POLICY PAPER

HELIOPOLIS

THE STATE OF PEDESTRIAN & ACTIVE MOBILITY INFRASTRUCTURE

FRIEDRICH EBERT STIFTUNG

Nada
The NADA foundation for safer Egyptian roads

هليوبوليس
HELIOPOLIS

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ABOUT THE NADA FOUNDATION

An Egyptian non-profit organization established in 2014. Our work focus on making mobility safer and more sustainable by providing science-based solutions and advocating for a rapid, on-scale, and coordinated switch to clean transport, as well as making our communities more walkable, bikeable, and transit-friendly to save lives and save the planet. Our Focal Strategic Priorities:

1. Raise Public Awareness & Mobilize to Act
2. Capacity Building & Empowering Road Users
3. Advocacy & Accountability
4. Networking & Building Partnerships

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In March 2017, a new Additional Protocol was signed in Berlin by both, the Egyptian and the German governments, amending the Cultural Agreement of 1959. This protocol was ratified by the Egyptian parliament in July 2017 and entered effect in November by Presidential Decree 267/2017.
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"الشوارع والأرصفة هى الفراغات العامة لأي مدينة، وتُعتبر أكثر أجزائها حيوية. ماذا يأتي فى أذهاننا عندما نفكر فى أي مدينة؟

شوارعها. الشوارع المتميزة تخلق مدينة جذابة، وكذلك الشوارع الرديئة يقبع خلفها مدينة أكثر رتابة."

(جين جاكوب - كاتبة ومنظرة عمرانية - 1961)

"Streets and their sidewalks, the main public places of a city, are its most vital organs. Think of a city and what comes to mind?

It's streets. If a city's streets look interesting, The city looks interesting; if they look dull, the city looks dull"

(Jane Jacobs – Writer, Urban theorist - 1961)

Source: Photographic postcard of Heliopolis, first half of the 20th Century

Executive Summary

This paper is intended to study the mobility patterns of pedestrians residing in Heliopolis in Cairo by analysing and assessing the supportive underlying infrastructure of the transport system & mobility patterns in the neighbourhood. The study acquires special value as it reflects and coincides with the enormous urban modifications movement and road infrastructure investments that Egypt has been witnessing within recent years. An enormous urban modernization movement within which the 'Greater Cairo region' has captured the largest share of the investments, including its signature project: 'The National Road Project' and public transportation modernization. Due to the plentiful challenges that confront Egyptian cities in general, and which get defined as mainly challenges related to the convenience of the transportation network/system and the spatial communication system (roads & streets), the question that always imposes itself is how can such national projects overcome challenges the transportation system encounters, while not excluding aspects related to sustainability, health, importance of guaranteeing the convenience of the roads modernization projects to local residents' social and economic needs and without ignoring environmental outcomes? Environmental outcomes that are capable of combating the negative impact of climate change, including Egypt's commitment to reduce carbon emissions, a commitment that takes special relevance given that Egypt hosted COP27 in 2022. In addition to the imperativeness of resisting desertification, securing enough shading for pedestrians and curbing the adverse effects stemming from reduced green landscape and green space such as the Heat Island effect.

The main announced objectives of those recent road infrastructure investments were mainly trying to improve transportation, specially mechanised transportation, and reduce traffic congestion, through facilitating car flow, reducing traffic congestion and increasing interconnectedness between cities. In order to strike the appropriate balance towards achieving the before mentioned objective and the optimal objectives of guaranteeing inclusion of local residents' social, economic and health needs, without ignoring environmental and sustainability outcomes, it is imperative, during the implementation of those necessary investments to have: a clear inclusive vision of the value & utility of public space; ensure collaboration and engagement of all sectors that have an interest that could be achieved within the public space (streets) including adopting standards and collective mechanisms which would promote active mobility while guaranteeing highest levels of pedestrian safety within residential areas in general and within big congested cities in particular.

Many of the more contemporary trends in urban development & design underscore the importance of the role of mobility & transportation systems in such settings, framing it as a pivotal focus within sustainable cities. It considers mobility & transportation networks and systems within cities as a fundamental building block of any society. The efficiency and utility of such mobility & transportation networks and systems, vary from one setting to another, from one country to another, as well as from one city to another, and in many instances from one neighbourhood to another. That efficiency and utility is usually evaluated through many indicators, the most important of which are: Diversity of the public transportation means (trains, buses, trams, metro, etc.), as well as the private transportation means such as privately owned vehicles, joint mass transport means (Microbuses, Minibuses, Toktoks, Uber services .. etc) and the critically important sustainable active mobility transportation means such as walking and cycling. Within the same context of evaluating the efficiency & utility of the mobility and transportation systems, other indicators include cost, quality, availability, accessibility, safety and the ease of connecting to several transport means, as well as the different functions of a public space..

In addition sustainable practices aim to achieve a balance between land utility & the multifunctional urban space/environment on the one hand, and transport system & mobility network on the other hand, in order to achieve complementarity among societies, socio-economic classes, ages, among different usage, activities, and functions effectively. To this point, sustainable mobility & transportation, as a model, aims to achieve the United Nations' Sustainable Development Goals (SDGs) by integrating and interlinking the environmental and socioeconomic aspects, as well as the transport system and mobility. A system within which active mobility (walking &

cycling) comes as a top priority, including the importance of furnishing an environment, an infrastructure that not only facilitates and protects but also incentivizes active mobility. That importance of active mobility is not only derived from its critical role for individual and public health but as a principal and reliable mean of mobility and fulfilment of personal needs for underserved and vulnerable populations in developing country settings including in many African countries (*UNHABITAT/ITDP, 2019).*

The importance of active mobility, especially walking, within the Egyptian context, can not be underestimated. Not only because walking is a mean for leisure and exercising in a setting that lacks public parks (or are only accessible for those who can afford related fees), but its prominence and significance is derived from being the chief and core mean of mobility and transportation for short trips, when long trips are dependent on motorized transportation. The significance and importance is in addition emphasized when the burden of disease in Egypt is leaning towards non-communicable diseases influenced by rising risk of obesity, hypertension and diabetes. For the majority of the population, especially the vulnerable ones, those essential short walkable trips are usually accomplished entirely on foot even with a challenging or in many instances an absent pedestrian infrastructure. Hence, the walking experience is negatively influenced, discouraged and unsafe.

Generally, assessing the 'walkability' of a street, of a neighbourhood, of a city, as well as the associated walking experience succumbs to multidimensional objective considerations, such as: availability of walkways and sidewalks with appropriate standardised length,width, built with proper materials, interconnected with one another, with safe crossing corridors, without barriers or hindrances, not obstructed or occupied or narrow and accessible to everyone including older people, children or the physically challenged. This study builds on previous projects that include some sort of assessment of the road infrastructure in the Heliopolis neighbourhood. The study that we underwent focuses on active mobility, specially walking as one of the most important means of mobility and transportation supporting sustainable transportation and cities.

The current study attempts to describe and identify the current status of the pedestrian infrastructure, including defining the existing challenges and barriers to walking, with the aim of prescribing and hopefully implementing a model that supports a shift towards more and better active mobility, a diversified system of mobility and transportation, an improved urban environment, attending to the diverse needs of different demographics in Egypt, and ultimately an improved quality of life for Egyptians. The study will provide a set of practical interventions that engages sensibly with the current procedural, physical, political and public policy context.

Targeted audience & stakeholders

This study will serve as an informative, guidance and advocacy document that will be disseminated not only to the public with the aim of elevating the understanding and uses of public space and active mobility and their impact on health, sustainable transportation and cities, economies and climate; but in addition the study will be used to empower all stakeholders across all sectors engaged with health, environment, urban development, sustainability and transportation topics and sectors. Sectors that include government, at all its levels whether executive and legislative; or at the central, governorate or municipality levels. In addition to the private or civil society sectors.

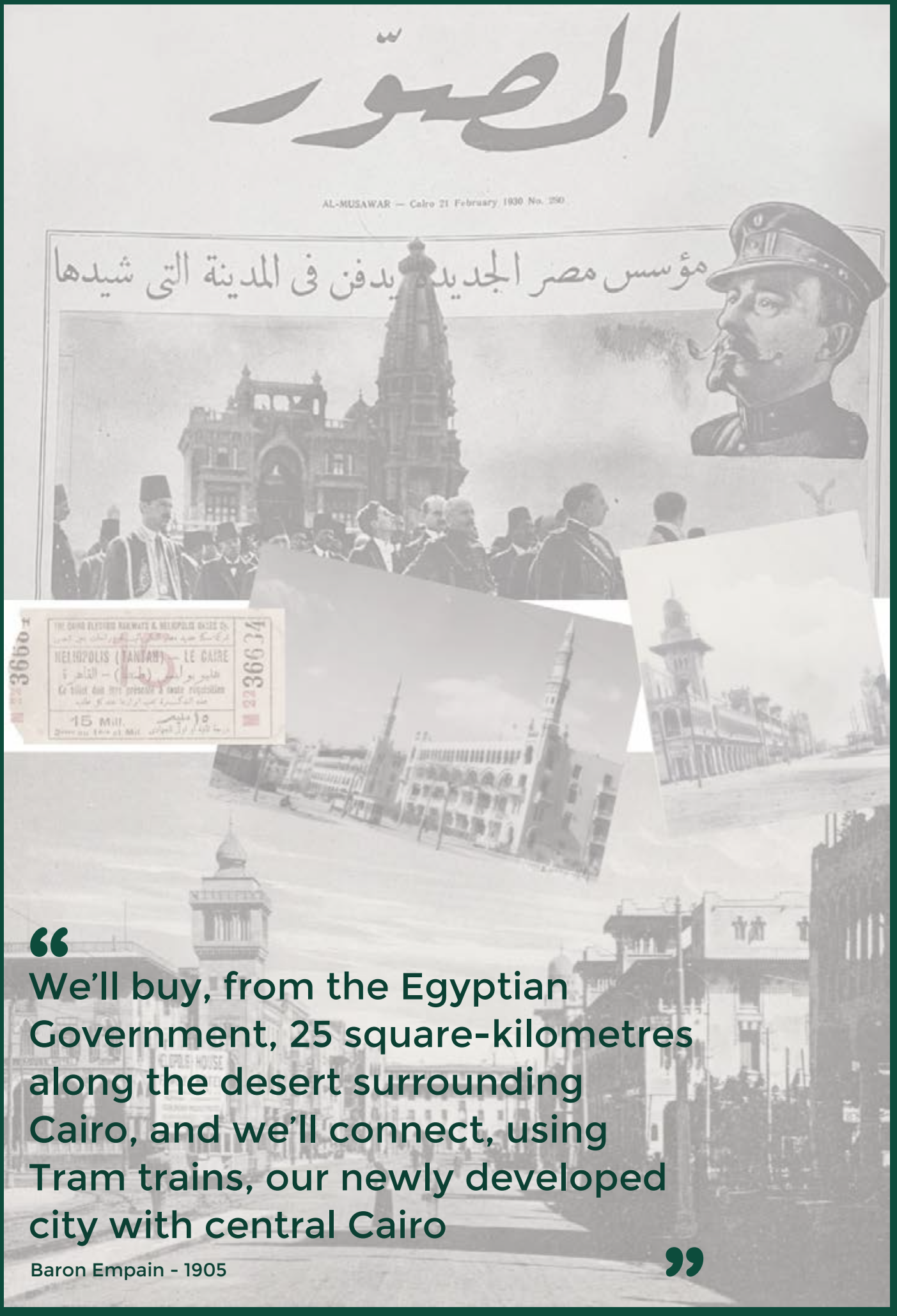
Recommendations

1. Increase investment in the public and mass transport sector and networks to meet the growing demand on transportation means, associated with population growth and urban expansion. This is specially important in light of the relatively low private car-ownership and which is mainly concentrated in Cairo and a handful of big Egyptian cities. Investments need to be coupled with imposing more restrictions on the use of private cars, while guaranteeing efficient, quality, interconnected and integrated public and mass transport with allocated separate lanes, increasing its attractiveness and relative competitiveness versus private car use.
2. Imposing restrictions on roads and streets widening projects (increasing street lanes and speeds), especially within residential areas and inside cities as well as in adjacency of public and mass transport stations such as underground stations. The latter relates to the adverse effects stemming from

the increased supply and accordingly demand on semi (and/or) informal transportation means (microbuses, minibuses, toktoks ..etc). Widening the streets within residential areas presents a significant threat to active mobility and pedestrians, especially with lack of proper sidewalks, safe crossings, and speeding vehicles.

3. Incorporating the concepts of active and sustainable mobility within Egyptian strategies, planning, policies and laws, thus a state institutional approach on all kinds of mobility and transportation systems as well as within urban planning and design. It is also relevant to reconsider reshaping and repositioning of relevant authorities responsible for transportation, urban planning and implementation to create integration and reduce tasks and jurisdiction overlap. The creation of empowered, accountable state institutions that ensure the execution of well designed codes and standards when investing in road/street/sidewalk infrastructure and which includes safety as the highest value is needed.
4. Increase investment in active mobility infrastructure that meet well established, efficient and effective codes, standards and ratings, with a special focus on improving walkability and pedestrian infrastructure in neighbourhoods, spaces and areas that are considered connections between public transportation networks and are transitional stations among public and mass transport means.
5. Applying a low-carbon emission zones policy by posing environmental constraints on old and dilapidated transport means within historical zones as in the case of where the current study was executed, and which was classified as heritage/historical site of distinct value by the National Organization for Urban Harmony and which was approved by the Supreme Council for Planning and Urban Development law no. (119) of 2008 which would enhance the area's ability to support active mobility, walkability and pedestrian-friendly infrastructure.
6. Develop guidelines to address the obstacles that undermine the pedestrian movement in the streets and sidewalks in the Egyptian cities, with the redesign of traffic intersections to ensure the ease of crossing and the continuity of pedestrian movement instead of automated transportation (the study area as an example), in parallel with the imposition of restrictions on the speed of cars, especially in the late night hours.
7. Develop guidelines for the basic infrastructure (roads and streets) according to the nature and context of each city/region separately, with the need for integration between the guides and engineering codes issued by different entities, such as the Guide to Standards for Coordination of Road Elements, issued by the National Center for Housing and Building Research, and the foundations and standards for coordination Civilization of Heritage Areas, issued by the National Organization for Urban Harmony (the study area as an example), and not based on broad standards that are applied to all Egyptian cities without taking into account the context and challenges of each city/region separately.
8. Improve the planning of sustainable mobility and transportation at the local/neighbourhood/municipality level is the key towards improving walkability and active mobility and complementing more sustainable transportation projects. The planning and execution of such projects needs to be implemented by well trained and specialized expertise with specialized units with local governments. The planning needs to take into consideration future needs and aspirations and which should integrate active mobility into those aspirations and plans given they are the most efficient and sustainable mobility patterns.
9. Consolidating the technical capabilities for local municipalities and local administrative employees by providing periodic capacity-building programs. This should be in tandem with revisiting the use of local allocations in favour of supporting non-motorized or active mobility and travelling (walking and cycling). Furthermore, the role of The National Organization for Urban Harmony should be activated due to its promising potential to improve the urban environment in heritage and historical areas.
10. Reconsidering the demand for "parking slots" while enacting pricing and codification programs and imposing constraints on vehicles' speed according to the area's specificity and function. The restrictions need to be strongly enforced, especially during late nights when traffic density abates and vehicles' speed rises, thereby increasing the probability of crashes.

11. Paying attention to the assessment and evaluation of the environmental impact of transportation and mobility projects in which these projects' evaluation should assess the public health impact, ecological cost, and carbon tax. Additionally, the quantitative flow of cars and vehicles should not be the only decisive factor during such assessments, by the same token, public and mass transport should be improved to reduce the demand for private car usage and minimize its entwined environmental and health high costs, In addition, the Egyptian code for urban and rural roads needs to be updated to enhance these concepts, as it is a substantial source for creating and renovating Egyptian roads and streets.
12. Collecting accurate and periodic data of mobility by manciples or representatives under the auspices of Land Transport Regulatory Authority LTRA, as its establishment resolution no. (73) in 2019 stipulates. These data are not only deemed as a significant factor in accurately determining the needs, but they also can anticipate the future demand for all transport means and their capacity. Therefore, the excellent point is to coordinate with mobile operators to get data regarding traffic and usage patterns periodically to construct a comprehensive database on active travelling.
13. Developing and upgrading the monitoring and evaluation procedures using efficient digitalized means that empowers local residents and road users to survey changes and obstacles on streets, sidewalks and public spaces, and which would allow for local administrations/municipalities (such as Heliopolis) to supervise and track arising challenges and urban development frequently addressing them in a timely manner. Within that context, pedestrians' infrastructure suffers from continuous deterioration due to the absence of periodic maintenance which springs from the weak management, monitoring and evaluation procedures and mechanisms and the overlap among stakeholders and involved-entities.
14. Enhancing community involvement, with all its sectors and categories, in the modification and development strategies, plans and projects and involving civil society representation in the decision-making process, such as the Heliopolis Heritage initiative.
15. Incorporating active mobility concepts within urban planning laws and regulations and focusing on successful practices and pilot models of designing and planning streets, roads, transportation systems/network, new cities and suburbs. Pilot models allow for experimentation of simple efficient interventions that are assessed for the different criteria mentioned along the above recommendations and which could be replicated if successful.



“We’ll buy, from the Egyptian Government, 25 square-kilometres along the desert surrounding Cairo, and we’ll connect, using Tram trains, our newly developed city with central Cairo”

Baron Empain - 1905

Introduction

Pedestrian infrastructure from a public health perspective:

Roaming around Cairo streets and major Egyptian cities, or listening or watching heard or watched media, you can not help but notice the increasing number of clinics, doctors, treatment centres, medicines, and prescriptions that market and promise an effective remedy for obesity problems, high blood pressure, asthma, and heart disease challenges. The anecdote is similar when it comes to the increasing advertising on streets, tv and social media platforms promoting extravagant, isolated, walled communities and housing compounds, isolated and secluded from the polluted, crowded and congested city. All these lavish compounds promise their buyers better standards of living. They are marketed by spacious landscapes, low traffic, low pollution, and above all, year-round flourished gardens with enormous green views, in which happy people can easily run and promenade within these luxuriant areas.

In that regard, a critical question imposes itself: What is it that contributes significantly to the spread of such individual and public health challenges, as well as the growing supply of quality of life-related services?

Figure (1): Top image, huge advertising banners on the October Bridge in Cairo for real estate marketing to one of the luxurious residential resorts in eastern Cairo (https://insiteooh.com). Bottom image, a huge advertising banner on one of the highways in Cairo marketing to one of the medical laboratories (same source).

Active mobility and public health:

Active mobility implies movement and or transportation via non-motorized means, and which significantly depends on human physical activity but is not confined to walking and cycling [1]. Generally, pedestrians are defined as persons whose main means of transportation is on foot. This definition has been expanded recently to include those using wheelchairs or assistive devices [2]. Generally, people do not walk or use any other non-motorized transport means unless it is a more cost-effective means of transportation; instead, people use these means as a transitional phase or as a connecting mean among several other motorized public, and mass transport means. This is specially the case in our modern urbanized world where cities have grown significantly and urban functions have become so complex and far apart that it is impossible to reach destinations without using both walking and other motorized means. This is called "First and Last mile trips," in which persons move on foot from their homes/offices/shops toward bus stations or main roads, and vice versa. In addition to the physical role of walking, an easy and not physically demanding activity, the literature concludes a direct and significant correlation between movement or active mobility and travel as a part of personal behavior or pattern and its positive impact on the health of individuals and societies. Hence, walking or on-foot activity reduces obesity, diabetes, as well as cardiovascular and heart diseases incidence and prevalence [3,4,5].

As a physical activity, walking results in low-obesity rates and a lower probability of high blood pressure and diabetes ratios [6,7]. A study that assessed the relationship between the number of daily steps and average rates of mortality from all causes shows persons aged over 65 years and who walked 10.000 steps per day have significantly lower mortality rates in comparison to those who walk 2.000 steps on average daily (12 per 1000 versus 78 per 1000) [8].

Despite the noticeable medical progress, availability and accessibility of vaccines, and limited spread of contagious disease, there are growing numbers of non-communicable diseases among Egyptians who also show an alarming rise in overweight incidence &

1 Children's Active Transportation. Elsevier. 2018.
2 Lo, R. H.Walkability: what Is it?. J. Urbanism: Int. Res. Placemaking Urban Sustainability.

prevalence over the last several decades. In the same context, the latest statistics from the World Health Organization (WHO) show that Egyptians are among the world's top five most overweight nations. [9] Unfortunately, the noticeable spread of the obesity "pandemic" is not only among adults, but has been impacting young people as well. Being overweight and obese increases the risk of cancer, heart disease, stroke, high blood pressure, arthritis, and many other diseases. [10,11] In addition, obese individuals are vulnerable 40 times more than a no-obese ones to developing non-communicable diseases; [12] it reduces life expectancy and quality of life by up to 14 years if they suffer from such illnesses before 40 years of age [13] . Besides the spread of non-communicable diseases (blood pressure, diabetes, heart disease, and so forth), deaths and injuries related to road traffic crashes have topped news headlines and social media platforms. In this regard, it is difficult to ignore the psychological, economic, and social aggregate losses of the whole society. According to CAPMAS, around 19 Egyptians die on average from traffic crashes. Every 75 minutes, an Egyptian family is informed that one of the family members lost their life because of a traffic accident somewhere, besides hundreds of injured daily. As a result, many of them are added to persons with permanent disabilities and hindered from continuing their everyday lives.

3 Hu, F. B., Sigal, R. J., Rich-Edwards, J. W., Colditz, G. A., Solomon, C. G., Willett, W. C. Walking Compared with Vigorous Physical Activity and Risk of Type 2 Diabetes in Women.
4 Gregg, E. W., Gerzoff, R. B., Caspersen, C. J., Williamson, D. F., and Narayan. Relationship of Walking to Mortality Among US Adults with Diabetes.
5 Smith, T. C., Wingard, D. L., Smith, B., Kritz-Silverstein, D., and Barrett-Connor. Walking Decreased Risk of Cardiovascular Disease Mortality in Older Adults with Diabetes
6 Sarkar, C., Webster, C., and Gallacher, J.Neighbourhood Walkability and Incidence of Hypertension
7 Howell, N. A., Tu, J. V., Moineddin, R., Chen, H., Chu, A., Hystad, P., et al. Interaction between Neighborhood Walkability and Traffic-Related Air Pollution on Hypertension and Diabetes
8 Saint-Maurice, P. F., Troiano, R. P., Bassett, D. R., Graubard, B. I., Carlson, S. A., Shiroma, E. J., et al. Association of Daily Step Count and Step Intensity with Mortality Among US Adults.
9 https://www.frontiersin.org/articles/10.3389/fpubh.2021.718978
10 Calle EE, Rodriguez C, Walker-Thermond K, Thun MJ. Overweight , obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults.
11 Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity.
12 Hu FB, Manson JE, Stampfer MJ, Colditz G, et al. Diet, lifestyleand the risk of type 2 diabetes mellitus in women.
13 Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson DF. Lifetime risk for diabetes mellitus in the United States.

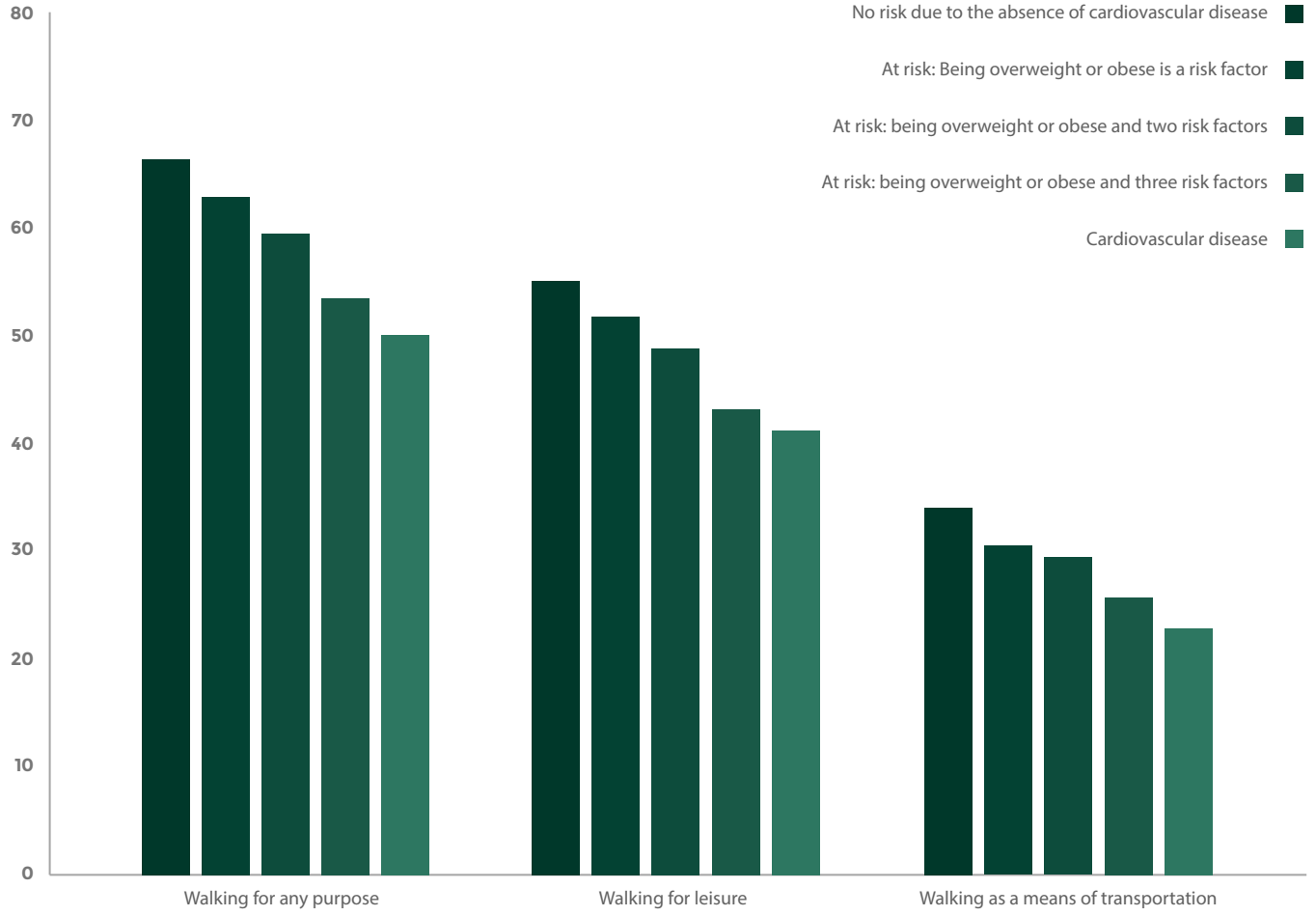


Figure (2): The state of cardiovascular disease, risk factors vary between high blood pressure, or diabetes. Significant linear trends by cardiovascular disease status (P < .05) were observed for either walking, walking for leisure, or walking as a means of transport. (Source: Walking as an Opportunity for Cardiovascular Disease Prevention)

Key Concepts

Mobility

As a definition, "Mobility" is different from "transport." The latter comprises motorized means only, while "mobility" includes both automated ones such as (trains, buses, trams, buses, private cars, vans, etc.) a as well as non-motorized means, known as active mobility or travelling, including walking and cycling.[14]

Active Mobility (Walking and Cycling)

Pedestrians are those who move on foot from one point to another or from one place to another, in which a journey usually is short and takes the lesser time within the whole trip. Over the past two to three decades, major cities around the world have worked towards supporting and incentivizing the concept of active mobility as one of the most sustainable and effective transport alternatives in comparison with motorized ones. In order to achieve that objective, those major cities have invested significant resources improving public infrastructure and related facilities that would support such a shift, including securing the safety and comfort of pedestrians and cyclists. Accordingly, such trends in designing mobility systems have become an effective and efficient model for sustainable cities and sustainable mobility, where public space and streets are dedicated primarily in the following order of priority: pedestrians, cyclists, users of different public buses, and finally, private vehicle drivers. This hierarchical order is designed to simultaneously guarantee just and effective use of streets.[15]

Streets and Roads

By definition, roads are the cornerstone infrastructure linking two specific destinations between regions, municipalities, and cities. On the other hand streets, the largest continuous network of public space, are those public spaces within cities, towns and neighborhoods, whether urban or rural. According to the United Nations (U.N.), streets are defined as a linking system within cities, while roads are a linking system among cities. The (U.N.) definition distinguishes between "roads" and "streets"; the first has only a functional role in connecting among multi-layers of urban systems. On the other hand, the latter is multi-functional; streets are a physical linkage between suburbs and neighbourhoods, in which streets constitute public spaces and mutual areas that are organized upon the users' different needs. It means that streets should foster the mobility of people, vehicles, goods, and commodities besides being a public space for commercial, cultural, social, and entertaining events.[16]

14, 15, 16 عصام، النقل والتنقل، جدل التحديث والاستدامة في مدينة القاهرة، ECSS.

Figure (3): From right to left, the process of expanding the first ring road around Cairo, a model of regional roads in Egypt, (source: nilefm.com) - Tahrir Street in Dokki district, a model of the main arterial streets in Cairo, (source: egyptianstreets.com) - Al-Gomhoria Street in downtown Cairo, a model of main streets with one direction, (Source: Amr Essam, Fall 2020) - One of the side streets in downtown Cairo, a model of secondary streets of a residential nature, (Source: Amr Essam, Fall 2021)

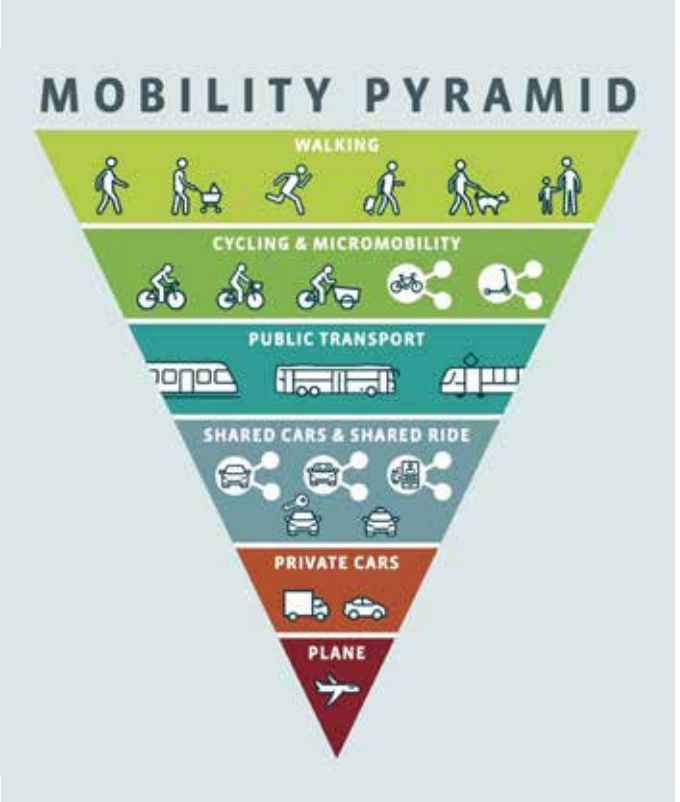


Figure 4: Mechanism for sustainable classification of mobility patterns and means of transportation (source: adapted from share-north.eu)

Historical background (Why Heliopolis?)

In the eastern desert of Cairo, Heliopolis suburb emerged in 1905 after a State concession granted by the Egyptian government to the Belgian businessman, Baron Empain, to establish two residential oases in the middle of the city's desert where the dry climate and lands' reasonable prices adds to its value as an investment. Due to economic pressures at the time, the proposal of establishing the two oases was replaced with only one, that was named (Heliopolis) or the "The City of the Sun," to confer a historical allure to it. Moreover, that area had a historical presence during the Ptolemaic era, in which Heliopolis' land was the location of a University of Philosophy that graduated deans and masters of Greek thought and philosophy, such as Hippocrates, Plato, and Aristotle, as well as genius scholars in medicine, rhetoric, and politics. By that time, Cairo residents there, felt the name, Heliopolis, was hard to pronounce, and accordingly they named it, literary "The New Egypt - Masr El Gedida." [17]

Over time, the Heliopolis or " New Egypt," experience presented itself as a successful pilot model in the planning and development of new cities, where securing a fast and convenient public transport system allowed and encouraged people to visit, reside and work in this relatively far destination neighbourhood. Its transport system's railways were extended for more than 26 Km, increasing the capacity of its surface Tram railway system to transport over 1.5 million passengers annually. In 1914, Heliopolis became one of few cities around the world that had an efficient transportation system; the Heliopolis "Tram surface railway".

As a construction experience story, Heliopolis was inspiring for many reasons; the tram played a pivotal role in the growth and development of the city's construction projects. By the beginning of 1908, two-tram line extensions were established for the town. One was to link the new city with Abasia, which was publicly known as the "White tram"; the second was to connect the new town with downtown, starting from Galal street, currently known as Emad Elden Street. By mid1910, a new fast tram was established, which was publicly known as "Heliopolis Metro," starting from (Bab El-Hadid Square), Ramses Square presently, to foster the city's accessibility. Over time, the Heliopolis tram was forked into three major lines, named as follows: Al-Nuzha, Al-Mirghani, and Abdel Aziz Fahmy. That tram was fast and worked at punctual scheduled times. Despite the relatively long distance, amid that time, between the tram starting station downtown and Mansheyat Al-Bakry station, approximately 10 km, the "Heliopolis metro" covered this distance in less than fifteen minutes (according to Mercedes Volt). After the tram started operating, that distance was taken less than the time expected, and the trip duration was modified after an crash happened due to high speed. The tram's speed is derived from its separated and lane-independent design far from the street and its vehicles' evolution and diversified appearance, consequently, it was named among Cairenes as the "metro." In addition, new sub-lines were forked, spreading into the new city's streets and areas. Due to its low speed, the new sub-lines did not have separate routes distant from the street, unlike the main lines that connected Heliopolis with downtown; yet, new sub-lines shared lanes with other transport means, creating new streets with multi-patterns of vehicles. These practices have led to new approaches and contemporary theories in planning sustainable mobility within cities. [18]
Generally speaking, the Heliopolis experience balanced the demand for mobility across the city with separate routes at regular times and affordable prices by establishing a fast tram, the "Heliopolis metro", that

externally connected Heliopolis with Cairo, and other lower-speed trams for easy and smooth transport inside the city, besides the unique and complementary urban planning and designing of the city. This planning specialty had largely supported active, on-foot mobility and/or public transport usage; therefore, multi-patterns and modes of sustainable mobility had been created inside the city.

The reason these patterns was sustained was the quality of the streets' design and connectivity between spaces and areas, as well as the reliance on the value and principle of diverse activities and utilities. Despite the design patterns of cities during that time, which was concentrated on aesthetic and morphological aspects, Heliopolis' experience in transport was an innovative application of many theories and practices of planning and urban design that appeared later, especially among those designs targeting integration between transport modes and means and land usage. Over time, and due to economic policy reforms and changes, since the sixties of the twentieth century, Heliopolis has witnessed many transformations and urban mutations; the new city is an integrable entity with a manifest identity and unique persona. Therefore, Heliopolis was included before the end of the new millennium's first decade on The National Organization for Urban Harmony list as one of the areas with distinguished urban and architectural heritage. In this regard, Heliopolis has entered a new wave of development and renovation, one of its remarkable outcomes was the third line of the underground of the greater Cairo metro that connects Heliopolis with downtown. Another result was the renovation of the Heliopolis tram to connect the suburb with new urban communities in East Cairo (this project was not implemented, which unfortunately was followed by the tram's removal).

Throughout the urban expansion and growth over the past few years, radical changes happened in Heliopolis, especially after the announcement of the new administrative capital project in eastern Cairo, followed by the start of the National Project for Roads that aims to facilitate motorized mobility and enhance the traffic flow over greater Cairo. This has been negatively reflected on the urban structure of Heliopolis in general and has reshaped the unique urban fabric of the suburb, only from a functional approach and the convenience level of the old and historical areas of Cairo to access the relatively new constructed spots such as the New Administrative Capital and east Cairo areas.

By the end of the new millennium's second decade, Heliopolis became a sort of a fragmented area sporadically scattered by widened and high-way roads. Despite that, Heliopolis is still one of the most notable vital neighbourhoods in Cairo with high value, not only from a historical perspective but also in relation to its location on the map currently in the urban skeleton of Greater Cairo. Heliopolis is still a connecting point, or a link between extension areas and urban expansion in eastern Cairo and its northern suburbs such as Al-Mataria, Al-Marj, and Ain Shams, as well as other urban extensions such as Nasr city and its periphery. Therefore, Heliopolis has exceptional importance from different perspectives, in which its "function" holds a central factor besides the suburb's history and value.

Figure (5): From the top right corner, the shaded gates for pedestrians at the bottom of a building on Abbas Street, Ibrahim Al-Laqani now (Source: Postal Card), the top left, a map showing the boundaries of the land allocated to the suburb of Heliopolis in the early twentieth century and its relationship to the city of Cairo, (Source: Heliopolis, Rebirth of the City of the Sun, AUC Press), the bottom right, an aerial photograph of the suburb of Heliopolis, in the late 1920s, (same source), on the left, photographic snapshots of the infrastructure of the suburb's streets in the early 20th century (Source: Postal Cards)

17 بدوي، حكايات مصرية، الهيئة العامة للكتاب.
18 عصام، ترام المدينة ومستقبل القاهرة،ECSS.

Methodology

The study followed a comprehensive methodology that was built on five main approaches: Studying and describing the current status, Reviewing the relevant studies & literature and incorporating it within the study, Evaluating the research's field study and residents/visitor survey, and finally, analyzing the general context of public policy of active mobility and travelling projects in Egypt. In addition, the study assesses Heliopolis's administrative and institutional structures and functions.The following figure shows the study's approach and methodology in a diagrammatic detailed manner:

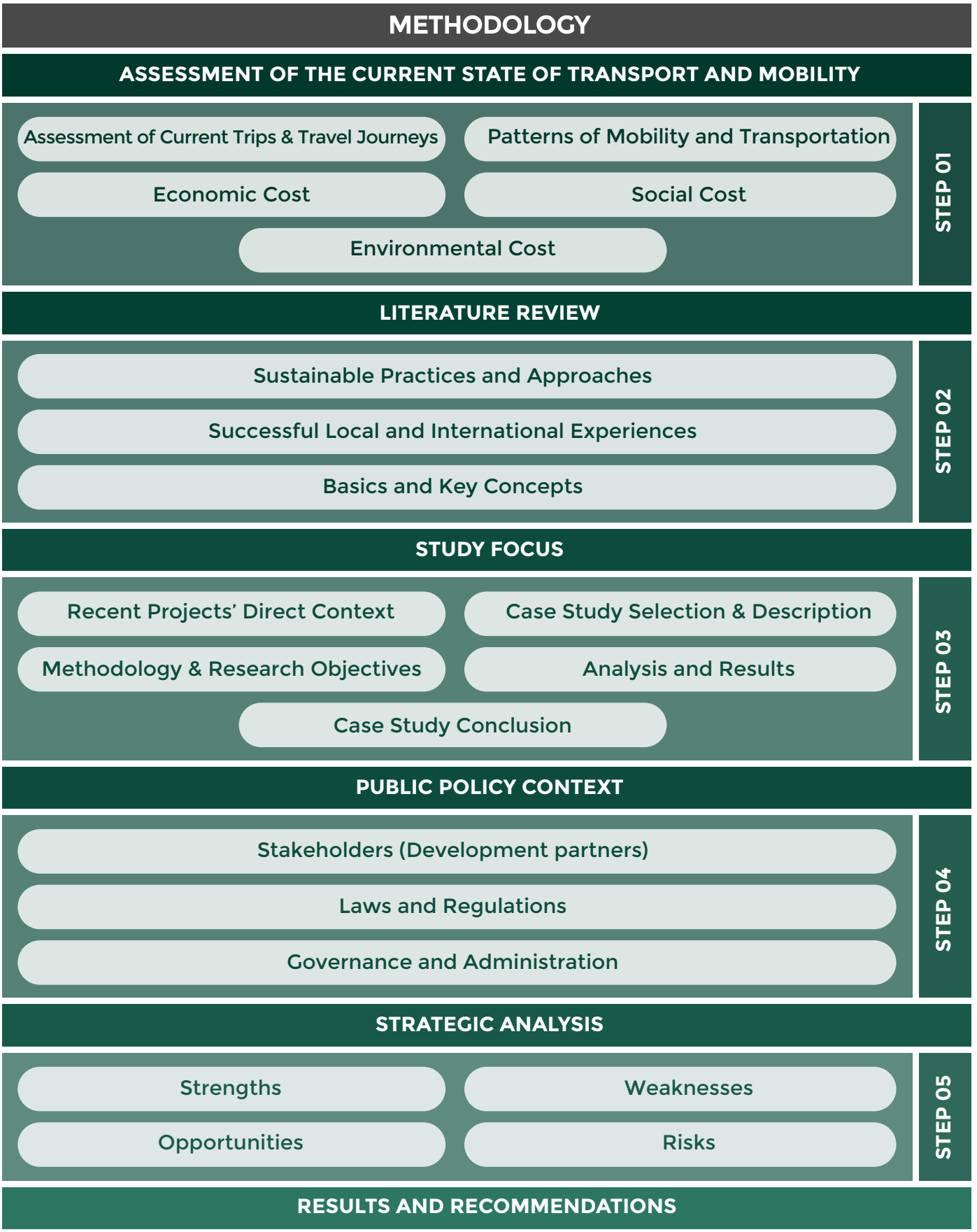


Figure (6): The proposed work methodology for the study (source: authors)

CHAPTER 01

Analysis of the Current Status
Why Address Pedestrian Infrastructure?

Mobility Patterns

Generally, data availability and accessing it is considered one of the significant challenges when attempting to analyze, plan and execute mobility and transportation projects in Egyptian cities, especially when it comes to active mobility/travelling projects (walking and cycling). Aside from Cairo, there isn't a lot of updated data on transportation and mobility for other Egyptian cities. Even for Cairo most data available is gathered and collected through projects executed by consultancy offices. Much less is the data collected periodically and sustainably by governmental institutions.

When it comes to the greater Cairo region, which depends on a mobility system made of combination of official (State owned) public transport systems (such as undergrounds, public transport buses), semi-official (Public/Private and/or Private but state controlled) transport systems (such as microbuses, and shuttle buses), unofficial means (such as tuk-tuk), and privately owned vehicles the proportion of trips undertaken by a motorized means of transportation reached 87%, compared to 13% undertaken by an active mobility mode of transportation (walking and cycling), from a total of 25.6 million daily trips in 2014. Approximately 67% of the 22.4 million daily trips in 2014, were undertaken by a mass transportation system, whether official (such as the underground, buses of The Public Transportation Authority, and private companies); and semi-official means, (such as microbuses and 'Suzukis'). It is relevant to note that 63% of the trips undertaken using a mass mode of transportation is done by semi-official modes of transportation.

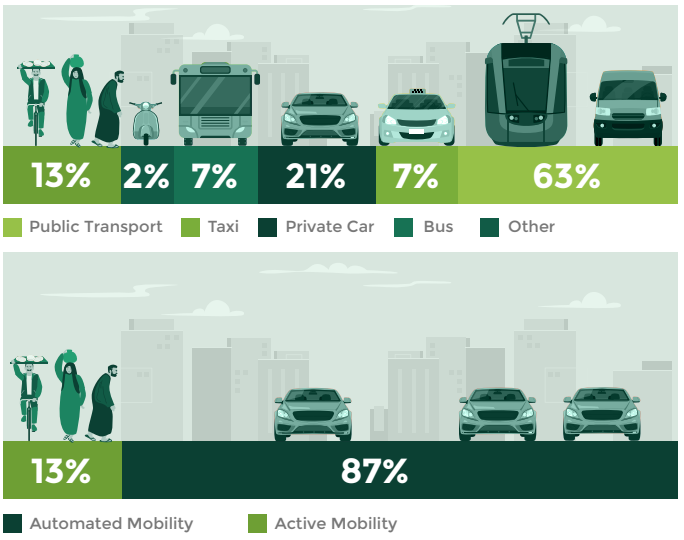


Figure 7: Percentages of trips using different modes of transportation in Greater Cairo in 2014 (Source: the authors - citing CEDARIE)

Travel trip analysis

Historically, "mobility" was not included within a more comprehensive conceptual development context. Instead the metric for measuring the transportation system's effectiveness and efficiency was measured against its capacity to increase traffic flow in a lesser amount of time with less cost. Accordingly the values of speed/velocity and the cost-bearing abilities of trips were mainly targeted. However the more modern mobility paradigms focuses mainly on development as the target and objective, and which are articulated the the U.N.'s Sustainable Development Goals (SDGs), and in particular goal 11.2, which spells out that mobility is not an objective per se; instead, it states: "SDG 11.2 aims that **all citizens will have access to safe, affordable, accessible and sustainable transport** systems by 2030 by expanding public transport. In doing so, special attention must be given to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons. A clear reference to safety, affordability, equity, accessibility and sustainability, that would in turn enhance access to opportunities and services. The sustainable mobility concept implies the ease of reaching a destination by residents with no discrimination, nor physical or economic discrepancy in a way that entrenches fair use of space, and enhances the quality of life. In this regard, the sustainable mobility model prioritizes the use of streets and roads for everyone, including (public, mass, or private transport, bikes, and pedestrians) meaning that the efficient traffic flow of motorized vehicles is not decisive in calibration. [19]

Proceeding from such a context, it is observed that

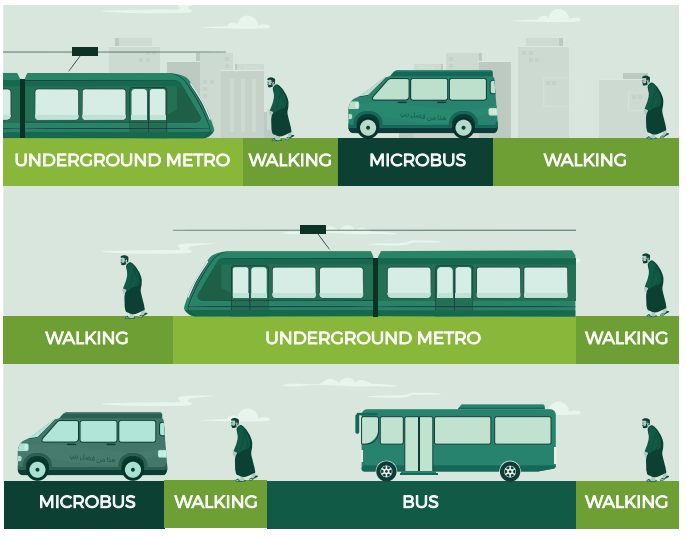


Figure (8): Walking as a transition between different modes of transportation (source: authors)

trips are uneven and different according to the nature and circumstances of each; having said that, all trips start and end by walking which underscores the importance of on-foot mobility as a vital component to be included in the Egyptian cities' mobility system as a connecting link or a transitional phase among several types of transport.

Social Cost

As the SDG goal/target 3.6 implies, the United Nations (U.N.) aims to reduce, globally, by half the number of deaths and injuries resulting from road traffic crashes by 2030. Towards a similar objective, SDG 11.2 emphasizes the importance of ensuring that **all citizens should have access to safe, affordable, accessible and sustainable transport** systems by expanding public transport, with special attention given to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

Within the before mentioned context, it is important to note that even though the official State statistics point to a reduction in the number of fatalities caused by road traffic crashes in Egypt during the past few years, however the incidence of fatalities and injuries caused by crashes is still worryingly high, specially when taking into consideration the proportion of car ownership relative to the overall population, as well as the total number and distance (kilometres) undertaken by Egyptians yearly. Accordingly when prioritizing transportation and mobility policies, it is important to take into consideration the before mentioned context, and which underscores the importance of enhancing pedestrians' infrastructure thus creating diverse options for users and contribute to improving social aspects as follows:

- Reducing the psychological, health, economic and social cost resulting from traffic crashes caused by increased demand for mechanized transportation specially privately owned vehicles lacking safety standards.
- Contributing to the reduction of non-communicable diseases that has been on the rise through active mobility.
- Furnishes secure, safe and comfortables spaces conducive of social networking via walking ensuring inclusion and human diversity inside cities.
- Laying the foundation of social justice and spacious equity through sharing street networks and public spaces without sexual, socio-economic or racial discrimination or physical discrepancies which establishes for justice and coexistence values.

Economic Cost

The association of development, transportation and economics is clearly articulated with the U.N.'s SDGs. SDG 11.2 emphasizes that transport is not an objective per se; instead, availability and accessibility of safe, clean, and affordable transport for everyone, which in turn would allow for accessibility to potential opportunities, services, and utilities is achieved. Similarly SDG 3.6, stipulates the importance of reducing traffic-crash related fatalities and injuries and their direct and indirect economic costs incurred on the individual, the family, society and the country, due to loss of potential productivity and earning, caring for the victims, costs on the health system and more. Furthermore, there are direct economic impacts like reducing trip time between home and workplace, leading to economic productivity, public health enhancement, and GDP increase. Efficiency of the transportation system is also a major contributor when people choose home location, workplace, and service spots, and accordingly define the economic value of real-estate and other related services.

Besides the unacceptable psychological and health costs stemming from traffic crashes, economic losses have enormous and multifaceted effects on individuals, families, and society. For instance, Egypt loses, in the most conservative estimates, around 3-4% of its GDP due to road related fatalities, and severe injuries that cost approximately 15$ billion a year. [20] Hospitalizations, treatment interventions, rehabilitation, and lost economic opportunities due to death or injury, contribute to the economic costs of road traffic crashes, injuries and deaths. Similarly, the economic cost extends beyond the victims to family members who must provide care to the injured, causing additional indirect economic burdens.

Unfortunately Injuries and deaths due to road traffic crashes are not equitable. The economically more challenged, the less fortunate educationally, those living in less affluent neighbourhoods; in other words the most underserved and vulnerable, are more exposed to the more severe injuries of road crashes as well as the higher health, psychological, financial, and

19 عصام، النقل والتنقل، جدل التحديث والاستدامة في مدينة القاهرة، ECSS.
20 Road Safety Opportunities & Challenges, World Bank 2020

economic costs. They thus end up slipping further into more poverty and suffering.
This entails the necessity to include all those variables when prioritizing policies and transportation projects in general but more specifically projects that target improving active mobility.

Environmental Cost

Environmental costs of transport activities inside Egyptian cities are divided along two main clusters:

Air quality

In Egypt, the transport and mobility system is considered one of the highest contributors of air pollution and carbon emission. It is estimated that 26% of the total (P.M.) particulate matter emissions (microscopic pollutant solid particles and liquid droplets in the air) in Greater Cairo alone, is caused by motorized vehicles and thus impacting public health negatively. Air pollution is one of the significant challenges facing Egyptian cities, especially Greater Cairo. In 2017, air-pollution casualties reached 13 thousand only in the capital city. According to The World Health Organization (WHO), the negative health impact of air pollution varies, contributing to many fatal heart and lung diseases. Moreover, fuel quality, particularly diesel, the leading operator for public transport means such as (microbuses), which constitute the most significant percentage of total trips in Egyptian cities, is a long-term problem. Sulphur content reaches 5000 parts per million, which exceeds international standards by 100 times (CEDARIE, 2019).

Carbon emissions contribution to Climate Change

According to the World Bank (W.B.) official figures, the economic cost of carbon emissions in Greater Cairo has reached more than 47 L.E. billion, translated to 1.3% of Egyptian total GDP (Larsen, 2019). That's to say, the transport sector is one of the leading contributors to the carbon emission volume, recording the second largest sector after the energy manufacturing sector, on the list of carbon emissions (EEAA in 2018). Indeed, there are many programs and promising plans to replace diesel with natural gas and increase electric vehicles in Egypt; nevertheless, electricity in Egypt is generated by natural gas-fired stations, resulting in a limited positive effect of electrification of transport means to reduce carbon emission.

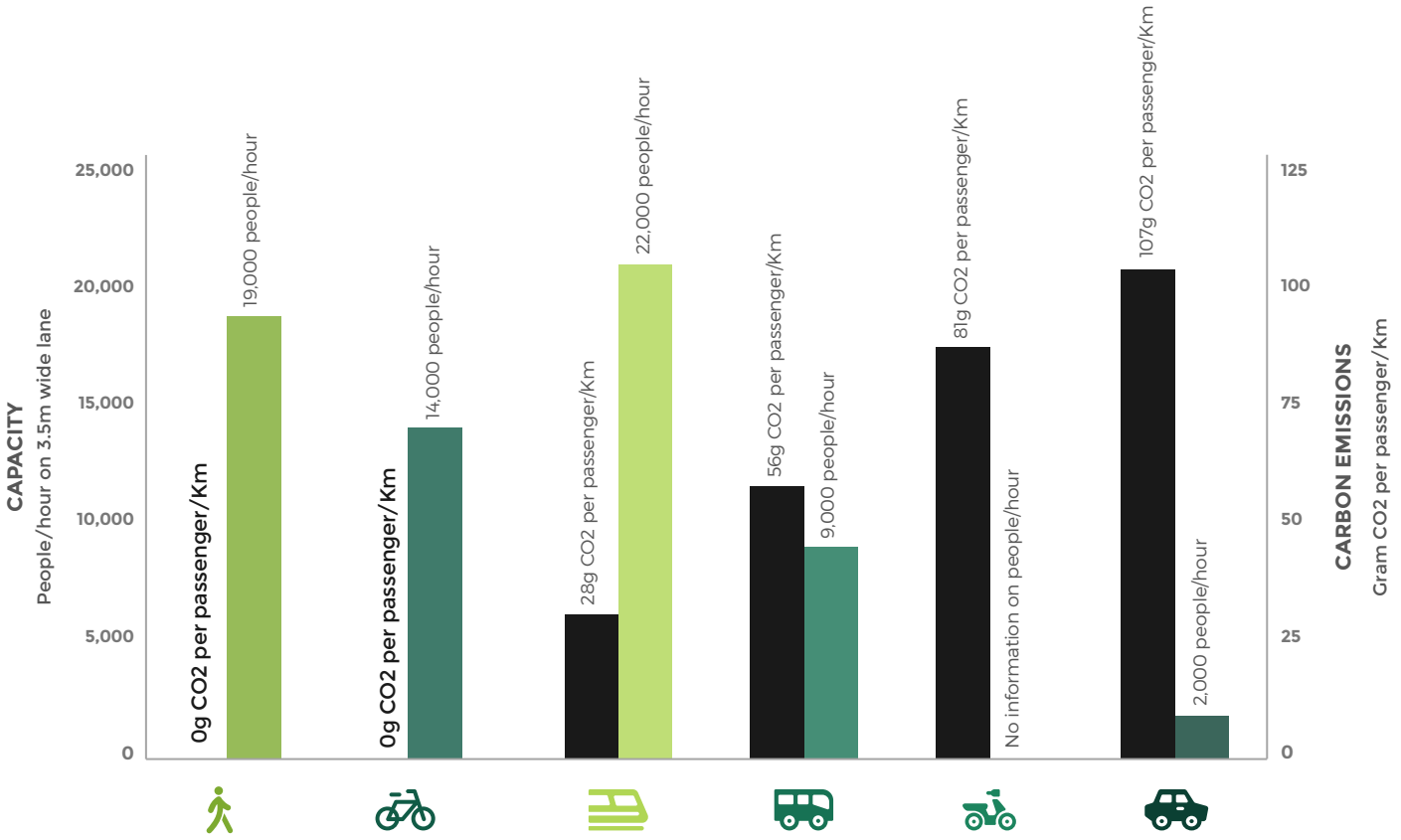
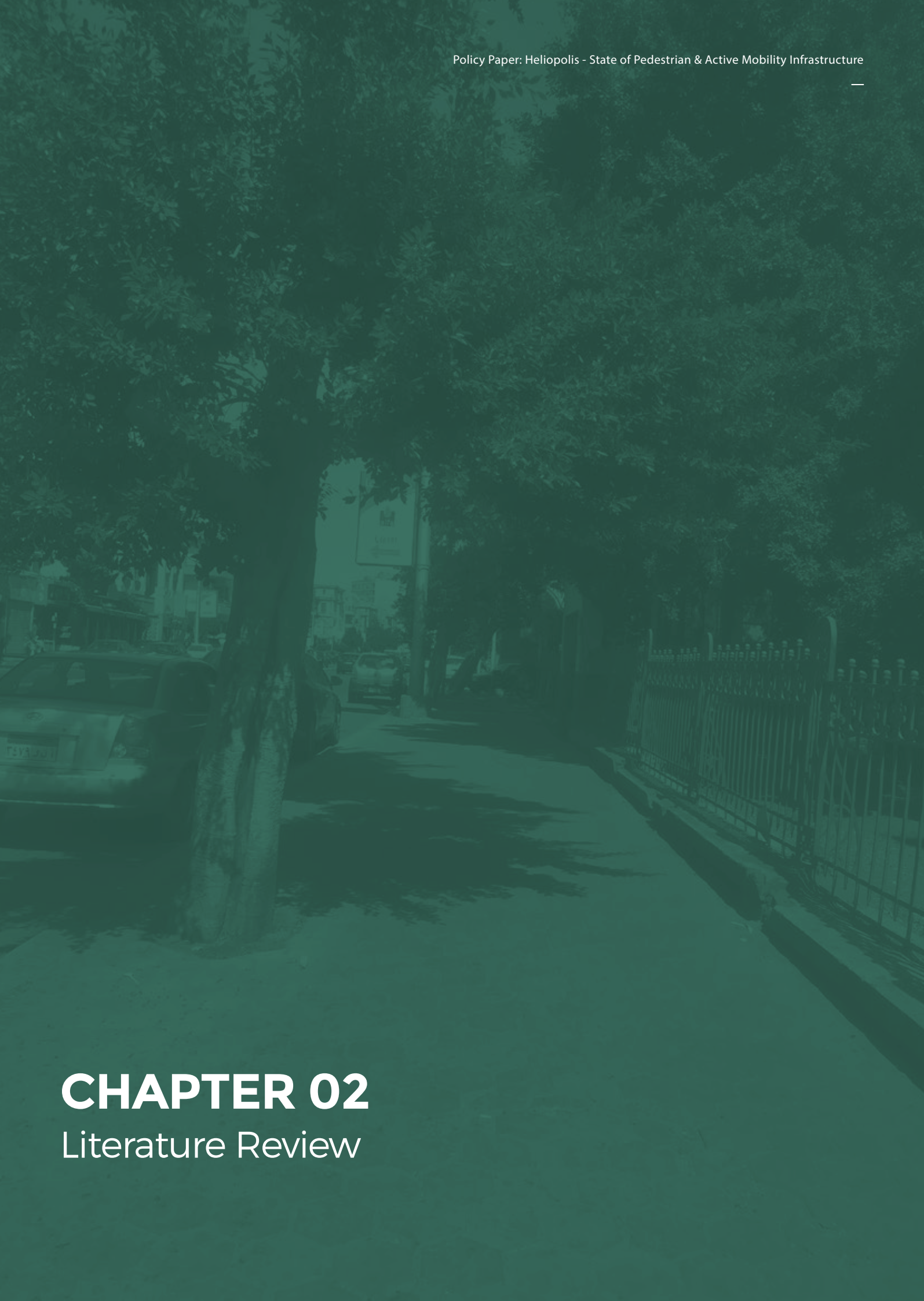


Figure (9): Comparison between different modes of transportation based on the volume of carbon emissions emitted by each mode (source, authors, with quote from Walk21.com)



CHAPTER 02
Literature Review

First: successful local and international experiences:

Active mobility projects are relatively state-of-the-art in Egypt, especially those related to pedestrian walking improvement. However, in the international and local contexts, there are leading practices and projects that can shape an insight stepping-stone for regional and global cities' transforming to use many able paradigms to multiple patterns of active mobility and providing a supportive environment to enhance pedestrians' traffic in historical areas, wether in Cairo or other cities. Also, some Arab countries aim to localize these projects to support transportation towards pedestrian-friendly cities. To achieve such, these projects should be deeply integrated and be attributed to complementary developing strategies. One of which is developing and designing streets based on streets' health indicators that the U.K. approved as one of the essential guidelines for calibrating roads and particular communication networks. These indicators are both subjective and objective as follows:

- Everyone feels welcome.
- Easy to cross.
- Shade and shelter.
- Places to rest and stop.
- Not too noisy.
- People choose to walk and cycle.
- People feel safe.
- Things to see and do.
- People feel relaxed.
- Clean air.

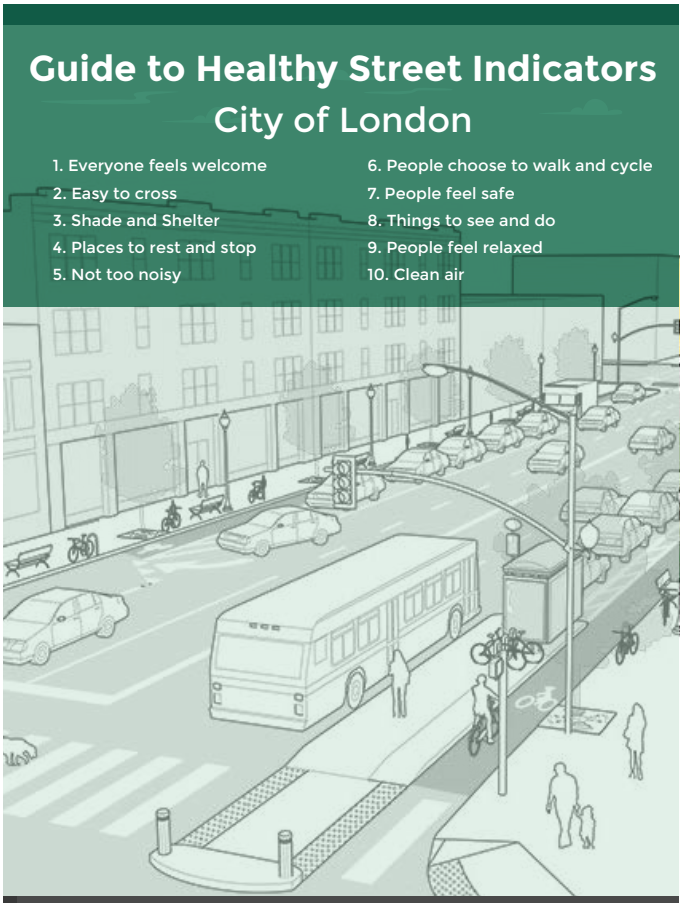
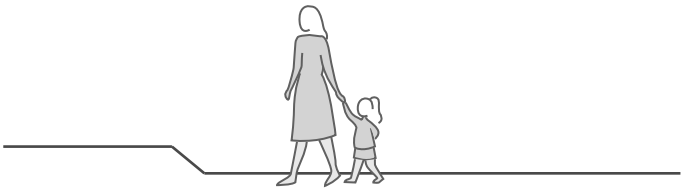
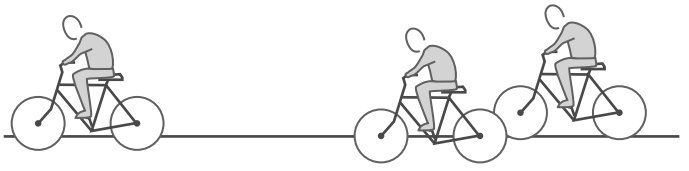
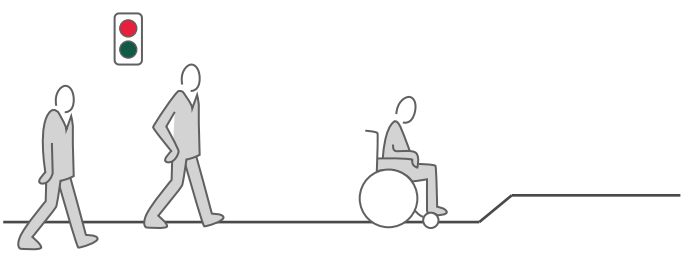


Figure 10: Healthy street indicators for the city of London (source: the authors - citing Guide to healthy streets indicators)







Active mobility enhancement i n Barcelona:

Barcelona, the Spanish city, is characterized by a well-connected and interdependent urban pattern resulting in diverse and substantial public spaces and squares. Due to the motorized transport dominance for many decades, the city suffered from excessive pollution for long periods, high-noise levels, and dense crowding that negatively impacted the city's quality of life. However, during the last few years, Barcelona has designed an ambitious plan to improve mobility to fade the negative impacts of motorized traffic by redesigning a distinctive network fabric of the city into square-shaped parts; each part consists of nine blocks where the priority is given to pedestrians' active mobility and non-motorized means such as bikes, then, priority is given to services and emergency vehicles, eventually, private cars of residents and visitors are given priority besides other motorized transport means such as public transport, vans or otherwise, within the blocks' periphery. Here, the core theme of this project is primarily to reduce pollution and limit motorized transport inside the city by providing more public spaces for pedestrians and cycling besides the existence of automated transport vehicles. This notion is built on the concept of transport patterns' repositioning by imposing some constraints on all motorized transport means. As a result, pedestrians' percentage increases by 10%, and cycling by 10%, while intuitive vehicle usage decreases by 40%. These results come alongside improving pedestrians' infrastructure, interconnected lanes, and passages for sustainable mobility across the city by redesigning and fragmenting blocks on a large scale. Other spectacular outcomes are localizing a set of social activities and services inside blocks' less important and unexploited spaces, including (sitting and rest areas, children's play zones, and so forth). Therefore, public spaces find their way to fold prominently inside almost all aspects of life and improve living standards for inhabitants and city visitors.

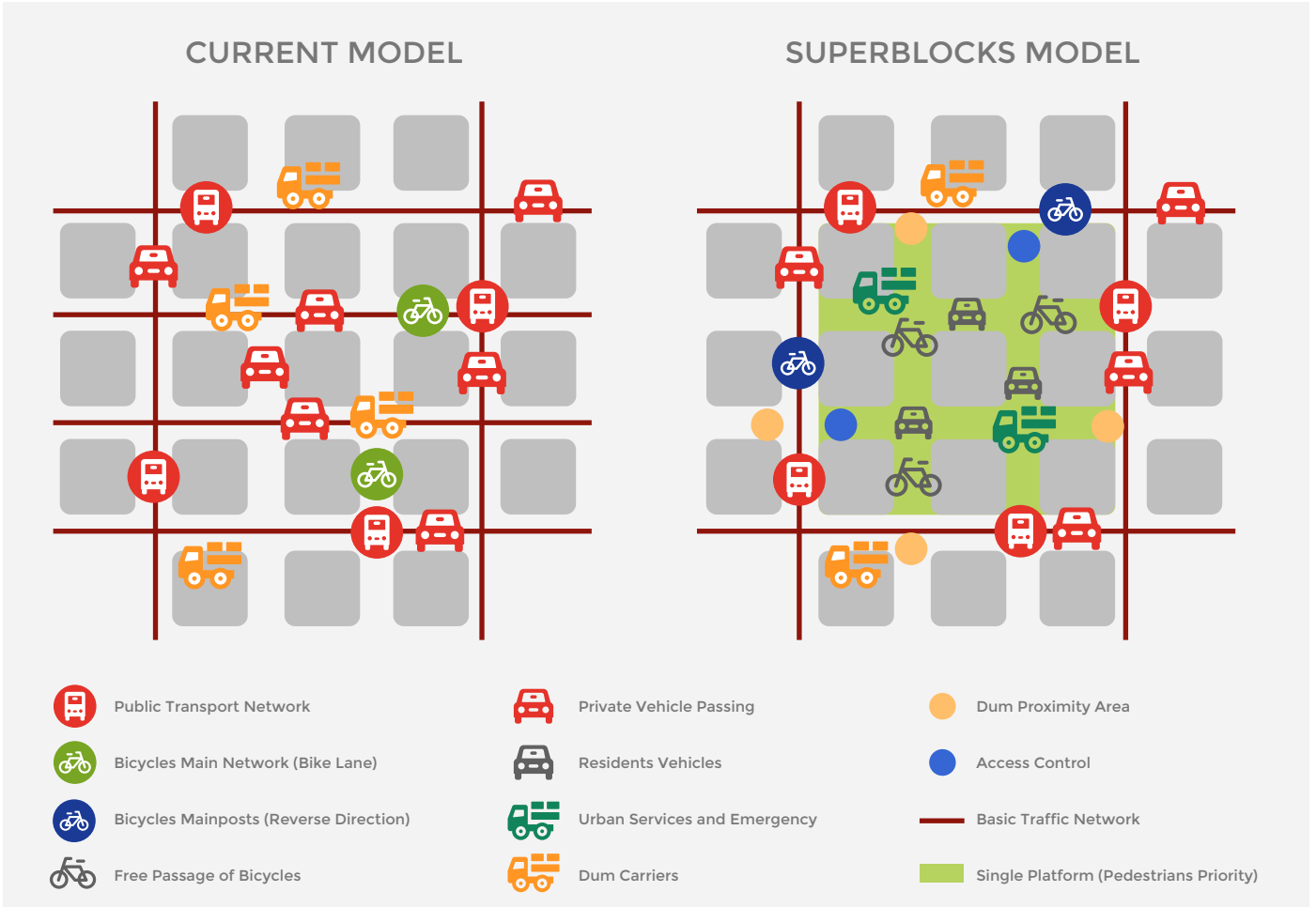


Figure (11): Barcelona City's strategy to improve mobility and enhance pedestrian movement (Source: https://barcelonarchitecturewalks.com/superblocks)

Second: sustainable approaches and practices:

Development literature defines sustainability as seeking continuity and connectivity and the ability of contemporary generations to meet their needs without detracting from upcoming posterities' opportunities to attain the exact requirements. In this context, active mobility projects aim to emphasize available resources and reuse them optimally with no future burden. Revisiting the literature presents a set of concepts and principles to help achieving sustainability in active mobility projects in Egyptian cities. Therefore, active mobility projects should include the following:

- Safety, providing all possible personal and traffic protection by fomenting underlying infrastructure for all ages pedestrians, especially women, the elderly, persons with special needs, and children.
- Accessibility, by fostering access to facilities, goods, and services for all users without any discrimination or inequality in terms of social status, physical discrepancy, or economic cost.
- Integration with other transport means through providing a catalyst for supporting and operating different transport means in mass transportation mechanisms that create an equilibrium between public and private transports. Hence, walking can be integrated.
- Appropriate walking distances by providing linking and continuing walking lanes to enhance on-foot mobility, the most sustainable mobility pattern among workplaces, homes, and service hubs.
- Sustainability paves the way for a healthy environment that can accomplish a good walking experience and enhances pedestrians' mobility, by reducing carbon emissions and noise levels.

Figure (12): The concept of a flexible city, through the ability to provide multiple patterns and alternatives for movement and mobility within the network of streets and public spaces. (source: Sim, David, Soft City Island Press)

Third: basic principles and concepts

Attributing to local and international experiences as well as practices and sustainable approaches, some basic principles and concepts can be identified to enhance walking and improve the underlying infrastructure of pedestrians as follows:

1. Allocating separate lanes for public and mass transport.
2. Protecting and disintegrating walking lanes from motorized transport.
3. Unifying the automated transport lanes in streets.
4. Linking pedestrians' network public and mass transport lines and stations.
5. Removing all walking hindrances that can curb the walking flow or pedestrians' movement continuity.
6. Providing safe pedestrian crossings in intersections and major gathering points.
7. Imposing constraints on car speed according to areas' functions and complexion.
8. Managing demand over parking areas to minimize the use of private cars.
9. Depending on parallel parking patterns instead of vertical, inclined ones.
10. Imposing environmental constraints over carbon emissions to improve air quality required for walking.
11. Changing unexploited and neglected spaces into multi-functional open areas.
12. Balancing between different types of land purposes by enhancing multi-functional street patterns.
13. Designing walking lanes according to standard dimensions for development, especially lightning and afforestation.
14. Designing streets' crossing intersections to enable pedestrians continuous movement while decreasing cars speed.
15. Taking into consideration the geographical context and local specificity by integrating social consideration within development concepts.

CHAPTER 03
Study Focus

Case Study selection and description

The study research team decided to choose one of Heliopolis' neighbourhoods, for its study, in an area which is bordered by the following streets: Al-Ahram, Othman bin Affan, Abu Bakr Al-Siddiq and Haroun Al-Rashid for many reasons. Importantly is, the significance and richness of the area from many angles. Historically, the area was the cornerstone of early transport projects such as the Heliopolis tram. Second, the site had and has a supporting infrastructure for active mobility, especially walking. Third, modern subway/metro lines have been extended to reach the area of the study through two main points, Al-Ahram and Haroun Al-Rashid metro stations operating within the third line of the greater Cairo subway network. Accordingly, the area of study possesses the potential to welcome pedestrians and public/private transport users.

Fourth, the site has many commercial, entertaining and attractive elements, allowing for multi-use and high frequency of visits by residents or outside visitors. For instance, commercial and entertainment elements such as famous-brand shops prevail in streets with specific divisions inside the area, and local and international restaurants.

Fifth, the traditional character of the area, which is still preserved in Heliopolis in general, including incorporating the Heliopolis neighbourhoods among Egypt's urban and architectural heritage areas. Also, the area of study has been added under category A [21] : the maximum protection. These efforts and procedures have enticed more visitors to the site.

Moreover, there is an exceptional and immediate importance for the area of study as Heliopolis is included in urban recent projects and plans that have been performed faster since 2019. [22] These projects and programs cover Nasr city neighbourhoods in eastern Cairo and other areas in the west of the city, especially the ones bordered by the ring road city to facilitate traffic flow by constructing overhead bridges, widening streets and roads, as well as redesigning several streets that ended up reshaping the many areas in the neighbourhood.

The researchers' field study and monitoring in the current study observed the following:

1. Al-Ahram street has been widened to be 30 meters to serve motorized vehicles and transportation, including a central island that was reduced from 20 meters to 4 meters, now serving vehicles; with another middle island 14 meters wide to accomodate a sidewalk and Tram stations stops. [23]
2. Abou Bakr Al-Siddiq street has been widened to 55 meters, also to serve motorized vehicles, while reducing the width of the central pedestrian island from 29 meters to 4 meters, to accommodate pedestrians and Tram station stops.
3. Construction of 'Safir' bridge/fly-over above 'Safir' square, as well as constructing the 'Hijaz' Bridge /fly-over(above Court Square after its removal), and 'Al-Nuzha' Bridge/fly-over (above Al-Galaa Bridge).
4. Widening of Al-Hijaz Street, the northern boundary of the area of study , to become 6 lanes for each direction, with a total of 12 lanes; after dismantling the historical Heliopolis tram line.
5. Finally, constructing three pedestrian crossing points, one of which is a pedestrian cross bridge, and six traffic stopping lights, only two working permanently in the area of study .

Figure (13): Comparison of changes in the study area between 2016 and 2022 (Source: Authors, satellite images using G.Earth)

21 طبقاً لحدود وأسس الحفاظ على منطقة مصر الجديدة، المعتمدة من المجلس الأعلى للتخطيط والتنمية العمرانية بقرار رقم 14 / 22 / 06 / 27

22 https://www.almasryalyoum.com/news/details/1440877

23 تم إزالة ترام من مصر الجديدة في مراحلة زمنية سبقت البدء في مشروع تحديث مصر الجديدة.

The direct context for the recent projects and road infrastructure investment

The area is bordered by Al-Hijaz Street from the north, Abu Bakr Al-Siddiq from the east, and Salah Salem Street from the south (see figure 15). Before these recent modernization projects, the design of the area had clear geographical boundaries that was reflected in the study area's residents and visitors' psyche. iThese borders constituted the area's entrances and exits for the public or private transport modes, including public ones with underground entrances, without encroaching on the area's urban fabric.

After recent updates in Heliopolis, as detailed previously, some of the area of study's streets have become focal points for speeding traffic penetrating the study areas' streets, such as Al-Ahram street. In addition, other streets turned to be breaching borders between the area of study and its peripheral neighbourhoods. Furthermore, these axes became disincentives for active mobility as it became very difficult for pedestrians to cross streets or to connect within appropriate walking distances. Therefore, the area is currently fragmented into separated sub-areas, north and south of Al-Ahram Street, as an example. On the other side, these updates have led to increased demand for private cars and motorized transport within the study area, which eventually led to significant changes in the movement patterns of both local residents and site visitors, especially after the removal of the remaining Heliopolis tram network and allocating its space for the sake of vehicles' lanes.

Figure (14): Pictures of Study Streets, Fall 2022 (Source: Authors)

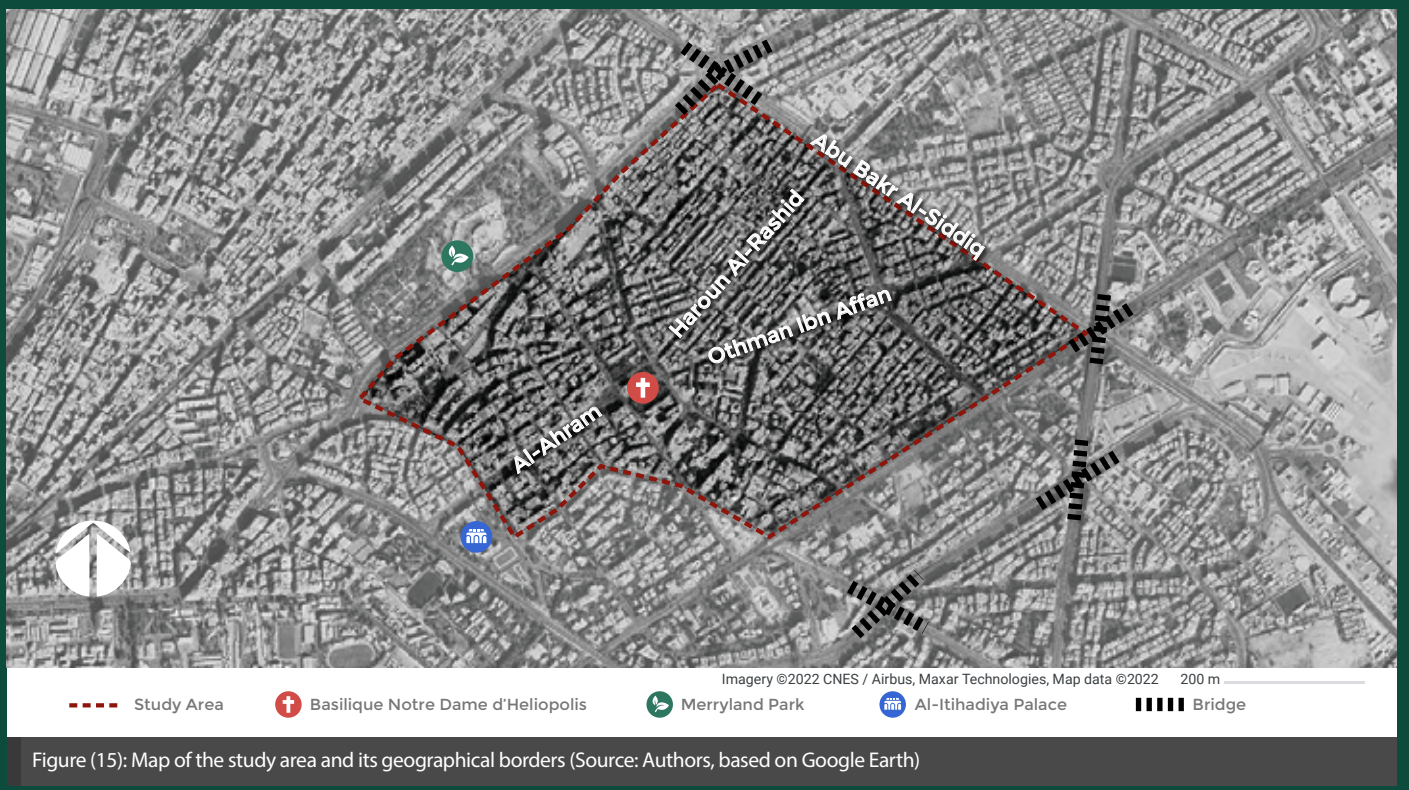


Figure (15): Map of the study area and its geographical borders (Source: Authors, based on Google Earth)

Methodology and research objectives

These abrupt changes in the underlying infrastructure in Heliopolis enticed the research team to investigate its effectiveness, efficiency and whether it addresses the needs of road users in the area, and specially pedestrian needs. Moreover, the research team attempts to understand whether such investment and projects has prioritized active mobility and public transport with emphasis on low carbon emission? Does the area infrastructure meet the needs of all-kind pedestrians? Do these projects impact the quality of underlying infrastructure and enable walking to be a sustainable transport means? How to upgrade the underlying infrastructure and encourage walking as a sustainable transport means? What are the expected returns of this transformation? How can the quality of the underlying infrastructure influence the most marginalized groups: the elderly, persons with special needs, children, women, and so forth?

To answer these questions, the research team has specified the study scope to include this area that falls within a specific distance, from 400 to 800 meters, and which aligns with other literature as an optimum scope for studying a neighbourhood. Therefore, walking distance represents the daily time and space local residents take to access their daily basic needs. [25,24]

The research team, accordingly, adopted a mixed approach for collecting data, that includes a quantitative and qualitative tools:

Qualitative tools:

1. In-person survey[26] was made to evaluate the pedestrians' infrastructure and the challenges they may face. Furthermore, the pedestrians' needs have been considered in detail assessing how to increase walking appropriate distances and active mobility. This survey was not only executed electronically, but in addition it was also implemented on the study area's streets face to face. to reach out to all targeted groups and avoid the well-known electronic connection determinants.[27]

2. Field observations: experts in design and urban planning performed field observations to assess the quality of infrastructure by dividing the principal axes, as in figure 16, and studying each street section through personal observations and previous self-experiences in walking inside the area of study , followed by data collection gathering in an agreed matrix to create a comprehensive perspective regarding the area.

24 Moudon, A. V., Hess, P., Snyder, M. C., and Stanilov, K., 1997, "Effects of site design on pedestrian travel in mixed-use, medium density environments", transportation research record: Journal of the Transportation Research Board, (1578), 48-55

25 Portland pedestrian master plan technical appendix D, 1998.

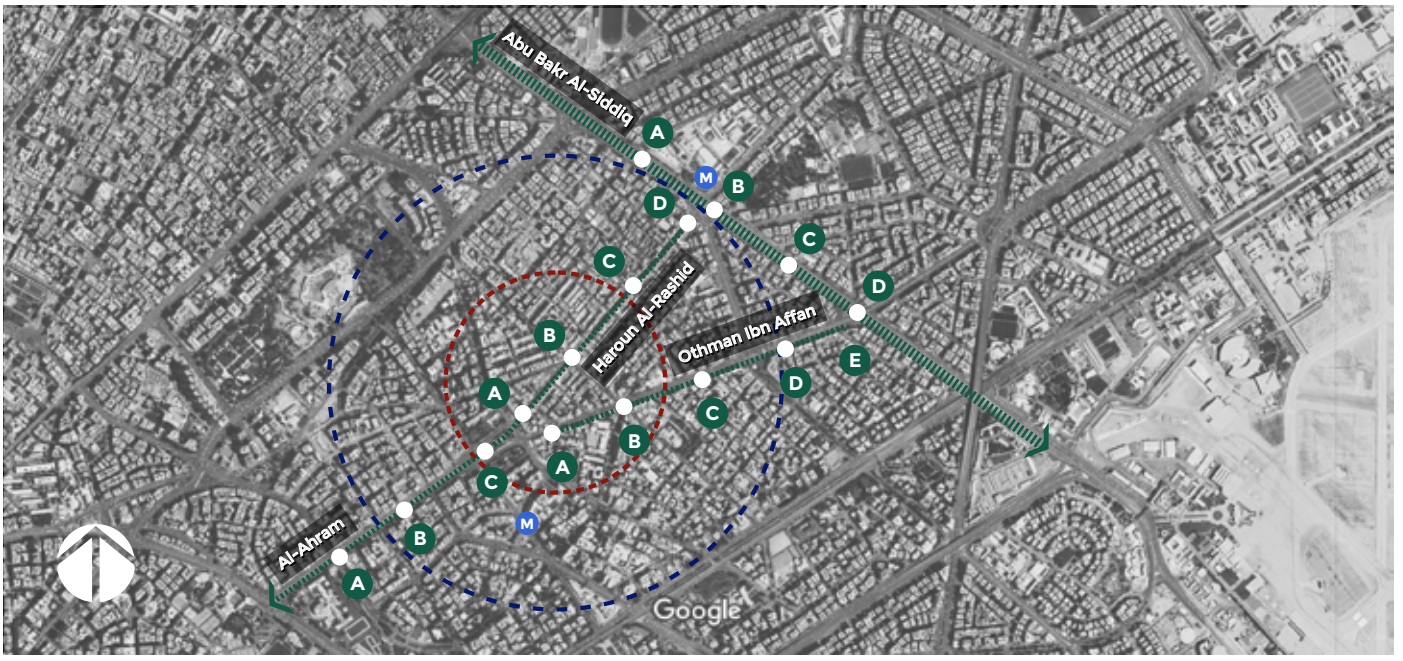


Figure (16): Dividing the study area into sectors and streets (Source: Authors, based on Google Earth)

Quantitative tools:

1. Counting & statistics: through field visits, researchers have classified pedestrians by counting statistics according to gender and age, then classifying different transport means and monitoring each kind, in order to compare and analyze the area of study to build up a concrete conception on users' behaviors and other movement patterns.

Towards that end a good portion of the data collection was undergone between August to October 2022 [28] throughout several field visits equally allocated on weekdays and hours per day. Moreover, researchers have covered the area of study in different contexts, such as working and school days as well as on working days and on weekends. The three tools were selected to complement each other. The study approach as well as the statistical methods were used to eliminate personal bias or even users' perceptions.

Analysis and results

The study results are divided into several hierarchical phases. First, the research team monitored pedestrians' movement and analysed their behaviors in streets and public spaces in the area of study . Then, the team assessed how pedestrians interact with the different transport means, such as private vehicles and public transport; the research team in addition assessed the dominant patterns of movement in the area.

The study found that privately owned vehicles dominate streets and public spaces comprising almost 55% of transport means in the area of study, while pedestrian mobility constituted approximately 21% of the total transportation means within the study area. The research team in addition studied all other means of transportation in each street while assessing the correlation between the road and pedestrian infrastructure on active mobility, pedestrians behavior and transportation choices.

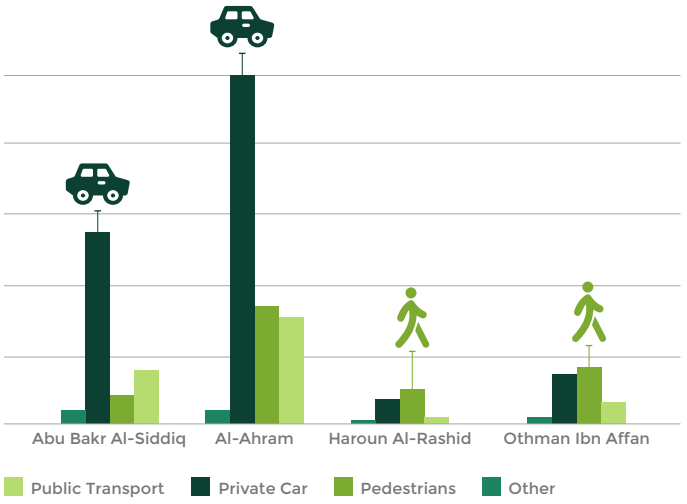


Figure 18: Percentage Distribution of Mobility Patterns (Source: Authors)

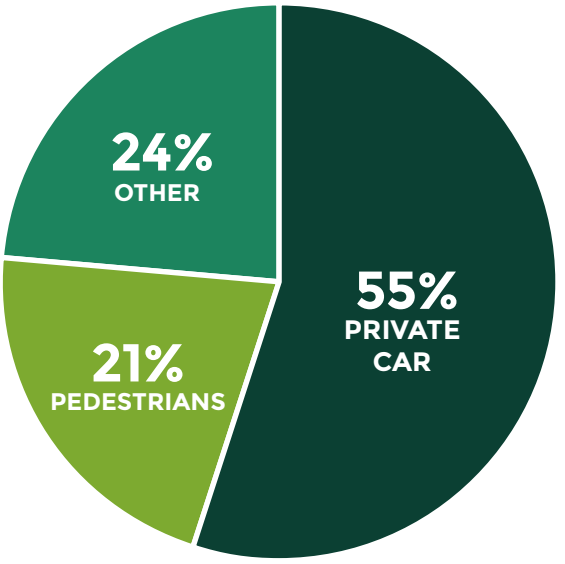


Figure (17): Classification of mobility patterns in the study area (Source: Authors)

26 إستخدم الفريق البحثي الإستبيان المُطور بواسطة
Neighborhood Environment Walkability Scale (NEWS)
27 .وصل عدد المشاركين في الإستبيان الى 451 مشارك/ة من المشاة
28 يدرك الباحثين إختلاف سلوك المستخدمين تبعاً لحالات الطقس، فمثلاً سلوك المشاه خلال أشهر الشتاء يختلف تماماً عن شهور الصيف، للتغلب على هذا المحدد، قام الباحثون بدراسة النتائج نسبة إلى الكل وليس كأعداد يُستند إليها، حيث أن الأعداد الإجمالية والجزئية قد تختلف بإختلاف وقت الدراسة.

Within the same context, other results from the study assessed similar correlations.For example, the research team found that the streets that have been recently widened, such as (Al-Ahram and Abu Bakr Al-Siddiq) have the highest proportion of private car street dominance relative to other transport means. On the other hand, the narrower streets with a high density, such as (Harun al-Rashid and Othman bin Affan) have shown increasing pedestrian numbers over private car numbers, and other transport means. Therefore, narrower streets have shown a priority for pedestrians' convenience.

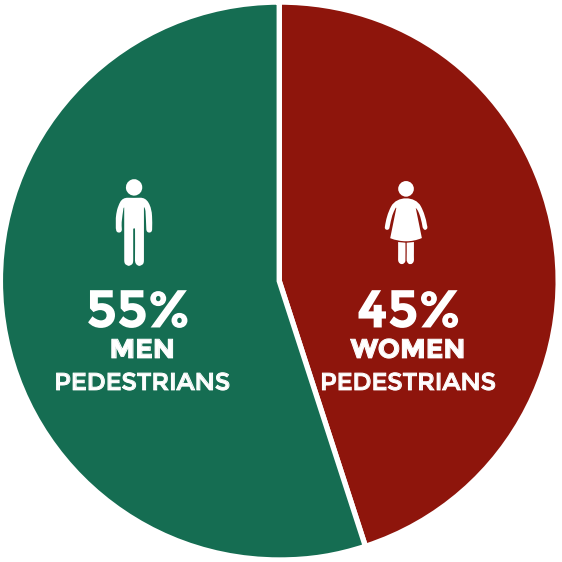


Figure (19): The relative distribution of pedestrians according to gender in the study area (source: authors)

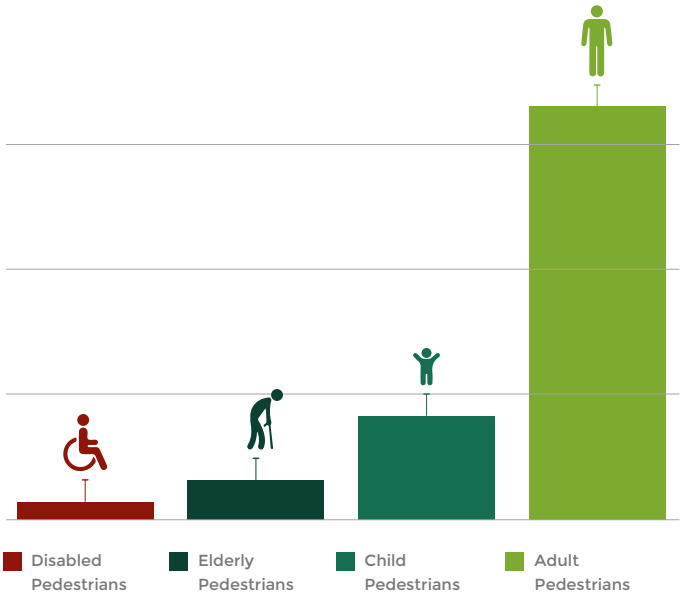


Figure (20): The relative distribution of pedestrians according to gender in the study area (source: authors)

Regarding pedestrian types and their behavior, results show that men's pedestrian numbers are higher than women. Moreover, pedestrians use vehicle passage streets (away from sidewalks) to walk more than their use of sidewalks (due to the deteriorating status of the pedestrians infrastructure that the paper observed). An interesting observation was that, the elderly and persons with special needs only comprised less than 0.5%, possibly due to an infrastructure, and a design that does not accommodate all kinds of road users.

In the second phase, the research team assess the infrastructure by field observations and walking trips done by the team as well as survey results. The assessment is divided into three sections tackling active mobility and pedestrian experience in relation to: convenience, comfortability, and safety.

A. Assessing the infrastructure for pedestrians from the perspective of convenience

Through walking trips and studying the available maps, the area's buildings are multi-functional, varying among commercial, administrative, and other purposes. Also, basic services are broadly available in the neighbourhood within a distance of 400 to 800 metres, consolidating the neighbourhood's chances in fostering walking if the pedestrian infrastructure is available and convenient. Moreover, the survey results show that around 40% of participants depend on walking for travel and mobility, of which 77% depend mainly on walking for services and for their primary needs (44% of them perform walking trips that time span from 11 to 20 minutes, one to three times a week). In addition, the results show that 48% of the participating pedestrians

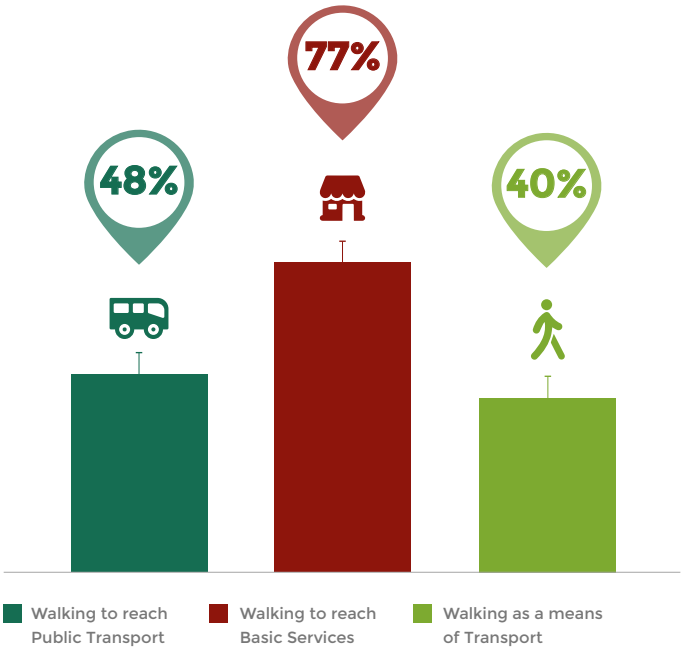


Figure (21): Classification of walking trips in the study area according to purpose (source: authors)

in this survey are dependent on walking in order to reach other and different transport means. Therefore, improving the pedestrian infrastructure should be a priority, alongside providing public and mass transport. Furthermore, the research team has noticed from in-person interviews that the Haroun Al-Rashid metro station which lies inside the area of study isn't easily accessible, due to transferring Abu Bakr Al-Siddiq street into a fast traffic axis, thereby making crossing the streets a risky and challenging endeavour.

B. Assessing the infrastructure for pedestrians from the perspective of comfortability

Feeling comfortable during walking trips depends on multiple factors, some of which fall under the standard criteria for designing pedestrians' paths, such as the distribution of trees, adequate lighting, and designing standard sidewalks, bearing in mind the elderly, and persons with special needs. Some other factors fall under the management of pedestrians' paths and sidewalks, such as periodic maintenance ensuring that the sidewalks are obstacles-free. The team comments are given regarding the underlying infrastructure for the area of study after dividing it into sections (as mentioned before). The team found that the underlying pedestrian infrastructure (sidewalks) lacks periodic maintenance and is not appropriate for the elderly and persons with special needs. In addition, the tree-shadow percentage and night lights are insufficient (if the lights of retail stores are excluded). In turn, this significantly undermines and does not encourage on-foot dependency as a transport means.

To evaluate these observations, the research team analysed the survey's results to know the users' evaluations and personal views. In this regard, around 72% of the survey's participants reiterate the availability of some sort of sidewalks in the area's streets, however 95% of them find walking trips in the area of study "uncomfortable." Furthermore, 89% of participants agree that obstacles on sidewalks constitute significant walking hindrance as the main reason for the lack of comfort during walking trips (obstacles such as parked cars, state-owned electric transformers and telephone line control boxes). Moreover, 55 to 69% of participants confirm that heights, inappropriate street sidewalks widths, and the absence of ramps for the elderly are the main reasons for discomfort while walking. Also, the absence of periodic maintenance enhances that feeling, which almost 65% of the survey's participants assure. Finally, around 70% of the survey's participants asked for more sufficient trees and shadowing sidewalks with appropriate heights for more comfort walking in the streets and the neighbourhood.

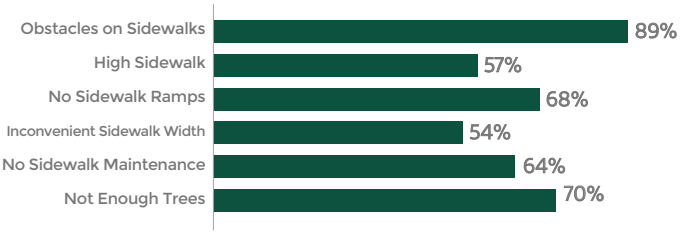


Figure (22): Reasons for pedestrians not feeling comfortable while walking within the study area (Source: Authors)

C. Assessing the infrastructure for pedestrians from the perspective of comfortability

The results show that around 96% of participants think the dense flow of cars and their speed has negatively impacted their walking experience. Moreover, 95% of the survey's participants confirm that the difficulty of crossing streets on-foot and crossing streets using pedestrians' bridges and stairs is not easy because it is not appropriately distributed, with long distances between each other. Moreover, 67% of participants find cars are speeding on the streets, which emphasises the researchers' observations on high-speed cars within a commercial and residential neighbourhood in the first place. Furthermore, the infrastructure inconvenience increases the walking risks. For instance, as mentioned before, the team found that pedestrians use the main car passages allocated in the street more than using sidewalks, which endangers pedestrians from walking crashes. Some participants refer to this walking tendency for many reasons; the most important one is the obstacles they encounter and high

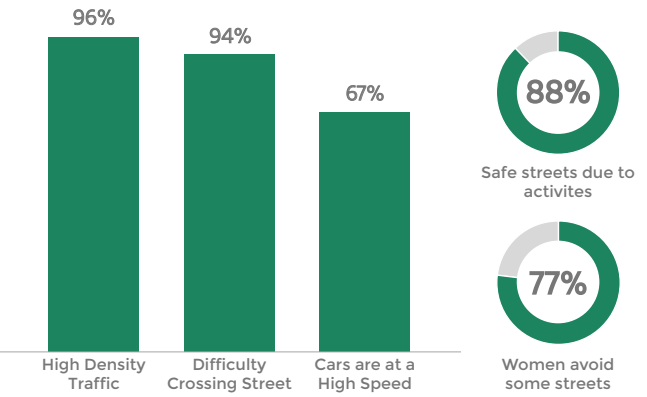


Figure (23): Reasons for pedestrians not feeling safe while moving within the study area (source: authors)

Figure (24): Assessment of the pedestrian infrastructure in the study area (source: authors)

Figure (25): Obstacles and problems existing on pedestrian sidewalks in the study area (Source: Authors)

sidewalks, inconvenience, discontinuity, and so forth. Regarding feeling secure, around 88% of the participants found streets safe and risk-free due to the operation of different and densely populated activities throughout the day. This poses a thorny question regarding feeling safe in streets that lack such kind of activities subjected to engagement process and profound change in the last few years. Such as Abu Bakr Al-Siddiq, pedestrians' numbers decreased in streets that have been enlarged and allocated the tram spaces for car passages after its removal. This has led to isolating each part from the other because of the inconvenient crossing. Also, the survey results show that almost 77% of women avoid some streets in the area of study.

Case Study Conclusion

Despite the high potential of Heliopolis that allows more active mobility and transformation from motorized to non-motorized transportation, the area's potentials are still untapped; they are shrunk occasionally. The survey results of the study confirms the following:

1. Tendancy of walking as the main transport mean in the area

65.0% of participants can consider **walking as a primary means of transport**

2. The area infrastructure status

93.0% of participants answered that **sidewalks have many obstacles and infringements**

3. Feeling safe (safety) in crossing streets in the area

94.0% of participants answered that **they cannot feel safe crossing streets**

4. Car speed in the area

76.0% of participants think **cars move so fast**

5. Environmental pollution and noises stem from vehicles' movement

84.0% of participants are **not satisfied regarding the polluting conditions**

Result

Inclination to walk relative to other modes of transportation in the study

There is a negative correlation between the inclination to walk and deteriorated infrastructure and safety in crossing streets and the high speed of cars inside the area of study.

The recent improvement of roads and infrastructure networks in greater Cairo allows private car dominance over other motorized and non-motorized transport modes. The study survey shows its negative impact on pedestrian mobility in the area of study. Albeit this, the neighbourhood can still retrain the basic infrastructure of on-foot mobility and provide safety, comfortability, and convenience for all users and pedestrians in particular.
The research results show that the area's underlying infrastructure still has the potential that the original designer firstly drafted the oasis[29]. The area's streets still have sidewalks on both sides and in the middle island (even after the area erosion over several periods). Over time, significant changes have converted the infrastructure from being safe in the past to the other way around for all on-foot persons. Many street obstacles are due to the absence of monitoring and following-up mechanisms and periodic maintenance, continuing infringements that led to diminishing the streets' walking space and put restrictions on the on-foot mobility generally and on the most vulnerable groups, especially the elderly and persons with special needs. The recent urban changes in the neighbourhood have played a pivotal role in undermining the sidewalks' ability to operate its primary function in housing an appropriate pedestrian-friendly environment. To this point, urban changes resulted in the unsuitable heights of newly refurbished sidewalks in the absence of up and down ramps, non-connectivity of these sidewalks, and long-distance walking mobility.

On the other side, the neighbourhood is already fully covered by public and mass vital network transport, which means the neighbourhood is suitable for active mobility. Therefore, walking is the best option to be employed as a transitional transport mean among other motorized ones. This hypothesis becomes one of the research results. More than 57% of the survey participants prefer to walk in the neighbourhood instead of using other motorized transport. In comparison, 26% of them prefer public transport, and only 17% prefer private cars, given that 75% of the survey participants own private cars which gives a notice for policymakers, these percentages mean the neighbourhood still has real potential for active mobility.

Furthermore, most users are eager to change their transport patterns to more sustainable ones. Nevertheless, needs fulfilment is much more subtle than any other walking hindrance. Therefore, users (who are capable) decide to walk and overcome the ongoing obstacles. It seems inevitable that they must share the same street passage with vehicles if it is necessary to walk, which increases vulnerability for on-foot mobility in the neighbourhood for a relative crash. Bear in mind that this may be the trajectory of those who decide to walk; a question arises regarding those who cannot, such as the elderly, children, and persons with special needs.

29 كان يُسوق لمصر الجديدة (هليوبوليس) فى بدء إنشائها بإعتبارها واحة وسط صحراء القاهرة.

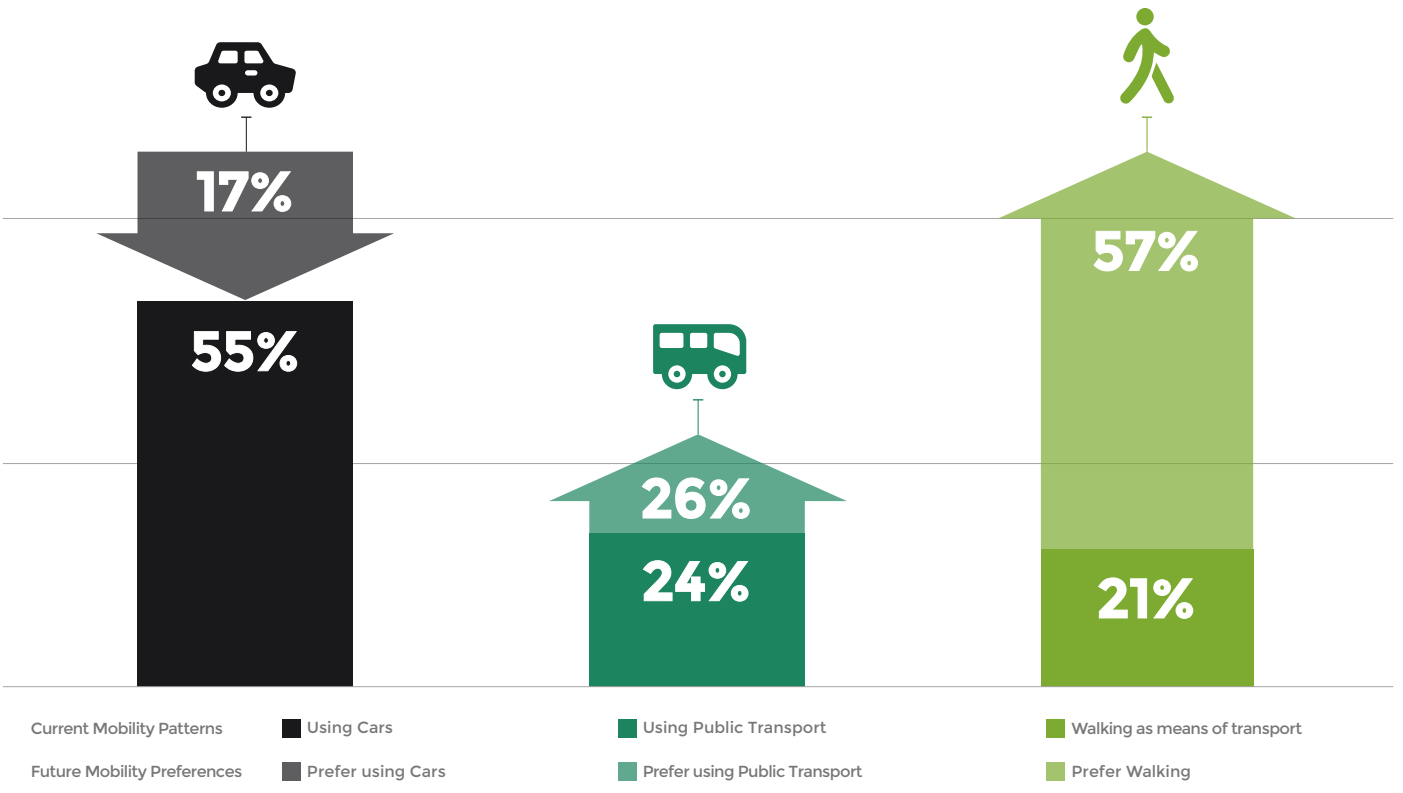


Figure (26): Comparison between current mobility patterns in the study area and future preferences from the perspective of the respondents in the questionnaire (Source: Authors)

CHAPTER 04
The Public Policy Context

Stakeholders (Development partners)

The area of study lies inside Heliopolis which is administratively affiliated to Cairo governorate, and in turn, the Ministry of Local Development. Moreover, the area of study is registered with distinct architectural heritage through the National Organization for Urban Harmony, an affiliated organ of the Ministry of Culture. In the study context and its scope (regarding streets and roads), other official institutions and entities are overlapping in the administrative and institutional framework of the area of study , such as the Directorate of Roads and Transportation is affiliated with the Ministry of Transport as well as the Public Authority for Roads and Bridges, and the General Administration of Traffic department that is affiliated to the Ministry of Interior as an executive and traffic law enforcement authority. Also, overlapping happens among the urban projects performing parties in Greater Cairo and these aforementioned official entities and ministries. For example, some of these official performing parties are the Armed Forces Engineering Authority and the Public Works Department affiliated with the Ministry of Defence. Furthermore, operating and leasing some of the recreational activities and other services are subjected directly to the supervision and management of the National Service Projects Organization, similarly, the Egyptian Company for Metro Management & Operation and the Canter for Public Transport Authority in Greater Cairo (CTA). In addition, the private sector exists in terms of private companies operating some minibus lines and other mass transport lines; these private companies are supervised by local administrations relative to the Cairo governorate. Overlapping among public-public and public-private extends to other relative parties such as Heliopolis Company for Housing and Development (the area owner) and other civil society organizations like Heliopolis initiative.

Laws and regulations

According to its nature, as a part of the administrative borders of Heliopolis, the neighbourhood is under the jurisdiction of the ministry of local development via laws and organizing regulations of the local administration in Egypt. Regarding its specialty, the neighbourhood is one of the critical heritage areas in Egypt, which puts the area under the supervision of the National Organization for Urban Harmony by regulations and requirements stipulated in the unified building law. Bear in mind that the study context focuses on pedestrians' underlying infrastructure (streets and roads). A set of laws and decisions describe the previously mentioned entities, ministries, and affiliated interactions within the area of study . Also, there are other rules, such as organizing technical guides and codes for maintenance projects of the pedestrians' infrastructure. Among these laws, regulations, and codes, the most relevant to the study are as follows:

- Local administrative law, No. (43) in 1979.
- Unified building law, No. (119) in 2008 and its internal statute and amendments issued by the Ministry of Housing, Utilities, and Urban Communities.
- The Egyptian traffic law and No. (66) in 1973 and its amendments last issued in December 2021.
- The codes and criteria for urban coordination of heritage areas and buildings, issued by the National Organization for Urban Harmony - Heliopolis tailored requirements.
- The public occupancy law No. (84) in 1968, and its amendments No. (146) in 1984.
- The public roads occupancy law No. (140) in 1956.
- The car parking lots project No. (522) in 2001.
- The regulating advertisements on public roads law No. (66) in 1956, and its amendments.
- The Egyptian code for urban and cellular roads, by the Housing and Building National Research Center affiliated with the Ministry of Housing, Utilities, and Urban Communities.
- The Egyptian code for the design of external spaces and buildings for the use of persons with special needs, by the Housing and Building National Research Center for affiliated with the Ministry of Housing, Utilities, and Urban cCommunities.
- The road coordination elements are guided by the Housing and Building National Research Center affiliated with the Ministry of Housing, Utilities, and Urban communities.

Governance and Management

Active mobility-related projects require a more flexible governance and administration framework to operate effectively. The current governance and administration system differs according to the city's nature (new cities - old cities), which means that the new cities are much more administratively and organisationally flexible than the old ones in supporting these projects. The reason is that all new cities are under the direct jurisdiction of the New Urban Communities Authority, while old cities subject to the Ministry of Local Development via its affiliated administrative agencies, Heliopolis local administration is an excellent example. In addition, underlying infrastructure projects (streets and roads) are subjected to the supervision and direction of centralized ministries via local technical bodies such as transport and roads directorates that follow the jurisdiction of the Ministry of Transport and are under the authority of the governor.

Similarly, the directorates of housing are under the jurisdiction of the Ministry of Housing, while it is under the governor's authority. Getting things to be much more complicated, in the major cities, such as Cairo, other institutions are also overlapped in their administrative hierarchy likewise the Public Transport Authority, greater Cairo Bus Company as the owner and operator of public transport lines, and the National Authority for Tunnels NAT as the owner of the greater Cairo metro facility and its operating and managing company. Therefore, active mobility projects require a malleable hierarchy and a less centralized governance model. Virtually, this means that the proposed governance model should be able to manage finance and operate mass transportation projects for pedestrians and avoid administrative hindrances. To this point, this can emphasize the local resources for each area and dismantle the public-public mentioned above and public-private overlap on the national and local levels.

CHAPTER 05
Strategic Analysis

Strengths

- Heliopolis conquers a prestigious worth, and is registered on the National Organization for Urban Harmony's list due to its unique architectural heritage.
- Mobilizing heavy investments towards the transportation sector in the last few years, limiting private cars dependency in favor of more sustainable means.
- Private sector serves as a core partner in transport improvement projects, purposefully mass transport, promoting multi-pattern sustainable mobility and micro-mobility means of transport that imply infrastructure adaptation of roads and public spaces to support those newly emergent means.
- Gas prices surge and vehicle operation and maintenance costs are leading and effective factors towards a fast transition on the road to more sustainable mobility patterns, walking, for instance.
- The conjoint awareness role the NGOs & civil society foundations (Heliopolis Heritage Initiative for example) hold with the involved governmental bodies and official entities.

Opportunities

- The launching of The National Initiative for Smart Green Projects in tandem with Egypt hosting COP27 is a considerable opportunity to fund a bundle of integral active mobility projects within Egyptian cities evading common financial and administrative obstacles.
- Climate funds and international grants allocated for green projects in developing countries are a reliable prospect to control carbon emissions through promoting and financing active mobility projects.
- Digitalization cleared the way for long-trips reduction through fostering walking and cycling-friendly infrastructure projects.
- Private sector social presence consolidation through magnifying their Corporate Social Responsibility (CRS) role in dealing with multiple pedestrians' infrastructure challenges by establishing goal-oriented and impactful projects.
- Recent studies pursue improving mobility in Egyptian cities such as the Egyptian code for cycling infrastructure, currently being drafted by Housing and Building National Research Center as a reference manual for such projects in order to facilitate the transformation towards increased sustainable transport means aiming for an inclusive infrastructure enhancement.

Weaknesses

- Extravagant centralization in terms of financing, implementing and managing mobility projects and plans.
- Lack of professional skilled technical staff in the districts' administrative units and technical directorates that are required for active mobility projects' planning, management and operation.
- Insufficient coordination between the government and Egyptian Higher Education Institutions to generate and provide needful studies in order to plan, manage and fund active mobility plans of action and projects.
- Poor resources allocation for public policy planning compared to those allocated for the construction and building industry.
- Accurate data concerning active mobility is scarce, since it is neither gathered/collected periodically, nor through specialized authorities and entities.
- The multiplicity of authorized entities carries out tasks and jurisdiction overlap among involved ministries that supervise mobility infrastructure projects in Egyptian cities in general, and active mobility in particular (Streets and roads network).
- Timeworn conflicting Egyptian laws and legislations that regulate streets and public spaces, along with the multiplicity of state authorities.

Risks

- Ignoring environmental and social pillars while witnessing the continuity of infrastructure modernization projects in Greater Cairo devoted to the efficiency of motorized mobility and traffic flow volume through the construction of roads and axes network.
- Growing demand on infrastructure that serves private modes of travel such as highways and wide streets, resulting from the increase in private car ownership rates.
- Overdependence on long travels promotes dependency on private vehicles, considering it as the most convenient mean of transport when it comes to direct destination arrival (under normal conditions) compared to other mass transport means.
- Climate change detrimentally impacts mobility shifts towards more sustainable options like walking and cycling due to the rising temperatures.
- Spread of semi/non-official transportation services and their consequential high environmental cost.

FINALLY

Results and Recommendations

Heliopolis neighbourhood – Active mobility opportunity cost model

The urban fabric has significantly changed in the last few years, these changes are mixed blessings. In order to cope with the increasing and enormous growth of private car ownership and the justified need for economic and urban development, the state has extensively invested in the infrastructure of roads and streets,[30] likewise many other developing countries. Indeed, direct economic benefits come in coeval with transport projects; the most important outcomes are facilitating goods and individuals' mobility and enhancing connectivity among the Egyptian governorates.

Nevertheless, these recently constructed transport projects have some negative impacts, especially on the underlying mobility infrastructure in urban and densely populated areas, that is to say, the new transport projects are designed for the sake of vehicles and other mechanic means of transport at the expense of the active mobility-friendly infrastructure, especially walking. Unfortunately, Heliopolis was not an exception while implementing these modernization projects.

Condensedly and precisely, the participating researchers found that Heliopolis streets have wide traffic lanes, which enables vehicles to move so fast inside the neighbourhood. This impact is considered one of the main factors that makes pedestrians feel unsafe while crossing the neighbourhood streets. Furthermore, despite its existence, the neighbourhood's sidewalks suffer unevenly from the overlap between auto transport and pedestrians' mobility because of long periods of private cars waiting over the day depending on each streets' disposition. Getting things worse, all sidewalks in the area are subject to the current retail stores and cafes infringements, not to mention the street vending and other temporary selling activities. In addition, the sidewalks' dysconnectivity stifles walking prospects, forcing pedestrians to share traffic street lanes with vehicles and other motorized transport means. Finally, regarding the concrete characteristic of sidewalks, the non-standardized inappropriate heights coerce certain groups not to use them, especially the elderly, children, and those who use wheelchairs or supportive devices. In short, the combination of all these factors discourages active mobility/walking, despite the capabilities of Heliopolis that support this pattern of mobility or even the transformation from auto transport to active mobility in a way that improves society's public health.

Indeed, no one has chosen to be obesely vulnerable, exposed to non-communicable diseases, death, or injury due to traffic crashes. Therefore, public policy should be applied in parallel with other policies promoting public health among all community members. In the same context, experiences prove that underlying infrastructure can be a catalyst for walking for all street users if designed to target such objectives for positive health impact; or providing an inducement for motorized transport if designed otherwise causing drastic health consequences. No wonder that the demand for active mobility can increase and be prioritized over other motorized transport means, as for a balanced design between active mobility and motorized transport is the logical result if the functional and operative needs of streets and public spaces and users' views and preferences are considered. To put a rationale, the increasing numbers of non-communicable diseases, diseases attributed to air pollution and traffic crash casualties. In this regard, policymakers, designers, and public policy planners should focus on curation and prevention. Therefore, the root causes of these diseases should be re-investigated. Although the prevalent non-communicable diseases are related to multi-aspects of different lifestyles and dieting as well as personal practices and behavior, there is a coherent relationship between public health and underlying infrastructure for cities and communities, including streets and sidewalk designs. In this context, some questions are proposed as follows:

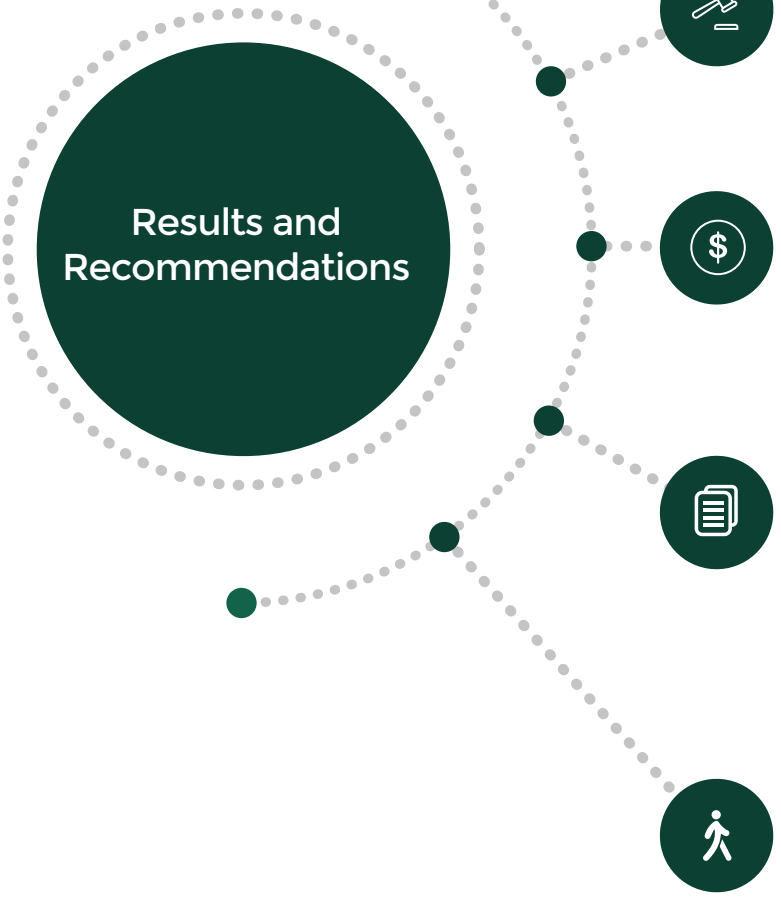
When a child or an older person tries to cross the street, which consists of 4 to 5 traffic lanes, or when having a traffic crash caused by a vehicle colliding with an average of 50 to 60 Km, the cause of death is recorded officially as injury/death of a car crash. Should the street design be reported as a reason of death whether as a root cause of or at least a variable one?

When public health planners try to cope with the prevalence of diabetes, hypertension, and obesity, does the neighbourhood's re-designing process promote walking as one of the best scientifically proven alternatives to prevent and cure diseases such as diabetes and obesity alongside chemotherapy and therapies interventions?

These questions are not intended to harden the traffic flow of motorized vehicles in streets and public spaces in the Egyptian cities, especially in Heliopolis. Instead,

30 http://english.ahram.org.eg/NewsContent/1/64/270451/Egypt/Politics-/-million-licensed-vehicles-in-Egypt-CAPMAS.aspx

re-considering the streets and public spaces design as a stepping stone to provide multi-patterns transport for all users through a collective and balanced approach. Literature and professional experiences have proven that the absence of underlying infrastructure of active mobility, mainly walking, results in multiple diseases that override obesity and increases its ratios. Unfortunately, consequences may lead to increased health care costs, deterioration of quality of life, social isolation, life expectancy decrease, and other adverse outcomes and social challenges. Therefore, multi-level recommendations and interferences can be mentioned to reposition public health in making policies alongside social, economic, environmental, administrative, and institutional considerations. The recommendations can be as follows:



Increase investment in the public and mass transport sector and networks to meet the growing demand on transportation means, associated with population growth, urban expansion. This is specially important in light of the relatively low private car-ownership and which is mainly concentrated in Cairo and a handful of big Egyptian cities. Investments need to be coupled with imposing more restrictions on the use of private cars, while guaranteeing efficient, quality, interconnected and integrated public and mass transport with allocated separate lanes, increasing its attractiveness and relative competitiveness versus private car use.

Imposing restrictions on roads and streets widening projects (increasing street lanes and speeds), especially within residential areas and inside cities as well as in adjacency of public and mass transport stations such as underground stations. The latter relates to the adverse effects stemming from the increased supply and accordingly demand on semi (and/or) informal transportation means (microbuses, minibuses, toktoks ..etc). Widening the streets within residential areas presents a significant threat to active mobility and pedestrians, especially with lack of proper sidewalks, safe crossings, and speeding vehicles.

Reconsidering the demand for "parking slots" while enacting pricing and codification programs and imposing constraints on vehicles' speed according to the area's specificity and function. The restrictions need to be strongly enforced, especially during late nights when traffic density abates and vehicles' speed rises, thereby increasing the probability of crashes.

Incorporating the concepts of active and sustainable mobility within Egyptian strategies, planning, policies and laws, thus a state institutional approach on all kinds of mobility and transportation systems as well as within urban planning and design. It is also relevant to reconsider reshaping and repositioning of relevant authorities responsible for transportation, urban planning and implementation to create integration and reduce tasks and jurisdiction overlap. The creation of empowered, accountable state institutions that ensure the execution of well designed codes and standards when investing in road/street/sidewalk infrastructure and which includes safety as the highest value is needed.

Increase investment in active mobility infrastructure that meet well established, efficient and effective codes, standards and ratings, with a special focus on improving walkability and pedestrian infrastructure in neighbourhoods, spaces and areas that are considered connections between public transportation networks and are transitional stations among public and mass transport means.

Collecting accurate and periodic data of mobility by municipalities or representatives under the auspices of Land Transport Regulatory Authority LTRA, as its establishment resolution no. (73) in 2019 stipulates. These data are not only deemed as a significant factor in accurately determining the needs, but they also can anticipate the future demand for all transport means and their capacity. Therefore, the excellent point is to coordinate with mobile operators to get data regarding traffic and usage patterns periodically to construct a comprehensive database on active travelling.

Applying a low-carbon emission zones policy by posing environmental constraints on old and dilapidated transport means within historical zones as in the area of study of where the current study was executed, and which was classified as heritage/historical site of distinct value by the National Organization for Urban Harmony and which was approved by the Supreme Council for Planning and Urban Development law no. (119) of 2008 which would enhance the area's ability to support active mobility, walkability and pedestrian-friendly infrastructure.

Consolidating the technical capabilities for local municipalities and local administrative employees by providing periodic capacity-building programs. This should be in tandem with revisiting the use of local allocations in favour of supporting non-motorized or active mobility and travelling (walking and cycling). Furthermore, the role of The National Organization for Urban Harmony should be activated due to its promising potential to improve the urban environment in heritage and historical areas.

Develop guidelines to address the obstacles that undermine the pedestrian movement in the streets and sidewalks in the Egyptian cities, with the redesign of traffic intersections to ensure the ease of crossing and the continuity of pedestrian movement instead of automated transportation (the study area as an example), in parallel with the imposition of restrictions on the speed of cars, especially in the late night hours.

Paying attention to the assessment and evaluation of the environmental impact of transportation and mobility projects in which these projects' evaluation should assess the public health impact, ecological cost, and carbon tax. Additionally, the quantitative flow of cars and vehicles should not be the only decisive factor during such assessments, by the same token, public and mass transport should be improved to reduce the demand for private car usage and minimize its entwined environmental and health high costs, In addition, the Egyptian code for urban and rural roads needs to be updated to enhance these concepts, as it is a substantial source for creating and renovating Egyptian roads and streets.

Incorporating active mobility concepts within urban planning laws and regulations and focusing on successful practices and pilot models of designing and planning streets, roads, transportation systems/network, new cities and suburbs. Pilot models allow for experimentation of simple efficient interventions that are assessed for the different criteria mentioned along the above recommendations and which could be replicated if successful.

Developing and upgrading the monitoring and evaluation procedures using efficient digitalized means that empowers local residents and road users to survey changes and obstacles on streets, sidewalks and public spaces, and which would allow for local administrations/municipalities (such as Heliopolis) to supervise and track arising challenges and urban development frequently addressing them in a timely manner. Within that context, pedestrians' infrastructure suffers from continuous deterioration due to the absence of periodic maintenance which springs from the weak management, monitoring and evaluation procedures and mechanisms and the overlap among stakeholders and involved-entities.

Enhancing community involvement, with all its sectors and categories, in the modernization and development strategies, plans and projects and involving civil society representation in the decision-making process, such as the Heliopolis Heritage initiative.

Improve the planning of sustainable mobility and transportation at the local/neighbourhood/municipality level is the key towards improving walkability and active mobility and complementing more sustainable transportation projects. The planning and execution of such projects needs to be implemented by well trained and specialized expertise with specialized units with local governments. The planning needs to take into consideration future needs and aspirations and which should integrate active mobility into those aspirations and plans given they are the most efficient and sustainable mobility patterns.

Develop guidelines for the basic infrastructure (roads and streets) according to the nature and context of each city/region separately, with the need for integration between the guides and engineering codes issued by different entities, such as the Guide to Standards for Coordination of Road Elements, issued by the National Center for Housing and Building Research, and the foundations and standards for coordination Civilization of Heritage Areas, issued by the National Organization for Urban Harmony (the study area as an example), and not based on broad standards that are applied to all Egyptian cities without taking into account the context and challenges of each city/ region separately.

References

In Arabic

عصام، عمرو، 2021، النقل والتنقل، جدل التحديث والاستدامة في مدينة القاهرة، المركز المصري للفكر والدراسات الإستراتيجية،ECSS

عصام، عمرو، 2021، ترام المدينة ومستقبل القاهرة، المركز المصري للفكر والدراسات الإستراتيجية،ECSS

حجازي، عبدالرحمن، عصام، عمرو، 2022، مستقبل التنقل المستدام فى مصر، ورقة سياسات، مركز دعم وإتخاذ القرار، رئاسة مجلس الوزراء، مصر

الجهاز المركزي للتعبئة العامة والإحصاء. 2020. نشرات المركبات المرخصة لعامي 2008 و 2018.

عبدالمنعم، على، محمد، هندسة النقل والمرور، دار الراتب الجامعية،بيروت

دليل تصميم البيئة العمرانية، 2019، وزارة الشئون البلدية والقروية،السعودية

بدوي،جمال،1997،حكايات مصرية،الهيئة المصرية العامة للكتاب

لنرت ولاندروك، مجموعة فوتوغرافية لوسط القاهرة – مجموعة خاصة بالمؤلفين

مجلة المصور المصرية، أرشيف خاص بالمؤلفين

بطاقات بريدية للقاهرة - كروت بوستال، مجموعة خاصة بالمؤلفين

الجهاز القومى للتنسيق الحضاري، أسس ومعايير التنسيق الحضاري للمباني والمناطق ذات القيمة المتميزة

حكاية مصر الجديدة، هليوبوليس...مدينة الشمس،2020، وزارة السياحة والآثار، مصر

قانون البناء الموحد، 119، لسنة 2008، ولائحته التنفيذية، المطابع الاميرية، مصر

In English

Jacobs, jane, 1992, the Death and Life of great American Cities.

Larsen, Bjorn. 2019. Egypt: Cost of Environmental Degradation: Air and Water Pollution, The World Bank

Pecqueur, Mark, Ceustermans, Huyskens, and Dimitrios Savvidis. 2008. "Emissions Generated from a Suzuki Liane Running on Unleaded Gasoline and LPG under the Same Load Conditions." In . https://doi.org/10.4271/2008-01-2637

Hegazy, M., Kalila, A., Klopp, J.M., 2019. Towards Transit-Centric New Desert Communities in the Greater Cairo Region, American University in Cairo - Alternative Policy Solutions Center.

The Centre for Environment and Development for the Arab Region (CEDARE). 2018."Mainstreaming Electric Mobility in Egypt - Policy Brief." Friedrich-Ebert-Stiftung, http://library.fes.de/pdf-files/bueros/aegypten/15389.pdf.

Children's Active Transportation. Elsevier. 2018. doi:10.1016/c2016-0-01988-5. ISBN 978-0-12-811931-0.

Lo, R. H. (2009). Walkability: what Is it?. J. Urbanism: Int. Res. Placemaking Urban Sustainability 2, 145–166. doi:10.1080/17549170903092867

Hu, F. B., Sigal, R. J., Rich-Edwards, J. W., Colditz, G. A., Solomon, C. G., Willett, W. C., et al. (1999). Walking Compared with Vigorous Physical Activity and Risk of Type 2 Diabetes in Women. Jama 282, 1433–1439. doi:10.1001/jama.282.15.1433

Gregg, E. W., Gerzoff, R. B., Caspersen, C. J., Williamson, D. F., and Narayan, K. M. V. (2003). Relationship of Walking to Mortality Among US Adults with Diabetes. Arch. Intern. Med. 163, 1440–1447. doi:10.1001/archinte.163.12.1440

Smith, T. C., Wingard, D. L., Smith, B., Kritz-Silverstein, D., and Barrett-Connor, E. (2007). Walking Decreased Risk of Cardiovascular Disease Mortality in Older Adults with Diabetes. J. Clin. Epidemiol. 60, 309–317. doi:10.1016/j.jclinepi.2006.06.013

Sarkar, C., Webster, C., and Gallacher, J. (2018). Neighbourhood Walkability and Incidence of Hypertension: Findings from the Study of 429,334 UK Biobank Participants. Int. J. Hyg. Environ. Health 221, 458–468. doi:10.1016/j.ijheh.2018.01.009

Howell, N. A., Tu, J. V., Moineddin, R., Chen, H., Chu, A., Hystad, P., et al. (2019). Interaction between Neighborhood Walkability and Traffic-Related Air Pollution on Hypertension and Diabetes: The CANHEART Cohort. Environ. Int. 132, 104799. doi:10.1016/j.envint.2019.04.070

Saint-Maurice, P. F., Troiano, R. P., Bassett, D. R., Graubard, B. I., Carlson, S. A., Shiroma, E. J., et al. (2020). Association of Daily Step Count and Step Intensity with Mortality Among US Adults. Jama 323, 1151–1160. doi:10.1001/jama.2020.1382

https://www.frontiersin.org/articles/10.3389/fpubh.2021.718978

Calle EE, Rodriguez C, Walker-Thermond K, Thun MJ. Overweight , obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. New England Journal of Medicine 2003; 348:1625-38

Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. Journal of American Medical Association 1999;282:1523-29

Hu FB, Manson JE, Stampfer MJ, Colditz G, et al. Diet, lifestyleand the risk of type 2 diabetes mellitus in women. New England Journal of Medicine 2001;345(11):790-97.

Narayan KM, Boyle JP, Thompson TJ, Sorensen SW, Williamson DF. Lifetime risk for diabetes mellitus in the United States. Journal of the American Medical Association 2003;290(14):1884-90.

Road Safety Opportunities & Challenges, World Bank 2020

Omura JD, Ussery EN, Loustalot F, Fulton JE, Carlson SA. Walking as an Opportunity for Cardiovascular Disease Prevention. Prev Chronic Dis 2019;16:180690.

Rosenberg, D., Ding, D., Sallis, J. F., Kerr, J., Norman, G. J., Durant, N., ... & Saelens, B. E. (2009). Neighborhood Environment Walkability Scale for Youth (NEWS-Y): reliability and relationship with physical activity. Preventive medicine, 49(2-3), 213-218.

Moudon, A. V., Hess, P., Snyder, M. C., and Stanilov, K., 1997, "Effects of site design on pedestrian travel in mixed-use, medium density environments", transportation research record: Journal of the Transportation Research Board, (1578), 48-55

Farr, Douglas, 2007, Sustainable Urbanism: Urban Design with Nature, Wiley Press.

Sim, David, 2019, Soft City: Building Density for Everyday Life, Island Press.

Lynch, Kevin, the Image of the City, MIT press, 1960

Gehl, Jan Cities for People, Island Press, 2010

Speck, J., 2012, "Walkable city: How downtowns can save America, One step at a time", Macmillan.

Jenks,Mike – Jones, Colin, Dimensions of the Sustainable City, Springer, 2010

Newman, Jeffrey, 2015, The End of Automobile Dependence: How Cities are Moving Beyond Car-Based Planning, Island Press

Vuchic, Vukan.R,Urban, 2008 Transit: Operations, Planning, and Economics, Wiley press

UN-Habitat, 2020, The Value of Sustainable Urbanization

Dobrowolska, Agnieszka, Heliopolis, Rebirth of the City of the Sun, AUC Press, 2006

Jenks,Mike – Jones, Colin, Dimensions of the Sustainable City, Springer, 2010

Vuchic, Vukan.R,Urban Transit: Operations, Planning, and Economics, Wiley press, 2008

Ceder, Avishai, Public Transit Planning and Operation: Modeling, Practice and Behavior, CRC press, 2016

Sims, David, Understanding Cairo, the Logic of City out of Control, AUC press, 2011

Sims, David, Egypt's Desert Dreams: Development or Disaster? AUC press, 2015

The Aga Khan Award for Architecture, the Expanding Metropolis: Coping with the Urban Growth of Cairo, International Conference, Cairo, 1985

UN-Habitat /ITDP, 2019, Streets for Walking and Cycling

UN-Habitat. (2013). Streets as public spaces and drivers of urban prosperity

In French

Volait, Mercedes, Memories Heliopolitaines, Institut Francais, Egypte, 2005

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