The relationship between built environment and obesity
An assessment of Cairo’s obesogenic environment

A Thesis submitted in the Partial Fulfillment
for the Requirement of the Degree of Master of Science
in Integrated Urbanism and Sustainable Design

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Disclaimer

This dissertation is submitted to Ain Shams University, Faculty of Engineering and University of Stuttgart, Faculty of Architecture and Urban Planning for the degree of Integrated Urbanism and Sustainable Design. The work included in this thesis was carried out by the author in the Year 2015.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

17/07/2015

Teresa Maria Fellinger

Signature
Acknowledgement

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My close friends

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Norhan Mohamed

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DAAD
Abstract

This thesis is fed by two different, but equivalent parts. The first objective is to develop a theoretical framework in order to prove that a relationship between obesity and the built environment exists as well as to define parameters to be able to measure this relationship. The second objective is to examine the relationship between Cairo's built environment and obesity based on the parameters defined in the theoretical framework.

Egypt has one of the highest obesity rates worldwide. Nearly 70% of its adult population are overweight or obese with a significant difference between urban and rural populations. Physical inactivity and consumption of unhealthy food are the main reasons that the weight status of many Caireens is out of control. At the same time, Cairo city seems to be out of control as well: overcrowding, high-volume traffic, heavy use of motorized transportation, poor air quality, lack of safe public spaces and recreational facilities. The consequence of these conditions is the absence of the opportunity for walking, cycling and other forms of exercise.

It has been established today that some diseases can be moderated by how our human environment is being designed and built. Therefore, it is critical for this thesis to assess if the built environment is a determining factor in the obesity epidemic in Cairo or not. After an intensive literature review on obesity, built environment and the relationship between these two subjects, the thesis explores the obesogenic environment of Cairo. Different method as inductive approach, which measure Cairo’s built environment in an objective and perceived way are applied on four different middle and upper class Shiyakha (smallest administrative Egyptian boundary) of the Cairo governorate. The measured outcomes are correlated with the obesity data from the Urban Inequity Study (Social Research Center of the American University in Cairo) and interpreted. Research results show that a relationship exists.

Keywords: overweight/obesity, built environment, food environment, physical activity, walkability, Cairo
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<td>BMI</td>
<td>Body-mass index</td>
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<tr>
<td>BRT</td>
<td>Bus rapid transport system</td>
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<tr>
<td>CAPMAS</td>
<td>Egyptian Central Agency for Public Mobilization and Statistics</td>
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<tr>
<td>EDHS</td>
<td>Egypt Demographic and Health Survey</td>
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<td>GOPP</td>
<td>General Organisation for Physical Planning</td>
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<td>IOTF</td>
<td>International Obesity Task Force</td>
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<tr>
<td>IPEN</td>
<td>International Physical Activity and Environment Network</td>
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<tr>
<td>MENA</td>
<td>Middle East and Northern Africa</td>
</tr>
<tr>
<td>NCD</td>
<td>Noncommunicable disease</td>
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<td>NEWS</td>
<td>Neighborhood Environment Walkability Scale</td>
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<tr>
<td>NOUH</td>
<td>National Organization for Urban Harmony</td>
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<td>SDG</td>
<td>Sustainable Development Goals</td>
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<td>SES</td>
<td>Socio-economic status</td>
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<td>UN</td>
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<td>WHO</td>
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**Transkription**

*Shiyakha* — شياخة

Smallest Egyptian administrative boundary
1 Introduction

The world is rapidly urbanizing and brings major changes in our living standards, lifestyles, social behaviour and health. Urban living, known for offering many opportunities including potential access to better health care compared to the rural area, nowadays concentrates health risks and introduces new hazards. Until recently, the principal link between urbanization and public health was air pollution, but now this is changing as obesity spreads dramatically.

Today’s cities tend to discourage physical activity and promote unhealthy food consumption. A variety of urban factors including overcrowding, high-volume traffic, heavy use of motorized transportation, poor air quality and lack of safe public spaces and recreation facilities makes it difficult to undertake physical outdoor activities. The megacity Cairo suffers from these conditions as well. This kind of urbanisation results in absence of space for the opportunity for walking, cycling and other forms of exercise. Physical inactivity and consumption of unhealthy food together often lead to weight gain. The result is obesity, reaching epidemic proportions worldwide. Obesity is emerging as a leading global public health concern, no longer confined to the industrial world. Nearly a third of the global population is affected. In Egypt, the fattest African country, nearly 70% of its adult population is overweight or obese with a significant difference between the urban and the rural population.
Being obese is not just an aesthetic issue; it damages human health, steals vitality and productivity and consumes time and money. But recently the understanding of factors which promote health and which damage health has grown considerably. Nowadays it is known that diseases can be moderated by how our human environment is being designed and built. Current urban environments, mainly designed for vehicles, are leading to a life-threatening level of physical inactivity. Our health depends on building neighbourhoods that promote walking, bicycling, physical activities on the one hand and that provide healthy food on the other hand.

Egypt, having one of the highest obesity-rates in the world, still does not recognize the medical and economic burden coming towards the country. Experts demand mass awareness campaigns to protect the next generation from obesity. With its poor healthcare system, it will be a tough challenge for Egypt to provide treatment for people suffering from the side effects of obesity, especially as obesity is spreading all over socio-economic classes due to heavily subsidised food. The Egyptian Ministries of Education and Health, busy with providing the basic services, make obesity seem more of a luxury than a necessity to tackle. The Egyptian Ministries for Housing and for Urban Renewal and Informal Settlements pay their attention towards building a new capital and fighting informality rather than creating public space. Being aware that Egypt faces many other political, economic and social challenges, this thesis should shed some light on an existing disease to which not enough attention is currently dedicated. Therefore, it will be explored if Cairo’s urban built environment contributes to the obesity epidemic or not.

1.1 Research objectives
This thesis is fed by two different, but equivalent approaches. First it is important to develop a theoretical framework out of the existing scientific literature from different scientific fields (public health, epidemiology, transportation & infrastructure management, sport science, urban planning, architecture) in order to prove that a relationship between obesity and the built environment exists. Further parameters for the following empirical study have to be ascertained to be able to define measured data for the field analysis.
The second objective is to prove based on a field research, if well-planned and well-designed environments can promote physical activity and a healthy diet, respectively weight loss and if obesogenic environment can enhance weight gain by reinforcing inactivity and overeating in Cairo. The question behind this hypothesis is if Cairo’s built environment plays a role at all for the risk of becoming obese besides the interplay of economic, political and socio-cultural factors. If the outcome of the research will have a positive result, thus built environment can be determined as an influencing factor for obesity in Cairo. If not, other factors besides the built environment are the reasons for the high percentage of obese Caireens.

In order to achieve these two objectives, this thesis should address some secondary research objectives:

**Understanding obesity:** The individual cannot be blamed alone. Obesity results out of an interplay of behaviour, genetic susceptibility and environment; each factor having various sub-factors.

**Understanding the development of obesogenic environment:** It is important to question the development of the environment we live in nowadays; mainly an environment that promotes physical inactivity and unhealthy food.

**Understanding the complex relationship of built environment and obesity:** Human beings are complex creatures, products of genes and environments. In order to understand the relationship between built environment and obesity it is necessary to understand the relationship between the body and the city as well as the relationship between the body and the space.

**Understanding parameters and methodologies for measuring built environment:** Many different parameters and methodologies are available to measure physical activity environment and food environment. For the result of the research it is crucial to find out which methodologies are suitable and manageable for this master thesis research in Cairo.

**Understanding the development of Cairo:** The development of Cairo, one of the biggest urban agglomerations in the world, has its own rules and regulations. Therefore, it is crucial to know the history of the city of Cairo.
1.2 Research questions
Exaining obesity as well as built environment is a challenging task. Consequently, it is important to clearly pre-define important questions that can guide this research till the end. The two main research questions are:

For part I:
**Which parameters evolve out of the environmental characteristics, which determine the relationship between the built environment and obesity?**

For part II:
**Do differently planned and designed shiyakha in Cairo promote or prevent physical activity as well as overeating and therefore increase or decrease the risk of being overweight, respectively obese?**

In order to be able to answer these two questions by the end, the following questions should support the research:

- What is obesity?
- Why are so many Egyptians overweight or obese?
- Which factors promote the development of overweight and obesity in Cairo?
- What is built environment and what are the factors determining the built environment?
- What are the factors determining the built environment in Cairo?
- What is obesogenic environment and how does it develop?
- What does obesogenic environment mean in Cairo? How did it develop?
- What is the relationship between built environment and obesity and what does this relationship look like in Cairo?
- Are there any existing policies which prevent obesity in Egypt?
- Which parameters determine the built environment?
- Which methodologies are suitable and manageable to measure built environment and food environment best in Cairo?
1.3 Plan of action

Part I contains an intensive literature review of scientific publications and deals with obesity and the built environment as well as the relationship between these two subjects. Then the relationship of the body to the city respectively the space is examined in order to deeply understand the relationship between obesity and the built environment. After that three built environment characteristics and their relationship to obesity are examined for the purpose of defining parameters for the following empirical study. These are: the physical activity environment and obesity, the food environment and obesity as well as the policy response and the obesogenic environment. This literature review forms the theoretical framework and the base for part II, the field work analysis.

In part II, first the prevalence of obesity, its determining factors and the development of Cairo’s obesogenic environment are explored. Afterwards the four research areas are introduced and the different methodologies, which measure the defined parameters, for the field research are explained. Further the research outcome is presented, discussed and the validity of theories, which were introduced in the theoretical framework, is checked, if they apply for Cairo as well. Further implications of the research results are drawn up on Cairo. Finally part III includes a future outlook and recommendations that could help mitigate the obesity-epidemic in Cairo/Egypt.
Part I: Theoretical framework

2 Overweight & obesity

2.1 Definition of overweight and obesity
The World Health Organisation (WHO) defines overweight and obesity “as abnormal or excessive fat accumulation that may impair health” (WHO a). The first time obesity was highlighted as a major global concern by WHO was in 1997. Most commonly overweight and obesity are classified by the body mass index (BMI). This is a simple index of weight-for-height. It is defined as a person’s weight in kilograms divided by the square of his height in metres (kg/m²). A BMI greater than or equal to 25 means a person is overweight, a BMI greater than or equal to 30 means a person is obese (James et al. 2010, p.1). Due to the fact that the BMI does not distinguish between excess body fat and lean mass, it is an imperfect measure of excess adiposity. The great majority of individuals with high BMI have excess body fat. Only small percentage of individuals is misclassified due to lean muscle mass. Moreover, the BMI does not give any information about the link of the elevated BMI and the health status of an overweight or obese person, i.e. it is unknown if the person, who is overweight or obese, suffers from a disease or not (Must & Evans 2011, p.11). Therefore, the Edmonton Obesity Staging System (EOSS) considers comorbidities and the patient’s overall health to grade obesity based on criteria from medical history, physical examination and standard diagnostic tests (Padwal et al. 2011, p.1059). But this staging system is far too sophisticated for huge studies. Nevertheless all criteria recommended by national bodies and the WHO are based on the BMI as it is a highly practical
measure as weight and height are routinely collected in health related studies. Also the International Obesity Task Force (IOTF), which has been formed by WHO in 1994 to understand and fight the worldwide obesity epidemic, concluded that the BMI is a reasonable measure of body fatness for children as well as for adolescents studies (Must & Evans 2011, p.11).

An increased BMI is a major risk factor for catching a non-communicable disease (NCD), i.e. a chronic disease which cannot be passed from one person to another person. The major health risks developing out of excessive fat accumulations are type 2 diabetes, various cancers, cardiovascular diseases (mainly heart disease and stroke) and hypertension. Worldwide obesity causes around 2.8 million deaths each year, thus causes more deaths than underweight (WHO b). Further, obesity creates a number of serious public health problems with negative physical, social and mental health consequences (Pearce & Witten 2010, p.3). Childhood obesity has even more drastic consequences. It is associated with a higher chance of premature death and disability in adulthood. In addition to increased future risks, obese children suffer from breathing difficulties, a higher risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects.

2.2 Obesity: a worldwide epidemic
Since 1980, obesity rates have been rising rapidly among both children and adults. In 2014, more than 1.9 billion adults, 18 years and older, were overweight (BMI ≥ 25). Of these over 600 million were obese (BMI ≥ 30). Additionally 42 million children under the age of five were overweight or obese in 2013 (WHO a). Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban areas. The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Globally, there has been an increased intake of energy-dense foods that are high in fat and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation and increasing urbanization. Given the detrimental health consequences of obesity and the rapidly rising
rates, successful prevention efforts are urgently needed (WHO a), as obesity is preventable.

The highest prevalence of overweight and obesity has the WHO Regions of the Americas (61% for overweight in both sexes, and 27% for obesity). The WHO Region for South East Asia has the least overweight and obese people with 22% people being overweight in both sexes and 5% being obese. Over 50% of women are overweight in the WHO Regions of the Americas, Europe and Eastern Mediterranean. In these three regions 25% of European, 24% of Eastern Mediterranean and 30% of American men are overweight or obese, so roughly half of the prevalence of overweight or obese women in these regions. WHO Region Africa (30.8% for overweight both sexes, and 10.4% for obesity) and WHO Region Western Pacific (33% for overweight both sexes, and 6.9% for obesity) have a moderate prevalence of overweight or obese population (see fig. 2-2 till 2-5). In all WHO Regions the number of people being overweight or obese increased by 1 – 2 % in the last four years (WHO d). Reasons for the development of the worldwide obesity epidemic are various (see chapter 2.3).

Within the “Global monitoring framework on NCDs”, the WHO formulated a “NCD global action plan” to reduce or stop the expansion of NCDs for 2025. Obesity is one of the nine global targets for NCD: “Halt the rise in diabetes and obesity.” Other formulated targets, like the reduction of physical inactivity, a reduction of 30% salt/sodium or alcohol shall prevent the rise of obesity and at the same time help to reduce the prevalence of high blood pressure (WHO g).

![fig. 2-1: Antecedents and outcomes of obesity](Source: Must & Evans 2011, p.19)
Fig. 2-2: Prevalence of overweight among men (ages 18+) in 2014
Source: WHO (d)

Fig. 2-3: Prevalence of overweight among women (ages 18+) in 2014
Source: WHO (d)
Since the case study of this thesis is in Cairo/Egypt, which belongs to the Arabic speaking countries (East Mediterranean, Arabian Peninsula and Northern Africa), it is worth it to have a look at the obesity prevalence of the whole region, before determining obesity in Egypt, respectively Cairo in chapter 6.
2.2.1 Obesity in Arabic-Speaking Countries

Only since a short time there is an increased concern about obesity and its illnesses in Arab-speaking countries. Having a look at table 2-1, which gives information about the prevalence of obesity in Arabic speaking countries and provides obesity data from other countries for comparison by WHO 2010, this concern is justified (Badran & Laher 2011, p.3).

<table>
<thead>
<tr>
<th>Country</th>
<th>Male</th>
<th>Country</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>44%</td>
<td>Kuwait</td>
<td>55%</td>
</tr>
<tr>
<td>Greece</td>
<td>30%</td>
<td>USA</td>
<td>48%</td>
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<tr>
<td>Mexico</td>
<td>30%</td>
<td>Egypt</td>
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<tr>
<td>Kuwait</td>
<td>30%</td>
<td>UAE</td>
<td>42%</td>
</tr>
<tr>
<td>UAE</td>
<td>25%</td>
<td>Mexico</td>
<td>41%</td>
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<tr>
<td>UK</td>
<td>24%</td>
<td>Bahrain</td>
<td>38%</td>
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<tr>
<td>Saudi</td>
<td>23%</td>
<td>Jordan</td>
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<tr>
<td>Egypt</td>
<td>22%</td>
<td>Saudi</td>
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<tr>
<td>Bahrain</td>
<td>21%</td>
<td>Tunisia</td>
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<tr>
<td>Jordan</td>
<td>20%</td>
<td>Qatar</td>
<td>32%</td>
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<tr>
<td>Qatar</td>
<td>19%</td>
<td>Lebanon</td>
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<td>Israel</td>
<td>18%</td>
<td>Mauritania</td>
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<tr>
<td>Spain</td>
<td>17%</td>
<td>Greece</td>
<td>26%</td>
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<tr>
<td>Lebanon</td>
<td>15%</td>
<td>UK</td>
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<tr>
<td>Belgium</td>
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<td>Israel</td>
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<td>Syria</td>
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<td>Libya</td>
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<td>Libya</td>
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<tr>
<td>Syria</td>
<td>12%</td>
<td>Morocco</td>
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<td>Iraq</td>
<td>8%</td>
<td>Iraq</td>
<td>19%</td>
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<tr>
<td>Tunisia</td>
<td>8%</td>
<td>Spain</td>
<td>17%</td>
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<tr>
<td>Oman</td>
<td>8%</td>
<td>Oman</td>
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<td>Algeria</td>
<td>6%</td>
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<td>Mauritania</td>
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<td>Italy</td>
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<td>Morocco</td>
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<td>Belgium</td>
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<td>Sudan</td>
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<td>Sudan</td>
<td>2%</td>
<td>Somalia</td>
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<td>Somalia</td>
<td>1%</td>
<td>Yemen</td>
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</table>

The rapid development over the last 25 years in the Arab World has brought changes in the socio-cultural environments, education and physical activity, diet and nutrition and difference in income and time expenditure. These progressions have led to significant prosperity and easier lifestyle in terms
of transport, access to cheap migrant labour, proliferation of western style fast food and as elsewhere greater opportunities for sedentary lifestyles. These are the main reasons which created the obesogenic environment in the Arab-speaking countries. In the Arabian Gulf for instance, the significant growths in income resulting from the rich deposits of oil reserves and the resultant impact on rapid urbanization appeared to have improved the living conditions (Badran & Laher 2011, p.1). The Middle East and the North African (MENA) Arabic-speaking countries are among the world’s top ten in diabetes prevalence. As already mentioned, obesity itself is not a disease; it is a risk factor for many NCDs. Obesity has become an economic burden worldwide. The MENA countries spend nearly 5.6 billion USD on diabetes related health care (Badran & Laher 2011, p.3). The most alarming range is the prevalence of low physical activity (table 2-2).

![Bar chart showing prevalence of low physical activity in selected countries of the Eastern Mediterranean Region](chart.png)

Table 2-2: Prevalence of low physical activity in selected countries of the Eastern Mediterranean Region according to the STEP-wise survey done by WHO 2003 – 2007. The figure summarises the daily physical activity lasting 10 minutes or lower of exercise in various Arabic-speaking countries
Source: Badran & Laher 2010, p.4

WHO found that its Eastern Mediterranean Region was second only to the America in terms of low activity rates. Another barrier in the Arabic-speaking world while fighting against obesity is the cultural desirability to some degree that obesity grounds on beauty, fertility and prosperity; this is especially the case for women. This may be aggravated since females have limited access to sporting or exercise activities, lower levels of education and are supposed to spend more time at home than men (Badran & Laher 2011, p.5). Further
Causes of the region’s high rates are a lack of common understanding of physical activity, a lack of political commitment, the climate and the outdated infrastructure, so Jasem Ramadan, physiology professor in the faculty of medicine at Kuwait University (Carroll 2014).

The United Arab Emirates (UAE) realized that physical inactivity is a serious public health problem in their country and initiated the Dubai Pulse Program. Dubai Pulse “is a multi-component initiative to promote physical activity to all segments of society, with the aim of reducing diseases and promoting physical and psychological health” (WHO c). The project is funded by Dubai Sports Council. Partners are Dubai Municipality, Dubai Road and Transport Authority, schools, government departments and private companies. Mr. Al Sharif, secretary general of Dubai Sports Council, echoed in the Move for Health Regional Forum in Dubai that “collaboration between ministries, municipalities, urban planners, media and sports societies was key to encouraging physical activity” (Carroll 2014). Up to now the Dubai Pulse Program had helped to increase the number of adults taking part in regular exercise to 41.9% (Carroll 2014) and won therefore the international award for national project on physical activity (WAM 2014).

However, a disproportionately low priority in governmental spending aimed at increasing awareness of the devastating health care effects of obesity despite UAE, which has the economic position to spend money on these kind of events, whereas other countries struggle to provide their populations the basic services and needs. Although in some Arab countries direct spending on health care and education seems to have suffered at the expense of military enrichment and industrial development. There appears to be a lack of public awareness of healthy eating habits and the interactions of diet, exercise and chronic diseases and significant cultural barriers that appear to affect women more (Badran & Laher 2011, p.7).
2.3 Shifting perspectives: Towards understanding the complexity of obesity

Until now the challenge to fight against obesity was clearly framed as a medical problem, since obesity is linked with many medical consequences. Only recently, a growing recognition developed that a more holistic approach is required to successfully combat the rise in obesity. The Foresight Obesity System Map (fig. 2-6), produced by the Government Science Office in the United Kingdom, highlights the complexity of the obesity issue. It suggests seven clusters that should be considered in the obesity epidemic. These seven clusters arise from more the one hundred proximal and distal factors.

![Foresight Obesity System Map](image)

Fig. 2-6: Foresight Obesity System Map showing thematic clusters
Source: Townshend et al. 2010, p.14

Many people tend to blame the individual for being fat. For sure the individual psychology and behavior as well as the biology play a major role for each ones individual weight. But when e.g. two third of the American population is overweight or obese, the blame can hardly be put on the individual (Demers 2006, p.34). There is a limit of self-control. The inflexible decision-making strategy of the brain’s non-cognitive system takes the decision over of what we want to eat and not everyone can resist temptation. We, the human
beings are hardwired and lost in the completely transformed environment of the last years (Cohen 2014, p.7). Just to focus on the change of individual behavior (physical activity and nutritional practices) will not be sufficient to mitigate the worldwide obesity epidemic. Also Walker Posten, a nutrition specialist from the Baylor College of Medicine in Houston, Texas, claimed in 1999: “Obesity is an environmental issue... Obesity-promoting behaviors are controlled by factors outside the individual and obese individuals cannot be expected to have total self-control over their weight in an environment that promotes weight gain by reinforcing overeating and inactivity any more than they can control their genes” (Demers 2006, p.34).

So obesity is the biological response to our changed physical and food environment as it takes thousands of years that the body and the genes adapt to the environment and it reflects the failure of the free market. Some say that obesity has similarities with climate change. Both are the outcome of several societal and industrial developments (see chapter 3.2). Coordinated central and local government, industrial, societal and individual changes are urgently needed to mitigate the catastrophe. Not just the individual should be advised to eat less and walk more, major environmental changes are necessary. Therefore, single remedies will not suffice despite many logical remedies remaining unproven (James et al. 2010, p.5).

However, the dynamics of the currently on-going obesity crises is complex and still little understood. But it is clear that the built environment can play a major role in “influencing obesity by creating a climate that promotes increased energy consumption and a reduction in energy expenditure” (Papas et al. 2007, p.129).
3 Built environment

3.1 Definition of built environment
The term built environment is very broad and can mean many things to scientists from different disciplines. It is a multidimensional concept. The built environment itself “consists of all the many features that have been constructed and modified by humanity” (Lopez 2012, p.5). By one definition, the built environment contains following elements: land use patterns, the distribution across space of activities and the buildings that house them; the transportation system, the physical infrastructure of roads, sidewalks, bike paths, etc., as well as the service this system provides, urban design, the arrangement and appearance of the physical elements in a community (Handy 2002, p.64ff). Public health research has broadened the definition of built environment. Only recently the term includes healthy food access, community gardens, “walkability”, “bikability” and sustainable development which aims smart growth (Lee et al. 2008). This broad terminology for the built environment from different scientific fields is the basis for this thesis.

While studying built environment, it is important to understand the history and process of the development of an environment, because it is the result of the interplay of economic, political, socio-cultural and other factors from former times. Every urban system has its own ‘genetic code’, expressed in architectural and spatial forms that reflect the community’s values and identity. Henri Lefebvre’s (1991, p.68ff) conceptual model shows that urban space is the result of social processes. That is why other environments like
the social and physical environment have to be considered while writing about built environment; e.g. physical environment like the prevailing climate or geology are directly influencing factors while factors like crime and safety influence the social environment more indirectly. Physical and social environment characteristics may arise from the built environment feature (Lopez 2012, p.4ff).

3.2 Obesogenic environment
The term obesogenic environment refers to an “environment that promotes gaining weight and one that is not conducive to weight loss” (Swinburn et al., 1999 in Powell et al. 2010) within the home or workplace. It is the “sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations” (Lake & Townshend 2006, p.262). The obesogenicity of an environment can be modified with the biggest impact for the residents at community and policy level. Changes can include access to healthy food and places to be physically active; thereby, supporting the health behaviours of individuals (Powell et al. 2010).

3.2.1 The occurrence of obesogenic environment
„When Jem and I raced each other up the sidewalk to meet Atticus coming home from work, I didn’t give him much of a race. It was our habit to run and meet Atticus the moment we saw him around the post office corner ith the distance ...“

(Harper 1960, p.34)

This quotation from Harper Lee’s book To Kill a Mocking Bird describes a typical neighbourhood before World War II (WW II). The father Atticus is walking home from work, children running independently in the street, having services like the post office close by in walking distance. A lot has changed since this time. The technological advances of the last decades had a huge impact on the design and development of buildings, the way of communication, transportation and how populations are fed (Giles-Corti et al. 2010, p.131).

It seems that Henry Ford’s dream to make motor vehicles affordable for the masses “nurtured people’s evolutionary drive to conserve energy expenditure
and, as a consequence, appears to have contributed to our ever-burgeoning waist lines” (Giles-Corti et al. 2010, p.133) and to the redesign of cities. The affordability of private transportation revolution due to the industrialization transformed society and had an effect on our residency and way of life (Giles-Corti et al. 2010, p.133).

At the beginning of the 1800s, cities were characterized as followed: densely settled, high land-use mix, clear distinction between urban and rural area, transportation was limited to foot or animal power and services and work were in walking distance to reduce time (Falconer & Giles-Corti 2008 & Newmann 2009 in Giles Corti et al. 2010, p.133). However, the model of the compact city was overdue with the start of the industrialisation. Separation between residences and the polluted and noxious land was needed. At this time planners and public health officials recognised the need of “segregation compared with agglomeration of land uses” (Falconer & Giles-Corti 2008 in Giles Corti et al.2010, p.134) due to health reasons of the inhabitants living in cities. Consequently, zoning of land uses was introduced. The practice of zoning and separation of land uses created a distance between residences and their workplace as well as their daily needed services and therefore increased travel times. By the 1900s, zoning had become an important element of planning strategy (Hall & Porterfield 2000 in Giles-Corti et al. 2010, p.134) and urban sprawl and suburbs emerged in the U.S. and European cities. Protecting the public from environmental contamination, zoning has contributed to an increased need for privatised transportation. With good intention, housing density within a suburb was constrained, but planners at that time did not recognise the inadvertent consequences for walkability and physical activity (Giles-Corti et al. 2010, p.134). With the increase of private motor vehicle ownership the pressure grew to design car-friendly neighbourhoods at the expenses of pedestrians and cyclists and related infrastructure (Giles-Corti and King 2009 in Giles Corti et al. 2010, p.135). In the 1930s under the name of functionalism for the first time “physical-functional aspects of cities and buildings were developed as a planning dimension independent from and supplementary to aesthetics” (Gehl 2011, p.43). The gain of medical knowledge leaded to a number of criteria for healthy and physiologically suitable architecture, e.g. dwellings needed to have light, air, sun and ventilation and open spaces were to be ensured to residents (Gehl 2011, p.43).
3.2.2 Obesogenic environment in the 21st century

After decades the human dimension has been overlooked, it is recognised that the design of built environment has multiple direct and indirect influences on health, including physical activity and obesity levels of residents. But even if criteria and knowledge exist, at the moment most of the cities are not built for the people. Copenhagen in Denmark might be one of a few exceptions, where effort is being taken by the government to design people-friendly cities (Kielgast). Currently places in which people can walk and meet, the human habitat, is shrinking. Consequently, we, the humans constrain ourselves to the private sphere and social interaction is becoming less. Of course, someone might argue that alternative possibilities for physical activity and losing weight are available, e.g. gyms. But these can be seen as sort of “wildlife preserve for physical exertion” (Demers 2006, p.31); a preserve which “protects species whose habitat is vanishing elsewhere. The gym accommodates the survival of bodies after the abandonment of the original sites of the bodily exertion. The gym is the interior space that compensates for the disappearance of outside and a stopgap measure on the erosion of the bodies” (Demers 2006, p.31).

Regardless, visiting the gym is not affordable for people of all social classes. A funny phenomenon is that people try to park their car as close as possible at the entrance of the gym, to spend their energy instead of walking on a treadmill. It seems that cities built after WW II are obviously not helpful in these aspect, which can be read in the paper “The McDonaldization of society” (Ritzer 1995), which discusses the irrationality of rationality (efficiency, calculability, predictability etc.) in our current societies.

But the vehicle ownership is not the only technological revolution which limits our daily physical activity. Home labour saving devices like washing machines as well as tools of communication like mobile phones and computers shifted our lifestyle into a more sedentary. Nowadays in some countries people do not even have to leave their home. Groceries, fast food and clothes can be ordered by telephone or in the internet and will be delivered right on the doorstep. In the past sending a letter required a walk to the post office which can be now done within a click in the internet 24/7. It appears that the technological revolution brought major societal changes fuelling the obesity epidemic and transformed ourselves to consumers rather than citizens (Giles-Corti et al. 2010, p.133).
3.2.3 Obesogenic environment in developing countries

A common feature of almost all cities, in which people still use urban space, is that they are increasingly poorly treated. The disappearance of public space and greenery, the increase of obstacles, noise, pollution and a high risk of accidents are part of the daily city-life-struggle (Gehl 2010, p.3). These disgraceful conditions can be especially observed in cities of less developed and emergent countries. Up to now, research about obesogenic environment has mainly taken place in Europa, North America and Australia. But especially in the less developed part of the world, where most of the rapid urbanization is taking place right now, the fast increase in motorization reduces the opportunity for the traditional movement of the inhabitants of walking and bicycling. Traditional outdoor businesses like markets, street trade on sidewalks and healthy street kitchens are vanishing day by day, being replaced by parking places and westernized fast food chains (Gehl 2010, p.215ff). All these developments are the reason for the drastically emerging obesity of the inhabitants of cities in developing countries.

That walking is still popular in Sub-Saharan Africa does not mean that urban streets there are walking-friendly. Over 60% of trips in Addis Ababa (Ethiopia) are made on foot, although 63% of streets in Addis Ababa lack any pavements or sidewalks. In Nairobi (Kenya) over 45% of people walk. In comparison London struggles to get 20% of people to walk and in New York it is between 10-20%. But walking in African cities pose a high risk, e.g. with 67% of road accidents involving pedestrians in Ethiopia’s capital. It is expected that road accident will be the third biggest killer in developing countries by 2020 (Davies 2011). Lagos /Nigeria is not the only city in which most of the sidewalks are used for parking and pedestrians are forced to walk on the street which exposes them to increased danger. In many developing countries owning a car is a metric for success. This mentality hinders transit and pedestrian infrastructure development, especially considering that the decision makers neither walk nor take the bus (Nkema 2014).

Some politicians in Johannesburg and Bogota have seen the need to create a save, active and affordable environment for their inhabitants. In these cities Bus Rapid Transit systems (BRT) were introduced. BRT are low cost and
efficient bus systems with dedicated ‘busways’ and high quality enclosed stations. They provide the usability and capacity of other Mass Rapid Transit. Moreover, 330km of new bicycle paths were built in Bogota. As bicycles are considered as a practical and cheap means of transportation, it ensures increased mobility for the inhabitants of the poorest districts in the city (Gehl 2010, p.222) and at the same time let them burn calories.

The city government of Mexico-City, Mexico, started a fitness campaign to raise awareness about the obesity epidemic in their own country, as seven out of ten Mexicans are obese. Mexicans are encouraged to make ten squats. In return they get a metro ticket for free. Therefore, monitors were installed in the metro stations. With this campaign the municipality wants to encourage his inhabitants to use the metro more often and at the same time raise awareness to fight against obesity (Carter 2015).

Another problem city governments of developing countries and megacities often face is if urban growth should proceed towards urban sprawl versus urban density. Urban density is associated with higher levels of productivity, least affordable housing market and less traffic congestion whereas urban sprawl is defined “by
low population densities, curvilinear street networks, limited mixed use and high dependence on individual motor vehicle to travel from place to place” (Frumkin et al. 2004 in Giles-Corti et al. 2010, p.134/135). Like in most cases a blanket statement does not exist and each city has to decide as the cases arise. In most of the cases, the decision is taken by the citizens of a country themselves through informal settlements which let the city grow either up or out.
4 The relationship between the body, the space and the city

4.1 The body and the city
Let’s start with a simple comparison between bodies and cities. Obesity causes illnesses as heart problems and diabetes. By analogy, sprawling (fat) cities such suffer traffic congestion and inner-city problems, disproportionate concentration of poverty and crime; so fat cities have “heart” problems. As a fat body has to circulate blood through pounds of useless electricity, in a fat city power is wasted through e.g. traffic jams (Sui 2003, p.77). Another illustration, sewer blockages and overflows in cities across the world are becoming more frequent, because restaurants often pour cooking residue into drains and local governments lack the resources to monitor grease disposal and enforce the relevant regulations. Harvey (2003, p.34) argues that “cities are constituted out of the flows of energy, water, food, commodities, money, people and all the other necessities that sustain life.” The contingencies and movements of fat bodies (as individuals), cities (as a collective action) and sewers (as infrastructure) emphasize a “multiplicity of urban metabolisms, each with different interconnectivities and forms of instability” (Marvin & Medd 2006, p.313).

Back to history, already the ancient Roman military engineer Vitruvius (31 B.C.–A.D. 14) debated the “relationship between the body and architecture in his classic, Architecture, a persistent and recurring theme has been to reflect the human body as the measure of all things in Western philosophy (Spickler, 1970; Gallop, 1988) and urban planning (Rapoport, 1977)” (Sui 2003, p.80).
Nietzsche, Kafka, Foucault as well as Deleuze argued persistently “that bodies should be considered primary objects of inscription surfaces, on which values, morality, and social laws are inscribed” (Sui 2003, p.80). Further statements like from Short (1996, p.392) “the phallic symbolism of high-rise tower blocks; the modern skyline of many big cities is often a solid metaphor for male virility and masculine strength” or Pile (1996, p.208) “the body and the city are mirrored one in the other” imply that the human body has acted as a powerful template for imagining the city. Grosz (in Soja; 1995, p.112) goes even further by arguing that “the city is made and made over into the simulacrum of the body, and the body, in turn, is transformed, ‘citified,’ urbanized as a distinctively metropolitan body.” Moreover, she wrote in her essay Bodies-Cities (1999, p.385):

“The body must be considered active in the production and transformation of the city. But bodies and cities are not causally linked. Every cause must be logically distinct from its effect. The body, however, is not distinct from the city they are mutually defining. Like the representational model, there may be an isomorphism between the body and the city. But it is not a mirroring of nature in artifice. Rather there is a two-way linkage which could be defined as an interface.”

The relationship between bodies and cities is mutually constitutive. Her proposed model understands bodies and cities as a “fundamentally disunified series of systems and interconnections, a series of disparate flows, energies, events or entities, and spaces, brought together or drawn apart in more or less temporary alignments” (Grosz 1999, p.385). The connotations are quite profound: “If bodies are not culturally pregiven, built environments cannot alienate the very bodies that produce. However, what may prove unconducive is the rapid transformation of an environment, such that a body inscribed in one cultural milieu finds itself in another involuntarily” (Grosz 1999, p.386). Cities create spaces, divisions and interconnections which simultaneously profile individual bodies as subjects and organise social rules and expectations. This means that different cities and different socio-cultural environments actively shape the bodies of their inhabitants (Grosz 1999, p.386). Therefore, it is helpful to have a closer look on the relationship between the body and the space.
4.2 The body and the space

The answer of defining the relationship between the body and the city lies in the body’s complex ties to space, place and society. As space is limited, some broad contours display how the body and the city are connected with each other via space, place and society. This helps to explore more broadly and deeply the social and cultural causes of the obesity epidemic and of the sprawling cities (Sui 2003, p.80).

First, Lefebvre (1974, p.170) argues from the perspective of the body and space, the body is spatially produced and space is bodily created:
“There is an immediate relationship between the body and its space, between the body’s deployment in space and its occupation of space. Before producing effects in the material realm (tools and objects), before producing itself by drawing nourishment from that realm, and before reproducing itself by generating other bodies, each living body is space and has space: it produces itself in space and it also produces that space.”

Second, according to the philosopher Casey (2001, p.688) the perspective of the body and place, each body has its place, and each place is embodied:
“But the body not only goes out to reach places, it also bears the traces of the places it has known. These traces are continually laid down in the body, sedimenting themselves there and thus becoming formative of its specific somatography. A body is shaped by the places it has come to know and that have come to it—come to take up residence in it, by a special kind of placial incorporation that is just as crucial to the human self as is the interpersonal incorporation so central to classic psychoanalytic theory. The reverse is also true: places are themselves altered by our having been in them.”

Casey (2001) argued further “thanks to the inscriptive tenacity and expressive subjection of the body, places come to be embedded in us; they become part of our very self, our enduring character, what we enact and carry forward ... they (places) are in us—indeed, are us— thanks to their incorporation into us by a process of somatization.” Aren’t these philosophical justifications enough to link obesity and urban form?
Third, from the perspective of the body and society, the body is socially produced, and social practices are inscribed in the body. Societies, especially in the developed world, have been characterized by heightened attention to the body, expressed in the changing relation of individual identity to health, sexuality, and bodily image (Synnott 1993). The rise of ‘body’ in consumer culture as a bearer of symbolic value has been reflected in the emergence of embodiment as a fundamental issue for both society and the academy (Turner 1996). According to Haraway (1991, p.222) bodies are nowadays maps of power and identity. Sociologist Turner (1992) even coined the term “somatic society” to describe how in modern social systems the body has become the principal field of political and cultural activity. Lowe (1995, p.174/175) stated, “the body, a historical materiality, is neither a body-in-itself for a body-for-itself, but always an embodied being-in-the-world, constructed and realized within social practices to satisfy changing needs.” He argued further that “this body referent is in the fact that the referent of all referents, in the sense that ultimately all signifies, values, or meanings refer to the delineation and satisfaction of the needs of the body” (p.14).

Most of these approaches seem to be abstract, lost in the space of social construction and theories of the body tend to be utterly disembodied. But by relating the obesity epidemic to these bodily based theories, it is perhaps possible to bring these theoretical approaches back to reality. Apparently “bodies cannot be reduced to either the social or the natural, rather they are simultaneously symbolically constructed and real” (Sui 2003, p.81/82). Understanding the phenomenon of the fat city, both an essentialist and a constructionist approach are useful, as both shed light on different aspects of the problem of the complexity of urban planning and obesity.
5 Built environment characteristics and obesity

The rising obesity epidemic reflects profound changes in society over the past decades that have been accompanied by rapid and widespread changes to the environment. These environmental modifications have created a climate that is conducive to increased energy consumption and reduced energy expenditure at a population-level. The environment can exert a putative influence on obesity at different spatial scales ranging from macro to micro. It is important to identify mechanisms linking the features of places to a range of health outcomes (mortality and morbidity) and health related behaviours (e.g. smoking) as significant potential for developing successful policy initiatives. Fig. 5-1 demonstrates a selection of environmental characteristics at assorted scales that potentially shape individual-level food consumption (energy in) and physical activity (energy out).

For each environmental characteristic regarding bodyweight a large number of position papers have been written. In this master thesis the meso-level is of the main interest. First, the relationship between the physical activity environment or as written in fig. 5-1 the urban design initiatives, and obesity is described. As there seems to be strong evidence that environments which encourage walking are less obesogenic, chapter 5.1 mainly considers the relationship between walkable environments and obesity. Second, making use of the broadened public health definition of the built environment (cf. chapter 3.1), the relationship between the availability of healthy and nutritious food and obesity is explained, since the consumption
of high energy food is on the rise worldwide. Subchapter 5.1 and 5.2 are supported with a case study review from countries all over the world. Third, the relationship between policy responses and obesogenic environment is elucidated, because the physical activity environment like the food environment can only develop through an implementation or through the non-existence of certain policies.

These three environmental characteristics were chosen, considering the environmental aspects of the sides of the energy balance equation: energy out (physical activity environment) and energy in (food environment). Policies can either support or neglect this energy balance equation. Aim of this chapter is to define parameters, which determine the relationship between the built environment and obesity and can be used for the field research later on.

![Diagram showing environmental characteristics](image)

**Fig. 5-1:** Examples for environmental characteristics that potentially influence weight status. The red box highlights the meso-level (added by author).

*Source: Pearce & Witten 2010, p.5*
5.1 The relationship between the physical activity environment and obesity

“Above all, do not lose your desire to walk. Every day I walk myself into a state of well-being and walk away from every illness. I have walked myself into my best thoughts, and I know of no thought burdensome that one cannot walk away from it.”

Søren Aabye Kierkegaard, Danish Philosopher 1813 – 1855

(in Gehl 2010, p.V)

Physical activity is an important lifestyle component improving health. It is defined as any bodily movement produced by skeletal muscle which results in energy expenditure above basal levels (Badran & Laher 2011, p.4). Walking is the most common form of adult physical activity. Brisk walking has been identified as protective physical health, independent of the benefits of more vigorous activity, particularly if it is done consistently (Saelens et al. 2003, p.80). Public health recommendations emphasize the need to accumulate physical activity of at least moderate intensity on five days a week for 30 minutes (WHO e). Walking can be done for leisure, recreation, or exercise, for occupational purposes and for basic transportation, including shopping or going to work or school. It provides an informal and uncomplicated possibility for being present in the public environment. Since walking demands space, it is considered as an outdoor activity. Gehl (2011, p.9ff) divides outdoor activities in three different types: necessary activities, optional activities and social activities. These are defined as followed:

“1. Necessary activities: all activities in which those involved are to a greater or lesser degree required to participate;
2. Optional activities: Those pursuits that are participated in if there is a wish to do so and if time and place make it possible;
3. Social activities: all activities that depend on the presence of others in public spaces.”

Gehl (2011, p.9 – 12)

When outdoor areas are of poor quality, only strictly necessary activities occur. When outdoor areas are of high quality, necessary activities take
place with approximately the same frequency, though they tend to take a longer time, because the physical conditions are better (Gehl 2011, p.11). Out of the higher quality of built environment a necessary activity can evolve into an optional or social activity.

As walking is physically demanding and people have different limits how far they are willing to walk, it is hard to define “the human level of tolerance for interferences encountered during walking so that spaces are sufficiently narrow and rich in experiences, yet still wide enough to allow room to manoeuvre” (Gehl 2011, p.133). Through a large number of surveys, the acceptable walking distances for people in ordinary daily situations has been found to be 400 to 500m. Reasons are that places where people can walk are becoming less, but people also have less time to do so or at least they think so. Perceptions of space and time have changed greatly that the distance people are willing to cover on foot is decreasing constantly. “The decline in walking is closely linked to the decrease of space in which to walk and to the increasingly cruel lack of time we face” (Demers 2006, p.55). Thereby walking is a multi-purpose tool. It helps to prevent
diseases and restore health, reduces traffic accidents, air pollution and global warming, enhances road safety, sense of community as well as social equity and on the side saves money (Demers 2006, p.137). Crucial to determining the acceptable distance in a given situation is not only the actual physical distance, but also to great extent the experienced distance.

5.1.1 Urban design initiatives and walking

Urban designers are the responsible experts who have to consider how people will perceive and interact with the human-made environment. The profession urban design “makes decisions about how natural (topography, vegetation) and built (buildings, roads, plazas) elements in a particular space will relate to one another” (Saelens et al. 2003, p.81). The fact that walking requires physical effort and is time consuming makes people naturally very conscious of their choice of transportation (fig. 5-5).

**Fig. 5-5: A proposed ecological model of neighbourhood environment influence on walking and cycling.**
Source: Saelens et al. 2003, p.88

* Some examples of demographic variables are provided, but should not be considered comprehensive. ** Psychosocial correlates of physical activity would include, but are not limited to, such variables as self-efficacy, perceived benefits, perceived barriers, social support and enjoyment of physical activity.
Parameter that influence the choice to use motorized or non-motorized transport are based primarily on two fundamental aspects of the way land is used, namely proximity (distance) and connectivity (directness of travel).

**Proximity:** Proximity relates to the distance between trip origins (i.e. where one is) and destination (i.e. where one is going). It is defined as the “straight-line distance between different land uses such as residential, office, retail, and commercial activities” (Saelens et al. 2003, p.81). Again proximity is determined by two land use variables. The first is density or compactness of land uses, e.g. if a person lives in a dense area with many apartment buildings, it will be more convenient for him or her to walk to visit a neighbour than if her or she lives in low-density area with single-family homes where there are likely few friends within easy walking distance. Second component of proximity is land use mix which is defined as the “level of integration within a given area of different types of uses for physical space, including residential, office, retail/commercial, and public space. Land use is controlled by zoning ordinances that reflect political decisions most often made at the local level” (Saelens et al. 2003, p.81). In older cities there are many residences above street-level shops, making it more convenient to walk to shops or to go to work. In modern suburbs, different land uses are purposefully separated, so it may be practically impossible to walk from one’s home to the nearest shopping centre or place of employment. High mixed used is characterized by a diversity of land uses within a small area. Much modern development is based on single use mix (Saelens et al. 2003, p.81).

**Connectivity:** Connectivity describes the “directness or ease of travel between two points that is directly related to the characteristics of street design” (Saelens et al. 2003, p.81). It characterizes the ease of moving between the origins and destinations within the existing street and sidewalk-pathway structure. Connectivity is high when street are laid out in a grid pattern and there are few barriers to direct travel between origins and destinations. With high connectivity, route distance is similar to straight-line distance. In addition to direct routes, grid patterns offer the choice of taking different routes to the same destination. By contrast, low connectivity is found in the layout of modern suburbs and is characterized by a low density of intersections
(e.g. long block size), barriers to direct travel (e.g. cul de sacs) and few route choices. Fig. 5-6 displays two different community designs. Above the main street that horizontally divides the figure, a conventional suburban layout and below a traditional layout is represented. The community on the top is located along curvilinear/bendy roads. Due to the designed street network straight-line distances are not possible, thus connectivity is low. Moreover, density of land per unit is meagre and possesses poor land use mix. In comparison, the community on the bottom is arranged in a more grid-like and more direct street network, thus connectivity is high. Additionally is provides different types of land use.

![Fig. 5-6: Distinct community design](image)

Source: Spielberg 1989 in Saelens et al. 2003, p.82

But the length of the way is not the only deciding reason if a walking distance is acceptable or not. The quality of the route, both with regard to protection and to stimulation en route, plays a major role. For this reason “the pleasantness of a place is partly contingent on protections from danger and physical harm, primarily protection from insecurity due to fear of criminality and vehicular traffic” (Gehl 2011, p.171). Further parameters are:

**Safety from traffic:** The most important safety requirement is protection from vehicular traffic. If this demand is not sufficiently given, people will avoid outdoor activities. Children will not be allowed to walk alone on the street or even on the sidewalk and old people will fear to cross the street due to transgression of speed limits or lack of crossings and traffic lights. Sometimes
even the sidewalk cannot give someone the feeling of complete safety. Therefore, planners must consider “the feeling of risk and uncertainty rather than actual statistical risk that plays the decisive role in a given situation” (Gehl 2011, p.173). Hence, not only the actual traffic has to be taken into account, but also the feeling of security with regard to traffic.

Safety from crime: Active street life decreases the number of crime incidents in neighbourhoods; so Jane Jacob’s, who examined the treatment of planning problems in U.S. cities. Many people in a street create mutual protection and if many things happening outside, people inside are more likely to watch what is going on in the street as a kind of entertainment. This effect is called "street watching". In Venice e.g. are nearly no drownings in its canals, because due to slow traffic and high activity level, someone will always be watching when an accident or crime occurs (Gehl 2011, p.171). For the night enough instalments of streetlights create a safety feeling.

Protection from unpleasant weather: As weather conditions vary from area to area and country to country, in each region the climatic conditions and cultural patterns must be taken into consideration to create a pleasant place for outdoor activities, which attracts people to leave the house even at unpleasing weather conditions. Well-designed climate protection and site planning is the key to improve the local climate and thereby create a better general situation, e.g. through an optimized wind flow. Nevertheless, essential for remaining outdoors is the microclimate around the bench or sidewalk, where people want to sit or walk (Gehl 2001, p. 173ff).

Urban elements: Pedestrian movement depends also on the attractiveness of the neighbourhood surrounding. For this reason the design of details plays an important role in developing pedestrian-friendly environments. Desolate and empty spaces – without benches, columns, trees for shading and so forth, do not invite people to stop by and stay at a place, e.g. to meet friends, interact with other people or to rest. This is also the case if the environment lacks interesting details like niches, holes, gateways or stairs (Gehl 2011, p.153). Opportunities for staying and sitting, which are more or less designated for recreational activities, should be placed at regular intervals throughout the
city. Moreover, pedestrian traffic is quite sensitive to pavement and surface conditions. Too narrow, interrupted or uneven sidewalks discourage people to walk on the sidewalk and force them to walk on the street. Adverse surface conditions disadvantage those who have walking difficulties or handicapped people (Gehl 2011, p.135). One of the best indicators for a nice, safe and attractive environment is to observe, if old people and children move in the street, not only the middle-aged people, because then the environment also allows them to actively participate in the outdoor daily life.

It seems possible that activity patterns in public spaces, cities and residential areas can be influenced, if enough attention is being paid to the design of the built environment. Within certain limits due to regional, climatic and societal conditions, it can be influenced how many people are physical active outside, how often events are organized, how long individual activities last as well as which types of activity can develop in the public space (Gehl 2011, p.37).

5.1.2 Case study analysis: urban design initiatives and obesity

A lot of research has taken place on the relationship between physical activity, overweight and obesity and the built environment. Sometimes it is hard to compare the studies as there is an inconsistency in approaches, methods, thus diverse outcomes were achieved. Nevertheless, the following literature review witnesses enough evidence that there is an existing relationship between built environment and overweight and obesity.

Proximity (density, land use mix, greenery) and bodyweight: The most widely cited study, which proves that urban form and health are linked, was carried out in Atlanta, Georgia. A significant correlation between the obesity of white males and the residential density of where they lived was detected; decreasing from 23% to 13% from the least to the most-dense neighbourhoods (Frank et al. 2005). A recent study of residents across residential neighbourhoods in New York explored a clear correlation between more dense urban environments and the relationship between urban form and obesity. Resident of neighbourhoods with high population density, great access to public transport and a great mix of land uses than people living in neighbourhoods without these environmental characteristics (Rundle et al.
Lopez’s (2007) study had a similar outcome. In his study higher rates of population density were related to significantly lower levels of BMI. Smith et al. (2008) came to the conclusion that among men population density was associated with a minor risk of overweight, but not for obesity or BMI. Among women, higher population density correlated only with an increased risk of obesity, but not for BMI or overweight.

For studies examining the relationship of land use mix and obesity, most of the time an objective measure of land use mix was used, which usually includes an even distribution of different land use types within a network buffer, a proxy neighbourhood unit or a prescribed distance from a person’s home using Geographic Information System (GIS) (Turrell 2010, p.156). Four studies (Frank et al. 2004, Mobley et al. 2006, Rundle et al. 2007 and Li et al. 2008) were in consistence with the theory: the probability that people are overweight or obese, or having a higher BMI, is much lower in neighbourhoods with an even or increased land use mix. Especially in traditional mixed-use neighborhoods, physical activity of the inhabitants seems to be much higher, because these neighbourhoods include local shops and services, school and employment opportunities, which are easily accessible within walking distance from people’s home; as studies in Australia and the U.S. showed that peoples’ willingness to exercise is greater, if the perceived aesthetics of a neighborhood is high (Carnegie et al., 2002 & King et al., 2003). Rutt & Coleman (2005) observed the opposite: people living in a neighbourhood where land use mix was high, they also tended to have a higher BMI.

Only a small number of studies examined the role of objective measured green space with physical activity of adults. A study of eight European countries figured out that level of landscaping within neighbourhoods correlates with more physical activity and can be a solution in encouraging for more exercise (Ellaway et al. 2005). In Seattle it was discovered that the quality and quantity of greenery in a neighborhood can be associated with obesity. This study reports that in areas with good accessibility to stores, services and a high degree of greenery, BMI rates were reduced compared to areas with a higher accessibility to stores and services and low measure of natural vegetation (Tilt et al. 2007).
Connectivity: Connectivity can be measured in various ways. Smith et al. (2008) was in accord with the theory that a greater street connectivity lowers the risk of overweight and obesity for men. For women, a higher street connectivity correlated with a lower risk of overweight, but not obesity. Lopez 2007, Rundle et al. 2007, Rutt & Colemann 2005, Frank et al. 2004 could not ascertain any positive correlation between connectivity and bodyweight. In terms of facilitating walkability in a neighbourhood, Frank et al. 2005, Saelens et al. 2003 and Handy et al. 2002 showed a positive relationship between high street connectivity and walkability, which may also be linked with lower levels of overweight or obesity.

Safety from traffic and bodyweight: A cross-sectional comparison of two urban areas in the U.S. looked at whether road conditions (high-speed traffic, lack of crossings and sidewalks) hinder physical activity (McGinn et al. 2007). Thereby, research combined neighbourhood perceptions together with objectively measured observations. Only little agreement between recorded perception and objective measurements was found. Moreover, the study concluded that perceptions of speed and volume were not associated with physical activity outcomes, though a perception of having places to walk was associated with higher physical activity, particularly walking. A study of Joshu et al. (2008) shows the relationship between obesity and perceptions of the presence of streetlights and heavy traffic. Those experiencing traffic as an obstacle in their neighbourhood, were likely to be obese than those who did not perceive traffic as a major problem; yet there was no correlation with perceptions of streetlight existence.

Safety from crime and bodyweight: Dolye (et al. 2006) detected a positive relationship between all types of crime and BMI. The lower the crime rate the much lower was the BMI among adults living in the neighbourhood compared to the BMI of residents living in neighbourhoods with high crime rates. Mobley et al. (2006) discovered that higher rates of robbery arrests per 100.000 population had the consequence that women aged 30 – 78 years had a significantly higher BMI in the U.S. With a 3-item neighbourhood disorder scale which included perceptions of crime, noise and cleanliness, Burdette & Hill (2008) ascertained increased perceptions of disorder with a heightened
risk of obesity. Foster et al. (2004) identified that women in England who were worried about safety during daytime in their neighborhood were nearly 50% less likely to take a walk during the day than those without concerns; though there was no association with men.

_Urban elements and bodyweight:_ Boehmer et al. (2007) researched the relationship of pleasant neighbourhood design and physical activity. The change of obesity was increased among interviewees who replied that their neighbourhood was not attractive to be physically active, because their neighbourhood lacks of pleasant sights. Moreover, Boehmer et al. (2007) found that respondents who disagreed that sidewalks were on most streets in the neighbourhood were more likely to be obese. On the contrary, Joshu et al. (2008) examined no relationship between obesity and perceptions of the presence of visual stimulating design in the neighbourhood in the U.S.

As childhood obesity is rapidly increasing as well, another study field is the relationship of children’s physical activity and the built environment. In Australia researchers suggested that micro-urban design environments, such as the quality of pedestrian realm and public crossings, can also be important environmental characteristics whether parents allow their children to walk to school (Timperio et al. 2006). Access to outside play space is another key aspect of the built environment that has attracted research, however, not just traditional parks and playgrounds. Moore (1987) found out that streets close to a child’s home are actually more significant, since they are readily accessible and are more exciting than specifically set aside play areas. In Ireland a linkage between the perceptions of the physical environment with perceptions of sense of community was discovered. The outcome of the study is that there is need for routes perceived as aesthetically pleasant in order to encourage walking. Moreover, it emphasized the role of psycho-social influences in determining whether people took exercise or not (Burgoyne et al. 2008).

_Climatic conditions and bodyweight:_ Studies examining the relationship between physical activity, built environment and weather prove that weather conditions can strongly encourage as well as discourage physical activity
behaviours (Merrill et al. 2005). It appears that levels of physical activity vary with seasonality, and the ensuing effect of poor or extreme weather has been identified as a barrier to participation in physical activity among various populations. Future physical activity interventions should consider how weather promotes or hinders such behaviour. Providing indoor opportunities during the cold and wet months may foster regular physical activity behaviours year round.

5.2 The relationship between the food environment and obesity

5.2.1 Exploring the nutrition environment

Food environment is one of the four major areas of the Obesity System Map developed by Foresight (see chapter 2.3). The term food environment can be widely conceptualized. It includes any opportunity to access food. This definition of food environment can implicate “physical, socio-cultural, economic and policy factors both at micro and macro-level. It includes food availability and accessibility on addition to food advertisement and marketing” (Lake & Townshend 2006 in Townshend & Lake 2009, p.910). Cummins & MacIntyre (2006, p.100) describe two pathways to obtain food; firstly, food for home consumption, i.e. from supermarkets and grocery shops and ready-made food for home; secondly out-of-home consumption, i.e. from restaurants and take-aways.

No doubt that a genetic basis for obesity exists, which may predispose individuals to obesity, but as recent research concluded the effect size is only little (Yang et al. 2007); this result further supports the view that obesity is primarily shaped by environmental forces. Peters et al. (2002, p.70) remark: „The environment encourages overeating through an abundant food supply that is high in fat and energy density, easily available, relatively inexpensive, good tasting and served in large proportions.“ Cohen (2014, p.121ff) claims in her book A Big Fat Crises for a safer food environment and calls for a model for obesity control like one exists for alcohol control. This would include i.a. standardized portion sizes, increase of taxes on foods most strongly associated with risk of obesity, warning labels e.g. on foods which increase the risk of heart disease (high in sugar and saturated fat food).
Glanz et al. (2005, p.331) developed a framework to explore some key micro-environmental settings that influence dietary behaviours (see fig. 5-7). This model combines research from multiple fields including public health, health and consumer psychology and urban planning. Additionally it displays relationships between dietary behaviours at the macro-policy environment, the micro-environment and the individual. Four features of the food environment are described within the following framework:

1. Community nutrition environment (e.g. number, type and location of food outlet)
2. Consumer nutrition environment (e.g. availability of healthy options, price, promotion and nutritional information)
3. Organizational nutrition environment (e.g. home, school, workplace)
4. Information environment (e.g. media and advertising)

According to Glanz et al. (2005) especially the community and consumer environment need much further investigation, both of which are a feature of the built environment and therefore, the focus for this thesis. Other factors of eating behaviours projected in the nutrition environments framework include government and industry policies, the information environment and individual variables including socio-demographic characteristics and perceptions of the environment.

Since studies evidenced a few years ago that the distribution of groceries and restaurants within micro-environments, like neighbourhoods, are a crucial determinant of residents diet and health behaviours, more attention on research was given. Most commonly the impact of the food environment is measured with the presence and density of food stores within a neighbourhood. Either studies explore a single food outlet type or multiple outlets (include chain brand supermarkets, midsize independent grocery stores, smaller convenience stores, greengrocers, fast food outlets and restaurants). Usually chain supermarkets and greengrocers are understood as possibilities to buy healthy foods, whereas convenience stores and fast food outlets are categorized as possibilities to buy mainly unhealthy food (Thornton & Kavanagh 2010, p.79).
Macro policy environment

Micro-environment

Individual

Outcome

**Community nutrition environment**
(e.g. number, type, location and accessibility of food stores)

**Consumer nutrition environment**
(e.g. availability, quality and costs of foods within stores in addition to other factors such as portion size, in-store promotion and provision of nutrition information)

**Organizational nutrition environment**
(e.g. money, work, school)

**Information environment**
(e.g. media and advertising)

**Socio-demographics**

**Perceptions**

**Dietary behaviours**
(e.g. fruit and vegetable consumption, fast food consumption)

**Health outcomes**
(e.g. weight gain)

Fig. 5-7: Conceptual framework for the study of nutrition environments
Source: Glanz et al. 2005, p. 331
5.2.2 Case study analysis: food environment and obesity
Studies exploring associations between the food environment and dietary behaviours and the individual health outcomes of local residents are the majority of studies. Powell et al. (2007a) e.g. discovered that the BMI of adolescents was lower in areas with more chain supermarkets and higher in areas with more convenience stores. Two studies lined better access to fast food with increased weight. Mehta & Chang (2008) as well as Maddock (2004) proved that a high fast food restaurant density was associated with increased BMI and likelihood of obesity, although others found no association with weight status among adults (Wang et al. 2007, Morland et al. 2006). Areas that have little or no food access have been termed food deserts however, their existence on deprived areas is not always apparent and this varies both between and within countries (Larsen & Gilliland 2008, Wrigley et al. 2003, Cummins & MacIntyre 2002). The presence of smaller grocery stores and convenience stores in the local food environment has been found to have a negative influence on health in some studies through links to a higher weight status (Powell et al. 2007, Wang et al. 2007, Morland et al. 2006), while other were unable to establish an association with diet or health outcomes (Pearce et al. 2008, Wang et al. 2008, Inagami et al. 2006).

The role of outdoor advertising has recently been investigated within four cities in the U.S. (Los Angeles, Austin, New York and Philadelphia) in relation to obesity (Yancey et al. 2009). Of interest were features including billboards, bus shelter advertisement, particularly those that promoted unhealthy food (high calorie/low nutrient). The density of these advertisements was patterned by neighbourhood level variables related to racial composition and income with poorer and minority communities (Latinos) most exposed. To date, research evidence on neighbourhood advertising level is sparse and further work is required, particularly with regard to how the influence of advertising may interact with the built environment (Thronton & Kavanagh 2010, p.84). Giskes et al. (2007) claim that a step-wise approach is needed to understand pathways and mechanisms by which the environment influences food behaviour and can then be related to this outcome to adiposity.
To understand the complex relationship between the whole food environment, food behaviors and ultimately adiposity, there is the need to move beyond
exploring local retail food environments. If this is done there will be a great potential for developing interventions, policies and ‘lasting solutions’ to address the social phenomenon of obesity (Wang et al. 2006 & McLaren 2007 in Townshend & Lake 2009, p.910).

5.3 The relationship between policy responses and obesogenic environment
Changes are needed to address to worldwide obesity epidemic. As already mentioned the individual cannot be blamed solely, policy responses regarding the food and built environment are an important measure to protect a large number of people from the excess of high-dense energy food and to promote activity by shaping a built environment that helps to adopt and maintain an active lifestyle. Policy interventions and public policies include laws, regulatory measures, guides to action or funding priorities at any level of government.

5.3.1 Policy responses on the physical activity environment
Part of the decline of physical activity is the result of the policy and planning regulations in regional development of the last 50 years (see chapter 3.1). Now it is time to improve features of the physical environment at different geographical scales through the right policy interventions in a way that increases the physical activity level of the population in their leisure time as well as in their daily life, e.g. walking and cycling daily routes to work, to school or to the supermarket. Policy interventions regarding a transformation of the physical activity environment can include the modification of organizational norms and social practices, the construction of pedestrian and cycle paths as well as the support of increased access to resources and facilities. Other possibilities could focus on the creation or improvement of facilities for leisure physical activity or land use strategies that enhance active transport (Riva & Curtis 2010, p.230).

In the last decades people’s awareness has grown to design our cities for the human scale again. Concepts like ‘Smart Cities’, ‘Smart Growth’ and ‘New Urbanism’ try to respond to the arising challenges from low-density and car-dependent kinds of development; e.g. ‘Smart Growth’ programs are designed
to counter urban sprawl through “the planning, design, development and revitalization of cities, towns, suburbs and rural areas to create and promote social equity, a sense of place and community and to preserve natural as well as cultural resources” (American Planning Association 2002, p.21).

The WHO released several calls for action. The framework Global Strategy on Diet, Physical Activity and Health by WHO (2004), combines the interventions for food environments and physical activity. It aims to “promote and protect health by guiding the development of an enabling environment for sustainable actions at individual, community, national and global levels that, when taken together, will lead to reduce disease and death rates related to unhealthy diet and physical inactivity” (WHO 2004, p.3). This global strategy includes a comprehensive instruction toolkit and acts as an international commitment, as it was endorsed by Member States, to enhance existing national efforts and to prevent chronic diseases and their risk factors (Riva & Curtis 2010, p. 231). Moreover, WHO produced A Guide for Population-Based Approaches to Increasing Levels of Physical Activity: Implementation of the WHO Global Strategy on Diet, Physical Activity and Health (WHO 2007). This document gives instructions for Member States on policy options to foster physical activity. Supplemented is this top-down approach with local ‘bottom-up’ initiatives like the WHO Healthy Cities network (WHO f), which provides policy and planning frameworks for local decision-makers. The WHO guide A Healthy City is an Active City: A Physical Planning Guide (2008) should support city leaders to design active living and sport in their community.

As these policies require highly committed governments, only cities in a few countries like Rijeka/Croatia, Brighton and Hove/UK and Kvasice/Czech Republic, implement concepts of the Healthy Cities Network of the WHO (WHO f). Nevertheless, if we want the people to actively move in the city, a safe and active environment has to be created. Even if proper policies exist, it is not an easy task to implement policy interventions and to change the physical environment. Changing the urban environment is expensive and takes up a lot of time. Moreover, zoning regulations may forbid mixed-use neighbourhoods. A further challenge is the need of a certain socio-political consensus that can
change social norms regarding modes of transportation, lifestyle and physical activity patterns. Finally active communication between different scientific disciplines (i.e. urban planning, architecture, transportation engineering and public health) is required for a successful implementation of the policies (Heath et al. 2006 in Riva & Curtis 2010, p.243).

5.3.2 Policy responses on the food environment
The food environment is a complex entity, building up on different components of the food supply chain:

- Primary production (e.g. agriculture, fishing)
- Food processing (e.g. cooking or packaging raw ingredients)
- Transportation (e.g. import and export)
- Marketing (e.g. endorsement, TV advertising)
- Retail (e.g. supermarkets, wholesalers)
- Catering/food service (e.g. canteens, takeaway outlets)

Consumers mainly get in touch with the last two steps in the food supply chain. To achieve a health food environment, policies should intervene at all points of the food-supply chain. It may differ from country to country which levels of governance is in authority for the formulation of policy that affects the food environment, but most commonly the local, state and federal government as well as organizational and international levels of governance are in charge.

The WHO published various papers investigating policy options on different levels of governance to tackle overweight and obesity. In general local governments are in control of the land use management (e.g. number, types and locations of food outlets and the use of land for primary production). State governments deal with the food distribution and types of food, e.g. sold in schools. Federal governments are responsible for the food composition standards, advertising, taxes and subsidies on food, e.g. high taxes for alcohol in Sweden and Norway and in Germany on tobacco. International governance controls trade arrangements between countries (Gieskes 2010, p.209ff). But not only the food environment needs hard policy options to fight against the obesity epidemic. Soft policy options are needed as well to provide people
with the necessary knowledge to interact with the food environment and to make healthy food choices.

5.4 Conclusion of the theoretical framework
The literature review presented from chapter 2 to 5.3 forms the theoretical framework and the base for the rest of this research work. The two main terms of this thesis, obesity (chapter 2) and built environment (chapter 3), were examined in depth. This allows a deeper understanding of the development of these two complex subjects and depicts the urgency of need for action to avoid a bigger health crisis. Scientists agree that obesity is preventable and cannot be treated exclusively as a medical problem any longer. Obesity is the biological response to our changed physical and food environment of the last decades. A successful fight against the worldwide obesity-epidemic demands interdisciplinary cooperation. The upcoming chapter 6 reflects chapter 2 and 3 and explains the current state of overweight and obesity in Cairo/Egypt and describes the development of the obesogenic environment in Cairo from the 1950s until now.

Evidence regarding the existence of the relationship between the built environment and obesity, builds upon the relationship between the body and the city, resp. the body and the space. Chapter 4 clearly outlines that cities create spaces which shape individual bodies as subjects and organise social rules and expectations. Hence, different cities and different socio-cultural environments actively shape the bodies of their inhabitants. Since the upcoming field research (chapter 7) has its focus on the meso-level (according to fig. 5-1), environmental characteristics of this geographical scale, which potentially influencing factors in the field of the physical activity environment (cf. fig. 5-5) and the food environment, are discovered. These underlie the choice of parameters for examining the research areas of Cairo. According to the studied literature extracted from different disciplines (public health, epidemiology, transportation & infrastructure management, sport science, urban planning, architecture), parameters which determine the physical activity environment are proximity, connectivity, safety from traffic and crime, the presence of urban elements as well as the climatic conditions. In the field of food environment the examination of the distribution of different kind of food stores within a certain geographical level appears to be the favorable
parameter. Consequently, these parameters are examined in the field study. Additionally the studied literature offers a huge variety of possible research methodologies regarding the built environment. The third environmental characteristic is about the implementation of regulations and policies. It is established that the implementation of policies is a crucial measure to protect a large number of people from overeating and to promote physical activity by shaping a built environment that helps to adopt and maintain an active lifestyle. Without the help of politicians supporting the implementation of health-oriented policies, urban planners and public health experts are powerless in establishing an environment that invites people to be socially active and live a healthy life.

While reviewing case studies, it was clearly recognised that most of the case studies being reviewed originate all from the U.S., Europe, Australia and New Zealand. Up to now barely enough research has taken place in emerging and developing countries regarding the relationship between urban planning, urban design and obesity. Globalization, the rising middle class and the launch of westernized food chains are named as the major reasons for the emerging obesity epidemic in these countries; built environment is not yet considered as a driving force. Therefore, this research is a pioneer in the field of public health and urban planning in the development studies and paves the way for a new transdisciplinary research field. Additionally this study identifies quantitative and qualitative data of the physical activity and food environment. Until now, hardly any other study addresses them together.
Part II: Field work analysis

6 The state of obesity and built environment in Cairo/Egypt

Cairo (al qahira, “the victorious”), Egypt’s capital, located on the banks of the Nile River is the largest city in the Arab World and with Lagos (Nigeria) the largest African city. Nowadays, if people make conversation about Cairo, they mainly talk about Cairo metropolitan area or Greater Cairo Region, which consists of three governorates, namely Cairo, Giza and Kalyoubia (fig 6-1). Cairo governorate is located at the east bank of the Nile River and spreads to the East and South. Giza governorate is located on the west bank of the Nile River and contains the Great Pyramids. Cairo and Giza governorates build the urban core of “Cairo”. The governorate of Kalyoubia is located to the North of the Cairo and Giza governorates. Shubrā al-Khaymah is the most urbanized part of Kalyoubia (Wendell 2012).

In 2014 Cairo had an estimated population of twelve million people, with a metropolitan population of around 22 million (World Population Review). Today it is a vibrant megacity, full of contrasts with one of the highest population densities in the world. Cairo has a hot dry climate. Rain is very rare. Cairo’s inhabitants suffer from social and environmental effects of overcrowding and from the politics of their neglectful government. Moving around in Cairo demands patience and awareness due to horrible traffic situations and the lack

Another issue which seems to be out of control is the weight status of Cairo’s inhabitants. “In Cairo, a war against weight is underway” (Fleishman 2011), “Obesity balloons in Egypt” (Rose 2014) and “Egyptians are the fattest Africans, says WHO” (Charbel 2010); these are the titles of articles of famous Egyptian and international newspapers from the last couple of years regarding the weight status of Egyptians. These two grievances lead to the question whether there might be any relationship between the weight status of Caireens and the built environment by which they are encompassed. Hereinafter the development and prevalence of obesity in Cairo/Egypt and the condition of Cairo’s built environment are described in detail in order to understand the dramatic state and the urgency for action of these two subjects.

Due to the limitation of being a non-Arabic speaker, research on literature regarding obesity and built environment in Egypt took place in the best possible way.
6.1 Overweight and obesity in Cairo and Egypt

With 62% of its adult population overweight and 28% of them obese, Egypt is one of the fattest nations in the world in the year 2014. Among Egyptians above the age of 18 more women than men are overweight and obese. Estimated 68% of females in this age group are said to be overweight, 37.5% out of them are obese; in comparison with approximately 56% of Egyptian males being overweight, with 20.3% out of them obese (WHO d). According to Ahram Online (2015), the Egypt Demographic and Health Survey (EDHS) of 2014 counted 85% of Egyptian women being overweight with 48% of that percentage suffering obesity. Statistics issued by the Egyptian Medical Association for the Study of Obesity in early 2010 estimated that 15% of Egyptian (school-age) children are obese. In comparison in 1990 only 6% were being estimated obese (Charbel 2011).

As the results from the EDHS of 2008 (UNICEF) show (table 6-1, 6-2), there is a significant difference between the weight status of men and women living in rural or urban areas; e.g. in Upper Egypt 38% of women living in urban areas were considered obese compared to 25% in the rural areas. In Lower Egypt 29% of men living in urban areas were considered obese in comparison to only 18% in the rural areas. Possible reasons for this difference are that people living in rural areas are not exposed to unhealthy fast food restaurants. Moreover, their daily work requires greater physical effort as technology might not have reached in the rural areas. Due to the fact that transportation is not frequently available, people have to walk more and longer distances compared to urban residents.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Urban Gov.</th>
<th>Lower Egypt</th>
<th>Upper Egypt</th>
<th>Frontier Gov.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>≤ 18.5 (thin)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>18.8 - 24.9 (normal)</td>
<td>22</td>
<td>24</td>
<td>27</td>
<td>33</td>
</tr>
<tr>
<td>25 - 29.9 (overweight)</td>
<td>30</td>
<td>29</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>≥ 30 (obese)</td>
<td>47</td>
<td>49</td>
<td>43</td>
<td>38</td>
</tr>
<tr>
<td>≥ 25 (obese)</td>
<td>76</td>
<td>75</td>
<td>72</td>
<td>26</td>
</tr>
<tr>
<td>Mean BMI</td>
<td>30</td>
<td>31</td>
<td>30</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 6-1: BMI of adult women (15-59 years) according to place of residence (%) in 2008
Source: UNICEF
According to Health Intelligence (2013) 15.6% of Egyptian adults (20 – 79 years) suffered from diabetes mellitus in 2013. This is one of the highest percentages worldwide. Egypt’s rate of cardiovascular disease is three times higher than the one of the U.S. (WHO Global Infobase). For Egyptian women breast cancer is one of the leading death causes. Poor nutrition and physical inactivity among post-menopausal women have been linked to this type of cancer (Olsson, & Berglund, 2003; Vanio & Bianchini, 2002 in Mowafi et al. 2011, p.1274). Musaiger (2004, p.791) discovered that exercising is the least done activity during leisure time for Egyptians. 2% of adults (20–70 years) stated to practice exercise on normal weekdays, 8.5% during the weekend and 2.5% during their annual leave. A general absence of women’s participation in sport can be observed in Cairo. A study of Asfaw (2007, p.481) proved that a “statistically significant relationship between the prevalence of mothers’ overweight/obesity and micronutrient deficiency” exists in Egypt.

At the same time a growing number of Egyptians suffer from malnutrition. According to the report by United Nations World Food Program (WFP) and the Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS), in 2011 17% (13.7 million) of the Egyptian population suffered from insecurity of food. 31% of children under five years are stunted compared to 23% in 2005 (UN News Centre). Poverty and food insecurity, but at the same time obesity rates have risen considerably over the last years in Egypt. Reasons for the drastic development are political and socio-economic changes and changes in lifestyle in Egypt after WW II.
6.1.1 The nutrition transition in Egypt

Several policy initiatives after WW II have affected the economy as well as the food supply. Following policies and legal initiatives brought major changes in the daily life for most Egyptians and therefore strongly contributed to changes in dietary pattern:

1. The food subsidy policy implemented in the early 1960s
2. The ‘open-door’ economic policy introduced in 1974
3. The economic restructuring imposed by the International Monetary Fund (IMF) that has largely dismantled consumer subsidies (except bread) and encouraged privatization of the economy

(Galal 2002, p.141)

Until 1960s, Egypt was essentially self-sufficient in food with the consumption of the nine main food products (wheat flour, maize, lentils, sugar, cooking oil, red meat, poultry, dairy products and fish). In the 1970s the food production could not keep pace with the rapid population growth. To cover the gap between the agricultural production and food consumption, which had reached about nine million tons in all groceries combined, food was imported by 1980. This action boosted the availability of food commodities, but also introduced new groceries into the economy that had not formerly been part of the traditional Egyptian cuisine (Galal 2002, p.141). Egyptian Government tried twice to narrow the gap between the food production and consumption, because it produced a huge economic burden. Firstly in the 1980s with major investments in the agricultural sector and secondly “with ensuring food supply has involved curtailing the extensive food subsidy system at the consumer level” (Galal 2002, p.142) in response to IMF pressure in the early 1990s.

Shifts in the Egyptian food supply led to less importance of legumes. Fruits and vegetables have remained on the same consumption level, but there was a significant rise in availability of sugar, oil and fats, meat/poultry and fish. For instance the former used ingredient Pellagra for baking bread disappeared in Egypt as a result of the shift towards wheat consumption and general improvement of availability of animal products (Galal 2002, p.143). Consequently, the energy intake per person increased due to the new dietary patterns.
6.1.2 Socio-economic status, culture, education and obesity in Cairo

A study about the relationship of the socio-economic status (SES) and obesity in Cairo shows that rich and poor are likely to be overweight and obese (cf. Mowafi et al. 2014). The Egyptian Government’s food subsidy program indicated in the 2005 United Nations Common Country Assessment (Fleishman 2011), is the major explanation for the so ‘even’ distribution of obesity across SES-levels in Cairo. About 70 - 80% of the citizens receive food subsidy cards. This ensures access to a core of calories (sugar, bread, beans, oil, rice and tea) for a majority of the population (Mowafi et al. 2014, p.19), but contradictory about 19% of the most vulnerable Egyptians are excluded, according to ‘Tackling Egypt’s Rising Food Insecurity in Times of Transition’ (UN News Centre 2013) which explains the growing number of stunted people in Egypt. Richer Egyptians tend to appease their hunger in one of the hundreds fast food branches, which are spread all over the city. Zeinab Khadr, Senior Research Scientist at the American University in Cairo claims: “The Egyptian market promotes unhealthy eating (...). [While strolling around in the city,] healthy snacks are difficult to find and relatively healthier options like salads are usually offered along with cream and fattening dressings (...). Fresh vegetables are not even included in subsidised food products by the government (...). Organic food is unaffordable even by the middle class” (Morgan 2014b). Moreover, she says that women who might have once cooked meals at home now order “home-made food” from caterers. The delivery-industry is a big business in Cairo. Everything can be delivered in Cairo; fast food, vegetables from the shop around the corner to groceries from the supermarket. If someone does not want to leave the house in Cairo, he or she does not have to. Additionally most social activities involve eating and drinking soda in Egypt (Morgan 2014 a). As there is a lack of public space, where it would be possible to meet friends, people end up eating the relatively cheap junk food in one of the fast food restaurants. Organised sport clubs are confined to the higher socio-economic class.

In another study Mowafi et al. (2011) found out that overweight and obese Caireens are not randomly distributed. BMI does differ by neighbourhood in Cairo. The explanation of this variance is the neighbourhood education levels:
“Overall, men and women in high education neighborhoods were significantly thinner than their counterparts in low education neighborhoods. (…) Although the same inverse association between area-level SES and BMI was seen using other neighborhood poverty and wealth measures, the magnitude of the association was largest when using the measure of % households > H.S. education” (Mowafi et al. 2011, p.1282). This result requires further studies whether education itself offers a protective effect in communities, above what is realized at the individual level, or if living in a neighbourhood with highly educated people is an indicator to be at a lower risk of becoming obese. By own admission of the authors, this study lacks variables such as health knowledge, food environment and neighbourhood design which will be partially overtaken for at least a few neighbourhoods in this thesis.

Another reason for the difference of BMI by neighbourhood could be cultural norms. It may be that higher educated people seek for western beauty ideals and are therefore thinner. In less educated neighbourhoods certain plumpness might show the wealth of a family and fertility. Dr. Khalil, who is a doctor in a traditional working class community, explains that her patients have a very old way of thinking about their weight: “Here she feels ashamed if she is too thin. Medically, she could need to lose weight, but she might refuse and say that she wants to gain weight because she wants to get married (…). It is anazra, an image that comes from old tradition. Men see their fathers with overweight women, and they think that she ‘fills the eye,’ or satisfies them” (Ibrahim 2012). This predominant Egyptian ideal of beauty is also reflected in the advertisements. Compared to advertisements in the western countries,
a huge number of advertisements show overweight and obese persons (fig. 6-2). Admittedly a certain laziness of Egyptians regarding physical activity can be observed, e.g. people prefer to queue until they can get on the escalator instead of taking the empty stairs in the metro station (fig. 6-3). Sometimes Egyptians, primarily ladies, even do not enter the metro if they see that a seating position is not available and prefer to wait for the next metro in order they do not have to stand in the carriage.

6.2 Obesogenic environment in Cairo
6.2.1 The development of Cairo’s obesogenic environment

Cairo has a long history. Founded in AD 969 on land adjacent to Fustat, by the 14th century Cairo had turned under the Mamaluks into a metropolis, unique in the medieval world. In the 17th century under Ottoman rule, Cairo had suffered from a long period of decline. Mohamed Ali Pasha successful politics in the mid-19th century, led to a process of economic growth and modernisation which largely depended on European entrepreneurs and technicians. From 1882 until 1936 Egypt and so Cairo, fell under British colonial rule (Sims 2003, p.1/2). But to understand how Cairo got to where it is now, it is best to start in the middle of the twentieth century after WW II and the July Revolution in 1952.

The city started to recover from its wartime restrictions and the massive Allied Forces armies. At this time Cairo had around 2.8 million inhabitants. Due to large migrations from the countryside to Cairo, the population growth of Cairo was over 6% per year. After WW II bourgeois industrialists started “to invest heavily in consumer industries protected by the high import traffic” (Sims 2010, p.45). Basic infrastructure was built such as roads, Nile bridges, railways, wastewater systems, power grids and trolley lines.

The expansion of Cairo’s historic, traditional town and the European Sector (today’s Downtown) continued to the north along two axes: Shubra/Rod al-Farag and al-Wayli/Heliopolis/Ain Shams and to the south to Maadi and Helwan, which were at this time small isolated satellites. On the west bank of the Nile (today’s Giza) development was restricted to urban quarters near the villages of Giza and Imbaba. Between 1952 into the 1960s the state instructed many public housing projects combination with private housing companies, e.g. Mohandiseen-Agouza. The formal Cairo expanded essentially
until June 1967. The war with Israel brought Egypt the shift to wartime economy (Sims 2010, p.50ff). But due to President Sadat’s infitah (open door policy) in the mid of 1970s, local business men and entrepreneurs “began to remerge and Egyptian workers started to flood the Gulf countries and send back remittances. A real-estate boom began to change Cairo’s landscape, with residential tower blocks, new hotels, and office complexes. Building controls seemed not to exist and many landlords gleefully added several floors onto existing buildings. Infrastructure projects, mainly symbolized by the Sixth of October Bride and flyovers, began to appear” (Sims 2010, p.52). In the 1980s the first metro line was introduced along with new highways like the Autostrad. Foreign assistance assured the maintenance and introduction of long-neglected infrastructure like sewerage systems, power plants and water treatment plants. In that time Madinat Nasr became the formal city expansion project in the east of Cairo. In the 1990s and 2000s for a better flow of traffic, the Cairo Ring Road was constructed as well as more flyovers and the Al-Azhar tunnel (Sims 2010, p.56). Many articles state that at the beginning of 2000, the population density did not rise. This was mainly due to slum clearance in the city centre for prestige projects in Bulaq and Rod al Farag. People living there before, were being resettled. Due to the new commercial centres and offices in Heliopolis, Maadi, Zamalek and Madinat Nasr, the decline of downtown began in 2008. Despite the huge infrastructure investments, hours-long traffic jams are the daily struggle for Cairo’s motorists. Due to traffic accidents, there are 42 annual road deaths per 100,000 Egyptians—compared with just 2.75 in Britain. This is one of the highest worldwide. 20%
of the deaths are pedestrians (WHO 2012). A fact which proves that Cairo’s urban built environment got out of human scale. Infrastructure for walking and cycling has heavily been neglected during the enlargement of Cairo. Crossing a street in Cairo is a challenging and life-threatening task.

Another indicator that the development of Cairo ran out of control is the disappearance of urban public space. Due to social, economic and political forces the general population lost their rights in urban realm to participate in social and physical space. The streets of Cairo used to be major spaces for public gatherings and spatial integration. Now they have been reduced to a “simple space for movement” (Levy 1999 in Attia 2012, p.12). In the 1950s Cairo’s city square used to be decorated with fountains, monuments and other work of art (fig. 6-6/7), while the public space was utilised for state and public celebrations, e.g. Mulid and the trade of goods and services (Madanipour 2003 in Attia 2011, p.12). As these celebrations were not accepted by the elite population, who in general likes to isolate itself from the general society, they were prohibited in the urban public space.

Nowadays, if people want to meet they have to seek for a coffee shop to be able to sit and talk in peace, because the few existing parks are either fenced, walled or full of trash. The WHO recommends a minimum standard of greenery of nine square meters per capita. Cairo makes it to roughly 1.65 square meters per capita (Argaman 2014). One reason is the privatization of space, e.g. both waterfronts of the Nile River are nearly not accessible. The waterfreights
belong to private institutions, expensive restaurants, clubs and floating boats. Another reason is that “citizens are separated into social groups or classes and are placed into separate realms (...). Consequently, the urban public realm becomes contested with diverse ideologies, leading to a general decline in the use of public spaces” (Attia 2011, p.11). The disappearance of public gardens and public squares is the result of social segregation. Attia (2011, p.12) stated: “The importance of good design to incorporate political, economic and social significance while inviting and enabling a natural production of social space is often overlooked and overpowered by the demands of certain groups of society in control of the decision making process. This is greatly reflected in Cairo’s street patterns and the use of space, as well as the physical and social elements that make up boundaries between private and public spaces.” Egypt’s urban planning struggles for symbolic dominance. Urban space mostly reflects the interest of the upper class capitalists. Lower socio-economic classes are perceived as a “threat to public wellbeing and thus displaced from social space through physical, social and symbolic barriers” (Attia 2011, p.12).

The new ‘public space’ in which middle-class Caireens like to spend their free time are shopping malls and hyper-supermarkets like the French chain Carrefour. In 1995 the first malls were built in Cairo. Abaza (2006, p.211) interviewed mall visitors and the majority was in line with these statements:
“the mall is much cleaner than the street ... to a certain extent the client is finer than the one of the street” manager of a shop in al-‘Aqqad Mall

“the mall is secure. It offers work opportunities to young people and it is better than the street” Ali al-Sayyed, engineer, Cairo Mall

“the mall is controlled..... but the street not... You find harag wa-marag (noisy and frenetic, chaotic behavior) in the street”, 42-year old engineer

(Abaza 2006, p.211)
The chaos of traffic in Cairo and Cairo’s pollution has become a major obstacle for its residents to do window-shopping or strolling in the streets of downtown (Abaza 2006, p.213). Due to the acceptance of the condition of the IMF austerity program by Mubarak’s government in the 1990s, “Egypt witnessed the consolidation of neoliberal ideology between the state and the international actors” (Abaza 2006, p.199). Although only around 20% of Caireens can afford to shop in malls, an ambitious brave new world in the development of new ‘public spaces’ of consumption in and around Cairo can be observed. Nevertheless, only a few Egyptian seem to be worried about the negative health effects of air conditioning and the 24-hour video surveillance in the malls. Critique about consumer culture seems to be non-existent among Egyptians. The malls are a symbol for the flourishing alliance between foreign capital and Egyptian capitalists. According to Abaza (2006, p.199) “land speculation from about twenty major family capitalists and their cronies has led to slum clearance to make way for high-rise buildings and hotels, cineplexes, restaurants, malls and other leisure spaces.” That the increasing economic interests shape the urban public space can be experienced by a trip along the Ring Road. Oversized advertisements along the main roads and bridges should summon Egyptians to buy the newest unhealthiest food (fig. 6-10 till 6-13).

6.2.2 Cairo’s and Egypt’s fight against obesogenic environment and obesity
Several individual groups and initiatives have recognised the need to start the fight against obesity in their society; even the current President Al-Sisi. In June 2014 he got on his bike to tackle Egypt’s bulging fuel subsidies and the waistlines of the Egyptians (fig. 6-14). Before getting on his bike on a Friday morning, Sisi stated: “This is the only way to build Egypt” (Kingsley 2014). Cycling would save Egypt a lot of money, as it can no longer afford the enormous energy subsidies and it would help to mitigate the obesity burden as well as the chronic traffic jams. Ahmed El-Dorghamy, co-founder of Cairo Cycler’s, complains that there are no cycle lanes, not even proper sidewalks for the pedestrians, beside that cycling for women is not yet socially accepted (Kingsley 2014). Women usually are exposed to harassment while riding a bike. A proper action plan as well as shift of the mindset is needed. First
attempts have been made. Bike lanes have been introduced in Maadi and on roads leading to Nasr City and New Cairo (fig. 6-15); but people used them for parking (Egyptian Streets 2015a).

The National Organization for Urban Harmony (NOUH) is the institution which is responsible to follow up and control the implementation of their developed design guidelines for urban public spaces, public parks, sidewalks, city centres, and heritage sites in Egypt (fig. 6-16). These guidelines should be applied by local municipalities (Urban Harmony). But despite NOUH and guidelines do exist, Egyptian authorities seem to be elusive. While governments around the world try to improve walkability, create new public spaces, promote public transportation, plant more trees, authorities in Egypt are doing exactly the opposite as examples from Port Said and Heliopolis in Cairo display.
In Mai 2014 the old trees and sidewalks in the city of Port Said were removed by the authorities without any public engagement. The argument of authorities was that their aim was to widen the streets for cars, although the number of car-owners in Port Said is little. Residents could not understand this systematic attack on the urban environment. A municipality, which is not able to manage street cleaning and trash collection, puts “so much effort into reducing the quality of life in a city already hit by economic stagnation and with its architectural and urban heritage disappearing everyday” (Cairobserver 2014). State-sanctioned vandalism presented as part of ‘upgrading’ or ‘modernization’ of the city took also place in Heliopolis, Cairo. The municipal authorities of Heliopolis call what can be seen in fig. 6-18, ‘tree trimming’ or beautification of urban environment, but in truth it was ‘tree killing’. Fig. 6-19/20 prove that the trees in front of the court building in Heliopolis disappeared over night.
Another nuisance Heliopolis’ residents have to deal with are informal tea and shisha shops which block the sidewalks and additionally hinder the residents to open their windows as noise from the shisha shop visitors and shisha-smoke enters their flats. El Watan News reported that the municipality took the first decisive measure and removed the electricity boxes from the illegal shops. Nevertheless, a continuous fight between shop owners and residents is going on (El Watan News).

In the meanwhile losing weight has become a big business in Cairo. Nutritionists and diet houses are popping out in the middle and upper class neighbourhoods (fig. 6-21/22).

The initiative *Cairo Runners* organises on a weekly basis runs in the streets of Cairo on Friday mornings and encourage Caireens towards a healthy lifestyle. They can also report some success about the fight against obesity. Through joining Cairo Runners Mahmoud El Kotoury lost 139kg (before 255kg, after: 116kg) by the age of 22 years old. Being morbidly obese, he was afraid of doing any kind of sports as he had physical and medical concerns. But he has been able to succeed leaning himself onto a diet plan, physical activity and a to-do-list. Now his long term goal is to be an “Anti-Obese Activist, not only get rid and defeat my obesity, but try and help out others in their battles and encourage them to fight against their own obesity” (Cairo Runners).

In February 2015 the Community Relations Team of the Students’ Conference on Communication and Information (SCCI), initiated a “Run against Obesity”
to spread awareness against the obesity epidemic and the culture of running for a healthier life in Cairo. 75 people participated in runs 4.3km and 10.6km long (SCCI 2015). Another students’ initiative is the EX Large Obesity Campaign of the Cairo University. Students from the Faculty of Pharmacy have chosen this topic, created information sheets about healthy food and the importance of physical activity and distributed these information on the campus of the university along with freshly made smoothies.

The assessment of the development of Cairo’s built environment shows many grievances. The lack of the willingness of Egyptian authorities creating an environment for the people is combined with the powerlessness of Egyptian residents to hinder tree butchering or downgrading of their urban environments as it is usually not announced. The presented initiatives of Caireens are a first step towards the right direction. Nevertheless more radical agenda is needed to raise the level of awareness about obesity in the entire population. The Ministry of Health runs only one campaign trying to bring healthy food habits closer to the Egyptians (MOHP). Until now, only a small number of the Caireens recognized the need for a change of their behaviour and their environment. How big Cairo’s built environment as a determining factor for obesity really is, is explored in the following empirical study.
Field research took place in four different shiyakha of Cairo governorate. Shiyakha is the smallest administrative boundary in Egypt which is a subdivision of the district level, i.e. a small number of neighbourhoods form a shiyakha. Different methodologies are applied in these four shiyakha in order to prove if there is any relationship between obesity and built environment in Cairo.

Data regarding the height and weight of Caireens come from the Cairo Urban Inequity Study (UIS). These were kindly provided by the Social Research Center of the American University in Cairo and are the same data as Mowafi et al. (2011 & 2014) used for their research. The American University in Cairo conducted the UIS which was a large survey funded by UN-Habitat from May till August 2007 with the aim of identifying potential intra-urban health inequities in the Cairo Governorate of Egypt (about 8 million individuals in 2007). 50 out of 634 neighbourhoods were chosen using a stratified random sample of low, medium and high deprivation neighbourhoods (fig. 7-1). A hierarchical data structure of individuals within households and within neighbourhoods was collected for the study. For the selection of the households, a block was randomly selected from each of the 50 selected neighbourhoods. A total of 5710 households were included. The overall survey response rate was 69.9%, resulting in a total of 3993 households from which 1990 men and 2003 women equal to or greater than 22 years old, participated in individual questionnaires in addition to the household survey (Mowafi et
al. 2014, p.14). Although the survey took place on a neighbourhood-level, the research for this master thesis engages with the entire shiyakha of the selected neighbourhood, since exact boundaries were only available on shiyakha-level. Data about shiyakha characteristics like area and number of population originate from Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS). Population data date from the year 2009 which is reasonable since the UIS took place in 2007.

![Map of 50 selected neighbourhoods of the UIS. The four selected neighbourhoods are highlighted in red (added by author)](image)

Source: Mowafi et al. 2014, p.15

Out of the 50 neighbourhoods of the UIS, the four neighbourhoods, resp. shiyakha (Garden City, Ard El Golf, Hadaeq and Hadaeq El Qubbah) with the highest socio-economic status were selected. There are two main reasons for the selection of four middle and upper class shiyakha. First, the four shiyakha are not informal areas, i.e. that at a certain point of time they were legally planned. If the outcome of this research will show a positive or negative relationship of the BMI and the built environment, Egyptian (planning) authorities can be praised or blamed. Second, it is taken for granted that residents of middle and upper class neighbourhoods can afford a high quality and nutrient rich food and do not necessarily depend on the food subsidy program of the Egyptian Government, which basically only promotes energy
dense and nutrient poor food. Moreover, the majority of residents living in the shiyakha are not considered as poor. Residents living in the four shiyakha might not all have throughout the same SES; however, through the exclusion of poor or lower middle class shiyakha, the socio-economic dimension can be excluded in this study which could be a determining factor for overweight/obesity in Cairo/Egypt.

The structure of the research part of the thesis proceeds as follows. First the four shiyakha are introduced. Then each research methodology is explained and placed into the context of Cairo. Directly after each methodology the results are presented before the next methodology is introduced (fig. 7-2). The methodologies were chosen under the aspect of data availability and time management. Afterwards the outcomes of the different methodologies are compared and discussed. Finally the research results are interpreted and implications are developed which draw a conclusion for Cairo’s way forward.

**Applied research methodologies**

**Physical activity environment**

- **Parameter**
  - Street network
  - Land use mix
  - Density
  - Connectivity
  - Perceived neighbourhood environment

- **Methodology**
  - Space syntax
  - Integration 1200m
  - Global integration
  - Walk Score
  - Population density
  - Link-node ratio
  - Intersection density
  - Questionnaire

**Food environment**

- **Parameter**
  - Availability of healthy food
  - Perceived food environment

- **Methodology**
  - Food store mapping
  - Questionnaire

Fig. 7-2: Overview of applied research methodologies
Source: Author
Research methodologies having hard data as an outcome are correlated with the compounded BMI out of the height and weight data of the UIS. Pearson correlation is applied throughout the research, which measures the linear relationship between two variables. Research methodologies having soft data as an outcome are linked with BMI and proved if they are logically related.

### 7.1 Introduction of research areas

The map (fig.7-3) shows the location of the four research areas including the most important fact.

---

**Garden City**
- Obesity: 23.30
- Population: 4521
- Area (km²): 6.41
- Pop-density: 11252 (person/km²)

**Hadaeq**
- Obesity: 27.89
- Population: 39527
- Area (km²): 0.75
- Pop-density: 52533 (person/km²)

**Hadaeq Al Qubbah**
- Obesity: 29.53
- Population: 81036
- Area (km²): 1.10
- Pop-density: 73479 (person/km²)

**Ard El Golf**
- Obesity: 24.39
- Population: 37051
- Area (km²): 3.22
- Pop-density: 11483 (person/km²)

---

Fig. 7-3: Location of research areas in Cairo governorate
Source: Author (© Google Earth)
7.1.1 Garden City

<table>
<thead>
<tr>
<th>Obesity</th>
<th>Inhabitants</th>
<th>Area (km²)</th>
<th>Pop-density (person/km²)</th>
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<tbody>
<tr>
<td>23,30</td>
<td>4521</td>
<td>0,41</td>
<td>11252,08</td>
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Garden City is a residential district in central Cairo. Kasr al-Ayni Street on the east and Nile Corniche on the west and Al Consultant Mohammed Fahmi Al Sayed Street in the north delineate the boarders of this shiyakha. Garden City is known for its calm, green and secure atmosphere. The nicest and most expensive hotels in Cairo like the Four Seasons, Kempinski, and Semiramis Intercontinental attract rich visitors and tourists from the Gulf or from America and Western Europe. The proximity to the Nile invites for a walk along the Corniche or to take a Felucca and enjoy the Nile view.

**History**

Unlike other upper class neighbourhoods like Maadi or Heliopolis, Garden City is characterised by absence of straight lines, grids or endless right angles. In 1905 the owners of the Nile Land & Agricultural Company, asked agricultural engineer Jose Lamba to create Cairo’s newest district. He laid out a series of narrow winding roads outlining ill-defined triangles and curvy rectangles modelled after an English garden suburb. The winding, nearly fully shaded streets intersect with each other several times. Garden City's original ordnance survey map evinces an area divided up into 273 unequal lots earmarked for villas, which were never to exceed a height limit of 15 meters. Before 1900 Garden City was only known as the location for Kasr El Aaly, the palace for the mother of Khedive Ismail. Apart from banks no other business or commercial activities were designated. Garden City was fully planned and financed by private investors. The design and geography of Garden City reminds someone more of a European Village than a North African city. The nature of the landscape, street layout, architecture and general atmosphere are the result of its designers and investors and Khedive Ismail’s attempts to Europeanize Cairo, who wished to escape the period of national construction that took place until 1952. The European touch as well as the proximity to downtown Cairo attracted and still attract the professional elite (Raafat 1998); namely rich Egyptians and Western foreigners, who enjoy the quiet, leafy and organized neighbourhood-life in this area.
Infrastructure (fig. 7-4 till 7-13)
The streets throughout the shiyakha are only one-way streets. That’s why they are also quite narrow. The road traffic seems to be well organized, drivers do not exceed speed limits and as a result less honking occurs. The streets as well as the sidewalks are well maintained and do not show a lot of cracks or construction sites. Nevertheless the parking situation is terrible. Proof is that during the field research it was only once possible to take a picture on which both sides of the sidewalks show. Usually cars park to the left and to the right of the street and sometimes even in a second row. Due to the horrible parking situation, sidewalks are often blocked by cars. Additionally trees or street lights block the sidewalks, which are very narrow.

Fig. 7-4: Benches along the Nile Corniche
Source: Author

Fig. 7-5: Single picture of Garden City in which the sidewalk on both sides of the street can be seen
Source: Author

Fig. 7-6: Attractive buildings in Dr Mohamed Fawzy Street
Source: Author
Fig. 7-7: Small sidewalk in Adb El-Rahman Fahmy
Source: Author

Fig. 7-8: Blocked sidewalk in El Saraya Al Kobra Street
Source: Author

Fig. 7-9: Beautiful building facades in Al Fasky Street
Source: Author

Fig. 7-10: Students walking in Gamal Al Din Abou Al Mahasen Street in the shade
Source: Author

Fig. 7-11: Sidewalk constricted by trees in Dr Mohamed Fawzy Street
Source: Author

Fig. 7-12: Sidewalk interrupted for garage driveway in Abd Al Latif Boltiya Street
Source: Author

Fig. 7-13: Narrow sidewalk blocked by street light in Kamel El-Shennawy Street
Source: Author
Consequently, people prefer to walk on the street. While walking in Garden City, there is a nice cool wind flow due to the nearly fully shaded streets (either by trees or by buildings). Attractive old villas and nice building facades make the walk exciting and varied. Buildings usually do not exceed the number of five stories. Sitting possibilities do only exist at the Corniche. As the villas are nearly all fenced or surrounded by walls, the building facades do not offer any sitting possibility for staying or waiting.

Most of the trees are old and tall as space was given them to grow. Garbage does not seem to be a problem in the streets of Garden City. Some residents complain about the leaves fallen off the trees on the street, which seems to be a luxury problem in Cairo. The metro station Zaad Zaghloul located in Mounira is reachable within a 10 – 15 minute walk.

_Socio-economic activities_
Garden City kept the character of being a mainly residential area. Around 15 banks, a few embassies and some travel agencies are based in Garden City. Other than this, no considerable commercial or business activities take place. Shops for daily services like greengrocer or mini-supermarkets are located at or close to Kasr al-Ayni Street. Informal activities do not appear in Garden City. Moreover, three private schools and three governmental schools are located in Garden City and some cultural and research institutes like Nazra for Feminist Studies.

The infrastructure of Garden City even allows parents to take their child for a walk in the pram (fig. 7-14). Inhabitants of Garden City enjoy walking their dogs (fig. 7-15).
7.1.2 Ard El Golf

The shiyakha Ard El Golf belongs to Heliopolis (Arabic: Masr el-Gedidah “City of Sun”) which is located in the northern part of Cairo. In the past Heliopolis was located outside Cairo. Nowadays it is part of Cairo. Ard El Golf is framed by Nasr Road to the south, El Tharwa Street, El Sayed El Merghani and Salah Salem Street to the north, Nozah Street to the east and El Tayaran Street to the west. The Ministry of Defense and the Egyptian Air Force occupy a huge part of the area. The Ain Shams University for girls, Kolyelet El Banat, is located in the centre of the shiyakha. The Masr El-Gedida Cemetery, the orthodox St. Mary Church and the World War II Memorial are other famous landmarks.

History

Édouard Louis Joseph Empain, Baron Empain, was a wealthy Belgian engineer, entrepreneur, financier and industrialist. After finishing a railway construction project of his company linking Mansuwrah (on the Nile River) to Matariyah (on the far side of Lake Manzalah from Port Said) in 1904, he founded the Cairo Electric Railways and Heliopolis Oases Company in 1905. For a cheap price Heliopolis Oases Company purchased a desert strip to the northeast of Cairo from the colonial government. In 1907 the new town Heliopolis started to be built, a “city of luxury and leisure” (The Egyptian Chronicles). Its urban development was based on a garden-city layout combining French architectural building tradition with the neo-Arabic style. Advanced infrastructure, broad avenues, Heliopolis Palace Hotel, Heliopolis House, and recreational amenities such as a golf course and a park distinguished Heliopolis’ from Cairo’s development. Compared to Garden City, Heliopolis was predominately inhabited by Egyptian citizen residents than Europeans. After the 1952 revolution led by Nasser, Cairo’s middle class discovered Heliopolis as place of residence. Since Cairo has expanded dramatically the once large distance between Heliopolis and Cairo has vanished (The Egyptian Chronicles).
Infrastructure (fig. 7-18 till 7-29)

Broad avenues like Ahmed Tayseer Street and Nabil Al Wakkad Street divide Ard El Golf. From big streets, minor streets lead to residential neighbourhoods. The smaller streets are two-lane streets, but due to the fact that cars park on the left and right side of the street, it is too narrow for two cars to drive past next to each other. The parking situation seems to be calmer than in Garden City. Only a few sidewalks were blocked by cars, as much more sidewalks were occupied by greenery. Otherwise sidewalks are very broad, well maintained and clean.

High-rise buildings are built next to the big streets like Abdallah Deraz streets. Newly constructed high-rise buildings are built in a pompous way. Inside the neighbourhood buildings tend to have three to six stories and look quite simple. Some facades and fences of the houses invite strollers to have a seat and rest a bit. Due to the rapid population growth, the gardens of Heliopolis were nearly all overbuilt. In each neighbourhood a small park survived. Most of them are private and fenced. The local residents pay for the maintenance of the parks. During the field study nobody lingered in the private parks, whereas the few public parks were occupied by playing children.

Most of the smaller streets are shaded by trees at least on one side of the street. By contrast the sidewalks along the big streets are not shaded, e.g. the sidewalk along Ahmed Tayseer the street that leads to the metro station Kolyelet El Banat. Due to this fact on hot days people could prefer to take a cab to the metro station instead of walking.
Socio-economic activities

Today Heliopolis is still home to the middle and upper class. International coffee chains and restaurants, cinemas as well as the largest malls are located in Heliopolis. It turned into one of the busiest parts of Cairo. The main observed commercial activities are furniture department stores and beauty centres. Many offices and private academic centres are based in Ard El Golf nowadays. The number of schools is low, so children most probably have to go by car or bus to school and cannot walk. As already mentioned in the introduction, Ard El Golf is characterized by the presence of the Ministry of Defence and the Air Force.
Fig. 7-18: Entrance to the WWII Memorial in Nabil El Wakkad Street
Source: Author

Fig. 7-19: High traffic density in Ahmed Taysee Street
Source: Author

Fig. 7-20: Ordinary buildings in Sayed Anbar Street
Source: Author

Fig. 7-21: Shortages of parking possibilities in Mohammed Zaghoul Street
Source: Author

Fig. 7-22: Possibilities for sitting and waiting in Shams Al Din Al Zahabi Street
Source: Author
Fig. 7-23: High-rise buildings along Abdallah Deraz Street
Source: Author

Fig. 7-24: Residential neighbourhood in Abou Al MAGD Al Askalani Street
Source: Author

Fig. 7-25: Sidewalk blocked by greenery
Source: Author

Fig. 7-26: Very broad and well maintained sidewalk in Abdallah Deraz Street
Source: Author

Fig. 7-27: Sidewalk blocked constricted by cars and blocked by trees in Sobhy Fahmy
Source: Author

Fig. 7-28: Children playing in a public park in Ard El Golf
Source: Author

Fig. 7-29: One of many private parks in Ard El Golf, well maintained but not used
Source: Author
7.1.3 Hadaeq

The shiyakha Hadaeq (engl.: garden) is pretty much formed like a triangle. It is located along the 6th of October Bridge and the metro line going to Shubra direction. The two main roads shaping the shiyaka are Port Said Street and Teraat Al Gabal. To the north Hadaeq’s boarder is defined at the height of Al Agahori Street. A famous landmark of this shiyakha is El Malak El Bahary Church in Terrat Al Gabal Street.

History

Since Hadaeq and Hadaeq Al Qubbah (see chapter 7.1.4) are located next to each other, most of the historical background relates to Hadaeq Al Qubbah area by which the development of the area around Al Qubbah Palace is meant. Al Qubbah Palace was built by Prince Jeshbeck Dawarda in 882 after the islamic calender.

Once, the area of Hadaeq Al Qubbah used to be one of the most prestigious districts of Cairo. It was inhabited by the most influential and rich Egyptian pasha and business people. Hadaeq Al Qubbah was known for its densities of trees and gardens. The most famous street Masr Wa El Sodan used to be called the Street of the Kings of Egypt and Sudan. This street leaded to the former Cairo city centre. King Faruk lived at the end of this main street. At that time it was not allowed to open any commercial business in this street until the reign of Nasser in 1952.

In 1908 a company called Hadaeq Al Qubbah, which owned 100 feddan (Egyptian unit, 1 feddan are equal to 4200m²), divided the land into smaller lots. The company built streets which diverted from Masr Wa El Sodan Street. Consequently, rich Egyptian came to Hadaeq Al Qubbah area to invest and settle. They constructed nice villas with huge gardens trying to copy the

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<td>0.75</td>
<td>52533.06</td>
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</table>

Fig. 7-30: Boulevard Masr We Al Sodan in 1925
Source: www.facebook.com/7adayek.elkobba/photos/
palace. By time workshops for construction started to open their business. After the revolution in 1952 and the implementation of the land reclamation law released in 1953, which says that the property has to be divided by the children of the landowner, the urbanization of Hadaeq Al Qubbah started. Gardens were destroyed in order to build medium-sized buildings. Since the revolution in 2011 these medium-sized buildings and the few remaining villas are demolished and replaced by high-rise building blocks. These high-rise buildings exceed the building heights of the legally binding land-use plan for this area as the infrastructure of Hadaeq Al Qubbah is not equipped for the increasing number of inhabitants. Due to the high population density and the deprivation of nice buildings, Hadaeq is in a downgrading process (reports from old men living in Hadaeq Al Qubbah during the field research).

Infrastructure (fig. 7-31 till 7-41)
The quality of the streets of Hadaeq range from very broad and well maintained to very small with a lot of cracks. In the eastern part of Hadaeq streets are broad so that cars can pass by each other easily and it seems that it is taken care of the sidewalks. In the heart of Hadaeq, streets are wide enough for cars, but the main street in the heart of Hadaeq, Al Ganayen Street, serves more as a pedestrian area. Along this street many tea shops and shopping facilities are located. The streets of the western part of Hadaeq, around El-Khalig El Masry, are of poor quality and very small. This area is only accessible with tuktuks or motorcycles. Streets are too narrow to have sidewalks. The same gradual degradation applies to the situation of housing. In the west, many old buildings and villas are preserved. Building heights range from three to five stories. In the centre of Hadaeq a current transformation is taking place. Small buildings are demolished and replaced by 10 – 15 story-buildings, of course illegally and without sticking to construction regulations, not to mention retaining the predominant style of architecture. This increases the population density drastically. The current infrastructure is not designed for this amount of people. Residents complain that due to the newly built high-rise buildings trees cannot grow anymore. Anyway trees are sparsely distributed all over Hadaeq and most of them are in a bad condition. Close to 6th of October Bridge is one park located, but of this is not taken care of. Almost all palms died and trash is lying around. Sitting possibilities are not established anywhere.
Fig. 7-31: Transformation process in Ahmed Eissa Street: three story buildings are replaced by high-rise buildings
Source: Author

Fig. 7-32: Impression of the main commercial street in Hadaeq, Al Ganayen Street
Source: Author

Fig. 7-33: Small shops established in front of an old villa in Shebeen Street
Source: Author

Fig. 7-34: Typical four-story buildings vanish day by day in Hadaeq
Source: Author

Fig. 7-35: Newly built high-rise building in Al Ganayen Street
Source: Author

Fig. 7-36: Bedraggeld buildings in the west of Hadaeq
Source: Author
Socio-economic activities (fig. 7-42 till 7-46)
The main economic activity in Hadaeq is the car industry. In Teraat El Gabal Street several international car dealers are located. Around Shebeen, Port Said Street and El-Khalig El Masry many car repair shops and other workshops have their businesses related to vehicles. Four private schools and two governmental schools are located in Hadaeq, much more are in Hadaeq Al Qubbah, the shiyakha located in the south of Hadaeq. The rest of Hadaeq is mainly residential. Hadaeq is marked by an active street life; men sitting on the street drinking tea and smoking shisha or reading the newspaper; children playing billiard. Surprisingly these activities always take place under trees, no matter how small they are.
Some advertisements for doctors or clinics treating obesity and weight loss can be found in the streets of Hadaeq (fig. 7-47/48).

Fig. 7-42: Carpenters blocking the sidewalk in Sayed Anbar Street
Source: Author

Fig. 7-43: A common picture in the streets of Hadaeq: men smoking shisha and trinking tea
Source: Author

Fig. 7-44: Kids playing soccer in Mohammed Magdy Allam Street
Source: Author

Fig. 7-45: Old man reading the newspaper under a small tree
Source: Author

Fig. 7-46: Kids playing under a small tree billiard in Al Kasr Street
Source: Author

Fig. 7-47: Advertisements for diet & reshape in Youssef Fahmy Street
Source: Author

Fig. 7-48: Advertisement for a clinic in Masr We Al Sodan offering natural treatment for weight loss
Source: Author
7.1.4 Hadaeq Al Qubbah

Hadaeq Al Qubbah (engl.: garden of the domes/palace) is framed by Sekat Al Walili Street to the north, Port Said Street to the west, Al Shaheed Bahgat to the east and Al Sheik Al Aghouri Street to the south. Al Qubbah Palace is very close to this shiyakha and a famous landmark of Hadaeq Al Qubbah.

**History**
Since Hadaeq Al Qubbah and Hadaeq are attached to each other, Hadaeq Al Qubbah has undergone the same evolution as Hadaeq. Therefore, see history of Hadaeq (see chapter 7.1.3).

**Infrastructure** (fig. 7-49 till 7-60)
Only few streets in the east of Hadaeq Al Qubbah are really broad and well-maintained. The majority of streets in the rest of Hadaeq Al Qubbah are narrow and only accessible for tuktuks or motorbikes. Due to that reason sidewalks only exist in the wider streets, but these seem to be in a good condition. Like in Hadaeq, three different types of architecture prevail, but not in the same gradual descending order from the east to the west. In the east and west of the shiyakha high-rise buildings are popping up; not like in Hadaeq in the centre of the shiyakha. The construction of high-rise buildings in Hadaeq Al Qubbah is not yet as advanced like in Hadaeq, so the number is still little. Behind the high-rise blocks in the west, some villas with nice gardens remind of former times. The buildings in the rest of Hadaeq Al Qubbah are simple four-story houses.

Trees and bushes are planted in the wider streets. Most of them are still little and therefore do not provide any shadow or cool wind flow. In El-Khalig El Masry Street, trees are old and big and invite to spend some time in the cooling shade. During the field research it could be observed that inhabitants take over the responsibility of their neighbourhood and clean the streets from trash.

<table>
<thead>
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<td>81036</td>
<td>1.10</td>
<td>73479.17</td>
</tr>
</tbody>
</table>
Fig. 7-49: Well-organized street in the east of Hadaekq Al Qubbah
Source: Author

Fig. 7-50: Old villa next to high-rise block in Ahmed Bassiouny Street
Source: Author

Fig. 7-51: Men sitting under a tree next to a school in Rfaael Suleiman Street
Source: Author

Fig. 7-52: Students on their way home from school in Al Modares Street
Source: Author

Fig. 7-53: Very narrow sidewalks in Ahmed Kamha Street
Source: Author
Fig. 7-54: Tuktuks rule the streets of Hadaeq Al Qubbah
Source: Author

Fig. 7-55: Typical street in the west of Hadaeq Al Qubbah, Abd El-Shafy Hasan Street
Source: Author

Fig. 7-56: High-rise buildings popping up at El-Khalig El-Masry Street
Source: Author

Fig. 7-57: Four to ten-story buildings in the centre of Hadaeq Al Qubbah
Source: Author

Fig. 7-58: Old villa in the east of Hadaeq Al Qubbah
Source: Author

Fig. 7-59: Old women rest on a step in front of a shop since benches are not available
Source: Author

Fig. 7-60: Market bustle Mohammed Othman Street
Source: Author
Socio-economic activities
In the centre of Hadaeq Al Qubbah many schools are located, so children of Hadaeq Al Qubbah could walk to school. Along Port Said Street many companies like the Industrial Construction & Engineering Company, are situated with their offices and workshops in this area. Moreover, a cultural centre founded by the famous actor Naguib Rehani is located in the south of Hadaeq El Qubbah. Many small businesses providing daily groceries and services are the dominant economic activities in this shiyakha. Additionally fruit and fish seller pull their carts through the alleyways. Besides these activities, Hadaeq Al Qubbah seems to be almost entirely residential. Due to the mainly narrow streets, it seems that the streets of Hadaeq Al Qubbah give less space for an active street life compared to Hadaeq.

Fig. 7-61: Cultural centre of the famous actor Naguib Rehani in the southeast of Hadaeq Al Qubbah
Source: Author
7.2 **Applied research methodologies** (see fig. 7.2)

### 7.2.1 Measuring walkability

Three different approaches for measuring walkability are applied in this thesis. The first one consists in measuring spatial configuration with space syntax. The second one operationalizes the actual physical environment based on urban design qualities such as population density, proximity to amenities and street connectivity and the third one examines the environmental perceptions of the shiyakha’s residents through surveys. This way makes it possible to obtain a holistic walkability analysis.

#### 7.2.1.1 Global integration and BMI

The integration of a street network can mainly influence the walkability behaviour of people as well as siting for businesses. The space syntax software is able to measure the integration of a certain part of a city.

*Methodology*

Space syntax is a graph based theory developed by Hillier and Hanson (1984) to analyse the spatial parameters of the street network. In order to parse the physical form of urban built environment areas, it is needed to focus on the “spaces between buildings, shaped by buildings, which is the street and road network. The street and road network is represented as a set of the fewest and longest axial sight lines. Therefore, an axial map can be processed with the UCL Depthmap software by calculating the total number of direction changes (topological distance) from every street to all others. The software can also calculate the angular relationship (geometrical distance) between street segments” (Mohamed et al. 2014, p.19).

The concept which is used for measuring movement patterns for this thesis is integration (to-movement or closeness). It depicts how easy it is to get from one spot to another and “[s]paces with maximum spatial integration will have minimum number of direction changes to all other spaces” (Mohamed, 2010 in Mohamed et al. 2014, p.19). A spatial global integration indicates “the relation of a street segment to all segments in a whole city”, this means e.g. a “global angular integration shows how each street segment is connected with angular weighting to all others within the whole metropolitan region” (Mohamed et al. 2014, p.20). Moreover, the theories of ‘natural movement’
(Hillier et al. 1993) and ‘movement economy’ (Hillier, 1996) say that the spatial configuration of the street network creates movement flows through built environments. For that reason “highly accessible spaces will attract movement-seeking activities (e.g. commercial uses), while non-movement-seeking activities (e.g. residence) will migrate to locations with low co-presence” (Mohamed et al. 2014, p.18).

Examining how spatially integrated a street segment is, is to use various metrical radii on different local scales. A 500-800 metre radius shows the integration-level of a street on neighbourhood scale; a 2000-5000 metres radius depicts the integration level of a street on city scale, while a radius like 10000 metres shows how integrated a street is on metropolitan level. Further ways of analysing the street network are choice and depth distance (Mohamed et al. 2014, p.20).

In this thesis the obesity data are correlated with the results of the integration of “radius in all” which covers whole Cairo metropolitan region. Further the outcome of the radius of 1200 metres, which corresponds to a 10 – 15 minute walk, is correlated with the obesity data. Data for this thesis were kindly provided by Abdelbaseer A. Mohamed, PhD candidate of Ain Shams University. The data of the street and road network of Cairo are from the year 2012.

In the context of Cairo

The rapid urbanization in Cairo has caused a fragmented spatial structure consisting of many small cities forming the large metropolitan area together. These differ spatially, socio-economically as well as culturally from each other. Due to this disordered development process, a city without any proper urban centre developed. For that reason, e.g. people living and working in Heliopolis barely visit Cairo’s downtown.

Fig. 7-62 shows the angular global integration of Cairo in 2012. The green and blue parts illustrate segregated settlements. These mainly informal settlements are located mostly on the peripheries. This figure reflects the largely fragmented Cairo. The patches are consistent with the settlement pattern of different social classes. Mohamed’s et al. (2014, p. 26) spatial analysis displays that Cairo’s most integrated part runs along from Mohandiseen in the west
to Heliopolis in the east. The four fields of research are exactly situated along this corridor. Cairo’s wealthy people are suspected to live along these highly accessible routes (red & yellow).

Fig. 7-62: Angular global Integration in Cairo 2012 (names of shiyakha added by author)
Source: Mohamed 2014, p. 26

Research results

The correlation of the obesity data and data on the integration-level of 1200m has a positive outcome ($r= 0.721$, $p= 0.279$). Nevertheless, it is an inverse relationship which means that the streets of the shiyakha with a higher BMI (Hadaeq & Hadaeq Al Qubbah) are greater integrated on a radius of 1200m than those with a lower BMI (Garden City & Ard El Golf).

The correlation on global integration level shows a medium negative relationship ($r= -0.680$, $p= 0.320$) which means that the higher integrated shiyakha on a level of Cairo metropolitan region, tend to have a lower BMI, which is in line with the theory with one exception. The street segments of Ard El Golf are less integrated in Cairo metropolitan region than the three other shiyakha.
7.2.1.2 Population density and BMI

Population density is defined by the number of people in any given area. Population density is closely linked with the residential density which is defined by “the spatial concentration of people, dwellings, or establishments (e.g. retail) within a given land area” (Turrell 2010, p.157). More people require more buildings, resp. higher buildings. From an urban planning and design perspective increased residential density is associated with a higher probability of small distances to daily destinations such as supermarkets or workplaces, because presence of more people implies a higher demand for goods and services. Consequently, local businesses can survive. For that reason increased residential density seems to be desirable. Moreover, a dense neighbourhood maximizes the use of neighbourhood infrastructure and saves energy. From a public health perspective, increased density supports alternative modes of transportation. If infrastructure is provided, short distances can be covered by foot or bike or public transportation (Saelens and Handy 2008 in Turrell 2010, p.157). On account on this, people living in a neighbourhood with increased residential density should suffer less from overweight and obesity (Turrell 2010, p.157). Information about an ideal or ‘healthy’ population density could not be found despite following strata (sparsely populated = 0–149 persons/km², moderately populated =150–499 persons/km², and densely populated = > 500 persons/km² (Liu et al. 2007, p.319) recommended from European Union epidemiologic studies for residential density, which look downright ridiculous compared to the population densities of Cairo.

Methodology

The population density data of 2009 (CAPMAS) are correlated with the obesity-ratio of UIS 2007 in order to check if there is any existing correlation between these two parameters.

In the context of Cairo

In 2006 the World Bank estimated Cairo’s population density at 37,136 per square kilometre. CAPMAS numbered 45,000 person/km² in 2012. This number corresponds roughly to one-and-a-half times the population density of Manhattan. Depending on the definition of Greater Cairo Region, it may
be the most densely-populated city in the world. Before the uprising in 2011 started, the Minister of Housing Ahmed al-Maghrabi expressed concern and said, “the city will eventually explode” (Argaman 2014). In a parliament speech in 2006 the former President Mubarak promoted to solve the problem of Cairo’s population density with colonisation of the desert: “The conquest of the desert is no longer a slogan or dream but a necessity dictated by spiraling population growth. What is required is not a token exodus into the desert but a complete reconsideration of the distribution of population throughout the country” (Argaman 2014).

As the Google earth image shows (fig. 7-63), population density can vary greatly within a few metres; in the west Bulaq Al Dakrour with 46.859 person/km² and in the east Doqqi with 18.892 person/km² (CAPMAS). These two shiyakha are divided by Sudan Street in Giza.

![Image: Visible difference of urban fabric between Bulaq Al Dakrour (west) and on the Doqqi (east)](source)

Cairo’s residential density seems to be the root problem for many other existing problems the city is struggling with (poor transit infrastructure, poor health and education infrastructure, housing access), whereas the World Bank as well as the General Organization for Physical Planning (GOPP) see Cairo’s density as an advantage. Due to the fact that 75% of Greater Cairo’s population lives within fifteen kilometres of the city centre (Sims 2010, p.228), people have relatively short distances to travel. Cairo’s government is not able to provide a road network and public transportation for a population that is still compactly-distributed. How would it imagine providing infrastructure and services to widely-dispersed population? Especially because the urban poor would be the ones being resettled to lower-density desert suburbs who
depend on public transportation as they do not own a car (Argaman 2014). Egypt’s master plans since the 1970 suggest density reduction. Also the visioning of Cairo 2050 promotes a framework of density reduction such as the plan for Egypt’s new capital city (Egyptian Streets 2015b).

Research results
The four shiyakha show a very high correlation ($r= 0.982$ and $p = 0.18$). But the relationship is the other way around compared to the theory mentioned above; the less the population density, the lower the BMI. For the case of the four shiyakha, a higher population density is associated with a higher BMI. Consequently, living in an overcrowded shiyakha is attended with a greater risk of becoming overweight or obese, but compared to population densities of European cities even the lower population densities of Cairo are still considered as high.

7.2.1.3 Mix-use and BMI
As in chapter 5.1 already defined and explained, a great land-use mix has been conceptualized as a key component to support walking in a neighbourhood. The most suitable methodology for measuring the mix use in the four shiyakha was to use the Walk Score methodology.

Methodology
Walk Score measures the walkability of any address using a patented system. The Walk Score methodology analyses for each address hundreds of walking routes to nearby amenities. The objective is to measure the friendliness towards walking of a specific address based on the proximity of important amenities for everyday life. Amenities are divided into seven categories: drinking & dining, groceries, shopping, errands, park, school and culture & entertainment. Points are awarded based on the distance to amenities in each category. Amenities within a five-minute walk (ca. 400m) are given maximum points. A decay function is used to give points to more distant amenities, with no points given after a 30 minute walk. A location is described as walker’s paradise if it has a Walk Score of 90-100 points, while any address with a Walk Score lower than 50 points is classified as a ‘car-dependent’ (table 7-1). Data sources include Google, Education.com, Open Street Map, the U.S.
Census, Localeze, and places added by the Walk Score user community (Walk Score b).

The Walk Score methodology was developed with the Walk Score advisory board which includes the internationally most recognized scientist in the field of walkability (Walk Score a). It has been validated by leading academic researchers working in urban planning, real estate and public health sector; e.g. in an analysis of four US metropolitan areas that the Walk Score index was statistically significant that cities with a higher accessibility of amenities within walking distance are likely to have 1.9% lower rates of adult obesity (Duncan et al. 2011).

<table>
<thead>
<tr>
<th>Walk Score</th>
<th>Description</th>
<th>Colour coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>Walker's Paradise</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>Daily errands do not require a car.</td>
<td></td>
</tr>
<tr>
<td>70-89</td>
<td>Very Walkable</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td>Most errands can be accomplished on foot.</td>
<td></td>
</tr>
<tr>
<td>50-69</td>
<td>Somewhat Walkable</td>
<td>Orange</td>
</tr>
<tr>
<td></td>
<td>Some errands can be accomplished on foot.</td>
<td></td>
</tr>
<tr>
<td>25-49</td>
<td>Car-Dependent</td>
<td>Pink</td>
</tr>
<tr>
<td></td>
<td>Most errands require a car.</td>
<td></td>
</tr>
<tr>
<td>0-24</td>
<td>Car-Dependent</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>Almost all errands require a car.</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-1: Walk Score rating
Source: Walk Score (b)

Egypt is categorized as an unsupported country, i.e. Walk Score is the only available. In other countries like the USA and New Zealand, which are a supported countries, additionally a Transit Score measures access to public transit and Bike Score measures whether a location is good for biking. A travel time map, which is available for all countries, explores how far someone can travel by car, bus, bike and foot from a certain location in a specific time. The quality and quantity of public service and utilities available are illustrated with points of interest, e.g. a shopping trolley as sign for the availability of groceries (fig. 6-64). For instance, Downtown Cairo has a Walk Score of 98—Walker’s Paradise.
Nevertheless, access to public transportation signs is shown in a map. The travel time map shows that within a 15-minute walk from Talaat Harb Street five metro stations are reachable (fig. 7-65).

Disadvantages of the Walk Score are, as it is based on GIS, that it is an objective measure. Information about the quality of built environment are not given. Moreover, the Walk Score approach has been frequently criticized for its applicability when data sources are sparse and highly generalized. For instance, Walk Score does not differentiate between small corner shops that sell groceries and a fully equipped supermarket. Therefore, complementary research is needed as it is done in this thesis. Yet, the Walk Score gives an important hint about the existence of nearby amenities for everyday life.
In the context of Cairo

Only one scientific paper was found about land mix use in Cairo, namely about the “influence of mixed land-use on realizing the social capital” (Nabil & Eldayem 2014). Still, the implementation of commercial and retail shops as well as services like laundry shops beneath homes is obviously shown in Cairo. Due to the lack of car ownership in former times, the concept of mixed use was necessary for achieving alternative forms of transport. Since the car ownership is still low in Cairo and population density is high, small shops and grocery stores can survive in the ground floors of residential buildings compared to the situation in many European cities, where big supermarkets replaced small corner shops and people have to walk or drive long distances for the shopping of their daily products. Only Cairo’s sprawling suburbs lack mixed land-use. For that reason developers try to bring mix use development in areas like New Cairo or Sixth of October (Planetizen 2010).

Research results

In each shiyakha the Walk Score was measured in five streets. The results were throughout very high (table 7-2). The streets of Garden City achieved the highest score with an average value of 93,2 points which means that Garden City is considered as a ‘walker’s paradise’ regarding the proximity of important amenities for everyday life. The streets of Hadaeq El Qubbah with an average value of 85,2 points and Hadaeq with 82,4 points are considered as ‘very walkable’. Most errands can be accomplished by foot. The streets of Ard El Golf are with an average level of 73,6 points on the lower end of the category ‘very walkable.’

The shiyakha, which score only ‘very walkable’ do lack existence of nearby parks and cultural and entertainment institutions. This insight results out of having a look at the score details of each examined street.

The correlation of obesity and the average Walk Score of the four shiyakha does not lead to any result \((r = -0.091, p = 0.090)\). Though Garden City with the lowest obesity-ratio \((23,30)\) achieves the highest score, Ard El Golf with the second lowest obesity-ratio \((24,53)\) reach the lowest score. Hadaeq Al Qubbah with the highest obesity-ratio \((29,53)\) notches up more Walk Score points than Hadaeq with a lower obesity-ratio \((27,87)\). Hence, no significant relationship between the proximity to nearby amenities of residents’ homes
and obesity in the four shiyakha of Cairo exists.

<table>
<thead>
<tr>
<th>Shiyakha</th>
<th>Street name</th>
<th>Walk Score</th>
<th>Colour coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden City</td>
<td>Doctor Moustafa Al Dewani</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Etehadd Al Mohamin</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Al Ibrahimi</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kamel El-Shennawy</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Al Kasr Al Aini</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø 93,2</td>
<td></td>
</tr>
<tr>
<td>Ard El Golf</td>
<td>Nabil Al Wakkad</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ahmed Tayseer</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asmaa Fahmi</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sour Al Dedaa Al Gawy</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rabaa Buildings</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø 73,6</td>
<td></td>
</tr>
<tr>
<td>Hadaeq</td>
<td>El-Zahraa Mosque</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Masr We Al Sodan</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ahmed Abd El-Sayed</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sekat Der Al Malak</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mohammed El-Ashri</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø 82,4</td>
<td></td>
</tr>
<tr>
<td>Hadaeq Al Qubbah</td>
<td>Al Ashmoni</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ahmed Bassiouny</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hamza Canal</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td></td>
<td>El-Hag Mostafa</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iskandar Masoud</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ø 85,2</td>
<td></td>
</tr>
</tbody>
</table>

Table 7-2: Result of applied Walk Score methodology
Source: Author
7.2.1.4 Street connectivity and BMI

Street connectivity is a key component for good neighbourhood design. Grid-like street networks display a higher connectivity and are preferred over networks that include many cul-de-sacs and long blocks, thus increasing distances between destinations, which is thought to discourage physical activity (see chapter 5.1).

Methodology

As there are many methodologies for measuring street connectivity and each of them has advantages and disadvantages, there is also a debate over how to measure connectivity and what levels of connectivity are appropriate. After an intensive literature review the most suitable and manageable methodologies for this research, in terms of data availability, are the link-node-ratio and the intersection density.

“Link-node ratio is an index of connectivity equal to the number of links divided by the number of nodes within a study area. Links are defined as roadway or pathway segments between two nodes. Nodes are intersections or the end of a cul-de-sac” (Dill 2004). Ewing (1996) figured out that a perfect grid has a ratio of 2.5. A link-node ratio of 1.4, about halfway between extremes, is a good target for network planning purposes. According to Handy et al. (2003) at least three cities have adopted the link-node ratio as a standard for urban planning, with values of 1.2 and 1.4. Fig. 7-66 demonstrates how increasing the link-node ratio leads to an increased connectivity. Plan A and B have the same number of nodes. Plan B has two additional links, resulting in a link-node ratio of 1.13 versus 0.88 for Plan A. Plan A allows only one route between points A and B. Plan B offers three potential routes which represents increased connectivity.

Fig. 7-66: Link-node ratio
Source: Dill 2004
A weakness of the link-node ratio is that the length of the links is not reflected in any way. A grid of 500m blocks will have the same link-node ratio as a grid with 200m blocks. That is why some cities combine the link-node ratio with an intersection spacing standard (Handy et al., 2003). In order to get an expressive result for this research, the link-node ratio will be combined with the intersection density method. “Intersection density is measured as the number of intersections per unit of area, e.g. square kilometre. A higher number would indicate more intersections and, presumably, higher connectivity” (Dill 2004). Too many intersections increase the risks of crashes, delay and congestions, at least for motorists. By contrast provision of a less dense street network forces motorists and pedestrians to travel farther to their destinations.

Links and nodes were counted on Google earth maps. Before the counting, these maps were compared to the actual street network in the field.

In the context of Cairo

So far, there is not any scientific paper written regarding the street connectivity in Cairo. Nevertheless, old and historic districts tend to have a much higher street connectivity, due to the fact that no or only a small number of cars existed in former times, so services had to be in walking distance. The street network and architecture were aligned to this situation. For example in Fatimid Old Cairo great street connectivity can be experienced. Additionally streets were narrow-built that only motorbikes can drive in these alleyways. It seems that only districts which were designed in the late 20th and early 21st century in Cairo have a much lower connectivity, like Sheik Zayed City, a district of 6th of October in Giza.

Research results

The correlation of the link-node ratio with the BMI shows a slightly negative relationship (r= -.337, p= 0.623). According to this result, Garden City is in line with the theory that a high link-node ratio promotes physical activity and consequently, Garden City residents have less weight. Hadaeq and Hadaeq Al Qubbah are as well in line with the theory as Hadaeq has a greater link-node ratio than Hadaeq Al Qubbah (table 7-3). Only Ard El Golf falls out of alignment with a link-node ratio of 1.29. It has to be considered that a huge
part of Ard El Golf belongs to the Ministry of Defence and the Egyptian Air Force. These areas have nearly no street network. Nonetheless, according to the defined standard of 1,2 – 1,4, all shiyakha have a high intersection density and offer a huge variety of possible walking routes.

<table>
<thead>
<tr>
<th>Shiyakha</th>
<th>Link-node ratio</th>
<th>Intersection density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden City</td>
<td>1,85</td>
<td>102,03</td>
</tr>
<tr>
<td>Ard El Golf</td>
<td>1,29</td>
<td>81,20</td>
</tr>
<tr>
<td>Hadaeq</td>
<td>1,50</td>
<td>316,31</td>
</tr>
<tr>
<td>Hadeq Al Qubbah</td>
<td>1,46</td>
<td>406,99</td>
</tr>
</tbody>
</table>

Table 7-3: Research results of link-node ratio and intersection density
Source: Author

The correlation of the intersection density with the BMI leads to a positive result (r= 0.979, p= 0.021). But again the outcome is not in line with the theory. The shiykha with a lower BMI (Garden City & Ard El Golf) have a minor intersection density as the shiyakha with a higher BMI (Hadaeq & Hadeq Al Qubbah).

7.2.1.5 Perceived neighbourhood surrounding and BMI
Crucial for the decision of the choice of transportation is quality of the walking route and entertainment along the walking route (chapter 5.1). According the Lefebvre’s idea of space, three different types of space exist: perceived, conceived and lived (Lefebvre 1991). “Perceived space refers to the relatively objective, concrete space people encounter in their daily environment. Conceived space refers to mental constructions of space, creative ideas about and representations of space. Lived space is the complex combination of perceived and conceived space. It represents a person’s actual experience of space in everyday life” (Lefebvre 1991 & Soja 1996 in Purcell 2002, p.102). The best methodology to discover persons’ experience of space in everyday life is with a questionnaire.

Methodology
In each shiyakha 30 residents were asked to fill in the questionnaire (see appendix). The questions in the author’s self-developed questionnaire are guided by the Neighborhood Environment Walkability Scale (NEWS) and being used by the International Physical Activity and Environment Network
The surveys were performed in the streets of the shiyakha at daytime. One criterion was that interviewees had to live in the shiyakha in order to be sure that interviewees knew their neighbourhood. The questionnaires were completed with the residents together, i.e. in case of any question appeared, these were explained by an Arabic speaker. The questionnaire includes questions regarding the factors which were approached in chapter 5.1.1 which might influence the decision taking if someone walks or takes another mean of transportation.

In the context of Cairo
As described in the chapter 6.2.1, Cairo’s streets lack public space, greenery and are built for cars rather than for Cairo’s inhabitants. How residents of the four fields of research perceive their neighbourhoods, is analysed hereafter.

Research results
In Garden City 17 men and 13 women, in Ard El Golf 15 men and 15 women, in Hadaeq 19 men and 11 women and in Hadaeq Al Qubbah 13 men and 17 women filled in the questionnaire. The core of the interviewees was in the age of 19 – 30 years (43 people), 29 people were 31 – 45 years old, 21 people 46 – 60 years and 19 people were equal to or younger than 18 and eight people were equal to or over 61 (table 7-4).

<table>
<thead>
<tr>
<th>Neighbourhood</th>
<th>≤18</th>
<th>19 - 30</th>
<th>31 - 45</th>
<th>46 - 60</th>
<th>≥61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden City</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Ard El Golf</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Hadaeq</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Hadaeq Al Qubbah</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 7-4: Age distribution of interviewees
Source: Author

85 people reported to leave their home several times a day, 21 persons once a day, eight a few times a week, five a few times a month and one person reported that she never leaves the house due to health reasons. As the interviewees were addressed on the street, people who barely or never leave their home were hard to be reached.
Table 7-5 shows that people in Hadaeq and Hadaeq Al Qubbah tend to spend a longer time walking in their neighbourhoods than in Garden City or Ard El Golf. Thereby men as women spend the same amount of time walking outside. This result is contradictory to the obesity-ratio. People living in Hadaeq and Hadaeq Al Qubbah have a higher BMI, but at the same time walk more than the inhabitants of Garden City and Ard El Golf.

Table 7-5: Average duration of walking of interviewees
Source: Author

An explanation for the contradiction between BMI and walking time can be that people of Garden City and Ard El Golf might eat less energy-dense food and/or do more sports. More people in Garden City and Ard El Golf answered with “yes” than with “no” to the question if people do any vigorous activities (e.g. running, aerobics, heavy work), on a regular basis (1 – 2x a week) for at least ten minutes compared to the inhabitants of Hadaeq and Hadaeq Al Qubbah (table 7-6). Additionally 60% of the interviewees in Garden City and 50% of Ard El Golf are member in a gym or in a club whereas only 23.3% of the interviewees in Hadaeq and Hadaeq Al Qubbah stated to be a member in a gym or club (table 7-7). It seems that the inhabitants of Garden City and Ard El Golf compensate the lack of walking with going to the gym.
The main reasons for leaving the house, of the interviewees of all shiyakha, is to take a walk for daily services like to the bakery, the next mini-market or to go to work or school (table 7-8). It is also interesting to see that in Hadaeq many people walk in order to be physical active, i.e. some residents of Hadaeq are aware that humans need a certain amount of physical activity per day. In general only a few people indicated to walk to public transportation. Ard El Golf has the highest score with nine responses. That means either public transportation is too far from their homes or they do not like to use it. In many developing and emergent countries people from upper social classes do not want to mix with people from lower economic classes; so they prefer to take their own car a cab.

![Graph showing reasons for walking in shiyakha](image)

Table 7-8: Interviewees’ reasons for walking in shiyakha (multiple choice)
Source: Author

The indications of the interviewees of destinations which can be reached in ten-minute walk display a high response (table 7-9). Shops which offer daily products and services as well as places for worship are close to all the residents’ homes. Except from Ard El Golf, where 50% of the interviewees responded to have a recreational facility in a ten minutes walking distance, the other shiyakha have less responses. In Ard El Golf for most of the people a post office is far away from their home and for many people living in Hadaeq El Qubbah a bank is not reachable within a ten-minute walk. Otherwise there are no conspicuous issues.
Sidewalk experience

It is established that well designed sidewalks can enhance a neighbourhood’s walkability and lead to healthy and active communities. A well designed sidewalk can encourage people to be more physically active in their daily routines. A complex set of players and regulations contribute to the design of a successful sidewalk space, e.g. height and width, cleanliness, shaded or not, interrupted or blocked.

In general the results of the residents’ perceived presence of sidewalks (table 7-10) are consistent with the author’s observations (see chapter 7.1.1 – 7.1.4). In Garden City and Ard El Golf sidewalks are nearly on both sides of almost all streets or at least on one side. Due to the fact that many streets inside Hadaeq and Hadaeq Al Qubbah are very small, sidewalks are not available, which is not a major problem as not a lot of traffic is passing through these small streets anyway. But on the bigger streets of these two shiyakha there are sidewalks on one or both sides.

More important is the question about the condition of the sidewalks (table 7-11). Sidewalks only fulfil their function, if people also can walk on them. Residents of Garden City stated that their sidewalks are very often blocked by cars. Additionally they are interrupted and too narrow. Only seven out of 30 interviewees said that their sidewalks are well maintained. Unlike in Ard El Golf; 50% of the interviewees thought their sidewalks are well maintained.
Only a few residents stated that they would be interrupted, have a lot of cracks and smell of pie. In Hadaeq more than half of the interviewees considered their sidewalks as interrupted. A small number of residents (5 – 8) described that their sidewalks have a lot of cracks and are too narrow. Five inhabitants had the opinion that they are well maintained. The sidewalks of Hadaeq Al Qubbah are mainly described to be interrupted and smell of pie. Again five residents had the opinion that they are well maintained. This result gives the impression that most of the sidewalks in Garden City, Hadaeq and Hadaeq Al Qubbah discourage people from walking on them or at least that people cannot enjoy walking on them as they seem to be not well maintained, except in Ard El Golf. Consequently, people only walk if
they really have to; otherwise they prefer to take any vehicle as a mean of transportation rather than their feet, which has a negative impact on their physical activity level. Related to the BMI, in shiyakha with better maintained sidewalks, residents tend to have a lower BMI (Garden City & Ard El Golf) whereas in shiyakha with less presence of sidewalks inhabitants seem to have a higher BMI (Hadaeq & Hadaeq Al Qubbah).

**Perceived neighbourhood surrounding**

Urban elements and a nice neighbourhood surrounding can encourage people to walk to their destination or even activate people to go for a walk as exercise. Surprisingly, in all shiyakha most of the inhabitants do not face any difficulty to walk in their neighbourhood (table 7-12). Thus the majority of residents of the shiyakha does not feel any obstacles walking in the streets. A minority of residents of Garden City and Hadaeq Al Qubbah claimed that walking is somewhat difficult or very difficult.

![Bar chart showing perceived difficulty to walking in shiyakha](image)

Table 7-12: Perceived difficulty to walking in shiyakha  
Source: Author

An important key component for walking in Cairo’s hot climate is the existence of trees and tree shading in the street (table 7-13). In Garden City and Ard El Golf, 24 out of 30 inhabitants confirmed that trees give enough shading in their streets. In Hadaeq residents perceived that trees give shading only on a few spots or that no trees exist; whereas the inhabitants of Hadaeq Al Qubbah have a very mixed opinion about the trees shading the streets of their neighbourhood.
In terms of garbage in the streets (table 7-14), Garden City and Ard El Golf seem to be the cleanest shiyakha. In Hadaek 19 out of 30 people responded that garbage disturbs them while walking, but they have to walk. Inhabitants of Hadaeq Al Qubbah feel that the garbage in the streets is an obstacle for walking.

The presence of perceived attractive sights in the different shiyakha is relatively balanced (table 7-15). Nevertheless, like two young men in Hadaeq Al Qubbah explained, there are not a lot of attractive sights, but many interesting people to meet on the streets and to visit at home.
21 out of 30 inhabitants of Garden City find the walk through their neighbourhood exiting, due to the existence of attractive buildings and building facades (table 7-16). In Hadaeq and Hadaeq Al Qubbah the residents state that some of their buildings in their shiyakha are quite interesting. By contrast in Ard El Golf most of the residents replied that there are no attractive buildings. The result of the perceived attractiveness of buildings complies with the author's observations (see chapter 7.1.1 – 7.1.4).

All the shiyakha lack of urban elements like benches or any other sitting possibility (table 7-17), but people take it sportive. Old people rest in front of shops, put their chairs on the sidewalks to participate in the street life and last but not least, residents of all shiyakha offer chairs to anyone who wants to sit and rest. Summing up the perceived neighbourhood surrounding, Garden City received the most positive responses regarding tree shading, less
existence of garbage in the streets, many attractive sights and nice building facades. Ard El Golf has the second most positively perceived neighbourhood surrounding. It might lack interesting architecture, but it is considered as clean, green and contains a lot of interesting sights. The results in Hadaeq and Hadaeq Al Qubbah are similar, but worse than in Garden City and Ard El Golf. By comparing these results with the obesity-ratio of the shiyakha, the outcome is a positive one. Consequently, it seems that shiyakha with a nice neighbourhood surrounding have a positive influence on the residents’ weight status.

**Perceived safety from traffic**

Interviewees were asked to express their perceived safety from traffic by ticking a number on the scale from 1 – very safe, to 6 – very unsafe. Table 7-18 shows a very balanced perception ranging between 2.33 in Ard El Golf (men) and 3.41 in Hadaeq Al Qubbah (women) regarding the perceived safety from traffic in the shiyakha. Moreover, there is not a significant difference between the perception of traffic from men and women.

The most frequently mentioned answer why people feel unsafe from traffic is that car surprise the people from the back and usually exceed the speed limit (table 7-29). Moreover, many people feel unsafe in Garden City and Hadaeq due to the fact that they have to walk on the street. This outcome correlates with the outcome of attributes given to the sidewalks. In Garden City, Hadaeq and Hadaeq Al Qubbah many people complain that the sidewalks are blocked by cars or are interrupted. Consequently, people have to walk on the street which increases the feeling of insecurity. Although the differences between the
perceived safety from traffic of the shiyakha are little, the correlation of the mean of the perceived safety from traffic (men & women) with BMI is positive (r= 0.779, p= 0.221) meaning that in shiyakha in which traffic is perceived more dangerous, people tend to have an increased body weight.

Table 7-18: Perceived safety from traffic (mean) in shiyakha
Source: Author

Table 7-19: Attributes of traffic in shiyakha (multiple choice)
Source: Author

**Perceived safety from crime**

Interviewees were asked to express their perceived safety feeling from crime at daytime and at night by ticking a number on the scale from 1 – very safe, to 6 – very unsafe. The perceived safety at daytime ranges for women between 1,31 in Garden City and 2,71 in Hadaeq Al Qubbah and for men from 1,65 in Garden City to 2,16 in Hadaeq (table 7-20). In Hadaeq Al Qubbah, the most unsafe perceived shiyakha at daytime, women mainly feel unsafe due to sexual harassment and street dogs. Overall the perceived safety feeling in all the shiyakha is quite high. The perceived safety at night increased around by one point in each shiyakha (table 7-21). Garden City (men: 2,35, women:2,31) is again perceived as the safest shiyakha, although a female interviewee reported that her handbag got stolen twice by young men on a motorbike.
passing by and cutting of her bag from her body. In Ard El Golf (men: 2,67, women: 3,07) men complain that cars are stolen at night and women mainly are afraid of street dogs and the darkness due to the lack of street lights. The residents (men: 3,63, women: 3,82) of Hadaeq are worried about the drug dealing activities in their neighbourhood at night. Additionally women face a lot of sexual harassment. The situation in Hadaeq Al Qubbah (men: 2,76, women: 4,18) is similar. Women and girls are offended by tuktuk-drivers who insult them and even chase them with their tuktus until they reach home. Only in a group, girls feel to be safe enough to take a walk in the neighbourhood in the evening. Moreover, women of Hadaeq Al Qubbah complain about missing street lights and a high crime rate. Men of Hadaeq Al Qubbah perceive street dogs and the lack of streets lights as problem for increased insecurity at night.

Both, the correlation of perceived safety at daytime ($r= 0,993$, $p= 0,007$) as well at night ($r= 0.900$, $p= 0.100$) with the BMI show a positive result. Due to a more unsafe perceived environment, inhabitants of Hadaeq and Hadaeq Al Qubbah might tend to stay more at home and be less physical active than the inhabitants of Garden City and Ard El Golf.

**Summary of results of the questionnaire**

Except the contradicting result of walking time and BMI, the perceived sidewalk experience, the perceived neighbourhood surrounding as well as the perceived safety from traffic and crime are in line with the hypothesis that a perceived well-designed and safe environment has a positive impact on peoples’ weight status.
While completing the questionnaire the researcher sometimes got into conversations with the inhabitants of the shiyakha. It was notable that people who have been to Europe or the U.S. perceive their environment more critical than people who have not been abroad yet. As people who travelled to more developed countries have experienced how an urban environment should or could look like, they perceive Cairo’s urban environment more unsafe as those who didn’t travel abroad.

7.2.2 Measuring the food environment
The growth in consumption of energy-dense foods available through fast-food and convenience food outlets is recognized as an important contributor to the rising prevalence of overweight and obesity (see chapter 5.2). Since it is known that the availability of food outlets can influence consumer purchasing and dietary behaviour, the investigation of the food environment of the four research areas should give some indication to what kind of food the residents of the shiyakha are exposed to.

With the help of a food store mapping, different kind of food stores categories are analysed and later on compared to the residents’ perception of the food environment.

7.2.2.1 Food store prevalence and BMI
Methodology
Food store mapping took place in the four research areas. Each street in the four shiyakha was branched off in order to map each single food store. Ten different categories were defined:

a) Greengrocer: shops in a building or on the street selling fruits and vegetables as well as shops offering fresh juices
b) Supermarket: store in which the customer can select food and household items out of a big variety such as Metro, BIM or Ragheb
c) Restaurant: restaurants with a proper interior furnishing and waiters serving slow food
d) Bakery/Butchery/Fish shop: selling fresh bread unprocessed meat or fish
e) **Mini-Market**: store selling basic food and household items having a small range of goods offered, mainly energy-dense food

f) **Kiosk**: very small store in a building or on the street selling sweets, chips and soda

g) **Candy Shop**: patisseries and shops selling exclusively cakes, Egyptian sweets, ice-cream or candies

h) **Fast Food (Egyptian)**: Egyptian street food restaurants selling Koshari, Shawarma, Falafel or Ful

i) **Fast Food (westernized)**: international fast food restaurants like McDonald’s Kentucky Fried Chicken or Pizza Hut, but also Egyptian fast food chains selling burgers, chips, pizza like Mo’men or Arabiata El Shabrawy

j) **Traditional tea/hisha café**: offering tea and shisha, almost exclusively men sitting in these shops
Fig. 7-71: Mini-market
Source: Author

Fig. 7-72: Typical kiosk in the streets of Cairo
Source: Author

Fig. 7-73: Candy shop selling traditional Egyptian sweets
Source: Author

Fig. 7-74: Egyptian fast food chain Mo’men
Source: Author

Fig. 7-75: McDonald’s fast food branch in Downtown Cairo
Source: Author

Fig. 7-76: Traditional tea/shisha café
Source: Author
The first four food consumption options (a - d) are considered as healthy as they offer nutritious rich and less energy-dense food. Categories e till j supply their customers primarily with processed and energy-dense food. For that reason these categories are considered as unhealthy.

The food stores were recorded in maps (fig. 7-77 till 7-80) in order to be able to locate the food stores afterwards. The food stores of each category in each shiyakha were counted. Since the number of food stores does not reveal a lot about how intensive inhabitants are exposed to a certain type of food, the number of different kind of food stores per 1000 inhabitants shed some more light on to what kind of food the residents of the shiyakha are exposed to most (North Central Region County Food Systems Profiles Portal).

In the context of Cairo

In the last decade many international fast food restaurants and new Egyptian fast food chains are popping up and conquering the streets of Cairo. Additionally new energy-dense groceries entered the Egyptian market. Due to the availability of these new products, the food habits of many Egyptians have changed in the last years and with them their weight status.

Research results

Food stores in Garden City (fig. 7-77) are almost exclusively located at Al Kasr Al Aini and Dr Handossa Street and on the byroads leading to these main roads. Inside Garden City are only three kiosks, one restaurant, one patisserie/coffee shop and one mini-market. Garden City does not have any supermarket or fish shop. The single western fast food shop is not an international chain, but an Egyptian street restaurant selling pizza.

Ard El Golf (fig. 7-78) has as the only shiyakha a Hypermarket, which is located at El Nasr Road. Food stores are mainly situated at the outer boarders of the small neighbourhood units and on the main roads in Ard El Golf. On the way to the metro station and around Koleylet El Banat (Ahmed Tayseer Street) many kiosks can be found. Ard El Golf has as single shiyakha international fast food restaurants like Kentucky Fried Chicken.

In Hadaeq (fig. 7-79) the four supermarkets are located at the main roads whereas mini-markets and kiosks supply the inhabitants living in the smaller streets with goods. In Hadaeq as well as Hadaeq Al Qubbah many traditional
tea and shisha-shops shape the neighbourhood- scape compared to Garden City and Ard El Golf.

Hadaeq Al Qubbah (fig. 7-80) possesses as only shiyakha out of the four research areas a market. In Mohammed Othman Street a huge market takes place which includes 22 counted greengroceries, ten butcheries/bakeries, seven mini-markets and two Egyptian fast food restaurants. However, in Hadaeq Al Qubbah a normal restaurant could not be discovered.

Fig. 7-77: Distribution of food stores in Garden City
Source: Author
Fig. 7.78: Distribution of food stores in Ard El Golf
Source: Author
Fig. 7.79: Distribution of food stores in Hadaeq
Source: Author
Fig. 7-80: Distribution of food stores in Hadæeq Al Qubbah
Source: Author
Almost all food stores are located at bigger roads or byroads which verifies Hillier’s theory of ‘movement economy’ (see chapter 7.2.1.1). It says that highly accessible spaces attract movement-seeking activities like commercial uses. The number of different kind of food stores per 1000 inhabitants reveals following insight (table 7-22):

<table>
<thead>
<tr>
<th></th>
<th>Greengrocer</th>
<th>Supermarket</th>
<th>Restaurant</th>
<th>Bakery/ Butchery/ Fish Shop</th>
<th>Fast Food (westernized)</th>
<th>Mini-market</th>
<th>Fast food (Egyptian)</th>
<th>Kiosk</th>
<th>Candy Shop</th>
<th>Traditional Tea Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden City</td>
<td>1,77</td>
<td>0</td>
<td>0,66</td>
<td>0,66</td>
<td>0,22</td>
<td>3,54</td>
<td>2,65</td>
<td>2,43</td>
<td>0,44</td>
<td>0,66</td>
</tr>
<tr>
<td>Ard El Golf</td>
<td>0,67</td>
<td>0,22</td>
<td>0,54</td>
<td>0,40</td>
<td>0,08</td>
<td>0,54</td>
<td>0,54</td>
<td>0,76</td>
<td>0,40</td>
<td>0,11</td>
</tr>
<tr>
<td>Hadaek</td>
<td>0,32</td>
<td>0,10</td>
<td>0,08</td>
<td>0,56</td>
<td>0,05</td>
<td>0,56</td>
<td>0,33</td>
<td>0,51</td>
<td>0,10</td>
<td>0,33</td>
</tr>
<tr>
<td>Hadaek Al Qubbah</td>
<td>0,84</td>
<td>0,03</td>
<td>0</td>
<td>0,57</td>
<td>0</td>
<td>0,70</td>
<td>0,30</td>
<td>0,65</td>
<td>0,07</td>
<td>0,41</td>
</tr>
</tbody>
</table>

Table 7-22: Number of different kind of food stores per 1000 inhabitants
Source: Author

Garden City features the highest score of all the different kind of food stores except in the category supermarket. This means that the residents are exposed to healthy food, but the number of unhealthy food stores outweighs (mini-market: 3,54, Egyptian fast food: 2,65, kiosk: 2,43). Hadaeq Al Qubbah has the second highest number of healthy food stores per 1000 inhabitants (greengrocer: 0,84, bakery/butchery/fish shop: 0,57). The relationship of food stores offering healthy food compared to food stores considered as unhealthy (mini-market: 0,70, kiosk: 0,65) seems to be balanced. The same applies to the prevalence of food stores in Ard El Golf (greengrocer: 0,67, restaurant: 0,54 vs. mini-market & Egyptian fast food 0,54, kiosk: 0,76). Hadaeq features the least number of greengrocers (0,32), Egyptian fast food stores (0,33) and kiosks (0,51) per 1000 inhabitants compared to the other three shiyakha. The prevalence of candy stores in Garden City and Ard El Golf shows a significant difference to the prevalence in Hadaeq and Hadaeq Al Qubbah. The number of supermarket as well as the number of western fast food restaurants per 1000 inhabitants is still small in all of the shiyakha.
Summarizing the outcome of this methodology, it does not provide a clear result. The residents of Garden City with the healthiest BMI (23,30) are predominantly exposed to unhealthy food outlets. In Hadaeq Al Qubbah the ‘heaviest’ shiyakha (BMI = 29,53) depicts a balanced variety of all food store categories, idem for Ard El Golf (BMI = 24,39). Only in Hadaeq a relationship between the prevalence of food store per 1000 inhabitants and BMI (27,89) could exist, since the number of food stores considered as unhealthy outweighs the number of food stores considered as healthy.

7.2.2.2 Perceived availability of healthy food

Methodology

One question regarding the perceived food environment was part of the questionnaire (see appendix) of the perceived neighbourhood surrounding (chapter 7.2.1.5). Aim is to compare the outcome of the number of the food store categories per 1000 inhabitants with the actual perceived food environment of the shiyakha. In this way it can be discovered if the residents of the shiyakha can distinguish between the availability of healthy and unhealthy food in their neighbourhood.

In the context of Cairo

As reported by Prof. Zeinab Khadr in chapter 6.1.2, the Egyptian market mainly promotes unhealthy food consumption. Healthy snacks can barely be found in the city. Therefore, it is crucial to find out if Cairo’s residents perceive their food environment as unhealthy or not. This would help to enlighten their degree of awareness and knowledge regarding nutrition.

Research results

Less than the half of the interviewees in Garden City perceived a limited availability of healthy food options in their neighbourhood which correlates with the outcome of food store prevalence. The residents of Ard El Golf also uttered a mixed feeling about the availability of healthy food outlets in their shiyakha. Inhabitants are right with this assessment as well since the number of different food store categories in Ard El Golf is balanced. In Hadaeq inhabitants mostly assess their food environment as healthy which does not coincide with the results of the food store mapping. Residents of Hadaeq Al
Qubbah predominantly perceived the variety of food stores in their shiyakha as healthy. Only a small minority seem to perceive the food environment, they are exposed to, more critical. Since the availability of healthy and unhealthy food outlets is even, the responses tally with the objectively measured food environment (table 7-23).

The outcome of this question regarding food environment shows that most of the interviewees are quite able to distinguish healthy food from unhealthy food options and possess consciousness regarding nutrition.

7.3 Discussion of the research results and the applied theories

The result of the inverse relationship of obesity and the integration-level on 1200m (higher integration is associated with a higher BMI) implies that street segments which offer many walking routes and which are highly accessible promote overweight and obesity. This outcome is also supported by the results of the intersection density. Shiyakha which show an increased intersection density are associated with a higher BMI. These two outcomes are a bit of inexplicable, because normally a highly connected and accessible street network is linked with increased walkability which should prevent weight gain. A possible explanation could be that daily services are so close to the residents’ homes that they do not have to walk for long distances. However, the correlation of obesity and the Walk Score does not show any relationship. But since the results of the Walk Score are throughout very high, which is confirmed by the outcome of the perceived proximity to daily destinations within a ten-minute walk, this could be a reasonable explanation.
The third inverse relationship, which is not in line with the theory, is the connection between population density and BMI. There is a chance that people living in an overcrowded shiyakha avoid walking outside, since the streets might be congested and overloaded by traffic and people. The outcome of the perceived safety of traffic underlines this argument. Residents living in a shiyakha with an increased perceived insecurity from traffic, tend to have a higher BMI. The most frequently mentioned answer for perceived insecurity from crime has less to do with urban planning rather than with the misconduct of Egyptian men, namely sexual harassment. Increased fear and malaise of doing some exercise in the streets of Cairo hinder girls and women from physical activity that could lead to weight loss. Especially women would be in need to exercise, since they show an increased BMI compared to men in Cairo. Moreover, street lights are missing in those shiyakha, in which the inhabitants have an increased BMI, what decreases the safety feeling of the inhabitants at night.

The correlation of space syntax data on global integration level with the BMI leads to the relationship that shiyakha, which are lower integrated on Cairo metropolitan region level tend to have a higher BMI. According to Hillier’s movement economy, more integrated areas are situated next to highly accessible streets which connect different parts of the city and consequently attract a lot of businesses. Outcomes of the Walk Score methodology, e.g. the result for Garden City (Walk Score 93,2), confirm this theory. The exception is Ard El Golf, which seems to be an independently working city within the city of Cairo.

Ard El Golf falls one more time out of alignment with the outcome of the correlation between the link-node ratio and BMI. Due to the fact that a huge part of Ard El Golf belongs to the Ministry of Defence and the Egyptian Air Force, proper street networks do not exist in these areas. As already indicated, the link-node ratio is insufficient as a single methodology measuring street connectivity. The result of the intersection density and the integration on 1200m validates this assumption. But again except Ard El Golf, the results for the link-node ratio and the BMI are in line with the shiyakha Garden City, Hadaeq and Hadaeq Al Qubbah.
The outcome of the results of the questionnaire regarding the perceived sidewalk experience and the perceived neighbourhood surrounding proves that green, attractive neighbourhoods with well-maintained sidewalks and nicely designed buildings promote a healthy weight status. The author’s observations of the infrastructure of the shiyakha (see chapter 7.1.1 - 7.1.4) reflect the research results. The fact remains that once greenery and urban elements do exist, they are used by the inhabitants of the shiyakha or even by other Caireens as the occupancy of the benches along the Nile Corniche show. Moreover nice building facades and attractive sights in the shiyakha seem to stimulate a healthier lifestyle.

The question regarding the perceived food environment shows that people know which type of food is considered as healthy or unhealthy, but this does not mean that they actually exclusively buy and cook healthy food. The food environment mapping depicts that food stores are mainly located at bigger and easily accessible roads. The exposure of food stores per 1000 inhabitants in a shiyakha did not give any indication.

Since the outcome of three applied methodologies (integration on 1200m, intersection density and population density), is inverse to the theory, the validity of the proposed theories (chapter 7.2), mainly developed from researchers in the developed world, has to be questioned. It seems that for megacities and rapidly growing cities in developing countries theories measuring the objective built environment need to be rechecked or redeveloped. Or the results of three inverse relationships between the built environment and obesity confirm the statement that Cairo’s built environment and Caireens’ weight status are out of control. In the following implications for Cairo are drawn based on the research results through an inductive approach.

7.4 Implications of research outcomes for Cairo and Caireens
(conclusion of field research analysis)
Being aware that the results of the research of the four shiyakha out of approximately 350 shiyakha in Cairo metropolitan region are not representative, it is attempted to formulate some consequences out of the given results for Cairo keeping chapter 6 in mind. Additionally it should be
considered that the four research areas are inhabited by the middle and upper class in formal areas of Cairo. 60% of Cairo metropolitan region is informal and primarily inhabited by the urban poor. Since the urban poor have less access to good education, the knowledge of nutritious and healthy food might be even less compared to richer Caireens (Mowafi et al. 2014). Moreover, the urban poor depend on the food subsidy program of the Egyptian Government which provides energy-dense food only. The government barely provides the basic infrastructure in the informal settlements and does not take care of their surrounding neighbourhood. Neither do the inhabitants since those are busy with their daily struggle for basic needs. Hence following implications can be drawn up on Cairo:

The fact that increased population density is linked with weight gain stimulates the on-going debate of urban density versus urban sprawl in Cairo. The result of this study shows that living in an overcrowded area has serious consequences on health. In a highly populated area usually adequate infrastructure for the number of inhabitants is not provided, not to mention public space or any other recreational facility which would give the people the chance to exercise. This argument can be supported by the observation of street life in Hadaeq and Hadaeq Al Qubbah. Whereas the residents of Hadaeq actively participate in the urban street life (children playing soccer or billiard, men sitting outside and reading the newspaper) the narrow streets of Hadaeq Al Qubbah do not allow optional or social activities. Consequently, the inhabitants of Hadaeq Al Qubbah move less and are on higher risk of gaining weight. On account of this, urban sprawl would be the favourable way to go. It would decrease the uncertainty from traffic in neighbourhoods with a high BMI, but it would increase the traffic volume all over the city due to increased commute between home and workplace. The deficiency of mass public transportation systems in Cairo is a huge disadvantage. In the year 2015 Cairo metropolitan region operates only three metro lines for a population of about 22 million people. Infrastructure for alternative modes of transport like bicycling is not available. Additionally through the expansion of the underground network less integrated parts of Cairo (blue & green parts of angular global integration fig. 62) could be included without increasing traffic volume or air pollution. This would decrease the social segregation since the urban poor live mainly in the disconnected informal settlements.
Drawing on the results of the perceived safety from traffic, in Cairo protection from vehicular traffic seems not to be given. Sidewalks are often too narrow, unmaintained or blocked. Most of the time, Caireens have to put themselves in danger and walk on the street. Furthermore, car drivers do not have to stick to any speed limits or traffic regulation. The fact that Egypt has one of the highest death rates from traffic accidents in the world reflects the grievances of the environment for the walkers and the carelessness of Egyptian motorists. This deficit in the field of urban planning becomes even more evident by the fact of the absence of children and elderly in the streets. These age-sets vanished from Cairo’s cityscape. Parents do not allow their children to play on the streets since it is too dangerous. Traffic-calmed zones, public space and playgrounds, where kids could play in a safe environment, do not exist. Due to the lack of possibilities for sitting and resting as well as street crossings, Cairo’s urban life is too fast and exhausting for old people to take a walk or for children to walk to school. Cairo’s built environment is designed for cars rather than for humans. Only in some neighbourhoods with smaller streets an increased feeling of safety from traffic exists.

The street connectivity measuring displays excellent values. Outcomes of the link-node ratio are in between or over the required value of 1,2 – 1,4 (Handy et al. 2003); idem for the proximity to daily needed products and services. Due to the high population density within Cairo metropolitan region it seems that small scale businesses can keep themselves afloat whereas populated areas seem to lack greenery and cultural entertainment. Due to the high pressure on Cairo’s housing market, investors want to make profit out of each open or not ‘efficiently’ economic used space. This development can currently be observed in Hadaeq and Hadaeq Al Qubbah. Old villas are being destroyed on purpose and replaced by simple ten-story high-rise buildings as the Egyptian Newspaper Al Ahram reported in mid of May 2015. Urban heritage conservation does not seem to be of interest of the Egyptian authorities, just as the construction of illegal buildings, resp. design heights is not effectively sanctioned.

The demolition of villas brings up another topic, namely the adaptation of the built environment to the prevailing hot climate in Cairo. In former times
buildings were constructed in a way which ensured a pleasant climate through natural ventilation in the house and through greenery around the house. Additionally, the houses were decorated and designed in an aesthetic way. Nowadays as nearly everywhere else in the world the economic profit drives the Egyptian housing market. Residential property is quickly set up, simply ignoring the laws of sustainable architecture. The results of the questionnaire support this observation. In Garden City where old beautiful villas surrounded by gardens still remain compared to the other three shiyakha, residents show the lowest compounded BMI of the examined shiyakha.

Although the problems of Cairo in various parts of the city and the different levels of economic development are not all alike, dreams and desires of Caireens in various parts of the city are not dramatic. All the people like to enjoy their leisure time in a green and livable space. The difference is that the middle and upper class can afford to escape into sport clubs, whereas the people from lower social classes have to expose themselves to great danger, noise and air pollution if they want to spend their free time in one of the few green spaces in the city (cf. fig. 6-8/9). The implementation of Al Azhar Park in 2005, an artificially 30 hectare planned park, does not serve the whole population, yet people have to pay for the entrance. Visiting Al Azhar Park in Cairo seems more a kind of event for Caireens than an ordinary daily activity.

Anyhow, most of the activities accomplished in Cairo seem to be necessary activities like commuting between home and workplace or doing the daily shopping. Optional and social activities do almost exclusively take place in the semi-public or private locations like strolling in a mall or meeting friends in a coffee shop. These optional and social activities in public spaces were only observed under trees. Since the Egyptian authorities prefer radical tree trimming rather than planting and taking care of greenery, it can be expected that also the remaining trees, provide cooling shade, will vanish (cf. fig. 6-19/20). Interpreting the result of the garbage in Cairo’s streets, a conclusion is very quickly drawn. As long as trash pins are not established and a disposal system not exists, Caireens will get rid of their garbage by throwing it in the streets. Regarding the outcome of the safety from crime, Cairo in general has a very low crime rate and is considered as a very safe city. Nevertheless
the sexual harassment towards women is a major reason for many Egyptian women to stay at home, despite their role and obligations as women in the Arab world.

At the current state of Cairo’s physical activity environment, campaigns promoting physical activity, besides going to the gym, would be unreasonable and mistimed. Exercising is life-threatening due to the built environment condition and Caireens cannot be expected to exercise only on Friday mornings when streets are untrafficked for once a week. Hence they can hardly be blamed for their sedentary lifestyle.

Being aware that Egypt has a strong ‘food culture’ as all family gatherings, social outings and celebrations are always associated with the presence of fatty and sugary food, the invasion of fast food chains and online delivery services has contributed the rest to Caireens waistlines. The research results of the food environment did not give a clear indication. But since many Egyptians suffer from overweight and obesity, they might lack knowledge about how to prepare healthy and light food. Additionally Caireens are exposed to advertisements promoting unhealthy food all over the city.

The lack of policies and the lack of commitment of politicians promote the development of the obesogenic environment in Cairo. A fundamental change of behavior and mindset is needed to avoid a bigger catastrophe since Egypt’s health care system is currently in a crisis as well (Shukrallah & Khalil 2012).
8 Future outlook

It should be emphasized that the content of this thesis should not insult any overweight or obese Egyptian neither the Egyptian culture. Ideal of beauty should not be changed to look skinny; a normal weight status which decreases the risk of suffering from NCDs is aspired. The aim of this thesis is to shed some light on a currently neglected worldwide on-going epidemic, which can be mitigated by an environment built for humans rather than cars, economic interests and the struggle for symbolic dominance. Egypt is just one of the countries where its population suffers a lot from many grievances regarding the built environment which affects the weight status of Egyptians, especially in the ‘fat’ city of Cairo.

In the theoretical framework the development of obesity and built environment has been described as well as the relationship between these two subjects. Leaning onto that description helps to explore the development of the obesogenic environment in Cairo. The defined parameters determining the relationship of built environment and obesity enabled the assessment of Cairo’s obesogenic environment. This master thesis is a pioneer concerning the measuring of the relationship of built environment and obesity in a developing country as well as regarding the combination of the different qualitative and quantitative methodologies together. Of course, more research is needed to find the optimal combination of research methodologies, best in an interdisciplinary research team. Moreover, big cities in developing countries have a different progression than those in industrial countries.
as well as their own laws and rules. Thus the validity of theories has to be redefined so they can be applied to the new megacities in developing countries. Nevertheless, research results, applying the parameters which were defined in the theoretical framework, show that a relationship exists between built environment characteristics and the compounded BMI of the inhabitants of the four analysed areas.

The complexity of problems that Cairo faces in the year 2015 on a political, educational, cultural and social level contributes to the obesity epidemic. The demand for better health care and education were raised by many protesters during the revolution in 2011 (Shukrallah & Khalil 2012, p.485). Both have a direct linkage with obesity. The lack of knowledge about nutrition of Caireens contributes to their increased weight status. Awareness of having a balanced diet is low and once people suffer from a NCD, only a minority has the money to be treated by a doctor. Obesity is not any longer a matter of beauty in Cairo. More and more women are so obese that they cannot even get pregnant and suffer from many serious side effects of obesity. Low self-esteem, stress, social pressures, and depression are contributing factors to obesity under which Egyptian women suffer more than men (Rios 2015).

The city of Cairo does not offer its inhabitants places for relaxation. Traffic congestions, the absence of safety in traffic, high population densities and air pollution even contribute to the struggle in the big city life. Egyptians suffer from inability of their authorities and the lack of commitment for the implementation of policies or programs which would increase the quality of life in Cairo. Hereinafter recommendations are outlined how the obesity-epidemic might be tackled in Cairo and Egypt.

8.1 Recommendations for the fight against Cairo’s and Egypt’s obesity epidemic

The fight against obesity in Egypt needs a holistic plan ranging from micro to macro-level and from short to long-term. The WHO recognised the need to fight against obesity in the Eastern Mediterranean Region which includes Egypt. *The Framework for the implementation of Global Strategy on Diet, Physical Activity and Health in the Eastern Mediterranean Region* (WHO
2010) provides a stepwise, cultural sensitive approach of flexible and practical approaches to assist ministries of health in order to develop strategies and policies from micro- to macro-level. Integral parts of the framework are the implementation of urban planning and transportation policies which ensure walking and bicycling in a safe environment as well as “strategies towards changing social norms and improving community understanding and acceptance of the need to integrate physical activity into everyday life” (WHO 2010, p.12), with a special focus on creating a physical activity environment for women.

But changing the physical activity environment is time-consuming and expensive and is therefore considered as a long-term intervention. Action is needed immediately to stop the spread of obesity and to help people suffering from this disease. For the moment a conceivable solution to fight against obesity is to start awareness campaigns for changing Caireens’ behaviour and mind-sets. Best is to educate and teach people from the earliest age that a balanced diet combined with physical activity is the way to go for a healthy life. Therefore, nutrition as well as sport classes should be part of the curriculum in schools. Children can bring their gained knowledge home and influence the dietary behaviour of the whole family.

Another recommendation is nutrition counseling for people living in underserved communities. Indispensable condition, which should go along with the nutrition counseling in underserved communities, is the inclusion of vegetables and fruits in the Egyptian’s governmental food subsidy program. Especially the poor suffer from malnutrition and overweight at the same time due to the consumption of cheap energy-dense food. Nutritional advice in lower social classes is particularly important since they do not dispose the resources to treat side effects of obesity. The book *Obesity Interventions in Underseverd Communities, Evidence and Directions* (Brennan et al. 2014) offers a great variety of different approaches how to tackle the spreading obesity epidemic in disadvantaged communities. It suggests different interventions and innovations like fitness integration trainings, nutrition education at mobile markets, walking groups in public housing developments and discusses solutions for health equity. All the approaches are based on community empowerment.
Until now Egyptians associated health and weight loss with diets rather than with physical activity. Rios (2015) reports that “culture for exercise is slowly enticing women to leave the house.” Since Egyptians like to spend a lot of time in front of the television, an interim solution until Cairo’s built environment might be less life-endangering, could be fitness classes on TV, because many Egyptians cannot afford to be member in a gym or do not have time to leave the house. The whole family could work out together and support each other in the fight against overweight and obesity. Another idea could be the affixing of information posters, e.g. which encourage the people to take the stairs instead of the escalator in the metro station. This would help them to integrate minimal physical activity in their daily life and at the same time raise awareness regarding physical activity and obesity.

This recommendation should not be an excuse not to fix Cairo’s built environment. It will just take a long time bringing Cairo back on human scale. Public transportation needs to be expanded, sidewalks and bicycle paths constructed, traffic regulations tightened, traffic offenses sanctioned and a culture of regularly being physical active, valid for women and men, established. Gehl (2010) provides in his book “Cities for people” a toolbox and key principles, which can help to transform the urban environment around the world based on his research into the ways people actually use - or could use - the spaces where they live and work. Finally “making a healthy city is not only about good design, but also about empowerment of people in the city-making process” (Muessig 2015). Small scale urban initiatives can hereby play a major contribution in improving Cairo’s public realm. A few initiatives like CLUSTER (Cairo Lab for Urban Studies, Training and Environmental Research) and Colouring a Grey City, which intervene in Cairo’s planning and design, bring back zest for life, happiness and at the same time empower the residents (Mohamed 2015).

Improving Cairo’s environment to promote a healthier lifestyle and winning the fight against overweight and obesity presents an enormous challenge. This challenge has to be accepted from individuals as well as government departments and international organisations. A good sign is that the provision of a health-supporting built environment is also part of the currently
formulated UN Sustainable Development Goals (SDGs), which follows on the Millennium Development Goals (MDGs 2000-2015). Thereby, walking is “critical ingredient for achieving a range of these goals” (Thornton 2015) towards ensuring “healthy lives and promote well-being for all at all ages” (goal 3, Thornton 2015).

8.2 Back to the human dimension
It is helpful to go back and have a look at the dual root meaning of the word “city” - urbs (buildings) and civitas (people), because some people might believe that cities are all about bricks and mortar. The term ‘fat’ city has inherited the dual meaning of the word city. Fat city has been used in the scholarly literature as a metaphor to denote the city’s ever-expanding boundaries (urbs). As most of the cities are too big, obesity-related research has given fat city a more literal connotation: “the expanding waistlines of its residents (civitas)” (Sui 2006, p.82).

Since we humans beings, evolved as an active species and are not sessile creatures, we should take some exercise every day. No matter how clever or technologically advanced we become as a species, our biology still carries the past. Physical activity was part of our ancestors’ lifestyle for millions of years. All the while our ancestors faced difficulties in balancing the exertion and energy expenditure. But due to the non-observance of the human scale and putting planning-priorities on car traffic and economic growth, the respect for and dignity of people living in cities got lost.

Not only in Cairo the human dimension has been seriously neglected in connection with built environment in the past 50 years. Idem in the economically developed world, planning ideologies considering rapid motorization were given the preference. In developing countries cities grow very fast due to the urban population explosion and the burgeoning of economic opportunities. In the same time the amount of traffic gets higher and higher without the appropriate infrastructure. This has led to monumental problems in city streets. A few European cities already managed to overcome the planning mistakes of former times and recognised the need for creating cities built for people. Walking, bicycling, and taking public
transportation has become trendy in European cities. The same development becomes apparent with unhealthy food. The first fast food chain had to close some branches in Germany due to narrow market. People in the developed world experience and suffer from the consequences of too less physical activity and the consumption of unhealthy food. That’s the reason for the current change of behaviour and adjustment of mind-set of people living in developed countries. The challenge is now to persuade people living in cities in developing countries not to repeat the same mistakes and that a big belly and owning a car is not symbol of affluence.

Developing countries can only skip this process by raising the awareness of their populations towards a healthy lifestyle as well as providing them an infrastructure that helps to adopt and maintain an active lifestyle. The incorporation of the human dimension in all forms of urban projects will be an inevitable condition. Architecture and urban planning can be considered applied arts that deal with the lives of human beings in a given framework. Therefore and morally speaking, thoughtfulness, concern and empathy appear to be the most important ingredients to tackle obesity issues on the one hand. On the other hand and politically speaking a more regulatory social intent has to rise in order to prevent the on-going ‘capitalistic approach’ of city development from destroying the well-being and the health of the inhabitants.
Appendix

Questionnaire: Perceived neighborhood design

Date: ___________________________   Time: ___________________________

District:   o Garden City   o Al Golf   o El Kurba / Quobba   o Al Hada’ek

Age:     o < 18     o 19 – 30     o 31 – 45     o 46 – 60     o > 60

Gender:          o male              o female

Status:       o married        o unmarried

1. Walkability/physical activity

*Walking is defined as a mean of transport, exercise and a distance longer than 200m.

1.1 How often do you walk in your neighbourhood?

a) Several times a day   b) Once a day   c) A few times a week

d) A few times a month   e) Never   f) don’t know/ not sure

g) other: _______________

if a - d please answer the following questions:

1.1.1 On those days that you walk, how long (in minutes) is your usual walk (average)?

a) Less than 10 minutes   b) 10-19 minutes   c) 20-29 minutes   d) 30 minutes or more

1.1.2 What are the reasons why you walk in your neighbourhood?

(Multiple choice)

a) Exercise / sports       b) Going to bus stop/ public transportation

 c) Going to a daily services (super market butcher, bakery   d) Visit neighbours

e) Enjoy the outdoors   f) going to school/ work   g) other: ______________
1.2 Is this destination within a 10 minutes’ walk of your home?

<table>
<thead>
<tr>
<th>a) Place of worship/Mosque/Church</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Medical clinic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) School or nursery</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>d) Park or recreational facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Bank/ATM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Personal services (hairdresser, beauty salon, laundry, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Post office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Grocery store/supermarket/shopping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Restaurant or other places to eat</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Food environment

2.1 Do you think that the restaurants and food shops in your neighbourhood promote healthy food?

a) yes, nearly all shops and restaurants  b) most of the shops and restaurants
c) only a few restaurants and shops    d) no, none of them

e) don’t know

2.2 Do you think that the restaurants and food shops in your neighbourhood have any impact (positive or negative) on your weight?

a) yes, strong impact       b) yes, partially      c) only a bit       d) no, not at all

e) don’t know

3 Sidewalk experience

3.1 What would you say: There are sidewalks on most of the streets in my neighbourhood:

a) Yes, on both sides of almost all streets  b) Yes, on both sides of some streets
c) Yes, on one side of almost all streets  d) Yes, on one side of some streets
e) There are no sidewalks  f) don’t know

if a – d please answer the following:

3.1.1 What would you say: The sidewalks in my neighborhood are:

(Multiple choice)

a) Well maintained  b) Too narrow

c) Interrupted  d) Have a lot of cracks

e) Sidewalks are blocked by cars  f) Sidewalks are too high, walking up and down all the time makes walking exhausting
g) its smell is awful because of pee or garbage with urine

h) other: ____________________
4 Neighbourhood surroundings

4.1 Is it difficult for you to walk a 500m in your neighbourhood?
- a) Not at all difficult
- b) Only a little difficult
- c) Somewhat difficult
- d) Very difficult
- e) Do not do this activity
- f) don’t know

4.2 What would you say: There are trees along the streets in my neighborhood which makes walking on hot days comfortable?
- a) Yes, trees give enough shading
- b) Yes, trees give partially shading
- c) Only on a few spots tree give shading
- d) There are no trees
- e) don’t know

4.3 Does the garbage discourage you from walking in your neighbourhood?
- a) There is no garbage
- b) There is a bit, but it does not disturb
- c) There is, but I have to walk
- d) Garbage is a reason for me not to walk
- e) Don’t know/ not sure

4.4 There are many attractive sights in my neighborhood (public spaces, parks).
- a) Yes, many
- b) Some
- c) Only a few
- d) Not at all
- e) Don’t know

4.5 There are attractive buildings/home facades in my neighbourhood.
- a) Yes, many
- b) Some
- c) Only a few
- d) Not at all
- e) Don’t know

4.6 Are there public benches in my neighbourhood (e.g. social interaction, resting)?
- a) Yes, many
- b) Some
- c) Only a few
- d) No benches
- e) Don’t know

5 Safety from traffic

5.1 Do you feel safe from traffic while walking in your neighbourhood?
(1: very safe, 6: very unsafe)

<p>| | | | | | |</p>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

If 4 – 6: Do you let your kids play on the street?

5.1.1. Why do you feel unsafe from traffic? (Multiple choice)
- a) Exhausting fumes
- b) Noise from cars/ honking
- c) Cars surprising me from the back
- d) Drivers exceed speed limits, driving too fast
- e) No crossings or traffic lights
- f) I have to walk on the street
- g) Other: __________________
6 Safety from crime

6.1 Do you feel safe from crime while walking in your neighbourhood at daytime? (1: very safe – 6: very unsafe)

If 4 – 6: 6.1.1 Why do you feel unsafe walking? (Multiple choice)

a) Sexual harassment        b) No street light        c) Street dogs        d) High crime rate  

If 4 – 6: 

6.2 Do you feel safe from crime while walking in your neighbourhood at night?

(1: very safe – 6: very unsafe)

If 4 – 6: 6.2.1 Why do you feel unsafe walking? (Multiple choice)

a) Sexual harassment        b) No street light        c) Street dogs        d) High crime rate

7 Your neighbourhood, physical activity level and your weight

7.1 Do you do any vigorous activities (e.g. running, aerobics, heavy work), on a regular basis (1 – 2x a week) for at least 10 minutes which causes large increases in breathing or heart rate?

a) yes        b) no

7.2 Are you a member in any sports club or gym to keep yourself fit, resp. to lose weight?

a) yes        b) no

7.3 Do you think that the design of your neighbourhood has any impact on your weight?

a) yes        b) no        c) don’t know

Shukran kiteer
الاستجواب: تصوير لتصميم مجاورة سكنية داعمة للسير على الأقدام

الегодня: 
التاريخ: 

الوقت: 

الحالة العائلية: 
أعزب 0 متزوج 0 أثنا 0 ذكر 0 أنثى 0 جامع سبتي 0 حول 0 حداد القبة 0 سكينة

القدرة على السير/الأنشطة البدنية

القدرة على السير: يقصد بها كوسيلة للانتقال أو ممارسة رياضة السير أو التمرين وذلك لمسافة أطول من 200 م

1. عادة ما هي عدد مرات سيرك على الأقدام داخل منطقتك السكنية؟

<table>
<thead>
<tr>
<th>مرحلة</th>
<th>عدد مرات</th>
</tr>
</thead>
<tbody>
<tr>
<td>أ- مرات متعددة</td>
<td>لا لا تنقل سيراً على الأقدام</td>
</tr>
<tr>
<td>ب- مرة واحدة في اليوم</td>
<td>و- لا أعلم/ ليست متاكداً</td>
</tr>
<tr>
<td>ج- مرات قليلة</td>
<td>س- أخرى</td>
</tr>
<tr>
<td>د- مرات قليلة في الشهر</td>
<td></td>
</tr>
</tbody>
</table>

إذا كانت إجابتك تتحسَب بين أ إلى د من فضلك إجب على الأسئلة التالية...

1-1. خلال فترات سيرك المعتادة ما هي المدة التي تستغرقها (بالدقائق)؟

<table>
<thead>
<tr>
<th>مرحلة</th>
<th>عدد مرات</th>
</tr>
</thead>
<tbody>
<tr>
<td>أ- أقل من 10 دقائق</td>
<td>ج - 29-30 دقيقة</td>
</tr>
<tr>
<td>ب- 10-20 دقيقة</td>
<td>د - 21 دقيقة</td>
</tr>
<tr>
<td>ج - 19-20 دقيقة</td>
<td>د - 21 دقيقة</td>
</tr>
</tbody>
</table>

2-1. ما هو السبب الذي يجعلك تلجأ للسير على الأقدام داخل منطقتك السكنية؟

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<thead>
<tr>
<th>مرحلة</th>
<th>عدد مرات</th>
</tr>
</thead>
<tbody>
<tr>
<td>أ- الاستماع بالسير</td>
<td>ج - الاحتراف الرياضية</td>
</tr>
</tbody>
</table>
| ب- الذهاب إلى المدرسة/ توسيع الأطفال إلى المدرسة/ الذهاب للعمل | ج - الذهاب لقضاء الخدمات اليومية (الجزائر، البقالة، الفرن،...)
| ج - التجول في المنتزهات | د - زيارته الجيران |
| د - المشي للترفيه |

2-2. هل مسافات السير التالية تستغرق منك 10 دقائق؟

<table>
<thead>
<tr>
<th>مرحلة</th>
<th>عدد مرات</th>
</tr>
</thead>
<tbody>
<tr>
<td>أ- أماكن مذاك العادة (الجامع، الكنيسة)</td>
<td>ج - المكتبات</td>
</tr>
<tr>
<td>ب- الحديقة الطبية</td>
<td>ج - المدرسة أو الحضانة</td>
</tr>
<tr>
<td>ج - المدارس أو المدارس</td>
<td>ج - المدرسة أو الحضانة</td>
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<td>د - المدرسة أو المدارس</td>
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<tr>
<td>د - المدارس أو المدارس</td>
<td>ج - المدرسة أو الحضانة</td>
</tr>
</tbody>
</table>

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Religious practices

المتخصصة: مكانيّات السير، الكنيسة

Medical clinic

School/Kindergarten

Parks recreational services

Banks

Personal services

Mentorship/Post office

Restaurant/food stores

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148
1- هل تقوم بشراء الخضروات والفواكه (الطعام) بنفسك؟

- دائما ألجأ لتوصيل الخدمة للمنزل
- أغلب الوقت أقوم بنفسى بذلك
- أحيانا ألجأ لتوصيل الخدمة للمنزل
- أخيراً ...

2- البيئة الغذائية

1- هل تعتقد أن المطاعم ومحلات الطعام في منطقتك السكنية توفر أكل صحي؟

- لا أحد منهم
- نعم جموع المحلات
- لا آعلم
- بألبوب اللمحلات

2- هل تعتقد أن المطاعم في منطقتك السكنية لديها تأثير (إيجابي أو سلبي) على الصحة العامة؟

- لا أذكر قوى
- نعم إلى حد كبير
- لا آعلم
- بالي حالما

3- ممرات المشاة والأرصفة

1- ما تقولك نجى المقوله: "هناك أرصفة وممرات للمشاة في أغلب الشوارع بمنطقتي السكنية"؟

- لا يوجد أرصفة على جانبى الطرق
- يوجد أرصفة على جانبى الطرق
- لا أعلم

3- هل من الصعب لك أن تسير لمسافة 500 م داخل منطقتك السكنية؟

- نعم أجد صعوبة
- لا أجد الصعوبة
- لا أدرى/ غير متأكد

4- الحاويات الحضرية للمجاهرة

- هل من الصعب لك أن تسير لمسافة 500 م داخل منطقتك السكنية؟

- نعم أجد صعوبة
- لا أجد الصعوبة
- لا أدرى/ غير متأكد
1- لا يوجد قامة ملقاه في منطقتي السكنية
  - لا أعلم/ غير متأكد
  - يوجد القليل ولكنها لا تؤثر
  - يوجد مامة ملقاه ولكن يجب أن أسير (مشياً)

2- هل هناك العديد من الماظر الجذابة تستمع بها أثناء سيرك على الأقدام؟
  - لا يوجد
  - لا أعلم/ غير متأكد
  - يوجد

3- هل يوجد أشجار وم Tiles جعلت يجدها فً منطقتى السكنية
  - لا يوجد
  - لا أعلم/ غير متأكد
  - يوجد

4- هل يوجد مناطق للجلوس (ملكية عامة) في منطقتك السكنية؟
  - لا يوجد
  - لا أعلم/ غير متأكد
  - يوجد

5- هل يوجد عدٌد من الماظر الجذابة تستمع بها أثناء سيرك
  - لا يوجد
  - لا أعلم/ غير متأكد
  - يوجد

6- هل تشعر بالأمان تجاه الحركة الآلية أثناء سيرك على الأقدام؟
  - لا
  - نعم العدد
  - لا آعلم/ غير متأكد
  - بض منهما
  - ج- خليلاً

7- هل تشعر بالأمان تجاه الجرائم أثناء سيرك خلال ساعات النهار؟
  - لا
  - نعم العدد
  - لا آعلم/ غير متأكد
  - بض منهما
  - ج- خليلاً
لا أعرف

شكراً جزيلاً لوقتكم الثمين

---

1- هل تشعر بالأمن أثناء السير على الأقدام خلال الليل؟
   
   □ أمن جداً
   □ غير أمن تماماً
   □ أمن

2- هل تشعر بعدم الأمن أثناء السير على الأقدام في منطقتك السكنية؟
   
   □ أرقام الجريمة (السرقة)
   □ التحرش
   □ الشارع مظلم
   □ الكلاب الضالة

3- هل تشعر بالأمان تجاه الجرائم أثناء سيرك على الأقدام خلال الليل؟
   
   □ أمن جداً
   □ غير أمن تماماً
   □ أمن

4- هل تمارس أي أنشطة تضفي عليك اللعب البدني (جري، الأكروبات، رفع الأثقال)...
   
   □ ب-نعم
   □ ب-لا
   □ لا أعرف

5- هل تعتقد أن ترتيب العناصر والخدمات في منطقتك السكنية يؤثر على وزنك؟
   
   □ ب-نعم
   □ ب-لا
   □ لا أعرف

---

6- هل تتغير أوضاعية تناول الوجبات أثناء السير على الأقدام خلال الليل؟
   
   □ أشجار النخيل
   □ الصمغ
   □ السكر
   □ الشاي

7- هل تعتقد أن ترتيب العناصر والخدمات في منطقتك السكنية يؤثر على وزنك؟
   
   □ ب-نعم
   □ ب-لا
   □ لا أعرف
Bibliography


المستخلص

يتم تغذية هذه الورقة من قبل جزئين مختلفين. الهدف الأول هو وضع إطار نظري من أجل إثبات وجود علاقة بين البدانة والبيئة المبنية وكذلك تعريف المعايير القائدة على قياس هذه العلاقة.

والفُهد الثاني هو دراسة العلاقة بين بيئة القاهرة المبنية والبدانة استناداً إلى المعايير المحددة في الإطار النظري.

تعاني مصر من ارتفاع معدلات البدانة على مستوى العالم، إذ يتمتع ما يقارب من ٢٠٪ من البالغين في مصر بزيادة الوزن أو البدانة مع وجود فارق بين هذه المعدلات بين الريف والحضر. كما أن قبل النشاط البدني للقاهرةين واستهلاكهم للأغذية غير الصحية من الأسباب الرئيسية التي تسبب البدانة بالإضافة إلى صعوبة السيطرة على المشاكل الصحية المرتبطة. وبالوقت ذاته مدينة القاهرة تبدو خارجة عن السيطرة: من الاكتظاظ والإزدحام الشديد واستخدام المركبات لوسائل النقل الألية، وسوء نوعية الهواء، وعدم وجود مساحات عامة أمنة ومراقب ترفتية. ونتيجة هذه الظروف هي عدم وجود فرص للمشي وركوب الدراجات وغيرها من أشكال ممارسة الرياضة.

تقد ثبت اليوم أن بعض الأمراض يمكن تقليلها أو حتى معالجتها بالكيفية التي يتم بها تصميم البيئة المشيدة. لذلك كان حاسمًا لهذه الورقة استبيان ما إذا كان تصميم البيئة المشيدة هو العامل الأساسي الحاكم في كفاءة البدانة المفرطة لبعض القاهريين. كما اعتمدت الدراسة على مراجعة العديد من الأدبيات المتعلقة بالبدانة والبيئة المشيدة في القاهرة والعلاقة ما بينهما. كما تدرس هذه الورقة العلاقة بين البدانة المفرطة في القاهرة. فقد تم تطبيق بعض المناهج البحثية الاستقصائية على أربعة مناطق بالقاهرة (شباخات) ما بين طبقات الاجتماعية المتوسطة وعالية. وترتبث نتائج الاستبيان مع نتائج بعض الدراسات التي أجرتها مركز البحوث الاجتماعية بالجامعة الأمريكية بالقاهرة، والتي أشارت إلى وجود علاقة وإن كانت طفيفة بين كلا العنصرين.

كلمات الفهرسة: البدانة، زيادة الوزن، البيئة المشيدة، البيئة الغذائية، النشاط البدني، القدرة على السير، القاهرة
هذه الرسالة مقدمة في جامعة عين شمس وجامعة شوتجارت للحصول على درجة العمران المتكامل والتصميم المستدام. إن العمل الذي تحويه هذه الرسالة قد تم إنجازه بمعرفة الباحث سنة ... هذا ويقر الباحث أن العمل المقدم هو خلاصة بحثه الشخصي وأنه قد اتبع الإسلوب العلمي السليم في الإشارة إلى المواد المؤخوذه من المراجع العلمية كل في مكانه في مختلف أجزاء الرسالة.

وهو إقرار مني بذلك،

التوقيع:

الباحث: تريزا ماريا فلنجر
التاريخ: 17/07/2015
العلاقة بين البيئة المشيدة و البدانة
تقييم البيئة المسببة للبدانة في القاهرة

مقدمة للحصول على درجة الماجستير في العمران المتكامل والتصميم المستدام

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تاريخ المناقشة:..............

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