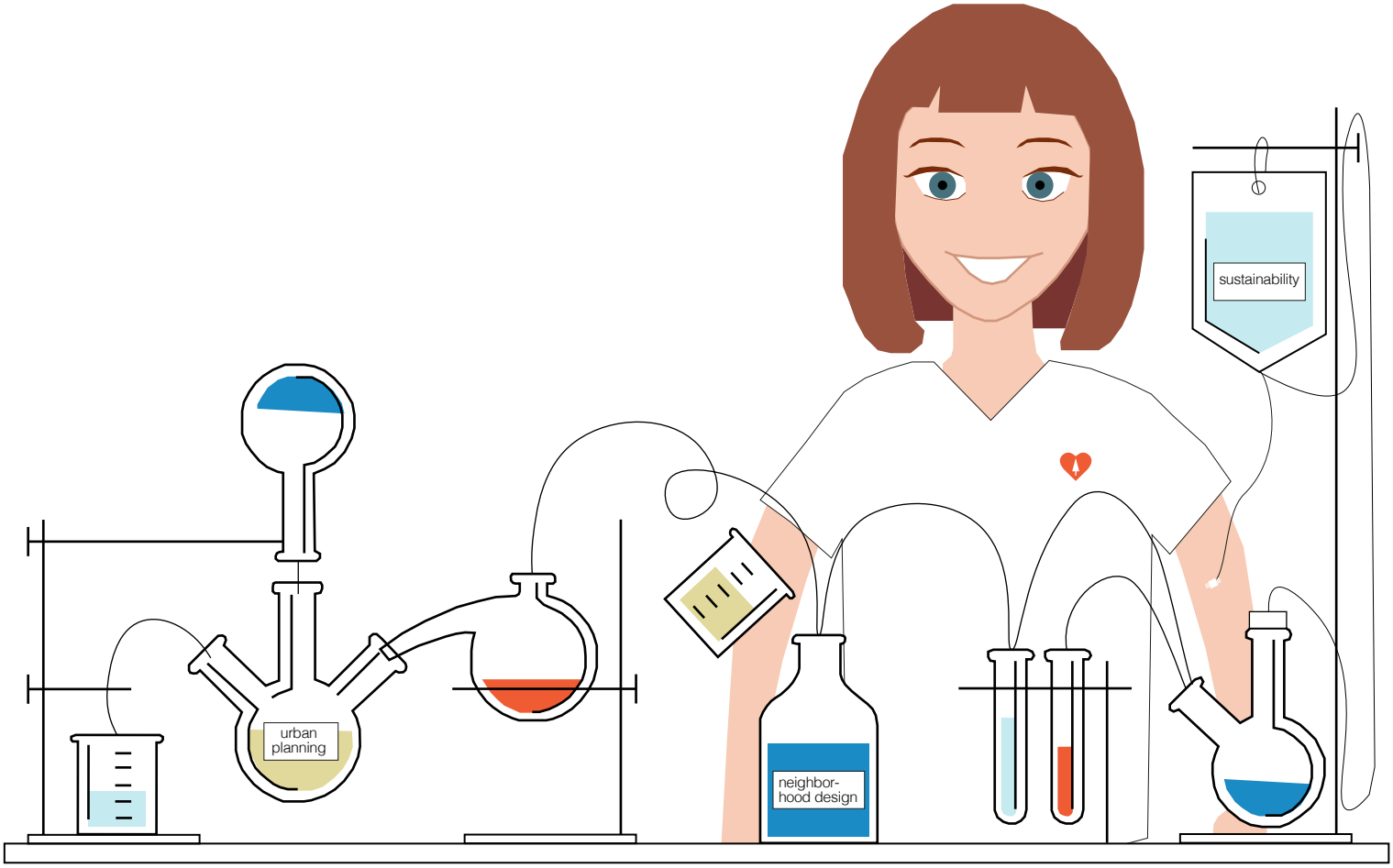

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HOW TO EXPLAIN SUSTAINABILITY

The future of urban planning researched through health

Abstract

The attempts made in history to design livable sustainable neighborhoods, have created dependency instead on motorized transportation and have increased the pressure of the city, leading to unsustainable environments and causing global climate change. To accomplish sustainability we introduce a new vision to explain what sustainability means in the built environment and how we can identify ourselves more with the term sustainability. In this thesis we explore therefore policies and strategies where the urban environment and public health meet each other. We believe that by increasing public health, a sustainable environment will be the result. To translate this into urban design, we suggest to design from the neighborhood, the building block of the city. By transforming neighborhoods into a network of healthy places we research how we can increase the quality (livability) of neighborhoods to increase public health, well-being and sustainability in the built environment.

Contents

1 Preface

1.1 Relevance

When I began with my Architectural study (2013), students around me complained about the word **sustainability**. The broad definition (to enhance economical, social, environmental and ecological interests) makes sustainability vague and people have lost their grasp upon. As David Owen (2009) says in his book *'The Green Metropolis'* sustainability is one of the most **abused words** in the English language in recent years. It lacks solid meaning. Yet what is it, over the long term, we are supposed to sustain? (Newton, Freyfogle, 2005)

In the built environment we experience also multiple ways to interpret sustainability. Mostly sustainability is confused with 'durability'. According to the Cambridge Dictionary, **durability** is the fact of something continuing to be used without getting damaged. Increasing life cycles of material, buildings and built environments are durable and therefore sustainable. Sustainability is the result, not a product! **Sustainability is the quality** of causing little or no damage to the environment and therefore able to continue for a long time. But how do we achieve sustainability?

Our behavior has caused global problems we now have to fix (Newton, Freyfogle, 2005). To achieve **behavioral change**, we need a new urban planning system which activates this new behavior and results in sustainability (and positive health benefits). We call this **healthy urban planning**. Next to that, people need to understand and identify themselves with the term 'sustainability'.

Understanding sustainability is crucial to encourage developments which will lead to sustainable environments so we can continue to live on it. Some think we need to be sustainable because of the government, or the EU. But that is not true. The reason we have to design sustainable is because of our **health**.

To understand idea of sustainability, we introduce a new approach with **health being the main goal**. Instead of designing 'sustainable' we design to increase our health. This way, on the long term, we will behave sustainable by designing healthy environments. By refering to health people feel more addressed towards sustainable developments (and will see the urgency of it). As the WHO puts it: "people find it often difficult to identify themselves with sustainability, while health in contrast is something everybody understands and with which everyone can identify" (WHO, 2000, p.5).
Also researchers believe by placing public health at the top of our agenda, a change of urban development towards sustainable development is possible and also needed. Moreover, a recent journal published an article saying it is also economically attractive to reduce carbon emissions while improving health ("Health benefits of climate action offset costs", 2019).

In this thesis we will practice this **new vision** of sustainability on urban scale. The way we currently design our urban environment, has caused negative effects on our health and contributed to global warming. Urban planning has

the power to be active on **micro-** and **macro-scale**, from neighborhood design till policies and strategies on (inter)national level. This, plus the fact that half of the world population lives in urban areas, makes it necessary to encourage healthy urban developments.

How can we increase the quality of the built environment to design and built for public health, well-being and sustainability?

1.2 Theoretical framework

Putting the definition of *the built environment* and *health* together we can argue that the built environment has an impact on or health by influencing and changing our **physical and social environment**. This is also argued by the World Health Organization, whom have published a book about *Healthy Urban Planning* (WHO, 2000). They explain the main determinants of health by the theory of Whitehead Daghlgren (2006).

1. ***The built environment*** *includes all buildings, spaces and products that are created or modified by people. The way we affect our built environment has impact on our physical and social environment, and therefore our health and quality of life.* (Srinivasan et al., 2003, p. 1446)
2. ***Health*** *can be defined as complete physical, mental and social well-being.* (Frumkin et al., 2011)

According to them, health can be seen as something which is determined firstly by your age, gender and factors you inherit from you parents. Next to these, also individual lifestyle, social communities, living and working conditions, and socioeconomic, cultural and environmental conditions are determining our health. These determinants are influenced by our built environment, and thus **urban planning**, the foundation of our built environment.

The intersection between health and the built environment
For many years health played a key role in urban planning. In historic sense, the first scale level where environment and health were brought together was the city (Wagenaar, 2015). The intersection between health and the built environment we call **environmental health**, which is a sub-field of what we call public health. In this thesis **public health** is defined as:

the dedication to fulfill society's interest in assuring conditions in which people can be healthy. These conditions can range from health-care systems to healthy environments. (Frumkin et al., 2011, p. 6)

The thought that our built environment can protect health can already been found in some ancient cities across the world where grid-like, hierarchical streets, monuments and public spaces, are carefully designed to manage water flow and buildings, reflecting efforts to protect health (Frumkin et al., 2011, p. 9).
The modern public health has made its appearance between the seventh- and eighteenth century, when industrialization an rapid population growth where threatening the health of the population. Many interventions that followed to increase public health, such as the need of water systems, sewer management and a better work conditions, where focused on the built environment (Frumkin et al., 2011). People came to realize people's physical circumstances can determine their health, and can be influences by the built environment.

Public health challenges
While our health generally has been improved the last centuries, global trends as **population growth** and **urbanization** are threatening our health in the twenty-one century. Currently, our population stands now close to 7.5 billion and almost 55% of people now live in cities. Moreover, projections indicate that total city population will rise from 4 billion to over 6 billion by 2050. To illustrate this, fifty years ago only three mega-cities were present in the world, while, according to the UN, there will be **41 mega-cities in 2030** (Grant et al., 2017). As the 'urban' is becoming the main habitat for humanity, cities themselves are hot-spots for large amount of **air pollution**, noise and heat islands effects, **physical inactivity** and neglected green spaces. Ineffective or absent urban and transport planning have resulted in high risks and challenges in public health (Barton, 2009; Grant, Braubach 2010; in Grant et al., 2017). For example, a recent study estimated that 20% of mortality may be premature because of poor urban management and pollution in Barcelona. (Mueller et al., 2017; in Grant et al., 2017).

Create health by design
Nevertheless, we have shown in history that we have the ability to control our urban habitat; and human health needs to be at the center of that. This rises opportunities for a new way of urban planning (Grant et al., 2017). Public health should therefore explore itself more to **create health**, next to its duty to sustain health.

A new way of urban planning
Public health is determined by our **behavior** (shaped by social networks, usage of health services, physical activity, waste management and consumption) and **living conditions** (physical and social environment, access to goods and health services) (Johnson, Gales, 2011). By looking at the **neighborhood scale** instead of city scale, we get the closest to citizens and where we can influence their behavior and living conditions. The way living conditions and behavior influence public health is measured by the **quality of the built environment**.

1.3 Research Questions

How can we increase the quality of the built environment to design and built for public health, well-being and sustainability?

Subquestions are:

- What can we learn from the attempts made in history to incorporate health in urban planning?
- What are the current policies/strategies an policies in relation to public health and sustainability?
- How can we translate these policies/strategies into urban planning?
- How can we use healthy urban planning for sustainable designs in neighborhoods?

1.4 Method

The method we use to answer our research question is a **meta-analysis** in which the relation between health, the built environment and sustainability will be researched and discussed. The goal of the thesis will firstly be to raise awareness on the link between the built environment, sustainability and health and secondly to introduce health as a tool to achieve better and sustainable urban planning.

1.5 Thesis structure

In this thesis, we will research how to increase the quality of the built environment to design and built for public health, well-being and sustainability. To give an answer on this question, the following chapters will first explain health in relation to urban planning and introduce the urgency of generating sustainability in urban planning. Secondly, we will reflect on the two most important urban visions in history in terms of sustainability and well-being. Thirdly, chapter 4 shows possible policies and strategies which could stimulate public health in urban planning in the future. In chapter 5 and 6 these strategies will be further explained by making cross-links between the design and transformation of the physical and asocial environment and how they increase the quality of the built environment.

2 Introduction

2.1 Health and the built environment

With **health**, we mean the state of our physical, mental and social well-being (Barton, Tsourou, 2000) and is known by environmentalists as livability. This new definition of health emerged in the latter part of the twentieth century, when health began to shift towards a social model. One saw health as the result of socioeconomic, cultural and environmental factors; housing conditions, employment and community (Barton, Tsourou, 2000) . This means our the way we design and redevelop **the built environment** influences our health. Therefore urban planning and policy making are of great importance to improve our health.

Moving away from the 20th century, where health was perceived mainly as a medical issue, we realized our mental, physical and social health is important too. These multiple health aspects are defined by our **well-being**. Our well-being relates to the state of happiness we find ourselves in. For example, experiencing stress has a negative effect on our well-being; it makes people unhappy and causes thereby negative mental health effects. Our well-being is influenced by several factors and influences many determinants. We can subdivide these factors in **four categories**:

- social interactions
- the built environment
- lifestyle
- human biology
- health-care systems

While we often think of health care systems, lifestyle and human biology in relation to our medical health, we consider less the environment as a factor of health. Yet it is **the quality** of the environment and its development that determine the state of our well-being and thus of our social, mental and physical health (WHO, 2000). How the built environment is designed determines the influence it has on social interactions (positively or negatively) and can trigger new lifestyles by behavioral changes. Like sustainability, health and well-being are a result of high quality built environments. Furthermore, **quality variations** of built environments are still present today and result in health inequities. Poor designed urban environments do not stimulate social interactions and healthy lifestyles. Increasing the quality of the built environment is the **key towards creating public health equity** with sustainable environments as a result. But how do we increase the quality of our built environment?

Globalization, population growth, urbanization and lifestyle are threatening our health and global climate. Tackling the treats of climate change means achieving sustainability that improves health and livability of the urban environment (Loftness, V. 2007). To design a urban environment for better health conditions, sustainable design should include the values of social and physical environmental determinants which influence the built environment and our health.

Though global warming is a global phenomenon, the impacts are not the everywhere the same (Johnson, Galea, 2011). In this thesis we explore the means of this new vision of sustainability through health. However, to turn this vision into practice, different stakeholders and professionals should discuss how this vision can be translates into their neighborhoods.

In history, many urban planners have thought about increasing the well-being of people through urban planning. The next chapter will discuss how health has always played a role during urbanization (Wagenaar, 2009) and we will discuss two urban planning concepts and review them in terms of sustainability.

3 Neighborhood planning in history

The **importance of neighborhoods** and the fact that they are a part of the the city network, can be explained through history. In historic sense, human settlements have always been divided into neighborhoods. Many urban planners and visionaries are interested into the neighborhood as a planning unit (Rohe, 2009; in Sharifi, 2016). While *'sustainability'* and *'sustainable neighborhood development'* are relatively new concepts, neighborhood planning has been practiced since the 20th century (Sharifi, 2016). Actually, we can see these sustainable concepts as a continuance of urban planning where we try **to develop and design livable and environment-friendly** neighborhoods. Therefore, we will discuss two European historical moments: the Garden City (UK) and the Post war period (NL).

3.1 The Garden city

Between 1870-1876 London was a hotbed for radical activities and 'causes' (Hardy, 1991a, p.30; in Hall, Ward, 2014) due to the industrial revolution and urban overcrowding. Many new groups in society emerged like *'Freedom'*, *'Commonweal'* and the Journal *To-Day*. All these groups wanted a new social order, but no one new how, until the appearance of the ideas of Ebenezer Howard (Hall, Ward, 2014).

Howard believed he had solved the complexity between land and the needs of a new social structure by the vision that the ideal community should be achieved, when one could determine land values by creating its own existence and efforts, resulting in a new social structure (Hall, Ward, 2014). This was the beginning of the Garden City Movement where the best features of the city and the countryside should be mixed. The new towns would be self-contained, surrounded by a greenbelt (Sharifi, 2016). This ideology translated itself into a concentric model of garden cities, which had a central park ringed by housing, schools, public buildings and other social functions. This network of towns would compete with the big cities (Wagenaar, 2015). To achieve a certain affordability, this meant the birth of green, low-density communities and the Garden City became the main example behind suburban development during the 20th century.

Howard's vision to divide the concentric city into multiple parts can be read as the first effort to introduce the relation between neighborhood and city scale in urban planning (Minnery, Knight, Byrne, Spencer, 2009; in Sharifi, 2015). According to the Garden City movement, to make neighborhoods healthier meant moving away from industries and the big cities. To divide the central city into a network of towns, the livability of the neighborhood would increase: light and space and green for everyone. However, the industries remained (and the pollution of the air) as the big cities, and by moving away from it (and introducing suburbia), we only made our health worse: we become more dependent on individual passive transportation (the car). Next to increased air pollution, the demand of fossil fuels grew rapidly.

3.2 Post-war period

Another example where health and urban planning are closely related is the Post-War period. After the Second World War (1945), the society was disrupted and the cities where damaged. It was time for new urban visions where architects had to reconsider their positions.

A new vision emerged among architects: the post-war cities should represent itself as a organized, independent structure, and would be a strong contradiction towards the chaotic former war-city. The previous (central) city structures where seen as 'too vulnerable': if the city got damages, everything (dwellings, shops, jobs, recreation) got damaged too (Smit, 2007). Here, the idea of decentralization came along: independent zones each with their own functions. The city would grow immensely so it would become less vulnerable and could expand easily. The city was seen as a machine, which would bring growth and welfare again to the country.

In this example, the shift of scale architects began to work is crucial. The big mono-functional neighborhoods where planned using a big scale which had big building blocks, big open spaces and lots of space for car users as a result. The consumption of space was thought of as 'liberation': a break-free from history.
Due to standardization, dwellings where seen as products, all with the same standards. In this way, many dwellings could been built in a short time. However, the standardization of dwellings did not create social interactions or nice public spaces where society could rehabilitate, but increased isolation of society instead since the large units and buildings stood independently in the (ideally endless) urban landscape (Wagenaar, 2015).

3.3 Conclusion

Both concepts argue for **decentralization of the city**. Instead of one dense urban environment, we shifted towards the idea of multiple suburban places which where linked to each other. However the built environment, whether it is suburban or not, is not a garden nor a machine. The low density communities with large street networks, and with no function mix within the neighborhood, created **large distances** between functions, stimulating car use instead of active transportation (Saelens et al., 2003). The suburban character of both concepts **created dependency** instead of in-dependency resulting in the rapid expansion **of motorized transportation networks**.

The city is our living environment, which we share with other people. It is serving and influencing us. This environment we create by ourselves: we determine what is influencing us and how it effects or health. To achieve our 'ideal' living environment, we have influenced the natural and the urban environment over time to increase our well-being. But while well-being can result to good health conditions it is not the same. Our well-being has been influenced by **welfare and power** (meaning: power to grow, expand and consume) (De Correspondent, 2019) not by health intentions. While urbanists and architects where looking for the 'ideal' living environment, we began to destroy

exactly that: the **balance** between the built (urban) and the un-built (natural) environments. But how can we as urban planners design sustainable neighborhoods in the future?

Over the past few years, some measurements have been designed to test a neighborhood on its sustainable character. Programs as LEED, BREAM and NSA tools are examples of those. However, analysis has shown these programs lack balance in considering all pillars of sustainability (economic, social, environment and ecological) (Komeily, Srinivasan, 2015). Thus, if we focus on the pillars of sustainability it is hard to measure if a neighborhood is sustainable or not. But if we focus on health we can measure the sustainability level (the quality) of the neighborhood. This way, neighborhood design can be used as a tool for cleaner, healthier urban environments (Marshall, 2009)

The next chapter will show how the Sustainable Development goals (which can improve health globally) to set up policies towards healthier neighborhoods.

4 Strategies and Policies

Due to the global climate change, increased awareness of the links between human health and the environment, have been translated into a global concept of sustainable development, which demands multidisciplinary action. The creation of the **Sustainable Development Goals (SDGs)** and **the Paris Agreement** are examples of these global concepts. These concepts could be seen as major public health opportunities. In this chapter, we will make a selection out of all the SDGs, which are influencing our social and physical environment and behavior, to create policies and strategies for better public health in neighborhoods.

4.1 Health as a central element

The concept of the Paris Argeement is to *"strengthen the global response to climate change, in the context of sustainable development"* (WHO, 2018). With this concept the climate change agenda, the Agenda 2030 and the SDGs are being linked . If the SGDs could improve health globally, encouragement to achieve them is important. This makes the Paris Agreement possibly the strongest public health agreement of the century (WHO, 2018). An other important policy opportunity to advance health and climate goal together took place in 2018, where world leaders committed themselves at the UN General Assembly to tackle the **NCDs**. Reducing air pollution was recognized as integral to meeting the goals (WHO, 2018).

To *create* health, the Sustainable Development Goals are used on global as well as on national level. Currently, countries use them to raise awareness among sustainability and as a starting point for sustainable strategies. For example, from 2016 the Dutch government started translating the SGDs into various national policies (Ploumen, 2016). In this thesis we focus on urban planning in general, without focusing on nationalities. From the seventeen Sustainable Developments, we will discuss three in this thesis:

- **Goal 9**
  Build resilient infrastructure, promote sustainable industrialization and foster innovation.
- **Goal 10**
  Reduce inequality
- **Goal 11**
  Make cities inclusive, safe, resilient and sustainable

On the next pages we will discuss the problems we currently encounter related to these goals and the urban environment in relation to our public health, following by concepts how we could tackle these problems. In the next chapter, we will explain how these concepts could function as ingredients towards the design of healthy urban environments.

09

Built resilient infrastructure, promote inclusive and sustainable industries and foster innovation.

4.2 Build resilient infrastructure, promote sustainable industrialization and foster innovation

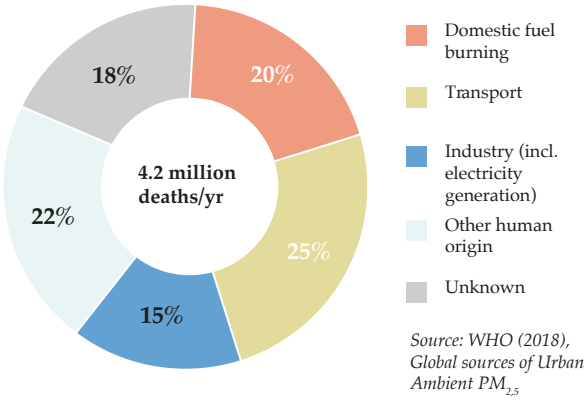
From the figure below we see approximately 25% of urban air pollution from fine particle matter is contributed by traffic, 15% by industrial activities (including electricity generation), 20% by fuel burning, 22% from unspecified sources and 18% by natural resources (WHO, 2018, p. 16).

Next to that, 90% of the urban population of the world breathes air containing levels of outdoor pollutants that exceed WHO's guidelines. Air pollution is considered to be the second leading cause of deaths from NCDs worldwide (WHO, 2018). Urban ambient sources (such as black carbon, methane and ground-level ozone) can contribute both to health damage as to climate change.

Apart from these pollutants, the global warming will also worsen the air quality. Air pollution has no boundaries and has a global impact, which is why immediate action is required within our urban planning.

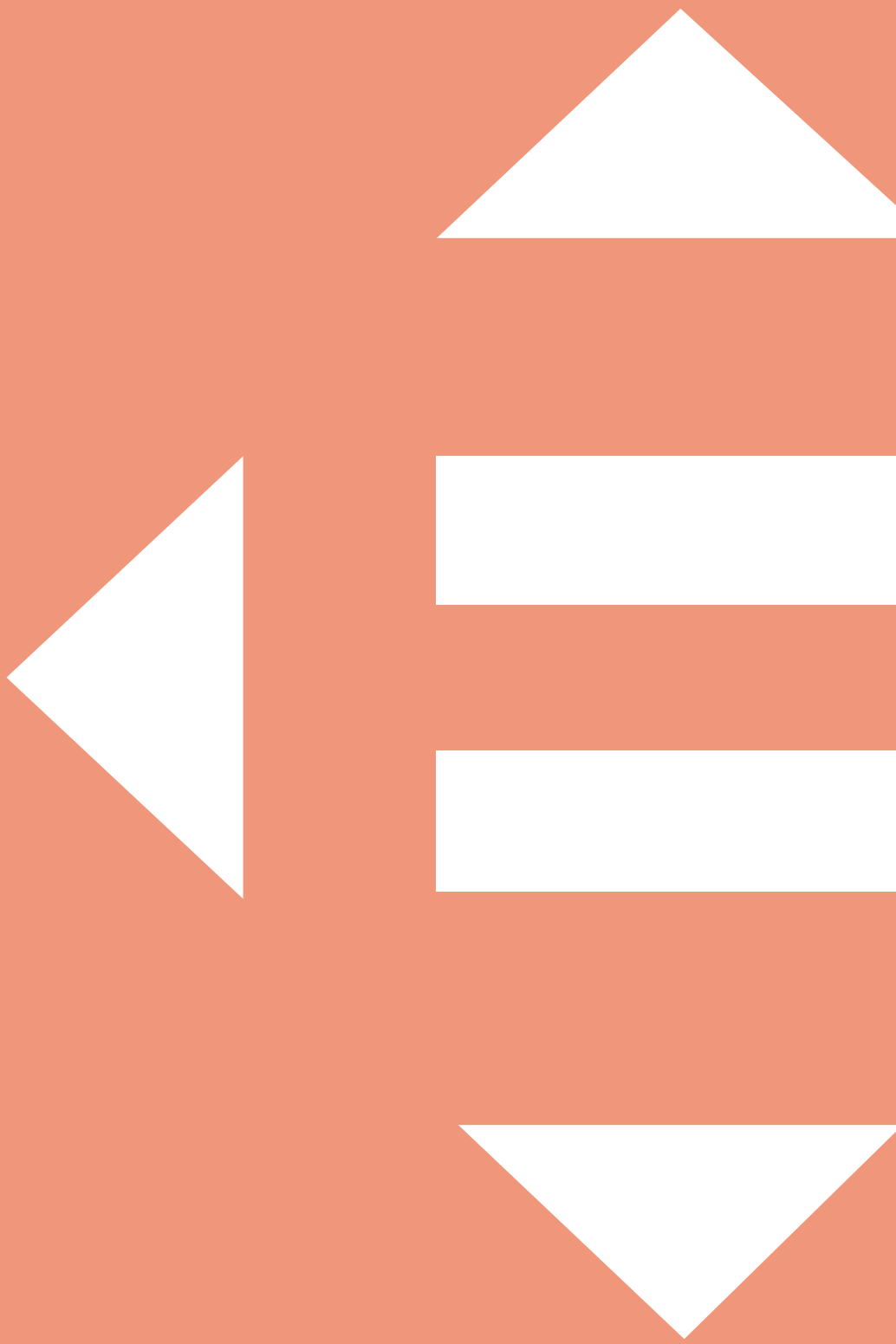
Policies have been suggested by the World Health Organization to reduce the dependence of fossil fuels and air pollution (WHO, 2000). Possible policies to reduce air pollution are:

- Increase housing density near local facilities and public transport services
- Encourage local shops, schools and leisure activities
- Develop a local network of places
- Plan safe and convenient bicycle and pedestrian paths
- Improve access to public space (economically and spatially)



Source: WHO (2018), Global sources of Urban Ambient $PM_{2.5}$

10 Reduce inequality of the built environment



4.3 Reduce inequity of the built environment

Apart form promoting health in urban planning generally, extra attention should be given to health inequity, since it is still seen globally. Of course within any country, differences in health do occur across the population; due to the natural process, biologically, or due to individual diseases. These we call *health variations.* With health inequity we mean systematic difference (inequality) in health status between various socioeconomic groups (Dahlgren, Whitehead, 2007). In the built environment, we see health inequity into bad designed urban environments, among which bad quality of public space conditions, air pollution and a lack of recreational space. Recently the WHO (2019) published an article showing housing inequalities in Europe: poor households in western European countries report 3.3 times more difficulty in keeping their homes warm compared to non-poor households.

On the other hand, *health equity* means the understanding that everyone has different needs to live in good health and ensuring all this needs are provided to one (the Gehl institute, 2018). Examples of these personal needs are of course medical access, but also access to good jobs, education, healthy food, safe environments, recreation and social facilities and affordable housing (the Gehl institute, 2018).

Through Europe health inequities are still present. For example in the Netherlands there is a difference of 5 years of life between men from low and high levels of education (van de Water, Boshuizen, Perenboom, 1996; in Dahlgren, Whitehead, 2007). The decrease in health, along with the decrease of ones social position is also called the *social gradient* (Marmot, 2004; in Dahlgren, Whitehead, 2007). Unequal distribution of education, employment, recreation, work and leisure, affordable homes and goods within the city creates inequality of living a healthy life. The unequal distribution of health-damaging experiences (like for example bad air, no recreational opportunities, unemployment) is not a natural phenomenon but is the result the communication between bad politics, poor social and economical policies, programs, and developments (Marmot et al., 2008). In conclusion, our daily life social determinants influences our health status and is the main cause of health inequity between and within countries.

Policies to achieve equity include improving the living and working conditions of deprived people and raising the quality of social and physical environments (WHO, 2000). These goals can be achieved by:

- Transforming the physical and social environment
- Enabling healthy lifestyles (such as active transport)
- Making services accessible to all

11 Sustainable cities and communities

4.4 Make cities inclusive, safe, resilient and sustainable

Goal 11, is a combination of three city approaches: the inclusive city, the safe and resilient city and the sustainable city. We will explain these approaches briefly, to clarify what this goal is about.

- **The inclusive city**
  Social health equity is created when the provision of accessible goods and services is available to all the members of the community (Talen, 1999; in Davern et al., 2017). Planning for good accessible social infrastructures should therefore be considered within the strategic planning of urban environments.

- **The safe and resilient city**
  The current transportation structures of the urban environment (made form visions of the past) the are stimulating climate change and unhealthy living environments. Therefore the urban transportation network should be redesigned, considering multiple scales. For urban neighborhood many active transportation has positive effects on safety and health in that neighborhood (Gehl Insititute, 2018). Furthermore, in urban cities innovation is needed towards public transport networks. Data from *International Energy Agency* shows us that rail has a significantly lower energy footprint than trucks and passenger cars (Hoffrichter, 2019). However apart from passengers also freight transportation is using the railway network. Managing both on the same railway network is possible, but is a challenge that needs (inter)national attention.

- **The sustainable city**
  The role of cities in sustainable development has become more important, since most of the worlds population is living in urban areas. However the concept of a sustainable city, can only contribute to overall sustainability when its built environments where the city is depending on are sustainable (Choguill, 2008). This makes neighborhoods as important as other urban systems. Both planners and policy have to understand that the design of neighborhoods are of great importance as they are the building blocks of cities (Searfoos, 2011; in Kormeily, Srinivasan, 2015).

To achieve this goal we can combine policies of goal 9 en 10, while adding the sustainability wish of cities. This results in the following policies to make cities inclusive, safe, resilient and sustainable:

- Making services accessible to all
- Plan safe and convenient bicycle and pedestrian paths
- Improve access to public space (economically and spatially)
- Develop a local network of places
- Changing the physical and social environment of neighborhoods

4.5 Conclusion

Health and sustainable development are interconnected, and bad developments can adversely affect the health of many people (WHO, 2000). Important global events which link health and sustainability are the Paris Agreement (2015) and the UN General Assembly (2018). Apart from promoting the SGDs, special attention has been given to urban air pollution, due to the threat NOx emmissions which damage public health. Also inequity within the physical and social environment and the different roles cities play in making sustainable environments have been addressed. Of these topics policies emerged which could help to create and improve public health in urban planning.

From these policies we formulated two strategies:

- Design a local network of healthy places (accessible public space)
- Transforming neighborhoods (balance between the built and un-built tissue)

Together they transform the physical and social environment. With these strategies, we reach both building blocks of the urban environment (building mass and public space). Together they cover all the policies mentioned in this chapter (see factsheet on the next page). In the following chapters, we will elaborate these strategies further, showing the relationship between public space, built mass and public health.

Framework

Sustainability goals - policies

Policies			=		
Increase housing density near local facilities and public transport services	x			x	Develop a local network of healthy places
Encourage local shops, schools and leisure activities	x			x	
Develop a network of places *(strengthen social network of the city)*	x			x	Changing the physical and social environment
Plan safe and convenient bicycle and pedestrian paths *(improve accessability by active transport)*	x			x	Increase housing density near local facilities and public tranport services Making services accessible for all Encourage local shops, schools and leisure activities Plan safe and convenient bicycle and pedestrian paths. Improve access to pubic space Sustainability in cities and communities should begin on neighborhood scale
Improve access to public space *(economically, socially and spacially)*	x			x	
Changing the physical and social environment		x		x	
Enabling healthy lifestyles *(such as active transport and recreation)*		x		x	
Making services accessible for all		x		x	
Sustainability in cities and communities should be tackled on neighborhood scale.				x	

Framework

Sustainability goals - policies

Policies	*Health aspects*		
	Physical	*Mental*	*Social*
			
Develop a local network of healthy places	x	x	x
Making services accessible for all Improve access to pubic space			
Transforming neighborhoods	x		x
Changing the physical and social environment Increase housing density near local facilities and public tranport services Encourage local shops, schools and leisure activities Plan safe and convenient bicycle and pedestrian paths. Sustainability in cities and communities should begin on neighborhood scale			

5 Healthy places

5.1 Network of public places

Apart from the place itself, the connection and the amount of public places within the neighborhoods may be even more important. Currently public places do not encourage people to go outside, due to the lack of sidewalks, air pollution and technologies that stimulate people to isolate themselves into their homes and to be physically inactive (Srinivasan, 2003). **Physical inactivity** and outdoor urban air pollution are ranked as one and two of the top fifteen global health threats (Ezzatti et al. 2002; in Marshall, 2009). Furthermore, physical inactivity and the lack of good connected public places results in less social interactions which also have a negative result on social health.

This chapter will make a distinction between the public place itself and the transportation in public space, which is the connector between the places. Both topics will show cross-relations between designing healthy places in public space and creating public health by supporting mental, physical and social aspects of health.

5.2 Inclusive public places

The reason why public places are important to have in our living environment and why they should be inclusive and could create public health, is because according to Staats (2016) public places do:

- stimulating intellectual development,
- learning of civility and tolerance,
- development of political action capability
- supporting mental and physical health

The accessibility of a place is determined by its quality and safety which are on their turn determined by the **characteristics** of the public place. Characteristics such as the presence of nature and welcoming edges and entrances do stimulate the accessibility of a place (Gehl Institute, 2018). Apart from that, encouragement of **different uses and the level of maintenance** also determines if a places has a certain quality or not. The use and form of public places are influenced by the location within the neighborhood, and the function of the place. All these characteristics can stimulate social and mental health outcomes. Together they can create social ties which could grow into social capital, which is one of the ingredients towards social inclusiveness (Gehl Institue, 2028).

Stimulating mental health
Places such as parks, streets or playgrounds are part of the **social infrastructures** in the city. Social infrastructures provide essential resources for society that **support the individual and community well-being** (Goe and Green (2005) in Davern et al. 2017). Moreover, if we do feel comfortable in a place, we

can grow attached to it. Place attachment and social infrastructure influences the individual satisfaction (stimulating mental health) and the ceation of a local community. Therefore, they contribute to the livability of the place. This makes public space essential for good health and well-being (Gehl Insitute, 2018).

Stimulating social health
Urban planners and designers can influence the way people get attached to a place by designing places that are attractive, stimulate social interactions, invite people to linger (Suillivan, Chang, 2011; Gehl Institute 2018) and have a positive influence on mental health. **Social ties** among individuals, neighbors or other groups are valuable and have a positive health outcome. These social ties are the product of social support and sense of community, which are influenced by place attachment. Social ties help people to create self organizing neighborhoods and are the foundations on which **social capital** develops. Social capital affects health through network-based resources and increases social control. (Suillivan, Chang, 2011).

5.3 Physical activity and accessibility

The connection between this network of places is made by transportation networks. We distinguish three types of transportation: transportation by car, by bike or by foot (active transportation and public transportation (by train, tram, bus).

Active transportation is an important lifestyle aspect of improving long- term health. It is the most beneficial behavioral change to increase health and reduce climate mitigation (COP24, 2018), which can be largely influenced by the design of the built environment. Active transportation can not only reduce air pollution, but could also increase healthy lifestyles by decreasing the amount of physical inactivity (Sealens et al., 2003, p. 80). Activities such as walking and cycling can be done for various purposes: for leisure, recreation, exercise, for basic transportation towards work, or commercial facilities. Moreover, a lot of daily movements (a trip from origin to destination) are short, not work related and close to home (Sealens et al., 2003).

The choice of using active or passive transportation are determined by the denseness (or compactness) of the neighborhood and the land use mix (variety of shops, offices, recreational and leisure). Together they design the distances we have to encounter to full fill our daily needs. If those distances are short (high proximity, high connectivity) its more likely to use active transportation (walking and cycling) to reach our daily destinations.

Many researchers believe neighborhood design and the choice of transportation are influencing one another. Factors influencing the choice of the transportation type (active or passive) are based on two fundamentals, which are influenced by the denseness *(compactness)* and land us mix of the neighborhood (Sealens et al., 2003):

- proximity (distance)
- connectivity (directness of travel)

These fundamentals are also confirmed by the Healthy Cities movement, who defined 5 characteristics (the 5 D's) to accomplish a healthy neighborhood (Ewing, 2011). The 5 D's are: density, diversity *(land use mix)*, design, destination accessibility *(proximity)*, and distance to transit *(connectivity)*.

Car independence
The association between healthy neighborhoods and active transportation is to achieve car independence. To achieve car independence, we have to create various options of transportation which are compatible with the car. Apart from active transportation, which demands short distances, density and diversity of neighborhoods, the use of public transport is also heavily correlated with density of neighborhoods. Public transport can overcome larger distances, and is (when it drives on clean fuels or electricity) also associated with multiple health benefits (COP24, 2018). Traffic injuries, noise-related stress and other mental health issues due to high-volume traffic (WHO (2011) in COP24, 2018) can be overcome. Moreover, reaching independence of car use, which is focused on the individual, public transport can increase equity, increasing the mobility of all. Increasing the mobility of all could influence the accessibility of public goods. This means the transformation of neighborhoods should focus of transportation independence which will foster healthier lifestyles and which could lead to sustainable behavioral changes.

5.4 Conclusion

Air pollution and lack of active transport stimulate negative health outcomes. However, neighborhood design can influences walking and other activities, as well as the quantity of air pollution (Marshall, 2009). This means transformation of the neighborhood environment.

The design of a network of public space can contribute to the transformation of the neighborhood environment. Firstly, the way places are designed can positively effect mental and social health, being part of a social infrastructure and feeling attached to a place. These are also the ingredients where social interactions, ties and capital can develop form which are the base for social inclusion. Secondly, the way public space (as a connector between these healthy places) can influence the choice between motorized and non motorized transportation. Since physical inactivity has become a serious health treat, active transportation should be stimulated through public space design. However to make active transportation attractive we have to increase the proximity and connectivity between public places. Proximity and connectivity of public places are associated with the level of density, diversity and design of the neighborhood.

6 Transforming the neighborhood

The capability of neighborhood design to create a sense of place, as well as livable walkable neighborhoods (by supporting pedestrian oriented and human-scale environments) (Stanislav, Chin, 2019) enhance every aspect of health (mental, physical and social). As we have read in the previous chapter, the way the neighborhood is being designed, contributes to the creation of place attachment, social infrastructures and physical activities, with have high health benefits. We also saw that, in order to design the healthy neighborhood, we need to increase accessibility of public place. This is where the urban build tissue do play an important role.

The location within the neighborhood varies in density, diversity and design, and influences the use, form and characteristics of a place. Moreover the 3D's also influence the destination accessibility and distance of transit from place to place and therefore the choice of transportation type.

6.1 Density and diversity

Jane Jacobs (1961) has already said that density and diversity are key to let communities work. For example, the diversity of apartments made it possible to mix businesses and neighbors and were not segregated by wealth. She also stresses that when people live closely together they interact with each other, while people living in a rural area rather avoid each other. Therefore, densification could make cities healthier, happier, and greener since everything is close by. And when everything is close by, transportation yourself is not a big issue anymore.
But of course, high density has its disadvantages too. If you live in a big metropolis, you can feel uncomfortable by the large numbers of citizens, the underground metro lines, the small apartments. And if there is a disaster, the impact on the citizens will be huge. However, dense urban cities can be a solution to deal with our dilemma of the increasing population growth and saving our planet.

This is why David Owen (2009) introduces three lessons which transform the urban living environment, to achieve a sustainable (high quality) urban environment;

- *Live smaller.*
  Second half of the second century the size of a household of the First World doubled. This is space consuming but also the energy used increased rapidly. In the Netherlands we now have to deal with a huge demand for housing but not enough houses to satisfy this demand. And if we have to built new houses, which environment is going to be 'sacrificed' for the built environment?

- *Live closer.*
  If we life closer together, we can live, play and work within a distance that can be realized by public transport, a bicycle or on foot. We can live more efficient and use less.

- *Drive less.*
  The problem with cars is, that they make it too easy for people to travel big distances; to spread out, encouraging developments elsewhere which are wasteful and damaging the environment. Another problem is that product designers and politics make the car very attractive object to use (cheap, pretty and solving congestion). What we really need is the opposite: making driving less pleasant and costlier. And that, will be a true challenge.

But what if we can increase the amount of houses, mixed with local shops, schools, leisure- and recreational activities by making neighborhoods denser? Firtsly, we will use the space we design for ourselves (the urban environment) more often, for multiple uses and for everyone accessible (close by). And secondly, we can support inclusion of diverse groups, stimulate physical activity and reduce climate mitigation. This is why I believe density can help us to in-balance our urban and natural environment. It can help us to be physical active: the greatest environmental benefits of population density is that destination become close by, which encourages people automatically to transport themselves non-motorized.

6.2 Design

Adaptation and Transformation
Of course, when transforming neighborhoods into more dense places, we need to be careful. This is why we use "transformation" instead of "demolishing" or "redesigning". The identity, an therefore the history of each neighborhood should be preserved. No neighborhood is the same, and we should not desire monotonous neighborhoods again. However the need for **smaller blocks** (Jacobs, 1961), and a **small scale network** should be implemented to achieve high proximity and connectivity between and within the neighborhood(s). This also means that the b (previous chapter) should also be part of the small scale network. Parks, playgrounds and square do not always have to be big; a high concentration of small positive public places can link different social environments and stimulates interaction and use of and in these places. A strong small network can make people **feel independent**, creating various options to chose from, all within an acceptable distance.

Sidewalks and bicycle paths
Streets and their sidewalks form the main public spaces of the city and are the cities' most vital organs (Jacobs, 1961, p. 29). The way we experience the street, influences how we experience the city. A street is is considered safe, when the street is taken care of by the city council and the citizens. Their should be a clear deviation between public and private space, and their should be eyes on the street (meaning the building should orient towards the street). Moreover the street should have users, which also encourages people to watch the street and increases streets activity (Jacobs, 1961). Apart from health benefits, the stimulation of active transport in neighborhoods can also lead to safer streets and social cohesion. For the stimulation of active transport, not every sidewalk has to be huge in size. Depending on the location in the city network, the streets, which connect the neighborhoods with each other, can have differ-

ent sizes. Important is however that a street consists of more than one type of transportation, the mix of bicycle, pedestrian and even car use is necessary to achieve maximum use of the street network and to create a street identity which shapes the neighborhood.

6.3 Conclusion

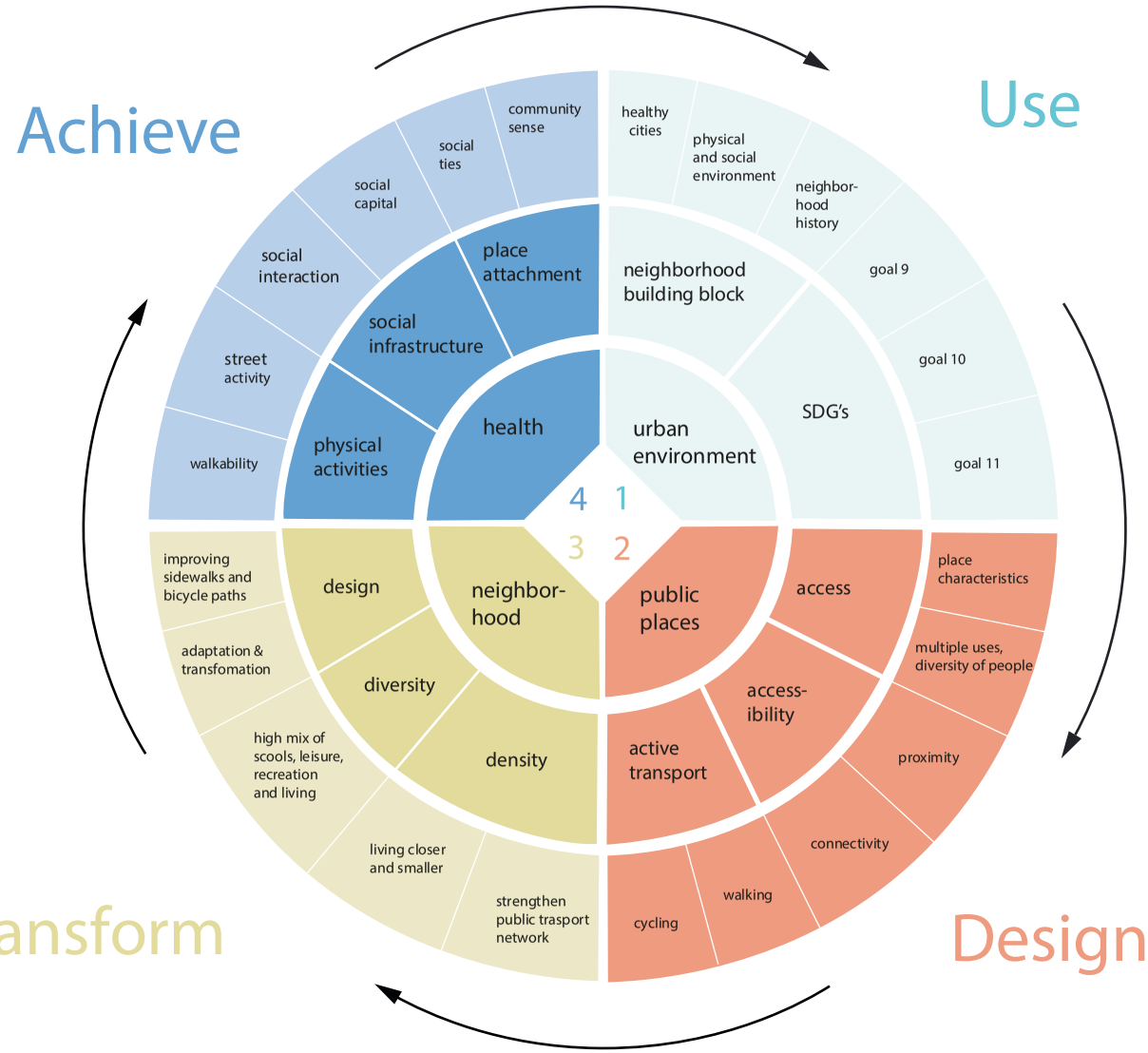
Next to the network of public places, we have to adapt our current neighborhoods on density, diversity and design level. High density levels have pro's and cons, but if we compare them with possible behavioral changes and possible qualities in the urban environment, high density can be related to positive health outcomes. High density is strongly related to high proximity and connectivity rates which stimulate active transportation and a high concentration of diversity within small distances. Of course some interventions we discussed will be perceived as something negative such as "living smaller". However, if the quality of the outdoor (as well as the indoor) environment is good and our public goods are nearby, we will probably spent more time outdoors. Like we said in the beginning of this thesis, we shape our own environment. It is time we realize how our choices influence our health and how that relates to climate change. Designing sustainable form a health perspective is not hard or complicated: it only requires collective support.

For a summary of this thesis, the tools and ingredients we discussed to design healthy environments, see the factsheet on the next page.

Framework

Healthy neighborhood

This framwork can be read as an summary of this thesis. We took the history of neighborhood planning as a starting point, and from that we used teh SGDs (chapter 4) to design healthy places (chapter 5) and to transform the current neighborhood (chapter 6). The way we use, design and transform the built environment is refelcted in the quality of the environment, which influences our public health status. High public health (and therfore sustainability) can be achieved by the usage of micro (neighbood) and macro scale (global policies), the design of accessable inclusive public spaces, and to transform neighborhoods into high density, diverse ans active neighborhoods.



7 Conclusion

Many urban planners and designers are interested in neighborhood design. While the "sustainable neighborhood" is a relatively new concept, the aim in urban planning to develop and design livable (healthy) neighborhoods is not new. The attempts made in history to design livable neighborhoods, by creating suburbs, has created dependency instead of in-dependency an has thereby enlarged the pressure on the city (and increased its centrality). Growth of motorized transport use and rapid expansion (at the cost of our natural environment) have been the results. These developments have affected our health (physically, mentally and socially) and shown to be unsustainable.

To accomplish sustainability in the urban environment, we need to redesign the neighborhoods. For that, we have to change our opinion about the neighborhood: instead of the neighborhood being a unit depending on the city, the neighborhood is a building block of the city. The status of our public health and well-being is here a way to measure the sustainability (and thus quality) of the neighborhood.

The policies derived from the SGDs formulated to strategies which would include all policies and create public health. The first strategy is to create a network of inclusive public places which connects the neighborhoods (an thus the city) and stimulates social interactions, place-attachment and physical activity. The second strategy is to transform the existing neighborhood in terms of density, diversity and design. Together the strategies shape the characteristics of places and encourage non motorized transportation by improving the proximity and connectivity between places and facilities in and across neighborhoods (using the 5D's of the Healthy City Movement). This translates itself into high quality neighborhood planning with sustainable neighborhoods (and thereby cities) as a result. This also means that sustainable cities in the future need to be healthy cities (Capon, Thompson, 2011). The goal however will remain the same: making healthy neighborhoods where public health is created by the urban planning.

8 Discussion

During the thesis, some decisions have been made to make the thesis understandable and coherent. However, not everything could be discussed in full detail. Therefore I would like to introduce some topics which are open for discussion:

- The selection of SGDs is considered carefully. However, other goals can also be used to formulate policies and strategies for the built environment, such as goal 6 *"Ensure access to water and sanitation for all"* and goal 7 *"Ensure access to affordable, reliable, sustainable and modern energy for all"*.
- Every neighborhood is unique in its way and it would be foolish to treat them as the same. Since we consider diversity as one of the tools to achieve active, healthy environments should value all sorts of neighborhoods. This is why we argue to organize the neighborhoods according to their building typology (and time in history). This way, qualities and characteristics of the neighborhood can be remained, and diversity be guaranteed.
- It is important to realize, while we focus on healthy urban planning, the built environment is designed by several other professions such as landscape architects, architects and civil engineers. All these professions thus influence our environmental health by designing our built environment. It is important that these professions share knowledge and work together when designing/transforming the urban fabric.
- Further research is needed to zoom in to the different types of neighborhood and to analyze them in terms of density, diversity and design to be able to make precise design strategies. Also the way the neighborhoods are connected with public places and the quantity/quality of these places should be researched.

Glossary

built environment includes all buildings, spaces and products that are created or modified by people. The way we affect our built environment has impact on our physical and social environment, and therefore our health and quality of life. (Srinivasa, S. et al., 2003)

connectivity The directness or ease of travel between two point that is directly related to the characteristics of street design (Saelens et al., 2003, p. 81)

environmental health is a subfield of public health, and focuses on the relationships between people and their environments.(Dannenberg et al., p. 6, 2011)

land use mix The level of integration within a given area of different types of uses for physical space, incl. residental, office, retail/commercial, and public space. Land use is reflected by political decisions (and therefore by policies). (Saelens et al., 2003, p. 81)

mega-cities cities with more than 10 million inhabitants (Grant, M. et al. 2017)
meta-analysis combines different studies to determine the overall effect found in the literature. (Dannenberg et al., p. 15, 2011)

NCD Noncommunicable diseases (NCDs), including heart disease, stroke, cancer, diabetes and chronic lung disease, are collectively responsible for almost 70% of all deaths worldwide. From: https://www.who.int/ncds/introduction/en/, accessed at 20th of May (2019).

physical inactivity Inactivity or insufficient activity (< 2,5 hr/week of moderate-intensity activity) have been linked to heart diseases, several cancers, diabetes while air pollution has been linked to asthma, atherosclerosis, impaired lung development to children, reduced lung function and more (Marshall, 2009, p. 1792).
place the broader physical and social environment where we lead our lives, both inside and outside our homes and workplaces (Gehl Institute)
proximity The straight-line distance between different land uses such as residential, office, retail, and commercial activities (Saelens et al., 2003, p. 81)
public health is dedicated to fulfill society's interest in assuring conditions in which people can be healthy. These conditions can range from health-care systems to healthy environments. This thesis discusses healthy (built)environments. (Dannenberg et al., p. 6, 2011)

satisfaction Fulfillment of one's wishes, expectations, or needs, or the pleasure derived from this (Oxford Dictionary)
social capital resources that individuals can access through their connections to a social group. Examples are the exchange of social support and the ability to undertake collective action for mutual benefit.
social determinants The social determinants of health (SDH) are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. (World HEalth Organisation)

urban planning envisioning, planning, designing, and monitoring the layout and function of cities. (Dannenberg et al., p.6, 2011)

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