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Towards preventative urban health resilience: a case study of Cairo's heliopolis

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MASTER THESIS

TOWARDS PREVENTATIVE
URBAN HEALTH RESILIENCE:
A Case Study of Cairo's Heliopolis

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Abstract

The increasing prevalence of diseases in urban populations caused by poor living conditions and social inequities is a major concern for cities and their dwellers alike. This concern has become even more relevant after the COVID-19 pandemic, which highlighted a significant vulnerability to health disasters. This dissertation aims to examine and fill the gap between urban health and urban resilience through the analysis of urban health determinants, particularly focusing on mobility and greenery, as well as investigating the inclusion of preventative urban health measures in the Cities Resilience Index (CRI) framework. These aims were achieved through a literature review and empirical research, the latter through a case study of physical and social determinants of health and semi-structured interviews with residents of Heliopolis in Cairo. Heliopolis is undergoing an urban mobility project intending to turn it into a large mobility axis. The findings underlined a major reduction in walkable spaces, percentages of greenery, and sense of safety; affecting the resident's lifestyles and space-use patterns and potentially leading to increased health risks, pollution and disaster vulnerability. This thesis closes by providing recommendations relinking urban health and resilience, adopting a more preventative approach to health promotion, especially in global south cities.

Keywords

Preventative Urban Health; Urban Resilience; Cairo; Mobility; Greenery

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“... we consider cities as one would any other ubiquitous exposure: the city inevitably has an influence on health through shaping all aspects of our context, influencing elements of our environment from the air we breathe to the water we drink, and including how we interact with these environments as we choose those behaviors ultimately influencing our health... Importantly, understanding that cities are ubiquitous exposures means that a small change in cities stands to have a substantial change on the health of populations.” (Galea, Ettman and Vlahov, 2019, p. 12)

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Table of Contents

Acknowledgments.....	4
Table of Contents	5
List of Figures.....	6
List of Tables.....	7
1. Introduction.....	8
1.1. Background and Research Question	8
1.2. Overall Aim and Research Objectives.....	9
1.3. Value of this research.....	10
2. Literature Review	12
2.1. Introduction.....	12
2.2. Exploring Urban Health and Urban Resilience.....	12
2.2.1. Urban Health.....	12
2.2.2. Urban Resilience:.....	13
2.3. Determinants of Urban Health	14
2.3.1. Social Determinant of Health	15
2.3.2. Spatial or Physical Determinants of Health.....	16
2.3.3. Provisioning of Health and Social Services.....	17
2.3.4. Population Composition	18
2.3.5. City Governance and Leadership.....	19
2.4. Urban Health in Resilience.....	20
2.5. Mobility and Greenery.....	25
3. Methodology and Case Study Background	27
3.1. Research Methodology and Design.....	27
3.2. Limitations.....	28
3.3. Case Study Background	29
4. Analysis and Discussion.....	33
4.1. Analysis of Heliopolis Through Physical and Social Determinants of Health.....	33
4.1.1. Growth, Urban Fabric, and Density.....	33
4.1.2. Mobility	36
4.1.3. Greenery	42
4.1.4. Pollution	43
4.1.5. Disaster Vulnerability.....	44
4.2. Discussion Summary	45
5. Conclusion and Recommendations.....	46
5.1. Conclusion.....	46
5.2. Recommendations.....	47
6. References.....	49
7. Appendix.....	52

List of Figures

“Figure 1 Levels of Influence on the Health of Populations (Adapted from: Kaplan, G. (2004) cited in Galea, S., Ettman, C. K., & Vlahov, D. (2019). Urban Health. pp. 16-17).” page 13

“Figure 2 Left. Urban Resilience Framework (Adapted from: The Rockefeller Foundation, & ARUP. (2015). City Resilience Framework, December 2015. p. 9) Figure 3 Right. Health and Wellbeing in Urban Resilience. The Rockefeller Foundation & ARUP. (Date Unknown). City Resilience Index Brochure, p. 18.” page 21

“Figure 4 Satellite image of Greater Cairo Region showing the relationship between Heliopolis and the center of Cairo and its outskirts, as well as the New Administrative Capital.” page 29

“Figure 5 Satellite image of the connection between Cairo’s center and the New Administrative Capital through Heliopolis.” page 30

“Figure 6 Left shows a before photograph of Abdelaziz Fahmy street in Heliopolis. Source: El-Dorghamy, A. (date unknown). Right shows an after photograph of Abdelaziz Fahmy street in Heliopolis. Source: El-Dorghamy, A. (2019). Figure 7 Before/after street sections of Abdelaziz Fahmy street. The author approximates road capacities according to multiple Google Earth and Google Maps satellite images of the streets.” page 31

“Figure 8 Above shows a before photograph of the roundabout at the intersection of Othman Ibn Affan and Abdelaziz Fahmy in Heliopolis. Source: Arafa, E. (date unknown). Figure 9 Below shows an after photograph of the roundabout at the intersection of Othman Ibn Affan and Abdelaziz Fahmy in Heliopolis. Source: Arafa, E. (2020).” page 33

“Figure 11 Analysis of mobility on maps of Heliopolis ca. 1946 and 1971. Maps obtained from The American University of Cairo Library – Historical Maps and Special Collections Department. Illustrations by author.” page 35

“Figure 12 shows a recent photograph of one of the modified areas; road changes and a bridge constructed above a pre-existing one. Source: Samaha, O, (2020)” page 36

“Figure 13 Map of urban changes in the Heliopolis, showing affected roads and roundabouts, and constructed bridges. Satellite images by Google Earth. Illustrations by author.” page 37

“Figure 14 Map of the tram network in Heliopolis, recreated using historical maps as well as satellite images throughout multiple years. Satellite images by Google Earth. Historical maps obtained from The American University of Cairo Library – Historical Maps and Special Collections Department. Illustrations by author.” page 37

“Figure 15 Before/after street sections of some roads that have been affected by the urban changes. The author approximates road capacities according to multiple Google Earth and Google Maps satellite images of the streets.” page 38

“Figure 16 Diagram of the interviewees’ self-reported changes in used modes of mobility before and after the project, showing significant reductions in active travel and majors increases in vehicular mobility.” page 39

“Figure 17 Diagram showing changes in the mobility experience affecting the interviewees.” ...page 40

“Figure 18 Before/after street sections of some roads that have been affected by the urban changes. The author approximates road capacities according to multiple Google Earth and Google Maps satellite images of the streets.” page 41

List of Tables

“Table 1 The Author’s Critique of the goals and indicators used in the ‘Measuring City Resilience’ framework. (Adapted from: The Rockefeller Foundation & ARUP. (March, 2016). Measuring City Resilience, 2016), p. 67.” page 24

“Table 2 Recommendations for promoting preventative urban health resilience in Heliopolis.” .. page 48

“Table 3 Path to a Healthy City. (Adapted from: World Health Organization. Regional Office for the Western Pacific. (2015). Healthy Cities: Good Health is Good Politics. Toolkit for local governments to support healthy urban development. p. 36).” page 55

“Table 4 Eleven Qualities of a Healthy City. (Adapted from: Tsouros, A. D. (2019). Urban Health. (S. Galea, C. K. Ettman, & D. Vlahov, Eds.). New York: Oxford Press. p. 287).” page 56

“Table 5 City Health Package of Nine Policies. (Adapted from: Castrucci, B. C. et al. (2019). Urban Health. (S. Galea, C. K. Ettman, & D. Vlahov, Eds.). New York: Oxford Press. p. 300).” page 56

“Table 6 An Agenda for Local Leaders Committed to Health, Equity, and Sustainable Development. (Adapted from: Tsouros, A. D. (2019). Urban Health. (S. Galea, C. K. Ettman, & D. Vlahov, Eds.). New York: Oxford Press. p. 391)” page 57

1. Introduction

1.1. Background and Research Question

Historically, urban health has played a significant role in shaping the practice of urban planning throughout changes in living conditions, disease outbreaks, and mass urbanization, inter alia. It is thus essential to acknowledge the seminal role of the link joining urban planning and public health, especially in the development of modern urban planning disciplines. However, along several decades this link has weakened due to changes in the priorities of the urban planning movements that followed. This weakening happened partly as a consequence of medical discoveries and changes in the disciplines of medicine and public health; changes in prevalent disease profiles from infectious diseases to more chronic and long-term diseases; increased life expectancies; improvements in medical treatments, etc. (Corburn, 2004). This manifested in a gradual decoupling of public health from urban planning disciplines, owing to the paradigmatic shift in medicine from studying environmental factors in the ‘humor imbalance theory’, towards the nineteenth-century ‘germ theory’ proposed by Koch (Rodger, 2019). Germ theory focused on minuscule scales of laboratory studies and reduced the focus on the larger environmental factors and systems affecting population health at large. Furthermore, a shift towards studying individual health further diminished the importance of health promoting urban environments and cities, alternatively referred to as “Salutogenic Cities”; cities that promote health and wellbeing (Capolongo et al., 2018).

Additionally, due to changes in spatial planning, mobility, and urbanization, cities have become more polluted and densely populated than ever before (Nieuwenhuijsen, 2016; Vlahov et al., 2007). According to a United Nations report, the percentage of people living in urban settings are projected to rise drastically from 55% to 60% by 2030, particularly in metropolitan and megacities (UN World Cities Report 2018). This mass urbanization puts more pressures on local governments and municipalities in terms of the services and amenities they ought to provide, creating differentials in the health of populations of different cities -and in some cases, in different neighborhoods of the same city.

Multiple cities and institutions are becoming more aware of the weakening of this link, which has led to the creation of multiple initiatives seeking to address this challenge. Namely; The Healthy Cities Movement, Partnership for Healthy Cities, The Fit City in New York City, The Nairobi Urban Health and Demographics

Surveillance System (NUHDSS), and Observatory for Urban Health in Belo Horizonte, amongst others. (Galea, Ettman, and Vlahov, 2019). However, most of these programs exist in global north cities, with an evident shortage of similar initiatives in the global south -where cities are growing at an alarming rate. This rapid rate of urbanization, paired with unsustainable growth and poor urban health planning, precedes a potential population health disaster in the future. As I was working on this thesis, the COVID-19 pandemic broke out, and has led to the adaptation of this study to provide reflections throughout the conceptual framework and analysis related to the pandemic, highlighting the relevance of this focus given the current events and future disasters.

1.2. Overall Aim and Research Objectives

Achieving the overall aim of this dissertation depends on two main goals; firstly, shedding light on the importance of urban health principles using a preventative approach towards the promotion of health and wellbeing of communities -thus reducing the prevalence of chronic and non-communicable diseases (NCDs). Secondly, examining the absence of these preventative health promoting approaches in frameworks of urban resilience, by investigating and aiming to fill the conceptual gap between the disciplines of urban health and urban resilience. The author conducts a case study of the neighborhood of Heliopolis in Cairo. The neighborhood underwent a massive mobility project leading to significant modifications in mobility and greenery¹. A mix of qualitative and quantitative research is done through a physical analysis of the neighborhood and conducting semi-structured interviews studying the effects of the project on the residents' urban use patterns and the possible associated health risks.

The overall aim of this dissertation is calling for 'preventative urban health resilience' (PUHR). This thesis is thus guided by two research questions: "What happens when urban health is not at the center of urban planning strategies?" and "How to create urban resilience that uses a preventative urban health approach for urban planning strategies?". Given the the mobility project's associated health risks, the recent environmental disturbances (storms and flooding), and the ongoing health disaster, this particular case study illustrates the author's research question regarding how detrimental these uninformed urban planning decisions could be to the health and resilience of cities and populations -especially in the global south.

¹ *The project has led to the loss of nearly 90 Feddans (0.378 Km²) of greenery -roughly double the size of Park Guell in Barcelona (Mokhtar, 2020) [Unofficial study]. Moreover, an estimated 2500-3000 trees were removed, in addition to the construction of seven bridges, and the widening of an extensive number of roads to increase vehicular flow.*

In order to answer the research questions, I develop the following objectives:

- i. Provide an understanding of urban health and urban resilience, identifying the physical and non-physical determinants of urban health, and the correlation between their constituents and population health.*
- ii. Critically evaluate the 'Cities Resilience Index' (CRI) framework of urban resilience concerning the inclusion of policies addressing preventative health measures addressing the identified urban determinants of health.*
- iii. Investigate the possible health effects of poor mobility and the absence of greenery and their relation to population health through the literature review, and empirically in a global south context through a case study of Heliopolis in Cairo.*
- iv. Explore changes in mobility, space-use patterns, and overall spatial experience through stakeholder's views as well as physical analysis of the neighborhood, highlighting potential health risks of these changes on population health.*
- v. Formulate contextually relevant recommendations for health-promoting urban resilience planning, focusing on preventative urban health that acknowledges the urban health inequities affecting under-represented groups in Cairo.*

The methodology involves conducting a literature review of scientific articles, institutional frameworks, and publications regarding urban health and urban resilience, investigating the embeddedness of preventative urban health measures in urban resilience frameworks. It focuses further on mobility and greenery as two components relating various determinants of urban health, and highlighting the gap in achieving preventative urban health resilience (i), (ii). Furthermore, the correlation between changes in mobility and greenery is further investigated with regards to the associated potential resulting health risks (iii). This conceptual framework aims to establish and provide a critical understanding of the gap between preventative urban health and urban resilience policies, relating the findings to the COVID-19 pandemic and its potential influence to population health and built environments as a whole. Whereas objectives (iv) and (v) involve the gathering and analysis of empirical data, and close by providing a conclusion and recommendations to promoting health and resilience through urban planning measures, and will be presented in the following chapters.

1.3. Value of this research

This research contributes to the small interdisciplinary body of literature joining urban health and urban resilience. Seeking to fill a research gap by producing a more holistic and preventative approach to urban resilience as a planning paradigm. The case study provides a cautionary example of unsustainable urban development that lacks an overarching framework addressing resilience, health,

or inequity. Secondly, it adds to the growing urban health scholarship pertaining to the global south, especially in the MENA region. Thirdly, through the conceptual framework, this thesis offers a more nuanced understanding of urban resilience as a growing concept that needs to be reviewed and developed further in order to include preventative health at its center. Lastly, it highlights the need towards healthier and more resilient urban environments in Cairo, especially capable of withstanding and positively adapting to health emergencies.

Although the conceptual framework could be adapted to other global south contexts, the case study of Heliopolis and the findings are difficult to generalize for other contexts. However, the methodology, research design and recommendations may be beneficial for other scholars to extrapolate in research concerning other global south cities.

And lastly, due to the COVID-19 outbreak, we are faced with a health disaster that showcases a manifestation of the weak urban health path dependency we have created through poor urban planning. These are health risks we can no longer afford, and which, according to COVID-19 statistics, pose a higher threat to older populations, particularly those with higher of non-communicable disease prevalence and comorbidities. According to the conceptual framing and theoretical assumptions of this dissertation, this could be considered a ‘preventable²’ disaster. Had our cities been designed to promote health, we would have seen significantly fewer mortalities today.

² *Preventable in this sense means mitigating the outcome by reducing chronic and non-communicable disease prevalence using urban health measures, and supplementing urban resilience in reducing and positively adapting to the magnitude of the disaster.*

2. Literature Review

2.1. Introduction

Throughout this conceptual framework, I intend to review the literature on the definitions of urban health and urban resilience, determinants of urban health, and their inclusion in urban resilience frameworks. Closing with a focus on poor mobility and greenery with relation to the associated health outcomes. The conceptual framework adopts several individual objectives that satisfy the overall aim of the paper, which is ‘to create preventative urban health resilience’ -starting with a literature review, and satisfying objectives (i), (ii) and (iii).

2.2. Exploring Urban Health and Urban Resilience

2.2.1. Urban Health

Public health has shaped the practice of urban planning historically due to city expansions along the years, especially so during outbreaks of disease and pandemics, such as typhoid and cholera in the Middle Ages and early modern period. Later, in post-industrial times, urban health has again reshaped our cities in response to the diseases resulting from mass-urbanization and poor living conditions. These significant urban health interventions came at times when urban authorities gained the power to enable their implementation -which seems to occur primarily after outbreaks (Rodger, 2019). The term ‘urban health’ refers to the study of “the relation between the urban context and population distribution of health and disease” (Galea & Vlahov, 2005, p. 342).

Growing academic attention has been given to the idea of urban health; journals, conferences, and educational programs have started focusing on the topic towards the end of the twentieth-century. Multiple authors have elaborated on the principle of urban health determinants, which are studied in depth in the following sub-chapter. These determinants provide a more holistic understanding of urban health, and have a significant effect on population health (Galea & Vlahov, 2005; Hoisington et al., 2019; Marmot, 2005; Vlahov & Galea, 2003; Wulff, Donato, & Lurie, 2015). Which, I argue throughout the conceptual framework, are unaccounted for in urban resilience frameworks.

Keyes and Galea argue that urban health shapes various aspects of population health through the ubiquity of cities. A quality that makes cities so influential in shaping health through shaping urban contexts, our environments, how we interact with these environments, and our daily behaviors, ultimately

affecting our health (Keyes & Galea, 2016). They further elaborate by saying, “cities are ubiquitous exposures [which] means that a small change in cities stands to have a substantial change on the health of populations” *ibid*, (p. 12). Figure 1 shows the framework of understanding adopted by Galea, Ettman and Vlahov (2019), illustrating multiple causal-levels of influence on population health, starting from upstream levels such as federal level policies, to downstream influences such as individual-level actions and behaviors. This framework reflects our healthcare systems’ focus on the downstream level of the individual, whereas the discipline of urban health focuses on a broader array of influences, particularly those related to living in cities and urban areas.

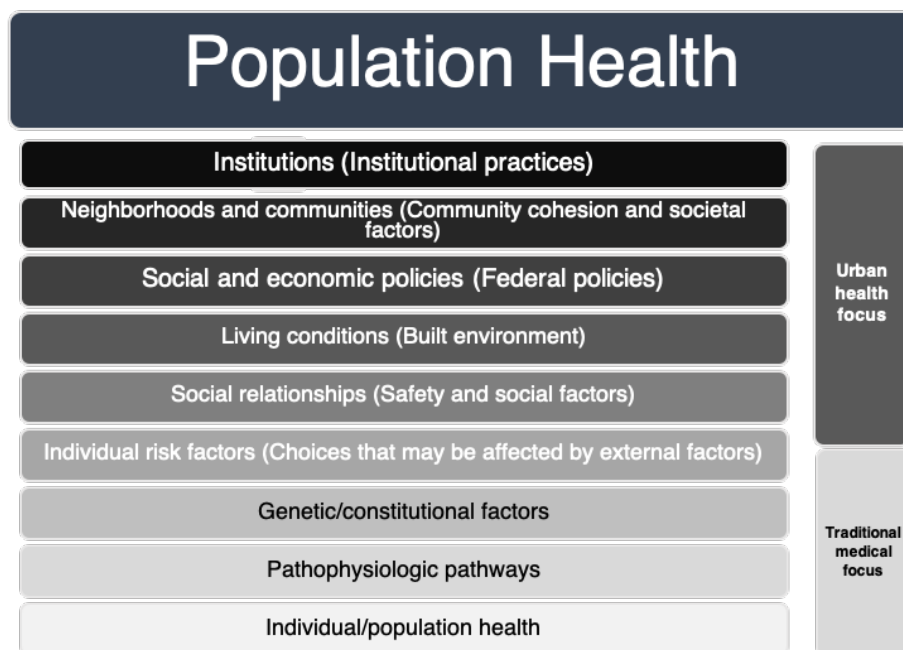


Figure 1 Levels of Influence on the Health of Populations (Adapted from: Kaplan, G. (2004) cited in Galea, S., Ettman, C. K., & Vlahov, D. (2019). *Urban Health*. pp. 16-17).

2.2.2. Urban Resilience:

Current paradigms of urban planning are moving towards newer and more progressive models of growth, such as Disaster Risk Reduction (DRR), sustainability, urban resilience, smart cities, among others. However, this thesis focuses specifically on the urban resilience paradigm. The concept of resilience has been referred to in the ecological terms as ‘the ability to persist or withstand changes’ (Holling, 1973). However, this concept was later adapted by several academics for other disciplines, including ‘urban resilience’. A concept which has evolved to gain multiple nuances shaping its definition. These nuances relate to the definition of urban, the state of equilibrium that

the urban system should or shouldn't return to, the positivity of said resilience, how it should be achieved, understandings of (mal)adaptation, and timescale of action. These nuances or "tensions" were raised by Meerow, Newell, & Stults (2016), who questioned urban resilience using a systems-thinking approach that looks into the cities as a resultant of interactions between connected, yet autonomous systems to achieve a more holistic and logical definition;

"Urban resilience refers to the ability of an urban system and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity." (ibid., p. 45)

Urban resilience has been a popular goal for cities, where several global north and south cities are implementing urban resilience strategies, often as part of their climate disaster mitigation schemes, or for other reasons; ranging from global economic competitiveness to climate change adaptation (Multiple sources cited in *ibid.*). Upon further inspection throughout the literature review, I argue that the current urban resilience frameworks tend to target provisional health, failing to address other determinants of health and preventative health promotion. Furthermore, I believe that urban resilience needs to look beyond the scope of natural disasters, taking into account resilience to health disasters and complex emergencies as well.

2.3. *Determinants of Urban Health*

Multiple authors have expanded on the concept of urban health to include several determinants of health, namely, social environment, physical environment, provisioning of health services, population composition, and lastly in some literature, good governance³ (Braubach & Grant, 2010; Corburn, 2015; Galea & Vlahov, 2005; Hoisington et al., 2019; Marmot, 2005; Vlahov, 2002; Vlahov et al., 2007).

In more recent literature, particularly on the social determinants of health, Salerno argues that the etymology of the term 'determinants' provides a false implication that these determinants are too strong to change—further elaborating on the reductionism of vulnerable populations' "resiliency and tenacity" in surviving despite these 'determinants' (Salerno & Bogard, 2019). However, I would argue that in global south cities especially, these determinants could be associated with more upstream influences such as political status quo or urban regime, where multiple factors affect the possibilities of

³ Various models of urban health determinants existed throughout the conception and growth of this discipline. It was found through the literature review that these models vary among scholars, and often constitute a mix of some of these five urban determinants.

change, and where the romanticization of slums will serve little purpose.

Taking the previously discussed points, the following determinants are presented in order of academic representation in the studied literature. And are reflected upon with relation to the author's view of preventative urban health resilience. Subchapter 2.4 examines the inclusion of preventative urban health measures and the discussed determinants into the City Resilience Index (CRI) framework.

2.3.1. Social Determinant of Health

Multiple authors have studied social environments and community interactions and their ability to shape our long-term health and wellbeing; throughout our day to day interactions, as well as through disasters and trying times. Poverty and space-based poverty are typically addressed in urban health literature. However, social and socioeconomic factors affecting vulnerable communities could also have significant effects on their health. David and Galea have produced multiple seminal articles on the urban determinants of health, giving attention to social determinants of health and its manifestations in population health (Vlahov and Galea, 2002; 2003; Galea and Vlahov 2005).

Multiple authors followed by elaborating on the health effects associated with community properties, socioeconomic status, crime and violence, the inclusion of marginalized populations, degree of participation in decision making, social cohesion, and social isolation. It is also important to note the potential predisposition of lower-income groups to negative health outcomes caused by poor living conditions, and the resulting health inequities. (Corburn, 2015; Hoisington et al., 2019; Marmot, 2005; Vlahov & Galea, 2003; Wulff et al., 2015). Corburn elaborates further by discussing spatial aspects that affect social determinants of health, such as the presence of cultural activities and parks, opportunities for pedestrian activity and the probability of social interaction, and reductions in feelings of isolation. Whereas larger infrastructural projects such as highways contribute to cyclical urban stressors such as air and noise pollution. These projects limit green and open space, due to land use allowances within city boundaries, resulting in potential reductions in physical activity, social interactions, and reducing protection from urban heat island effect. In addition to the daily effects of the previously mentioned urban stressors, traffic jams, traffic safety, and gender-based safety play a significant role in shaping our health through multiple social channels, *ibid.*

Unlike Wulff and colleagues, who argue for community Health Resilience that looks primarily into social determinants of health, my aim is to promote resilience that includes preventative urban health measures addressing all other urban determinants of health (Wulff et al., 2015). The effects of social cohesion on community resilience must also be studied, particularly in disaster resilience, as studies have shown that social cohesion is associated with reduced stresses and increased social support (Friel et al., 2011 cited in *ibid*). Social isolation and perceptions of safety in neighborhoods will be profoundly affected after the COVID-19 pandemic, and more research is needed on innovative ways of creating safe places for social interaction, encouraging community cohesion, while maintaining physical distancing.

2.3.2. Spatial or Physical Determinants of Health

Spatial determinants of health cover a variety of areas, such as access to basic and essential services; sanitation, waste disposal, clean water, as well as good living and work conditions. It also includes access to efficient public mobility, walkable areas, and green spaces. Corburn adds by including access to housing, land-use allocation for pedestrian and cycling areas (active travel), as well as public spaces, recreational areas, and parks, contrasting with percentage of motorized roads (Corburn, 2015). Fortunately, spatial determinants of health use more quantitative data, facilitating numerical studies that provide projections for proposed land-use plans and their potential effects on noise and air pollution, amongst other quantifiable indicators. These indicators are correlated to potential increases in the prevalence of physical diseases and mental disorders; cardiovascular diseases (CVDs), respiratory diseases and infections, cancers, stress and mental disorders, amongst others (Braubach & Grant, 2010; Corburn, 2015; Groenewegen, Van Den Berg, De Vries, & Verheij, 2006; Vlahov, 2002; Vlahov et al., 2007). Thus, the need for preventative urban health policies that limit harmful exposures and encourage healthier behaviors.

Hoisington has provided us with an understanding of the correlation between the social and spatial determinants of health and how they affect the physical and mental wellbeing of people. Especially noting social inequities of health affecting vulnerable populations, and the potential mental health consequences of poor indoor living conditions (Hoisington et al., 2019). Whereas Corburn highlights the importance of reducing toxic stress with relation to place-based poverty as a factor that constantly affects population health *op cit*. Owing to the previously mentioned quality of 'city ubiquity' (Keyes & Galea, 2016), these determinants have a significant impact on people's health, especially so in

poorer living conditions. Furthermore, lower-stream decisions on the individual level affecting exposure and behavior have an impact on the resulting health outcomes as well. These complex interactions between determinants could overburden other determinants, such as 'provisioning of health and social services'. The correlation between social and spatial determinants of health is especially relevant when discussing mobility and greenery, and provides reasoning for studying them further in subchapter (2.5).

Our understanding of public as well as private space will need to be re-evaluated in order to allow for physical distancing measures, post-COVID-19. Additionally, the potential shift towards sprawled urban planning will put more strain on active travel as well as public transport systems -affecting disadvantaged groups more inequitably, and putting them at more health risks. Slums and poorly designed neighborhoods house higher concentrations of essential workers and informal-market labor, who could be facing more risks due to the natures of their work. Slums thus, will bear a heavy health burden due to high densities, poor urban conditions, and lack of services and utilities. Further increasing the need for better quality housing and safer urban environments for disadvantaged groups and their resilience.

2.3.3. Provisioning of Health and Social Services

The provisioning of health and social services is highly related to the healthcare access policies, and is highly reliant on land use allocation and distribution. Access to healthcare, whether primary, secondary, or tertiary, is crucial for health in urban and peri-urban areas, particularly in low and middle income countries (LMICs) where slums and more impoverished urban conditions often cause health problems. Emergency healthcare access is a crucial priority for underprivileged neighborhoods and informal areas (Corburn, 2015; Galea & Vlahov, 2005; Vlahov, 2002). Furthermore, lack of access to sustainable and secure livelihood sources affects access to healthcare due to insurance and healthcare policies, especially when universal healthcare access is not implemented -or is partial.

According to David and Galea, transport and mobility also play a significant role in access to health services in terms of speed and distances crossed, causing health access differentials between neighborhoods and their socioeconomic levels. Whereas Corburn focuses on access to more localized community healthcare provisioning, encouraging decentralization of health systems, and using a more bottom-up approach to healthcare access.

Provisioning of health and social services has shown to be an incredibly

decisive determinant in health disaster mitigation, especially so after the pressures faced by our healthcare systems due to the COVID-19 pandemic. Health systems need to provide PPE, protect healthcare staff, increase health provisioning capacities, and provide temporary health facilities -especially in times of disasters. Adopting Meerow, Newell, & Stults' view, resilience should affect the swiftness of the response and its capacity to mitigate the disaster as well as its ability to prevent future disasters. Positively adapting and improving after the situation, op cit. Particularly in LMICs, where access to decentralized health services must be ensured to protect people living in poorly provisioned areas.

2.3.4. Population Composition

Population composition is one of the less addressed urban determinants of health. Age and gender demographic distribution, density, diversity of the urban phenotypes, genetic factors, health beliefs, as well as aging populations, and increased stressful urban lifestyles are amongst the factors that have a significant effect on the urban health of communities. (Carmichael et al., 2019; Vlahov et al., 2007). Additionally, Vlahov and Galea stress the importance of studying urbanization rates as major factors affecting population composition.

Carmichael adds that the public health focus has shifted from infectious disease control to non-communicable disease alleviation, owing in part to changes in population composition. He notes that population composition profoundly affects rates of pollution and may potentially decrease access to healthier lifestyles and access to public health services. Thus making it an important determinant of urban health, and centers it to the narrative of reducing the 'urban health penalty' and increasing the 'urban health advantage', which are later discussed in this subchapter.

Density, in particular, will have to be reconsidered using an urban health perspective due to the COVID-19 pandemic. Cities need to adapt and be flexible to de-densify while maintaining measures of physical distancing, sustainable public transport, securing livelihoods, and preventing urban sprawl and mass-migration to the suburbs. The health of the elderly would also require further attention, seeing as though aging populations are more vulnerable to health disasters, our urban planning should focus on improving their overall health and wellbeing. Eckert and Kohler assess the strong correlation between levels of urbanization and prevalence of diseases, through a systematic literature review; highlighting the increased prevalence of various communicable and non-

communicable diseases due to urbanization. Affecting lower-income populations and rural communities especially through reduced access to healthcare services (Eckert & Kohler, 2014).

2.3.5. City Governance and Leadership

City governance and leadership affect how communities are included in decision-making activities that relate to their social and spatial surroundings, amongst many other aspects of their lives (Wulff et al., 2015). According to Grant et al., when and where participation exists, planning decisions are directed more towards the needs of the people due to debate about the impacts and the needs of the population (Grant et al., 2017). Corburn elaborates further by stating that decisions ought to be less technocratic and more experience-based and knowledge-oriented, coming from a bottom-up approach (Corburn, 2004). Environmental justice is a concept tying multiple determinants of health, which 'City Governance and Leadership' is one of. The presence of active and local NGOs and CBOs should be supported by municipalities and local authorities to improve urban areas on the neighborhood level, as well as improving citizen participation in decision-making processes. Ensuring autonomy and functionality through emergencies and providing resilient mechanisms for localized action and relief efforts. Innovative community participation, bottom-up strategies, and urban activism lead to improved urban health outcomes through embedding environmental justice in urban policies (Brulle & Pellow, 2006).

Although good 'City Governance and Leadership' are not often mentioned in literature as an urban determinant of health per se, some authors address them through policies and recommendations, highlighting their significance in shaping and influencing health. After the COVID-19 pandemic, governance will determine whether urban planning policies will shift to healthier and semi-compact cities, or towards massive urban sprawl. Good governance should also address the resulting health inequities and risks resulting from urban planning decisions, especially after realizing the seminal role essential workers play in our society.

Given the various determinants of urban health and their complexity, in addition to the concept of city ubiquity and its significant effects on population health, more academics are calling for interdisciplinary research linking urban planning, public health, epidemiology, etc., in an attempt to re-establish the previously existing link between urban planning studies and health studies (Corburn, 2004; Corburn, Nguendo-Yongsi, Caiaffa, Oni, & Salem, 2019; Galea et al., 2019; Grant et al.,

2017; Vlahov, 2002; Vlahov & Galea, 2003). Furthermore, theories of ‘differential vulnerability’ in urban health highlight the ways by which health stressors affect people differently according to their socioeconomic status (Pearlin, 1999, cited in Galea, Ettman and Vlahov, 2019). Feminist urban health scholarship highlights the urban differential previously mentioned, focusing on the individual’s axes of oppression and privilege, with relation to intersectional socioeconomic factors such as race, age, gender, social and economic backgrounds (Frye, Putnam, & O’Campo, 2008). Urban fear is also a significant factor in shaping the experience and spatial use patterns of women and girls in particular through the public and private spheres (Bondi & Rose, 2003). These differentials in safety and access to public space lend themselves to justify intersectional and feminist approaches to urban health in order to create a more accessible and equitable urban health planning.

The ‘Boston Public Health Commissions’ referred to “area-level poverty”, where people face health inequities based on various socioeconomic, racial and gendered reasons, and especially tend to affect marginalized communities (2018, cited in Galea, Ettman and Vlahov, 2019, p. 21). Multiple scholars address health inequities as a characteristic of cities, but do not, however, address it as an urban determinant of health (Corburn, 2004; Corburn et al., 2019; Galea et al., 2019; Grant et al., 2017; Marmot, 2005; Vlahov, 2002; Vlahov et al., 2007). However, I believe inequity should also be considered a determinant of urban health in its own right.

2.4. Urban Health in Resilience

Multiple frameworks of urban resilience exist; however, for this thesis, the Rockefeller Foundation and ARUP’s ‘City Resilience Index’ (CRI) framework is explored further in Figures 2 and 3. The framework is comprised of four categories, twelve goals, and fifty-two indicators for building urban resilience in cities. The degree to which the indicators are met provides an understanding of qualities related to every specific goal. This thesis focuses on the first category, ‘Health and Wellbeing’; analyzing its goals and individual indicators in relation to the previously discussed urban health determinants, and assessing the inclusion of preventative urban health resilience measures in the indicators. Figure 3 provides a more explicit elaboration of the individual indicators in the ‘Health and Wellbeing’ category of the CRI framework.

Adopting the understanding of urban planning as preventative medicine by Corburn (2015), the CRI should include preventative measures of health promotion in cities, creating what some authors refer to as ‘Salutogenic Cities’ (Capolongo et al., 2018). We need cities that prioritize urban health planning, and that would be capable of preventing or mitigating deaths and overburdened health systems should a health crisis like COVID-19 occur. The current and future trajectory of urban resilience -represented in the CRI framework- has been faced with a catastrophic health disaster, and upon further investigation seems to lack preventative urban health goals. That is not to say that these measures should be explicit to outbreak and pandemic control, but should also reduce the prevalence of non-communicable and chronic diseases, and promote physical and mental wellbeing.

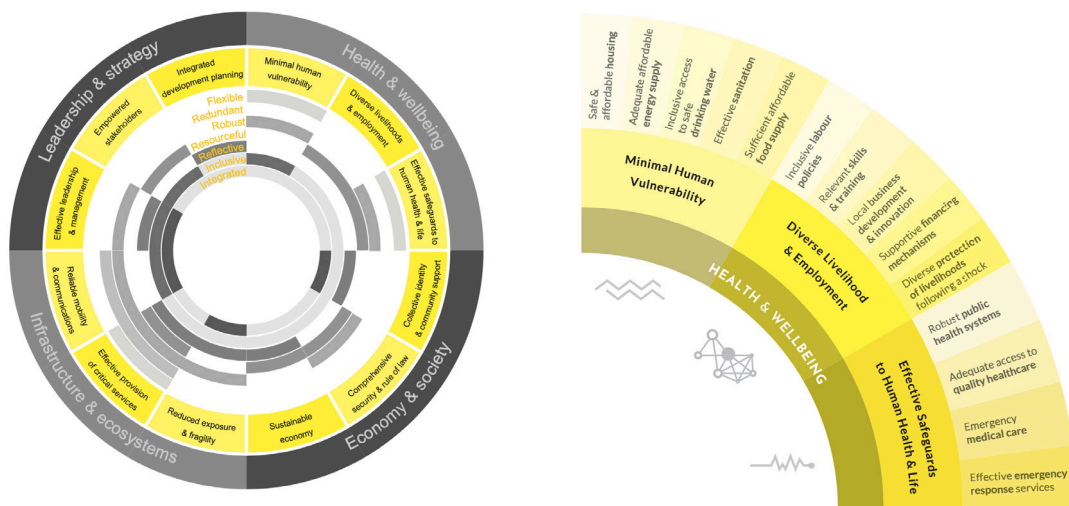


Figure 2 Left. Urban Resilience Framework (Adapted from: The Rockefeller Foundation, & ARUP. (2015). *City Resilience Framework*, December 2015. p. 9) Figure 3 Right. Health and Wellbeing in Urban Resilience. The Rockefeller Foundation & ARUP. (Date Unknown). *City Resilience Index Brochure*, p. 18.

Expanding on the individual indicators for the three goals in ‘health and Wellbeing’, Table 1 shows the corresponding topics of action, goals, and indicators along with the author’s critique of said indicators with relation to the author’s conceptual framework. The ‘Health and Wellbeing’ sector seems to focus primarily on provisional health and access to it; providing basic human needs (goal one), supporting employment and livelihoods (goal two), and lastly, provisioning of medical care and health services (goal 3).

Goal	Indicators	Topic	Author's Critique
Minimal Human Vulnerability	Safe and affordable housing	Housing	<p>This goal is essential, especially from an urban health equity point of view, and affecting the spatial and social determinants of health. However, it is limited to provisioning of basic needs and services and does not address other various spatial health determinants -other than basic needs. Additionally it does not consider the importance of community interactions and social environments, previously discussed (Wulff et al., 2015).</p> <p>There is a lack of focus on indoor building quality, especially in housing, which has been shown to affect the physical and mental wellbeing of building users. Especially due to poor urban living conditions, or proximity to high outdoor pollution (Hoisington et al., 2019; Vlahov, 2002; Vlahov & Galea, 2003). The focus on quality of life should be established, ensuring that the elderly and the differently-abled could have an opportunity to live in a health-promoting city that considers their needs.</p>
	Adequate affordable energy supply	Utilities - Energy	
	Inclusive access to safe drinking water	Utilities – Water supply	
	Effective sanitation	Utilities – Drainage and sanitation	
	Sufficient affordable food supply	Food	<p>Sufficient and affordable food options are vital points, however, access to 'healthier' food options is considered a significant factor affecting individual eating behaviors and health. More commonly causing a high prevalence of obesity, in higher income countries (McClintock 2011, cited in Anguelovski, 2013).</p> <p>Whereas in LMICs, there are many informal markets providing access to affordable healthy foods for various income brackets (Battersby, 2019). Further showing the complexity of urban health issues and their relation to their contexts.</p>

<i>Diverse Livelihood & Employment</i>	<i>Inclusive labor policies</i>	<i>Employment and labor</i>	<p><i>This goal could be tied to social determinants of health, primarily those dealing with poverty and affecting people’s living conditions. Communities living in slums or poor urban conditions would certainly benefit from this goal due to potential improvements in access to sanitation, waste disposal, amongst other basic and essential services. Additionally, financing mechanisms help people who have unstable or unsteady incomes to find diverse sources of income, thus improving their access to better services or healthcare options, especially those relating to space-based poverty.</i></p> <p><i>However, this goal should ensure access to independent or secondary sources of income for women, access to employment for the differently-abled, and pensions for the elderly -enabling vulnerable populations to secure their livelihoods and empowering them.</i></p>
	<i>Relevant skills and training</i>	<i>Education and Training</i>	
	<i>Local business development and innovation</i>	<i>Business, finance and economy</i>	
	<i>Supportive financing mechanisms</i>	<i>Business, finance and economy</i>	
<i>Diverse protection of livelihoods following a shock</i>		<i>Employment and labor</i>	<p><i>The protection of incomes and livelihoods has shown to be of fundamental value in disasters, as clearly shown by the COVID-19 outbreak. Where the diversity and steadiness of incomes for lower-income groups and day-to-day wage workers were especially affected.</i></p> <p><i>Other informal or unstable income-generating activities such as domestic help, could disfavor women in particular during emergencies.</i></p> <p><i>People, especially women, from lower-income groups, are faced with vulnerability and risks to their spending capacities, which could worsen their living conditions and access to healthcare. Additionally, the inclusion of economic opportunities and livelihoods for people with disabilities is a vital concern for post-disaster recovery.</i></p>

<i>Effective Safeguards to Human Health & Life</i>	<i>Robust public health systems</i> <i>Adequate access to quality healthcare</i>	<i>Health</i> <i>Health</i>	<p><i>These two indicators have proven to be essential, and to have an even greater value in times of crisis. Where density could be a factor affecting adequate healthcare access in crowded cities, especially those in the global south.</i></p> <p><i>However, more focus is needed towards access to community-level health centers and clinics, particularly in global south countries. Where multiple examples have shown the importance of localized health access points (Wulff et al., 2015). Additionally, different public and private health systems need to be coordinated and managed more efficiently to establish a more holistic health provisioning system and prevent fragmented healthcare systems.</i></p>
	<i>Emergency medical care</i> <i>Effective emergency response services</i>	<i>Health</i> <i>Disaster</i>	<p><i>These two indicators primarily focus on provisional health and life-saving services in emergencies -which healthcare systems around the world are having difficulties providing during the COVID-19 outbreak. Bringing forth concepts of flexible land use, and the capacity to create temporary healthcare centers and facilities.</i></p> <p><i>Additionally, non-communicable disease prevalence further worsens the impact of disasters on populations (Jobanputra, Boule, Roberts, & Perel, 2016). Which essentially relates to the first question of this thesis regarding preventative urban health resilience.</i></p>

Table 1 The Author's Critique of the goals and indicators used in the 'Measuring City Resilience' framework. (Adapted from: The Rockefeller Foundation & ARUP. (March, 2016). Measuring City Resilience, 2016), p. 67.

Reflecting on the analysis and findings of this table, it shows that the CRI's approach to urban health is highly provisional towards health. Although it could also lead to many indirect health improvements, it does not, however, address these determinants preventatively; lacking measures addressing prevalence of communicable and non-communicable diseases, obesity, pollution, social anxieties, and poor mental wellbeing in the built environment. Furthermore, the appropriateness of these indicators for global south contexts seems to require further attention, especially taking into consideration the urban health inequities facing disadvantaged groups in LMICs.

2.5. *Mobility and Greenery*

Finally, this thesis focuses on mobility and greenery, preceding an empirical evaluation of both in the following chapters. Mobility and greenery represent manifestations of land-use mix policies that have significant effects on all determinants of health, particularly social and spatial determinants of health.

Mobility is considered one of the drivers of urbanization, affecting access to livelihoods and multiple essential services (Giles-Corti et al., 2016; Nieuwenhuijsen, 2016). However, the available modes of mobility have a major impact on noise and air pollution, physical activity, local climate, and climate change, social interaction, and mental wellbeing, amongst other factors (ibid., Rydin et al., 2012). Samet draws our attention to the multiple ways in which urban determinants of health affect our health and wellbeing through pollution. Modes of mobility in particular, affect health through several pathways; through the adopted lifestyles, but also resulting pollution, thereby worsening the impact on our health. Mobility thus, could Result in a vicious feedback loop that manifests in an overall reduction in population health (Samet, 2019). In contrast, greenery plays a vital role in mitigating the consequences of this loop, as it has some influence on their pathways of influence.

The interrelationship between both mobility and greenery goes even further, where they often compete for percentages of land-use allocation in planning policies and regulations. More commonly in LMICs, mass urbanization leads to increased car-dependency, affecting vulnerable groups more inequitably than others due to increased exposure to pollution, economic and time burden of commuting, public transport safety, etc. (Rydin et al., 2012).

Nieuwenhuijsen and Khreis established nine pathways in which transport can affect our health; Motor Vehicle Crashes (MVC); Transport Related Air Pollution (TRAP); noise; increased local heat exposures; reduced green space exposure; decreased physical activity; and climate change (Nieuwenhuijsen and Khreis, 2019). Transport is also associated with increased mortality, NCD prevalence and comorbidities, mainly affecting cardiovascular and respiratory diseases, cancers, obesity, diabetes, and lastly, stress -which is one of the most influential factors affecting physical as well as mental wellbeing, multiple sources cited in ibid.

Whereas green space 'use and exposure' are associated with reductions in mortality and cardiovascular disease prevalence, stress reduction, pollution

control, as well as improved mental health and increased social activity (Nieuwenhuijsen, 2016). However, evidence shows that exposure to greenery poses a higher risk of skin cancer and Lyme disease *ibid.*, and may also have adverse mental effects such as increasing feelings of unsafety and visibility depending on the design and type of greenery used (Li, Zhang, & Li, 2015; Rydin et al., 2012). UV exposure and heat could be ameliorated through shading, and more active-travel oriented design measures. Additionally, the presence of greenery has been associated with increased physical activity, further increasing its capacity to affect people's health and wellbeing (Fong et al., 2018).

It is necessary to provide a multimodal transport system that favors active travel (walking and cycling) and public transport, and decreases demand for vehicular transport and car-use. The presence of green and public spaces paired with considerations of accessibility, walkability, and safe cycling in urban design practices would further improve the livelihood and attractiveness of neighborhoods and promote healthier cities.

Given the importance of physical-distancing measures, increased demand for large sidewalks and bike lanes, and percentages of greenery per capita, as well as public space and its allocation in land use-policies will need to be reconsidered. Additionally, major challenges facing public transport systems include: the economic impact of reduced ridership on funding public transport; the expected increase in private car-use; and the limitations on safe public transport user capacities. Challenges which may be even more difficult if coupled with increased suburban sprawl and reliance on vehicular transport.

3. Methodology and Case Study Background

3.1. Research Methodology and Design

The methodology of this study relies on a review of pertinent literature to establish the correlation between urban health and urban resilience, and creating a conceptual framework for conducting the empirical research and analyzing the gathered data. The case study of Heliopolis provides a specific area of focus for mobility and greenery -amongst many systems operating within the neighborhood, and the broader dynamic forces shaping the city of Cairo. The author uses a mix of qualitative and quantitative data gathering techniques, namely, semi-structured interviews and mapping exercises residents and built environment experts, partially satisfying objectives (iv) and (v). Additionally, the author conducts a physical analysis through primary and secondary sources to understand the factors shaping urban health in the area. The reasoning behind this research design is to create a comprehensive but preliminary understanding of the correlation between urban changes and their associated health risks and effects on the neighborhood as a whole.

The sampling of interviewees uses a snowballing technique based on existing contacts and their social networks⁴. Although the sampling technique could lead to less representative results due to the similar socioeconomic backgrounds of the interviewees, the author attempts to focus through their literature review and data analysis on the impact of this project on more disadvantaged groups as well. Primary data is gathered by conducting fourteen semi-structured interviews with built environment experts, a public-health expert, and non-expert residents. The data provides a deeper understanding of the consequences of these urban changes and how they affect people's spatial experience, use patterns, and mobility.

Additionally, through site visits and observations, the author reviews and gathers primary data due to the lack of available publications about the ongoing urban project. Secondary data is gathered by reviewing historical maps, satellite images, and the released plan of the urban mobility project, providing

⁴ *The intended sampling was to use snowballing techniques to reach a larger sample size followed by cluster sampling to reach other family members, domestic workers and doormen. The intent was to represent a larger socioeconomic demographic and provide results of the urban changes on various subgroups. The first technique intended to increase the number of interviewees, and the latter attempts to decrease bias by interviewing residents from various backgrounds in the neighborhood to diversify the findings.*

However, due to the COVID-19 situation, the methodology was changed due to the potential health risks and inconvenience associated with implementation.

an understanding of the urban morphology and changes in the neighborhood throughout several years. Furthermore, social media publications by residents and news articles are also considered.

The selection of the case study satisfies two goals; firstly, it provides an example of poor urban planning decisions, which could be detrimental to population health, and secondly, it could lead to increased vulnerability to health disasters and natural disasters. Therefore, it essentially ties the two aspects of the conceptual framework of this thesis and supports the call for 'preventative urban health resilience'.

3.2. Limitations

Studying urban health requires longer durations of time and involves multiple confounders affecting the findings. Therefore, a longitudinal cohort study of the residents' health is required to establish relevant findings. However, this thesis uses findings from literature as well as empirical data to provide a preliminary understanding of the topic. Some limitations detected in previous literature may also affect the findings of this study, including: diversity of subjects, family medical history, dietary factors, among other factors. Furthermore, the amount of scholarship on urban health and urban resilience on Cairo is scarce, thus the author increases their reliance on primary data and physical analysis, adapting global north literature to extrapolate their findings. The inability to access project information in addition to the ongoing operation of the project requires more studies after completion. Furthermore, the political atmosphere prevents this paper from investigating the relationship between governance and decision-making processes shaping the project and the health of the residents.

Due to the impact of COVID-19 on the data gathering process, the methodology and conceptual framework were modified to reduce the number of interviews and the diversity of the sample. Limitations on the second phase of interviews due to lockdown measures, particularly interviews with less privileged groups also affects the representation of the findings. Fairness and bias were reduced by informing the interviewees of the intended research outcomes, and using a relatively randomized sample selection primarily based on the availability of interviewees.

3.3. Case Study Background

The chosen case study area is the neighborhood of Heliopolis in Cairo, Egypt. It was commissioned in 1905 by the Belgian industrialist 'Baron Edouard Empain' to be an 'oasis in the desert' for wealthy Egyptians and foreigners alike. Heliopolis is one of the most affluent and esteemed neighborhoods in Cairo, competing against other neighborhoods, and tending to be greener, cleaner, and less crowded than other areas in the Greater Cairo Region (GCR). In addition to the presence of historic architecture that shows the manifestation of said affluence, Heliopolis was the last neighborhood to maintain a functioning, yet dilapidated tram infrastructure in Cairo. The neighborhood underwent a sudden and significant number of urban changes starting in September 2019. These urban changes are happening in lieu of extensive suburbanization and outmigration from central Cairo to satellite cities and gated communities, shown in Figure 4, further affecting the provisioning of health, population composition, and social determinants of health of the remaining inhabitants.

The aim of this development project intends to turn Heliopolis -situated along the East-West Cairo axis into a highly motorized mobility axis leading to the new 'Administrative Capital' as shown in Figure 5. Public green areas and green roundabouts, as well as tram infrastructure, were removed to allow for massive road widenings. Additionally, seven bridges⁵ were constructed in an attempt to improve traffic conditions and ease congestion in the neighborhood. According to the literature review findings, this lack of informed planning mechanisms incorporating urban health and urban resilience measures, along with a car-oriented development approach, could have detrimental effects on the health of Cairo's residents in general, and Heliopolis in particular. The project adopts a top-down masterplan approach, freezing political dominance and urban power dynamics in concrete and tarmac and leaving little room for future contestation or reclamation of space (UN-Habitat, Urbanization and Development Report, 2016).

⁵ However, more bridges are currently being constructed, showing the possibility of more expansions in the future.

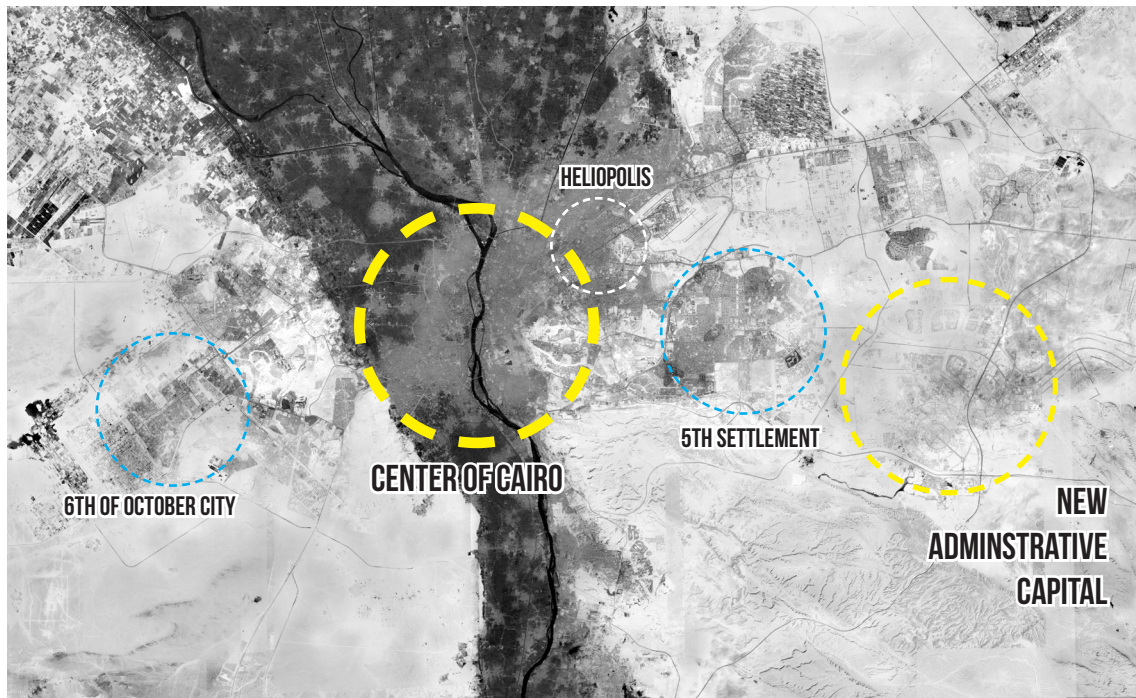


Figure 4 Satellite image of Greater Cairo Region showing the relationship between Heliopolis and the center of Cairo and its outskirts, as well as the New Administrative Capital.

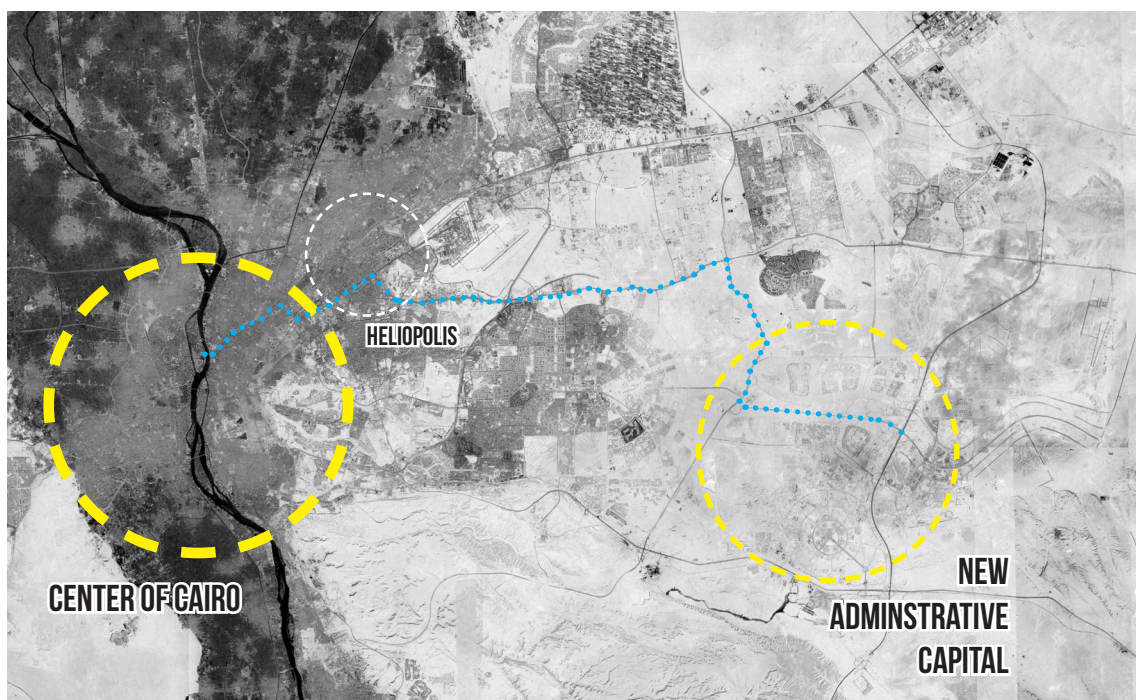
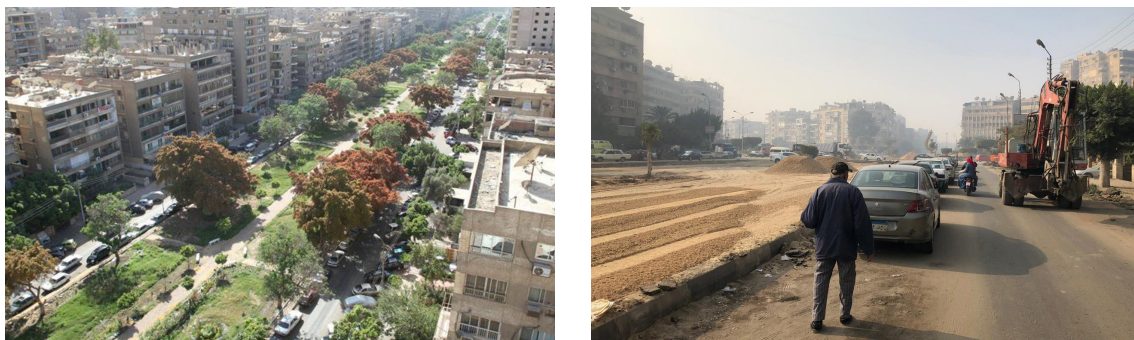


Figure 5 Satellite image of the connection between Cairo's center and the New Administrative Capital through Heliopolis.

This urban development scheme has led to the removal of greenery amounting to nearly 90 Feddans (378,000 m²) (Mokhtar, 2020), and an estimated 2500~3000 trees, leading to potential severe health risks in the future. Additionally, the project's implementation started without prior notice and was thus received with surprise from the residents. In light of the reduced greenery, mass-motorization, and lack of participation, as well as the hurdled attempts to prevent or contest the urban changes, many urban health determinants have been weighed towards an unfavorable health outcome. Additionally, these urbanization schemes have posed significantly adverse effects on ecosystems, biodiversity, and national resources -which are especially vulnerable in a metropolitan city like Cairo, further weakening disaster risk reduction capacities op. cit. Before and after images of one street show the changes in road design and the massive changes intended for increased vehicular mobility, Figures 6, 7.



Farid Semeika Street

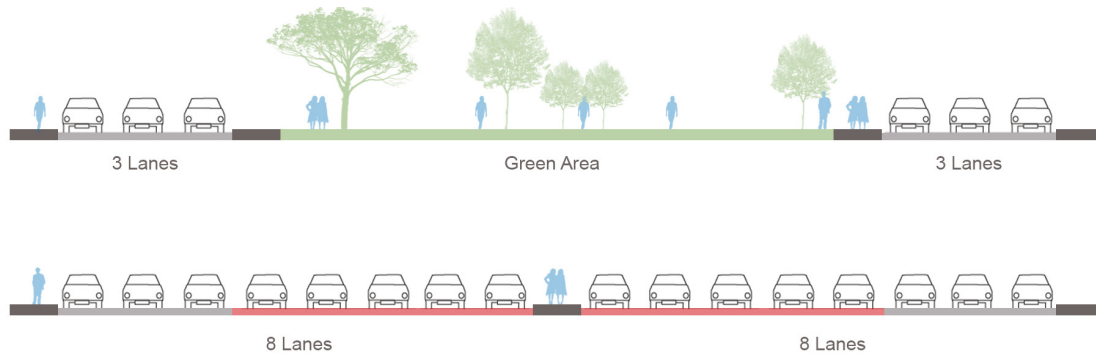


Figure 6 Left shows a before photograph of Abdelaziz Fahmy street in Heliopolis. Source: El-Dorghamy, A. (date unknown). Right shows an after photograph of Abdelaziz Fahmy street in Heliopolis. Source: El-Dorghamy, A. (2019).

Figure 7 Before/after street sections of Abdelaziz Fahmy street. The author approximates road capacities according to multiple Google Earth and Google Maps satellite images of the streets.

Cairo has witnessed multiple heatwaves, torrential rains, and floods recently, possibly causing disturbances that prevent emergency services from reaching affected populations -especially if combined with other disasters. One example of such disasters was an episode of heavy rain December 2019 affecting Heliopolis intensely; causing roadblocks, multiple injuries, and deaths -even before the

completion of the mobility project. Due to the worsening urban conditions, wealthier residents often move to gated suburbs, worsening the vicious cycle of car-centric dependency in Cairo's urban planning. A shift that could further widen the inequity gap, increase social segregation, and overburden public transport systems, as well as reduce green/public spaces within the highly-centralized city center. This urban sprawl could also cause people from disadvantaged backgrounds to pursue distant work opportunities, despite inefficient modes of mobility and poor urban conditions. Furthermore, they bear the economic burden as well as adverse effects related to commuting and harmful health exposures (Rydin et al., 2012). With an inefficient transport network and rising concerns for gender-based safety in Cairo, particularly sexual harassment, women and girls face significant challenges related to mobility and safety in the city, especially those from lower-income brackets. Lastly, the highly motorized Heliopolis raises more concerns of diminishing 'eyes on the street', a factor of safety and security in cities theorized by Jane Jacobs (Jacobs, 1961; Batabayal, 2016).

These changes could lead, I argue, to severe health consequences on the residents due to changing mobility patterns, car-dependency, reduced urban greenery, increased pollution, in addition to an increased impact on climate change and vulnerability to climate risks and disasters in the future.

4. Analysis and Discussion

4.1. Analysis of Heliopolis Through Physical and Social Determinants of Health

4.1.1. Growth, Urban Fabric, and Density

An analysis of historical maps and contemporary satellite images of Heliopolis provides an incremental understanding of its morphology, especially regarding changes in mobility and greenery throughout the years. Figures 8, 9 show before and after photographs of the urban changes at the intersection of Othman Ibn Affan and Abdelaziz Fahmy streets, further highlighting some of these urban changes. A historical map of Heliopolis ca. 1949 shows parts of the tram network as well as a significant percentage of urban greenery around buildings, in addition to large medians of greenery in the neighborhood's roadways and roundabouts, Figure 10. Comparing both maps ca. 1946 and 1971, shows the area's urban growth and tram network expansions, showing the continuation of the wide road design with large green medians in new urban expansions, as well as the areas affected by the recent mobility project, Figure 11.



Figure 8 Above shows a before photograph of the roundabout at the intersection of Othman Ibn Affan and Abdelaziz Fahmy in Heliopolis. Source: Arafa, E. (date unknown).

Figure 9 Below shows an after photograph of the roundabout at the intersection of Othman Ibn Affan and Abdelaziz Fahmy in Heliopolis. Source: Arafa, E. (2020).

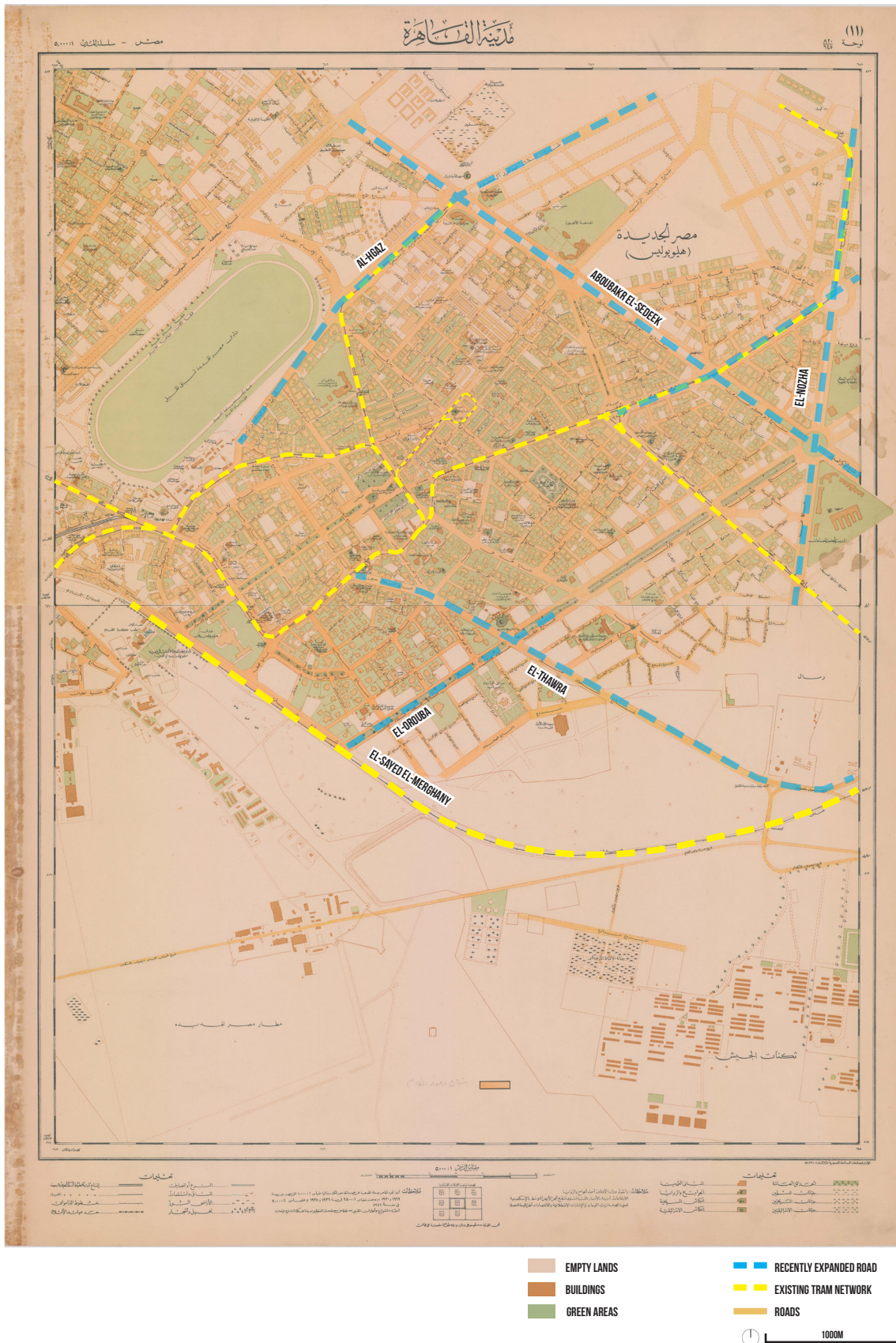


Figure 10 Merged Map of Heliopolis ca 1946, showing tram network, urban density, and greenery. Maps used were surveyed in 1946 and 1949. Maps obtained from The American University of Cairo Library – Historical Maps and Special Collections Department. Illustrations and merging by author.

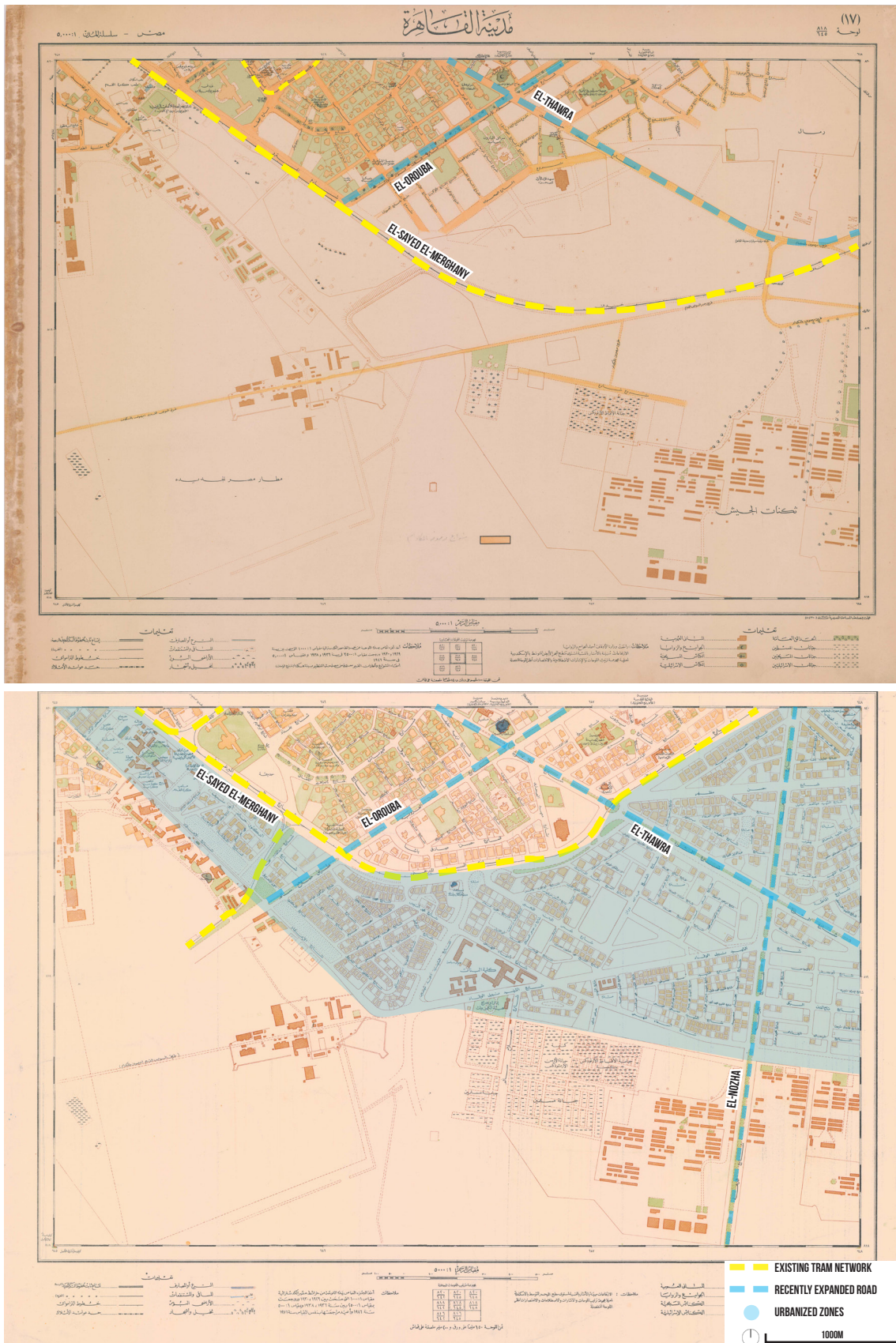


Figure 11 Analysis of mobility on maps of Heliopolis ca. 1946 and 1971. Maps obtained from The American University of Cairo Library – Historical Maps and Special Collections Department. Illustrations by author.

4.1.2. Mobility

Analyzing the historical maps shows the removal of the extensive tram network and construction of new roads, as well as the changing urban planning priorities and paradigms manifesting spatially. The maps show only a small portion of the recent urban changes, as they do not cover the North-Eastern side of Heliopolis, which is the most heavily changed zone. It is unclear whether the maintained road design throughout the historical maps was mandated by urban regulations, tram network requirements, or only due to the geometric constraints of the urban fabric of the area. The neighborhood's spacious major roads (approx. 60m wide) allowed for the implementation of the recent mobility project that turned its streets essentially into what some interviewees referred to as "highways". Figure 12 shows a general overview of one of the streets in Heliopolis where a new bridge was constructed above a pre-existing one. Whereas Figure 13 presents a larger scale understanding of the changes in the neighborhood; road design changes, bridge construction, and roundabout demolition. Analyzing the 'now-removed' tram network shows previous the extent of public transport coverage in the neighborhood. Additionally, it could have provided complementary modes of transport to the underground metro line opened in 2019, Figure 14.

Most of the neighborhood now suffers from proximity to major roads, which is associated with increased mortalities due to motor vehicle crashes, traffic-related air pollution (TRAP), noise, greenhouse gases, among others. They are also associated with increased prevalence of cardiovascular diseases (CVDs), elevated blood pressure, lung diseases, cancers and respiratory infections (Multiple authors cited in Nieuwenhuijsen, 2016; Nieuwenhuijsen & Khreis, 2019).



Figure 12 shows a recent photograph of one of the modified areas; road changes and a bridge constructed above a pre-existing one. Source: Samaha, O, (2020).

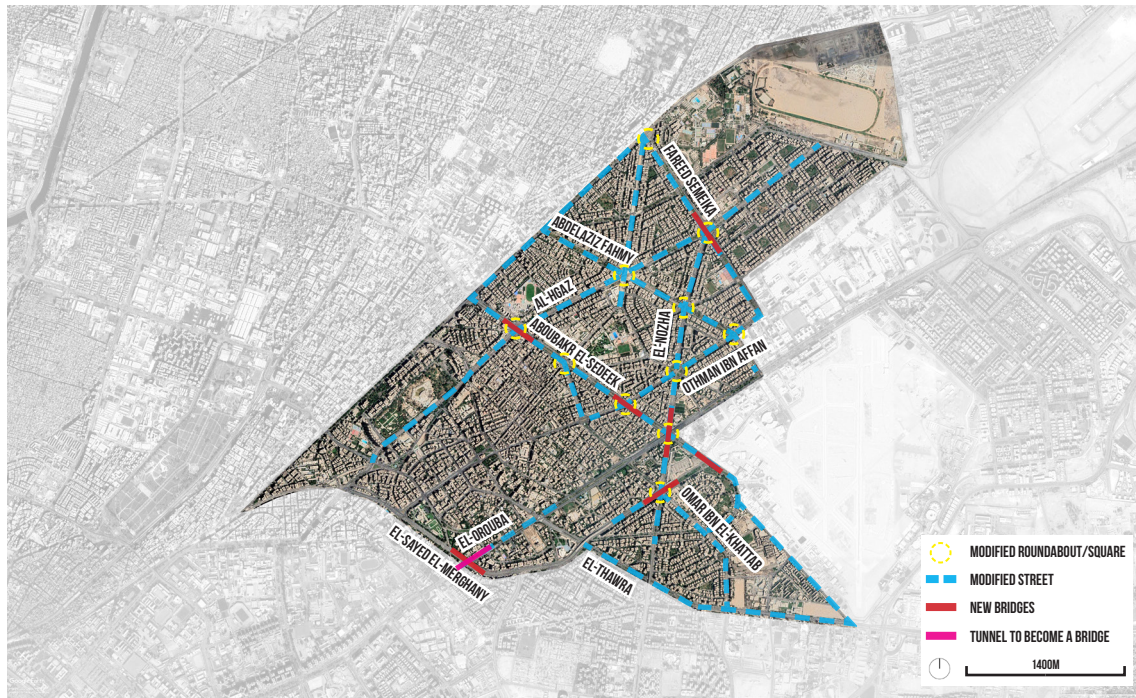


Figure 13 Map of urban changes in the Heliopolis, showing affected roads and roundabouts, and constructed bridges. Satellite images by Google Earth. Illustrations by author.

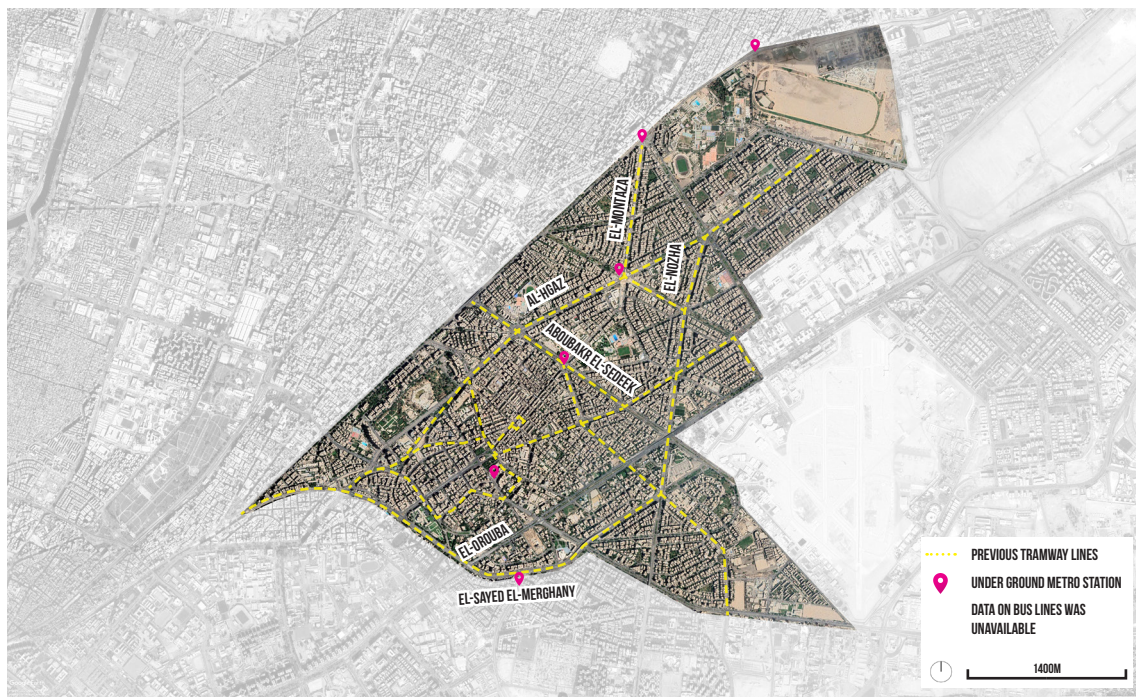


Figure 14 Map of the tram network in Heliopolis, recreated using historical maps as well as satellite images throughout multiple years. Satellite images by Google Earth. Historical maps obtained from The American University of Cairo Library – Historical Maps and Special Collections Department. Illustrations by author.

Figure 15 shows the magnitude of the urban changes in individual streets, comparing street sections prior to the project to how they currently are; highlighting the mass motorization, loss of greenery and open spaces, and narrowed pedestrian areas. This project has created an urban environment with an inequitable distribution of car roads compared to spaces for people, seemingly affecting non-car users more significantly, and increasing their exposure to multiple urban threats. Additionally, narrow walkable spaces bring forth concerns about crowding and physical distancing with regards to COVID-19, illustrating one example of how non-car users could be further disadvantaged in this scenario. The street sections show an approximated car capacity rather than the number of lanes, partially due to a lack of clear demarcation of lanes, but also due to reduced adherence to traffic lanes at times of heavy traffic.

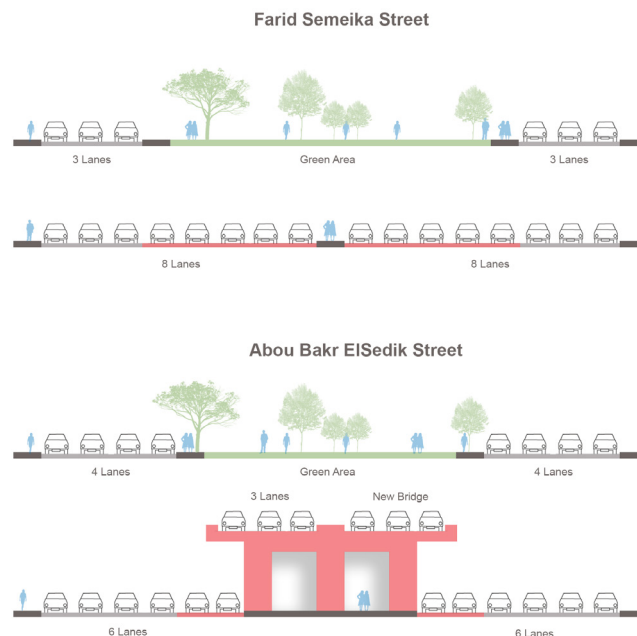


Figure 15 Before/after street sections of some roads that have been affected by the urban changes. The author approximates road capacities according to multiple Google Earth and Google Maps satellite images of the streets.

The analysis below is based on the findings from the semi-structured interviews and gathered empirical data. Additionally, satellite images of the changed roads combined with site visits were included in the data used to compare the urban changes. Topics and findings from the interviews were grouped and analyzed with relation to the conceptual framework and are presented in the following section:

Changes in used modes of mobility were also studied, where questions about previous and current modes of mobility showed a general reduction in the variation and frequency of non-vehicular modes of transport. Comparing data on mobility use changes shows significant increases in car-use and ride-hailing, as well as significant decreases in active travel and public transport use, and for 2 respondents an increase in carpooling Figure 16. General reductions in non-vehicular mobility and physical activity affected a large number of interviewees, where eleven respondents reported decreases in active travel, six of which were significantly affected due to their regular pattern of inner neighborhood walking.

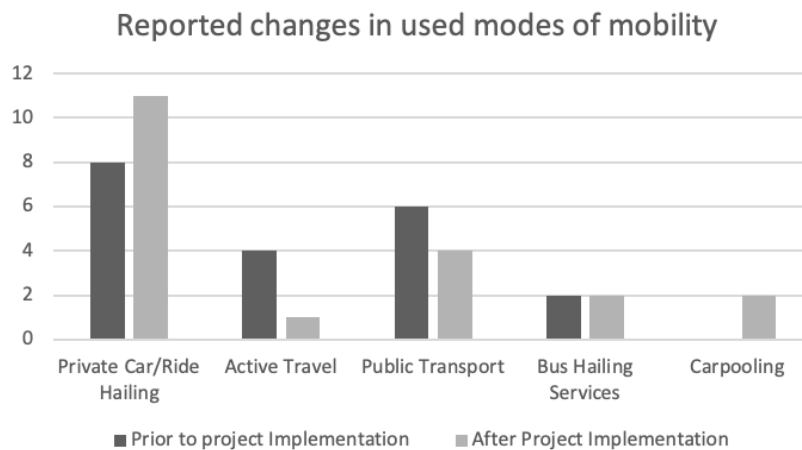


Figure 16 Diagram of the interviewees' self-reported changes in used modes of mobility before and after the project, showing significant reductions in active travel and majors increases in vehicular mobility.

Safe walking and cycling infrastructure was noted to be absent in site observations and reflected on interview responses as well. However, two respondents reported no changes in active travel, owing to their reliance primarily on cars and the long distances to their respective workplaces.

Reductions in **physical activity** and increased sedentary behavior are associated with increased prevalence of CVDs, type-2 diabetes, cancers, obesity, and reduced life expectancies, putting the health of residents at significant risks. Additionally, adverse effects on mental wellbeing such as increased stress levels,

depression, and time spent in cars could also be associated with increased risks of cardiovascular diseases and poor mental health (Corburn, 2005; Multiple sources cited in Giles-Corti et al., 2016).

The mobility experience has also changed, affecting the interviewees' choices of mobility and traffic as a whole Figure 17; longer routes for relatively close destinations could lead to more gridlocks on a neighborhood scale if paired with a dependency on car use. Four expert interviewees highlighted the poor urban design associated with these urban changes, leading to exacerbated traffic conditions (bottlenecks, dangerous U-turns, etc.). Furthermore, the interviewees noted that road widening has led to a major increase in traffic flow and driving speeds throughout the whole neighborhood, which has been associated with increased noise and air pollution, significant reductions in walkability, and an increase in traffic-related injuries (Corburn, 2005).

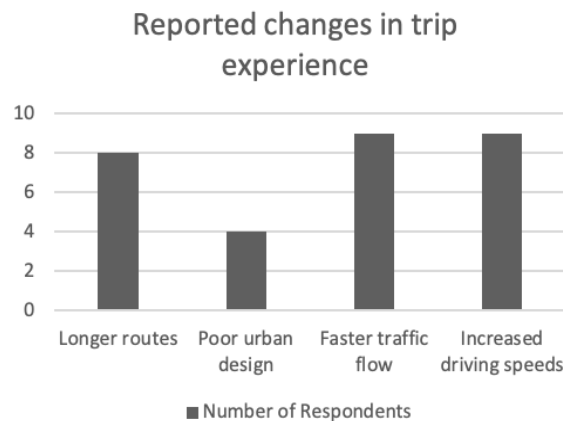


Figure 17 Diagram showing changes in the mobility experience affecting the interviewees.

Perceptions of safety were also affected, where eleven respondents felt significantly less safe in the neighborhood, additionally raising concerns for children and the elderly, lack of accessibility for the differently-abled, gender-based safety, as well as crowdedness on narrow sidewalks. Moreover, increased fear of car-related injuries and unregulated traffic flow affects the residents' mental wellbeing, and is associated with increased stress levels, as well as a decreased physical activity, *ibid*. Two respondents added that the number of deaths from car-related accidents was thirty-five (March, 2020). A number which was correlated with an observed lack of regulatory measures controlling vehicular flow, such as road crossings, speed bumps, sufficient sidewalks, traffic lights, etc., further resounding the term “highways” used by several interviewees Figure 18.



Figure 18 Before/after street sections of some roads that have been affected by the urban changes. The author approximates road capacities according to multiple Google Earth and Google Maps satellite images of the streets.

Many respondents reported severe and increased fears of sexual harassment/assault, adding that the street often creates spaces of ‘entrapment’ due to the narrow curbs separating wide roads on either side, and the limited escape routes from potential assaults. Additionally, a reduction in the number of people in the street -especially other women- further increases the fears faced by women and girls. One interviewee shared the impact of these changes on her spatial experience in Heliopolis after the project’s implementation:

“I used to be able to walk without worrying about getting hit by a car. There were more people around [before the project], so harassment was much less, and I could always choose a different escape route because of the different options around [me], that helped a lot. Now, especially when crossing a large street, I often find myself stuck between harassment or sexual assault on that narrow strip of curb between two sides of a seven-lane road. These are decisions women make on a daily basis” -One interviewee’s response on perceptions of safety.

Urban fear could lead to increased staying indoors, decreased physical activity, and potentially increasing social isolation. In addition to increased exposure to toxic indoor air and allergens, especially in low-quality indoor environments (Corburn, 2015). Multiple residents reported that the urban form and building heights reduce the amount of sunlight and natural ventilation entering their homes. It is essential to be wary of the negative effects of external influences such as major roads and the resulting pollution on internal factors such as indoor air quality, and the physical and mental wellbeing of the residents (Hoisington et al., 2019). Issues in way-finding and neighborhood attractiveness have also been reported to affect several people, increasing their sense of alienation and presence in a previously more familiar and attractive neighborhood, further increasing urban fear for multiple interviewees. Figure 19 further shows some of the effects of the spatial experience on walkability.



Figure 19 left shows the experience of walking in Heliopolis during road changes and bridge construction. Source: Samaha, O. (2020). Right shows a bridge constructed right after pre-existing bridge in El-Sayed El-Merghany street. Source: Samaha, O. (2020).

4.1.3. Greenery

The **use of public green space** is not a significant part of Egyptian culture, however, most respondents preferred walking near green spaces -prior to their removal. Eight interviewees reported decreased green space use, three of which had used the green areas regularly.

Exposure to green space, on the other hand, was reported to be significantly decreased by all interviewees, five of which reported substantial reductions in exposure due to the removal of green areas near their residences.

Greenspace use and exposure are related to reductions in mortality and prevalence of CVDs, as well as improvements to mental health, social interaction, sleep patterns. In addition to the promotion of physical activity, stress-reduction, and reductions in noise and air pollution. However, it is also associated with increased risks of Lyme disease and skin cancer and decreased perceptions of safety when visibility is reduced (Li et al., 2015; Multiple sources cited in Nieuwenhuijsen, 2016).

Social isolation is associated with poor mental health, negative lifestyle behavior, increased premature mortality, as well as elevated blood pressure, reduced stress-recovery, low birth weights, increased infant deaths, cognitive problems, obesity, CVDs, and respiratory problems (Corburn, 2005; Giles-Corti et al., 2016).

Multiple authors have discussed the effects of reduced neighborhood attractiveness and the lack of nearby open and green spaces with relation to associated decrease in physical activity and likelihoods of social interactions (Ekkel & Vries, 2016; Sugiyama, Francis, Middleton, Owen, & Giles-Corti, 2010).

4.1.4. Pollution

Concerning **future pollution**, seven respondents reported concerns for TRAP and PM (Particulate Matter) resulting from construction and loss of greenery, in addition to potential reductions in air quality. The effects of the project and construction work on air quality was found to affect those with pre-existing health conditions within a shorter onset period; five respondents reported exacerbated respiratory problems and allergic reactions from the construction work. Exposure to air pollution is significantly correlated to increased mortality, affecting prevalence and comorbidities of lung diseases, CVDs, diabetes, premature mortality, obesity, increased risks of cancer, lung impairment, damage to the nervous system, neurological damage as well as Coronary Obstructive Pulmonary Disorder (Multiple authors cited in Nieuwenhuijsen, 2016; Samet, 2019). It is important to note that the effects of pollution could put people at an increased risk for respiratory diseases and infections, such as asthma, allergies, etc., which could also lead to increased vulnerabilities to respiratory diseases and outbreaks such as COVID-19.

The **effects on mental wellbeing** resulting from the urban modifications were also studied, where six respondents suffered from increased stress and anxiety associated with driving and reduced green spaces, noting that noise pollution further exacerbated their condition. It is also worth mentioning that there are three airports near Heliopolis, significantly increasing noise pollution in the area. In contrast, one interviewee with 'stationary traffic-induced stress' reported a reduction in stress levels due to reduced traffic.

Noise has been associated with increased prevalence of CVD mortality and morbidity, sleep disturbances, elevated blood pressures, reductions in cognitive performance, as well as increased stress levels, and increased stress and anxiety (Hoisington et al., 2019; Nieuwenhuijsen, 2016).

Community cohesion was found to have already been weak prior to the project; all the interviewees reported feeling socially-isolated from their neighborhood and communities. However, five residents reported further reductions in social interaction, random chance encounters, etc. Two respondents noted that activities such as dog-walking often encouraged their used green areas for walking, enabling social interactions and creating a sense of community. However, they also noted that due to the lack of green areas, they now drive their dogs to walkable areas -not only decreasing active mobility but also increasing demand for cars.

4.1.5. Disaster Vulnerability

Disaster vulnerability resulting from these urban changes concerned Four experts with regards to the neighborhood's capacity to withstand future disasters; increased urban heat island effect, flooding, climate change, biodiversity loss, water scarcity, lack of underground water recharge, loss of livelihoods, etc. Additionally, poor public transport, widened roads and decreased walkable space for physical distancing measures could have a detrimental effect on the safety and health of people during the COVID-19 pandemic -especially those who do not use cars, making lower-income groups even more vulnerable to infection.

4.2. Discussion Summary

The physical analysis showed a significant reduction in overall walkability, active travel, and public transport, paired with an increase in grey infrastructure, essentially aiming to facilitate motorized transport. It also shows the morphology and growth of Heliopolis, which maintained a more sustainable growth pattern until a certain point, showing tram infrastructure expansions and large areas of public greenery. However, later urban planning schemes seemed to favor a car-oriented approach.

Interviews with residents offered a more advanced understanding of the multiple variables affecting their use of mobility and greenery and the resulting changes in their lifestyles. The data was analyzed and correlated with potential health risks based on the literature review findings in order to present some of the challenges for promoting urban health resilience in the neighborhood. Furthermore, the ‘analysis of mobility and greenery through physical and social determinants of health’ offers insight into the complex ways in which urban systems could affect the resulting health outcomes for the population. Multiple authors highlighted the dual nature of pollution and disaster vulnerability; being resultants of urban change, as well as having a causal impact on the health of the population⁶.

Keeping the project’s intent in perspective, this is still a preliminary understanding of the situation and the potential health outcomes. This project intends to improve traffic flow ‘through’ the neighborhood and to the ‘New Capital’. It is thus essential to consider that the analyzed data regarding current vehicular capacities and the impacts of these changes on people’s health are not indicative of the full impact of the project. The impact of these changes will only be apparent when the new capital is operating, and when this mobility axis reaches higher capacities of traffic flow. Adding to that, one respondent noted that most route options currently facilitate access to the ‘Suez road’ -the road leading to the new capital, as opposed to the lesser route options leading to inner neighborhood destinations.

⁶ It should also be noted that the interviewees’ socioeconomic backgrounds facilitated the transition to more vehicular modes of transport and reductions in walking. Additionally, the need for public (green) space was not high, primarily due to the use of private social and sports clubs with large recreational and green areas, offering a substitute for public spaces. Thus, it is imperative to conduct further studies with larger sample sizes and sample diversity, including interviewees from different socioeconomic backgrounds, and studying the inequities that they may face due to the lack of means to adapt to these urban changes.

5. Conclusion and Recommendations

5.1. Conclusion

This thesis investigated the missing gap linking urban health to urban resilience in an attempt to reduce said gap and focus on health promotion through urban planning -essentially, aiming to promote 'Preventative Urban Health Resilience'. The framing of this research sought to answer its two guiding questions; "What happens when urban health is not at the center of urban planning strategies?" and "How to create urban resilience that uses preventative urban health for urban planning strategies?". The former question was answered through the analysis of the findings, where research showed how these strategies have led to decreased physical activity and social interaction, increased pollution as well as vulnerability to disasters, significantly increasing potential health risks to the population and inequitably affecting less-privileged socioeconomic groups. Answering the second question requires a multidisciplinary and holistic approach towards urban planning; shifting towards a more decentralized city and away from car-oriented development, involving the public in participatory planning activities, as well as adopting sustainable urban growth models, amongst other measures, could significantly improve the health and wellbeing of our cities and people. The author also presents recommendations based on the research findings to promote Preventative Urban Health Resilience, especially for the case of Cairo and possibly for other global south cities as well, Subchapter 5.2.

The empirical analysis of mobility and greenery in the case study showed the complexity of channels through which they affect people's health, primarily through the social and physical determinants of health, and also highlighted the importance of adopting complex approaches and strategies to urban planning in Cairo. Whereas the findings from the literature review and interviews showed increased potential risks for non-communicable disease prevalence as well as worsened mental wellbeing and increased stress. Reduced mobility options, walkability, and active travel, in addition to decreased perceptions of safety, decreased exposure and use of greenery, as well as poorer mental wellbeing and social isolation indicate an increased risk to the overall health of the neighborhood. Faced with a major health disaster such as COVID-19, cities are becoming more aware of the dire need for health-promoting urban planning, as well as an increasing need for disaster resilience.

5.2. Recommendations

This subchapter provides recommendations for policymakers and built environment experts in order to promote preventative urban health resilience, focusing on the health influencing channels previously explored in the study. It also partially answers the second research question guiding this dissertation.

<i>Factors</i>	<i>Recommendations</i>
<i>Growth, Urban Fabric and Density</i>	<ul style="list-style-type: none"> • <i>Implementing sustainable growth measures such as the ones that were taken into consideration in the development of Heliopolis (greenery and public transport)</i> • <i>Ensuring the reclamation and revival of the changed urban fabric and investing in neighborhood attractiveness</i> • <i>Addressing the increased density caused by urbanization and changes in building regulations with regards to mobility, greenery, and land-use mix allocation; network of public transport; large green spaces; more parks and public land-uses.</i> • <i>Favoring healthier and sustainable development and aiming to reduce socioeconomic inequities within different communities in the area</i>
<i>Used Modes of Mobility</i>	<ul style="list-style-type: none"> • <i>Diversifying public modes of mobility</i> • <i>Reviving the pre-existing tram network</i> • <i>Creating a bus network that allows connecting to other areas in and out of Heliopolis</i> • <i>Increasing metro lines and stations in the neighborhood</i> • <i>Shifting towards active travel by providing safe and climatically relevant solutions for walking and cycling</i> • <i>Allocating more land-use to walkable and open spaces to encourage active travel, and reducing percentages of vehicular road</i>
<i>Walking and Cycling Infrastructure</i>	<ul style="list-style-type: none"> • <i>Ensuring accessibility for the differently-abled throughout the neighborhood (ramps, visual and auditory guides, barrier-free access and elevators, accessibility adapted public transport modes, etc.)</i> • <i>Implementing a safe and well-separated cycling infrastructure network along with traffic lights and street crossings</i> • <i>Ensuring shading of walkable spaces and planting of trees on sidewalks</i> • <i>Creating large sidewalk widths to enable physical distancing measures</i>
<i>Changes in Mobility Experience</i>	<ul style="list-style-type: none"> • <i>Improving urban design (Dangerous u-turns, bottlenecks, inefficient roundabouts, etc.)</i> • <i>Implementing speed regulating measures</i> • <i>Improving healthier and more sustainable modes of mobility, such as public transport and active travel</i> • <i>Ensuring the implementation of physical distancing measures in public transport and protecting riders from high densities</i>
<i>Perceptions of Safety – Urban Fear</i>	<ul style="list-style-type: none"> • <i>Implementing traffic regulating measures to protect pedestrians, cyclists, and drivers (crossings, traffic lights, speed bumps, safe cycling lanes, etc.)</i> • <i>Reducing speed limits within the neighborhood along with decreasing road widths and traffic flow</i> • <i>Reducing ‘islands’ of unsafety created by wide roads</i> • <i>Developing walkable streets with proper lighting, urban furniture and other measures aiming to increase street presence and ‘eyes on the street’</i> • <i>Diversifying services and commercial areas within the neighborhood to create more lively and safe streets</i> • <i>Ensuring the enforcement of laws that protect from harassment and sexual assault</i>

Use of Greenery	<ul style="list-style-type: none"> • Encouraging the use of green spaces by providing services and urban amenities • Encouraging social and community events to increase public space usage • Increasing parks and recreational facilities offering activities to attract residents
Exposure to Greenery	<ul style="list-style-type: none"> • Encouraging rooftop farming on a large scale to increase green areas, potentially increasing rooftop farming and markets which could also improve social cohesion • Increasing greenspaces along sidewalks and streets to increase exposure for pedestrians, cyclists and drivers alike
Social Isolation – Community Cohesion	<ul style="list-style-type: none"> • Creating an atmosphere allowing civil society organizations which bring people from different communities together • Hosting public events and activities for the neighborhood and residents • Encouraging neighborhood walks and cultural events in coordination with civil society organizations
Future Pollution	<ul style="list-style-type: none"> • Testing car-free days in certain streets or blocks • Increasing the number of pedestrian streets or alternating use streets, while ensuring the safety of users • Limiting zone-based car access with relation to car pollution • Limiting the use of polluting cars in the neighborhood, as well as other areas in the city center • Increasing green infrastructure and working with ecosystem services • Limiting noise pollution by reducing vehicular traffic and limiting the use of car horns • Encouraging active travel and reducing private vehicular transport to limit future pollution
Mental Wellbeing	<ul style="list-style-type: none"> • Ensuring that the causes of poor mental wellbeing are addressed in the previous points • Increasing green spaces and parks, which aid in stress-reduction and recovery • Limiting noise pollution, as discussed above
Disaster Vulnerability	<ul style="list-style-type: none"> • Investment in Water Sensitive Urban Design and green infrastructure solutions • Regenerating ecosystems and increasing benefits from ecosystem services • Increasing pervious surfaces for reducing rainwater runoff and flooding, as well as recharging underground water levels • Ensuring the presence of early warning systems and protocols to mitigate and recover from disasters • Ensuring vulnerability from infectious diseases and pandemics can be mitigated through healthier urban solutions, as discussed above.

Table 2 Recommendations for promoting preventative urban health resilience in Heliopolis.

Adding that urban changes could have significant effects on other urban systems within the city, it is essential to note that they often affect disadvantaged groups more inequitably. These changes happen in lieu of neo-liberal models of suburban sprawl, possibly pushing higher income groups to live in gated communities. In contrast, lower-income groups are forced to live in perpetually decaying urban areas. Addressing these inequities is essential for promoting better urban health for everyone. The thesis closes by calling for more research on urban health as well as urban resilience, especially in global south contexts.

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7. Appendix

Questions for residents:

Name (Initials)

Gender

Age

Work/Education Number/ Age of Children Location of residence Location of work

Questions for Residents

Existing health conditions? (Because it would be important to highlight that pre-existing or chronic disease can be worsened, and may have been related to urban health causes)

Mobility:

How do you move around generally? Any specific mode of transport/mobility?

Do you own a car?

How often do you use public transport?

Any use of uber and similar platforms of transport?

Nearby services:

How close is the nearest shopping/grocery store? How far are the childrens' school?

How do you take the children to school?

Greenery:

Did you use the green spaces prior to the project? How often? How do you feel about removing greenery?

Perceptions of recent development:

What do you think about the recent development in Heliopolis?

Has your street or immediate surroundings been affected by the project?

How has your community and neighborhood coalition -if exists- react to this?

Have you contacted any initiatives or pursued any changes?

How do you feel about widening the streets?

Have your modes of mobility changed after that?

Have you considered moving to the suburbs/outskirts before? and now?

Perception of safety in the streets now compared pre-development?

Do you feel safe being a woman when moving around Heliopolis, especially on foot?

Questions for experts:

Name (initials)

Gender

Age

Work/Education Number/ Age of Children Location of residence Location of work

Existing health conditions? (Because it would be important to highlight that pre-existing or chronic disease can be worsened, and may have been related to urban health causes)

Mobility:

How do you move around generally? Any specific mode of transport/mobility?

Do you own a car?

How often do you use public transport?

Any use of uber and similar platforms of transport?

What is your topic of focus in academia/practice?

How familiar are you with the topic of urban health? And urban resilience?

Greenery:

Did you use the green spaces prior to the project? How often? How do you feel about removing greenery?

General questions about the neighborhood

Do you go to live in, or go to Heliopolis?

What are your opinions about what's happening at the moment in Heliopolis?

Do you know the reasons or frameworks behind it?

How do you think these changes relate to environmental health outcomes of the residents? (Could be somewhat subjective and predictive)

Any opinions about the changes in mobility and greenery within the neighborhood?

Questions about Planning for Public Health

What has been your involvement in the topic of planning for health? (Academically or practically)

What are your thoughts on the correlation between urban health and greenery/mobility?

Do you have any recommendations for improving urban health?

Are you using any existing tools or metrics to measure health outcomes of project work such as health impact assessments? If yes, how? If no, what have been the main obstacles for using them?

Are you aware of any urban health initiatives in the city?

How about initiative related to mobility and active travel?

How about initiatives related to greening?

Opinion about recent project:

What are your opinions on the matter of the recent development in Heliopolis?

How do you/your dept/your organization deal with the consequent health issues related to the recent developments in Heliopolis?

Do you think this project is going to affect Heliopolis residents' health? If yes, how?

Do you think the project is going to affect Heliopolis from a resilience perspective? If yes, how?

What have been the improved aspects from this project?

Do you think there a role for urban planners and healthcare workers to play together in the Heliopolis neighborhood?

Questions about relations with community

Has your department (your team) ever given support to urban health improvements? If yes, how? If yes, what have been your motivations for offering such support? If no, what have been the obstacles to offer support?

Practice: What is the nature of interaction and collaboration, if any, between community organizations and official city entities that are tasked with delivering healthcare and improving local public health conditions?

Nm.	Action
1	<i>Sidewalks: sidewalks can be powerful for stimulating neighborhoods and should be a place for people to congregate and interact. Well-paved expanded sidewalks with green plants and trees make it attractive and safe to walk, and promote physical activity. Sidewalks with art, food or music events make street environments more appealing, engage walkers and encourage social interactions.</i>
2	<i>Benches: seating lining the sidewalks welcome people to take a breather, enjoy refreshment in the sunshine, and allow elderly people to rest their legs.</i>
3	<i>Trees and flowers: trees cool the temperature in the air and on the road, and help reconnect people to nature within the concrete jungle.</i>
4	<i>Street closures: street closures implemented on regular days and times create a safe space for adults and children to play, dine and hang out with friends.</i>
5	<i>Bicycle lanes: dedicated bike lanes make it safer and more appealing for people to cycle, either for exercise or as a mode of transport. When we cycle, we get exercise and reduce our carbon footprint compared to driving a car.</i>
6	<i>Public transport: a well-connected network of safe and clean public buses and trains will decrease commute time and enable access to services and employment. This reduces the need to own a motor vehicle and contributes to a lower carbon footprint. Public transport that is wheelchair-accessible enables people with a disability to move around the city easily, and makes them feel socially connected and included.</i>
7	<i>Traffic lights, speed bumps and raised pedestrian crossings: these aim to reduce vehicle speeds, enhance visibility and make it safer for pedestrians.</i>
8	<i>Pedestrian islands: pedestrian islands constructed in the road median, especially on wide roads, provide a safe rest stop for pedestrians who need more time to cross the street.</i>
9	<i>Street lighting: street lighting enhances the visibility of pedestrians and cyclists and works to reduce crime in the neighborhood.</i>
10	<i>Signage: street signs should be purposefully designed and placed where they can be seen and read when traveling at a certain speed.</i>
11	<i>Waste management: providing an adequate number of bins along sidewalks and conducting regular waste collection ensures proper disposal of waste and cleaner streets. Clean streets make walking more appealing, energize the neighborhood, and prevent waste from clogging drains, which may result in flooding.</i>
12	<i>Smoke-free indoor and outdoor environments: smoke-free indoor and outdoor environments are the most visible indication of a city's commitment to health. A place where people can smoke and are exposed to second-hand smoke is particularly unfriendly to families and children. Banning smoking indoors and outdoors reflects concern for health and well-being.</i>
13	<i>Shops or stands selling fresh food, fruit and vegetables: increasing access to fresh food options creates a health-enabling food environment, and inspires people to choose fresh over preserved food. The display of colourful fresh fruits and vegetables also stimulates our senses and makes a neighbourhood come to life.</i>
14	<i>Community health centres: clinics in the neighbourhood enable mothers to obtain vaccinations for their children, and help people manage their health without needing to travel long distances. It also prevents unnecessary trips to tertiary hospitals.</i>
15	<i>Community centres and spaces: areas for physical activity and social gatherings enable people to interact and bond, and support their emotional, mental and physical well-being. There should be spaces allocated where residents can participate in group exercises, tours and health screenings and karaoke sessions, for example.</i>

Table 3 Path to a Healthy City. (Adapted from: World Health Organization. Regional Office for the Western Pacific. (2015). *Healthy Cities: Good Health is Good Politics. Toolkit for local governments to support healthy urban development.* p. 36).

Nm.	Quality
1	<i>A clean, safe, high-quality environment including affordable housing.</i>
2	<i>A stable ecosystem.</i>
3	<i>A strong, mutually supportive, and non-exploitative community.</i>
4	<i>Much public participation in and control over decisions affecting life, health and well-being.</i>
5	<i>The provision of basic needs for all people.</i>
6	<i>Access to a wide range of experiences and resources with the possibility of multiple contacts, interaction and communication.</i>
7	<i>A diverse, vital, and innovative community.</i>
8	<i>Encouragement of connections with the past, with the varied cultural and biological heritage, and with other groups and individuals.</i>
9	<i>A city form that is compatible with and enhances the preceding characteristics.</i>
10	<i>An optimum level of appropriate public health and care services accessible to all.</i>
11	<i>A high health status (high positive health and low disease status)</i>

Table 4 Eleven Qualities of a Healthy City. (Adapted from: Tsouros, A. D. (2019). *Urban Health*. (S. Galea, C. K. Ettman, & D. Vlahov, Eds.). New York: Oxford Press. p. 287).

Nm.	Policy	Elaboration
1	<i>Earned sick leave</i>	<i>Earned sick leave laws reduce the spread of contagious illnesses, increase employment, and income stability, and save cities money in health care costs.</i>
2	<i>High-quality, universal pre-kindergarten</i>	<i>Children who can attend high-quality pre-k are more likely to succeed in school, go on to stable jobs and earn more as adults – all of which are linked to better health and stronger communities.</i>
3	<i>Affordable housing/ Inclusionary zoning</i>	<i>As cities grow, it's important that residents of all income levels have access to affordable housing that sets them for good health.</i>
4	<i>Complete streets</i>	<i>Complete streets policies unlock opportunities by allowing city residents to safely walk, bike, drive and take public transit around their community.</i>
5	<i>Alcohol sales control</i>	<i>Neighborhood with high concentrations of alcohol outlets are linked to more drinking and higher rates of violence and driving under the influence. Policies that control the number of alcohol sales outlets can reduce crime, increase safety, and reduce spending on health care and criminal justice.</i>
6	<i>Tobacco 21</i>	<i>Curbing tobacco use among young adults has been shown to decrease the number of people who start -and continue- smoking.</i>
7	<i>Smoke-free indoor air</i>	<i>Comprehensive smoke-free laws protect non-smokers from secondhand smoke and reduce smokers' consumption of tobacco -the leading cause of preventable death in the US.</i>
8	<i>Food safety and inspection rating</i>	<i>Policies requiring food establishments to publicly post safety inspection "grades" empower consumers, reduce food-borne illness rates and cut down on health care costs.</i>
9	<i>Healthy food procurement</i>	<i>Policies that make sure healthy food options are available on public property aid city residents in making smart decisions that will help them achieve and maintain a healthy weight.</i>

Table 5 City Health Package of Nine Policies. (Adapted from: Castrucci, B. C. et al. (2019). *Urban Health*. (S. Galea, C. K. Ettman, & D. Vlahov, Eds.). New York: Oxford Press. p. 300).

Nm.	Policy
1	<i>Recognize that health is a fundamental human right and that every human being is entitled to the enjoyment of the highest attainable standard of health</i>
2	<i>Strive to make health and well-being core values in city vision statements, policies and strategies.</i>
3	<i>Promote health and equity in all local policies and in alignment with the SDG Agenda.</i>

4	<i>Address inequalities through the social determinants and gender perspectives.</i>
5	<i>Create public spaces that support healthy and active living.</i>
6	<i>Prove universal coverage to health and social services and community support.</i>
7	<i>Invest in giving children a healthy start in life and support socially vulnerable and disadvantaged groups such as migrants, urban poor and unemployed.</i>
8	<i>Strengthen population-based disease prevention programs with an emphasis on obesity, smoking, unhealthy nutrition, and physical activity.</i>
9	<i>Promote healthy urban planning and design.</i>
10	<i>Invest in green, clean, child-friendly, and age-friendly environments.</i>
11	<i>Support community empowerment and community-based initiatives and promote social inclusion and community resilience.</i>
12	<i>Strengthen local capacity to deal with public health emergencies and effects of climate change.</i>

Table 6 An Agenda for Local Leaders Committed to Health, Equity, and Sustainable Development. (Adapted from: Tsouros, A. D. (2019). Urban Health. (S. Galea, C. K. Ettman, & D. Vlahov, Eds.). New York: Oxford Press. p. 391)
