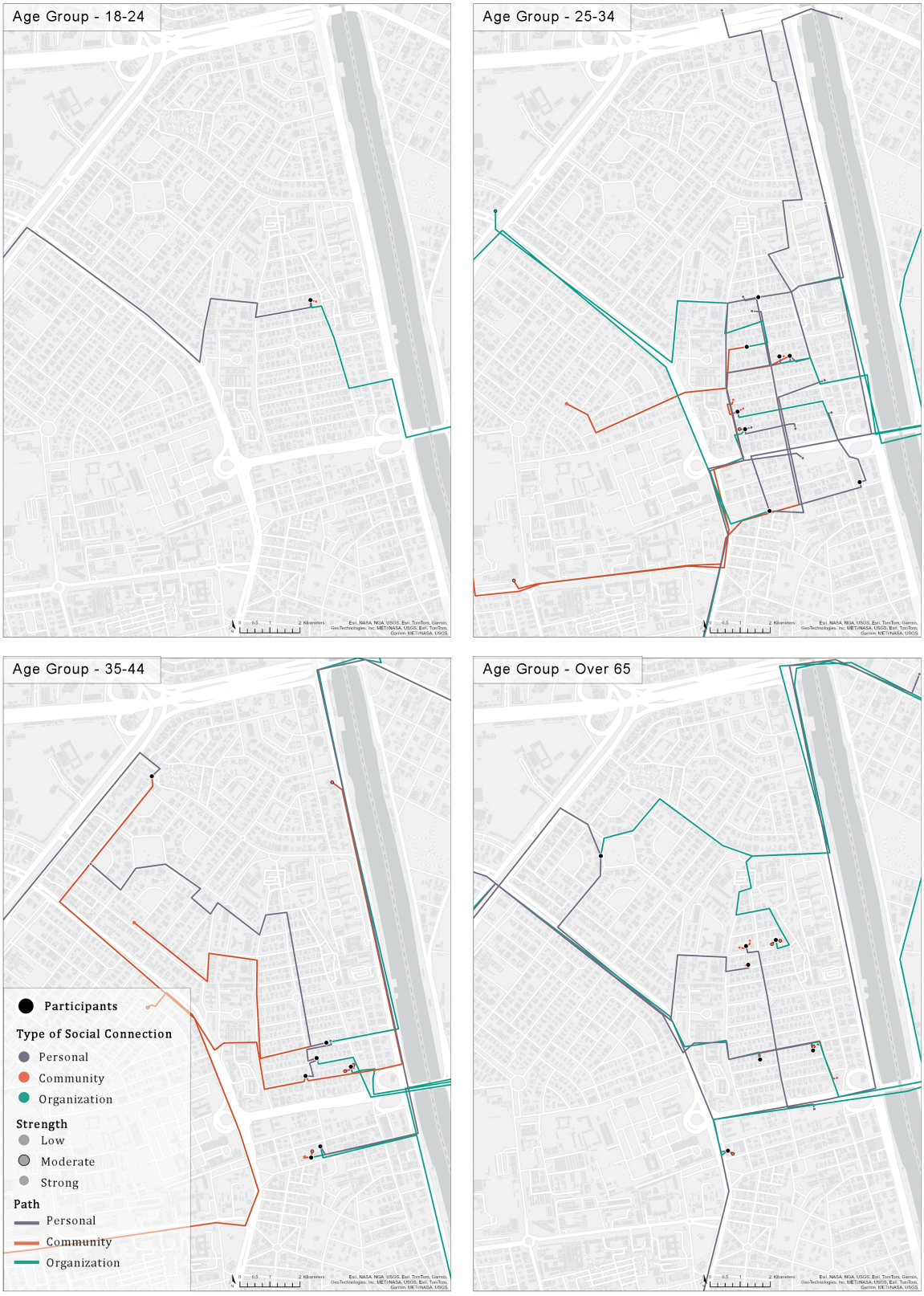


Figure 118 Agouza's Social Network Map (Divided by participants' groups

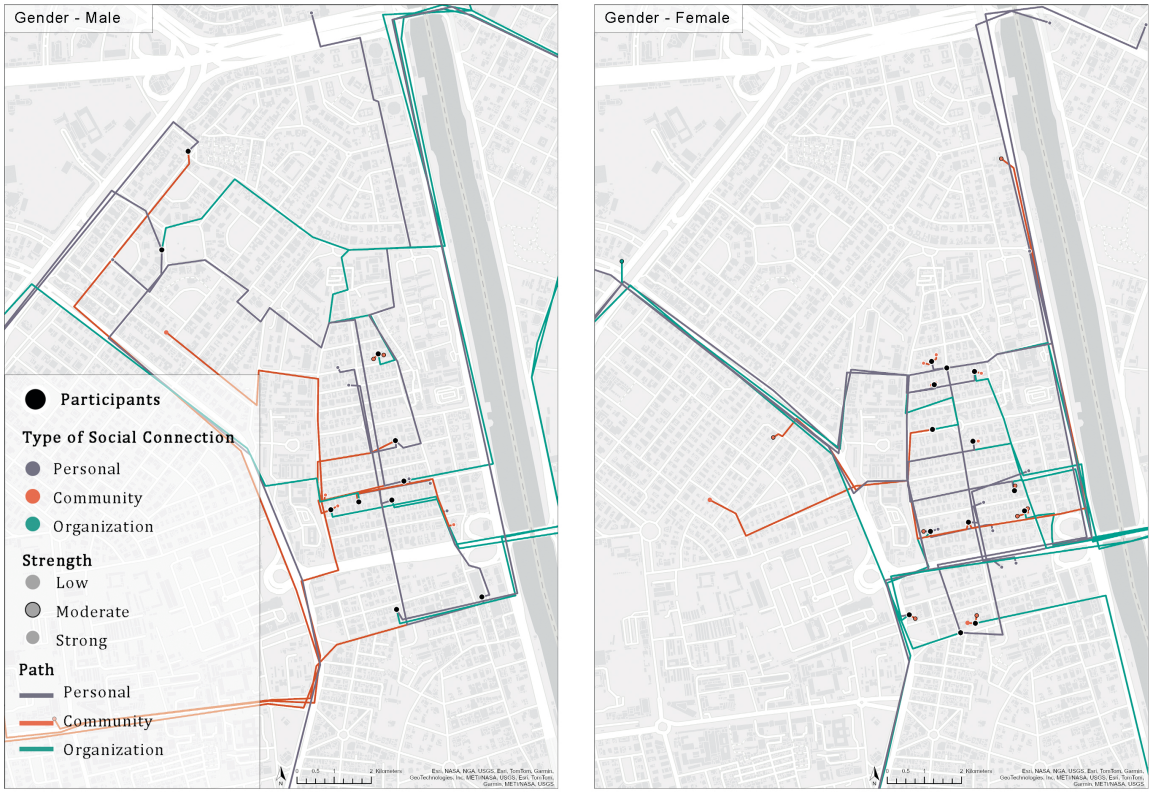


Figure 119 Agouza's Social Network Map (Divided by participants' groups



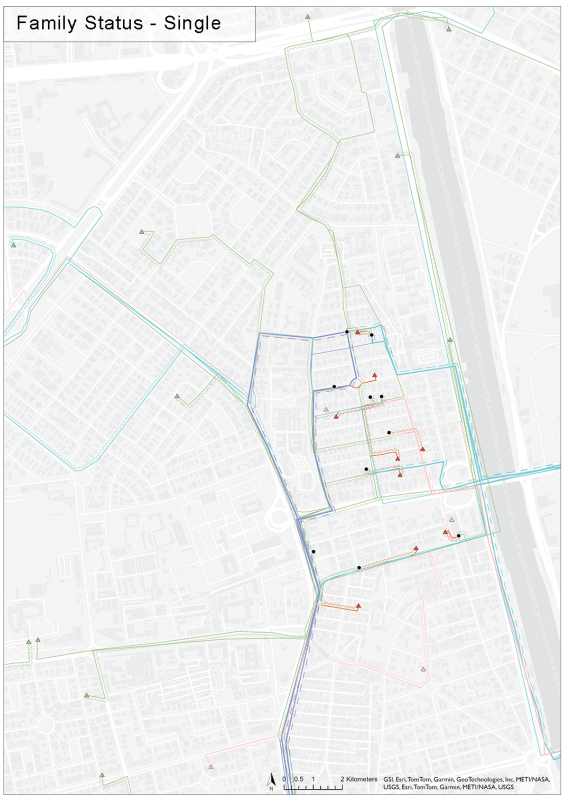
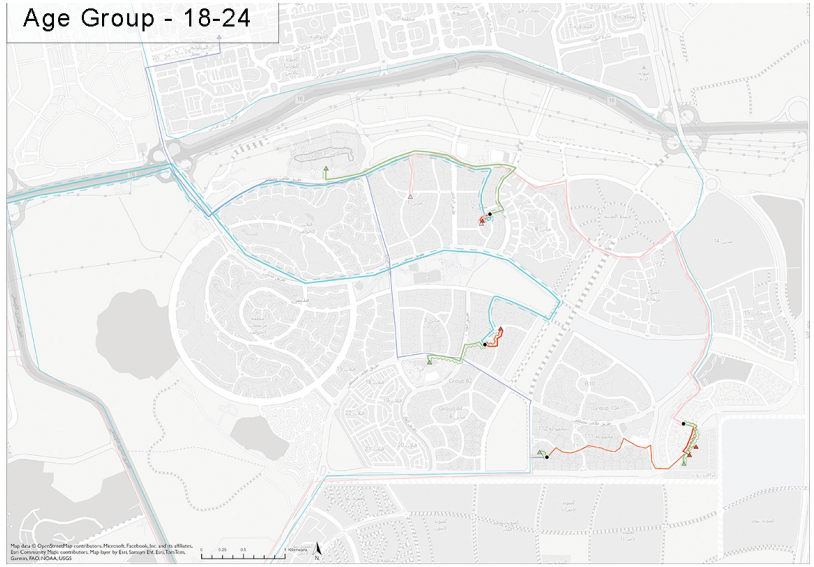
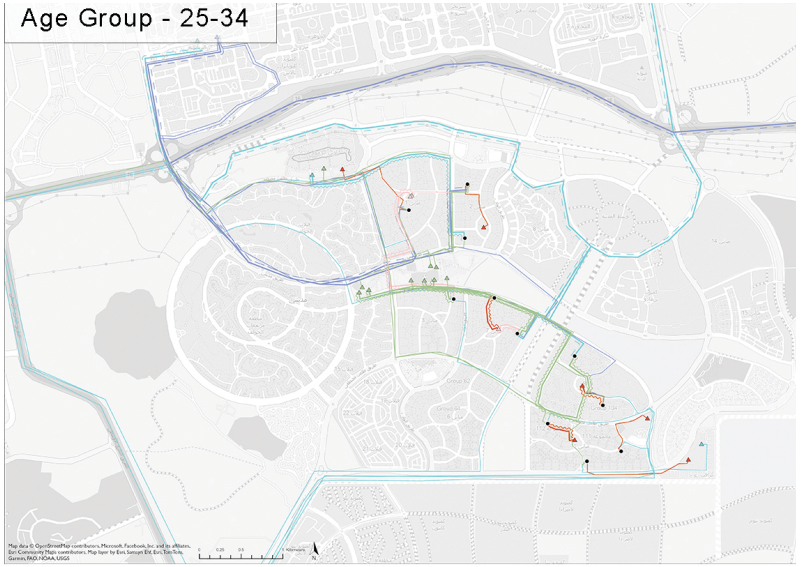
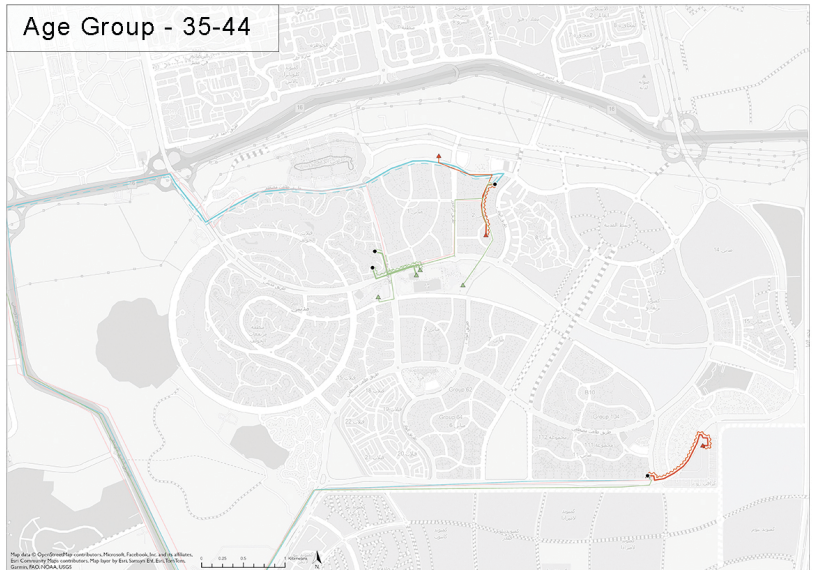
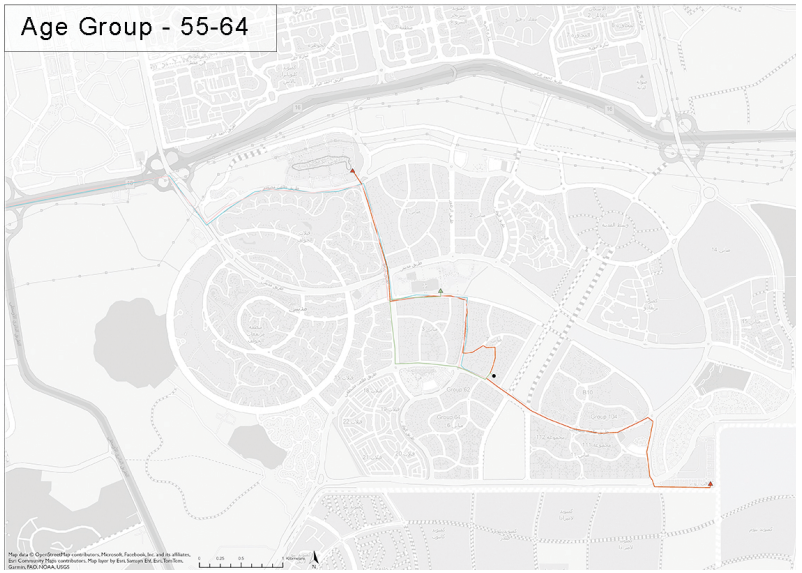


Figure 120 Mobility Experiences Maps (Divided by participants' groups)









Appendix 11: Groups Social Network Maps - Madinaty

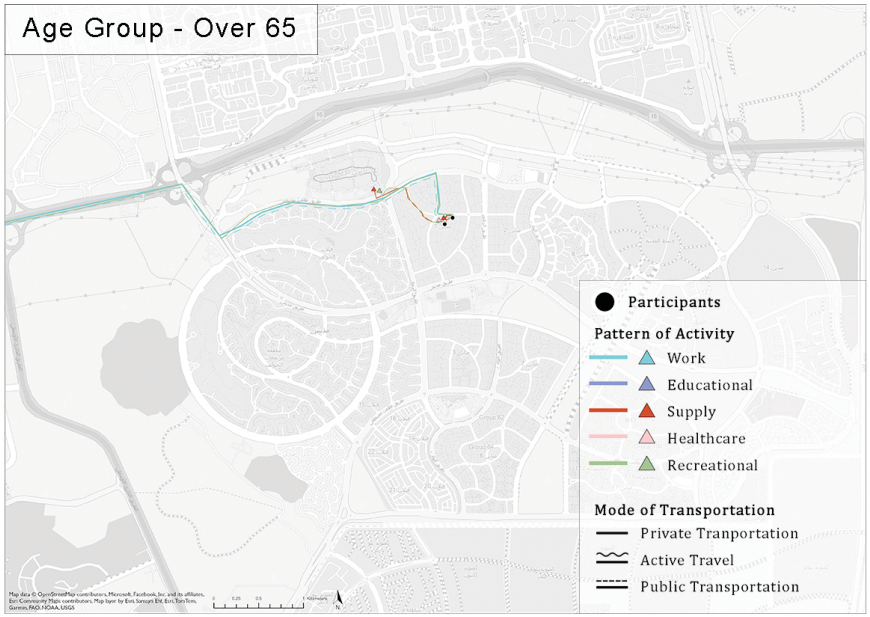


Figure 121 Mobility Experiences Maps (Divided by participants' groups)

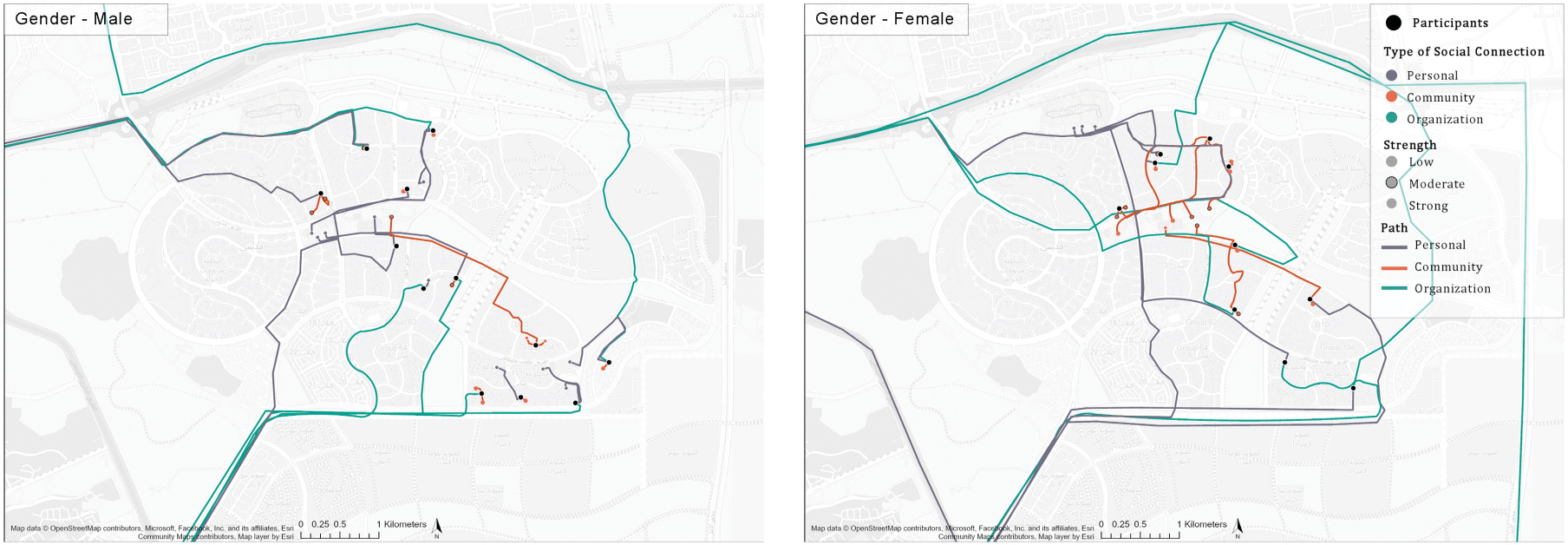


Figure 122 Madinaty's Social Network Map (Divided by participants' groups)



Figure 123 Madinaty's Social Network Map (Divided by participants' groups)



Figure 124 Badya's Social Network Map (Divided by participants' groups)

Appendix 12: Groups Social Network Maps - Badya

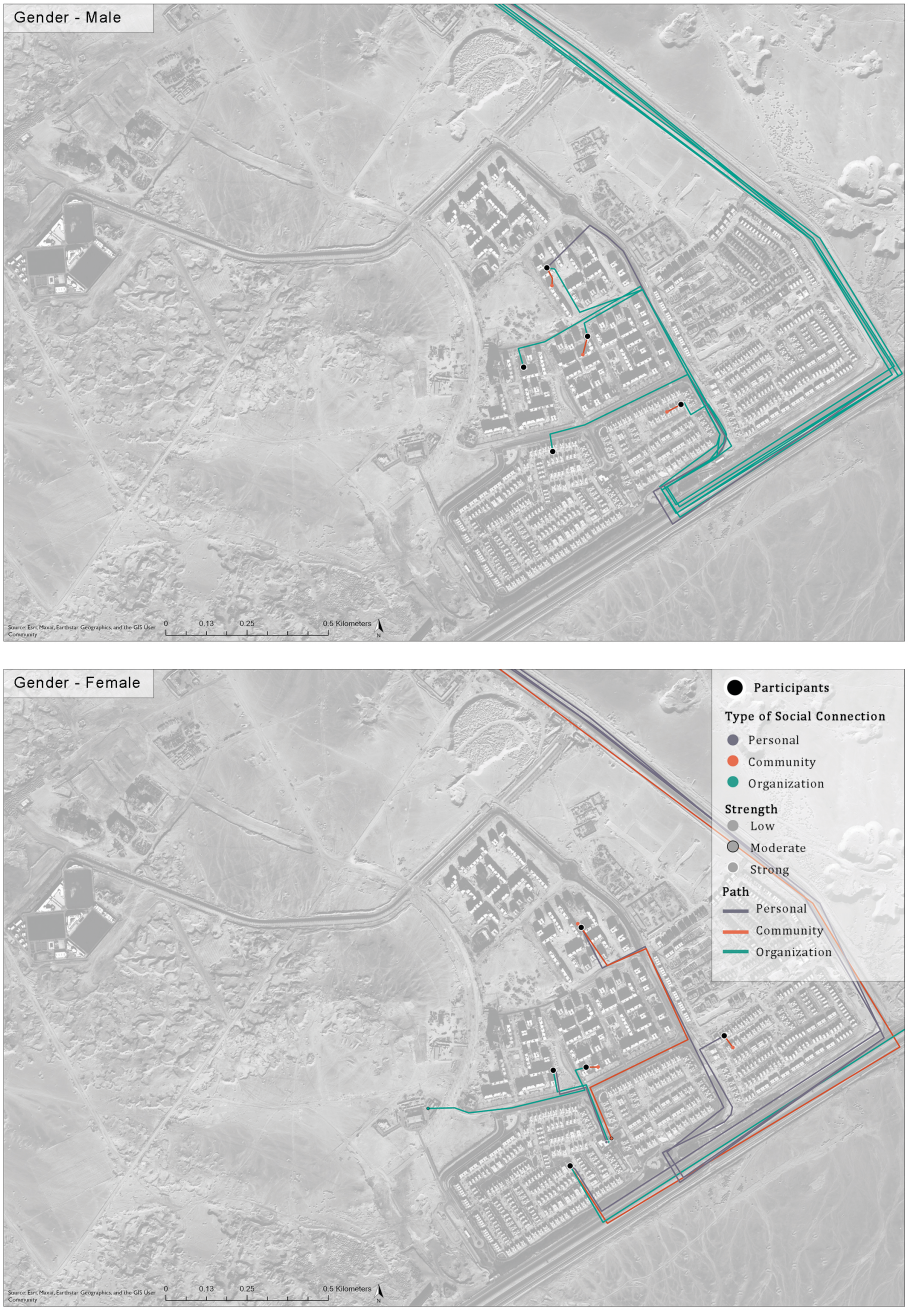


Figure 125 Badya's Social Network Map (Divided by participants' groups)

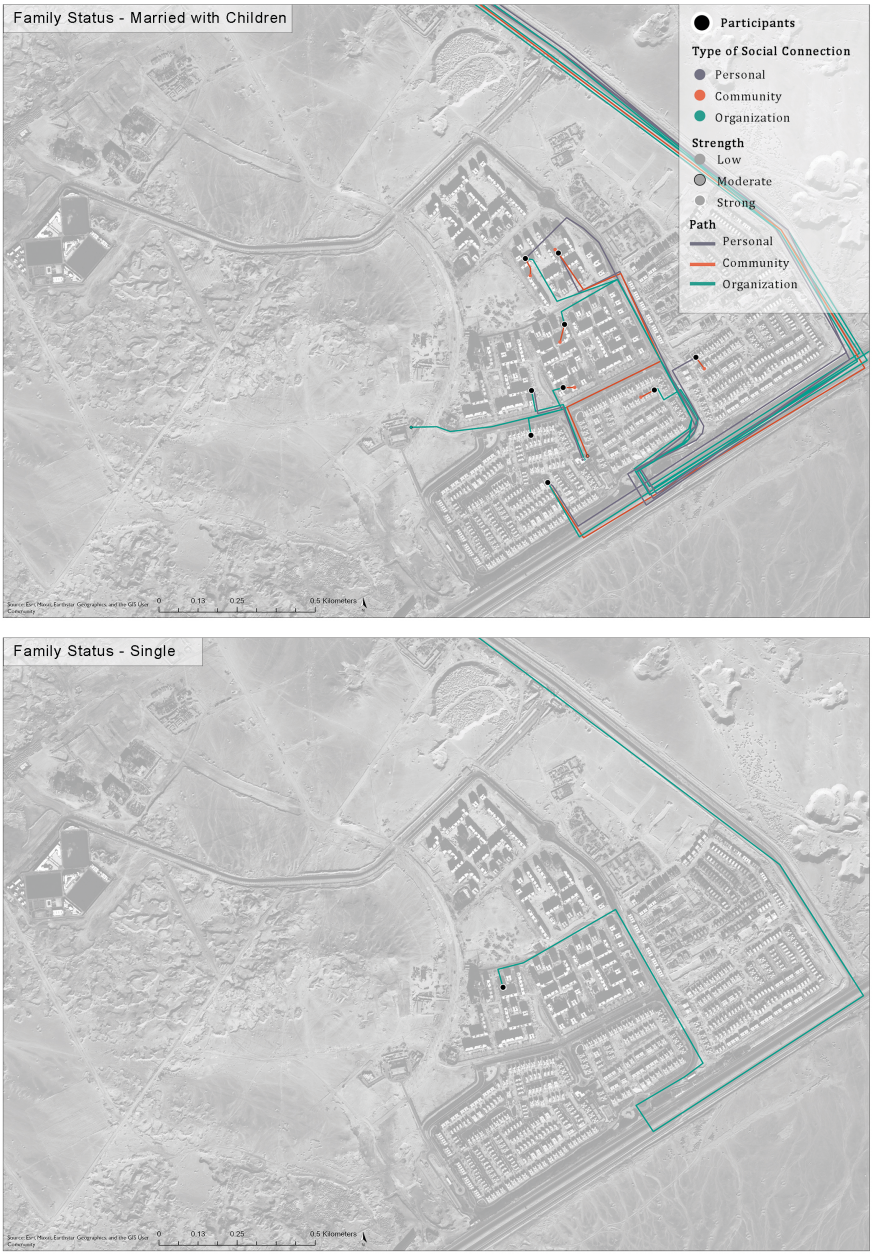


Figure 126 Badya's Social Network Map (Divided by participants' groups)