Case Study Report

Healthy cities - Immediate Impact and Long-Term Benefits.
How?

Sertaç ERTEN, Arup, Turkey
Kristian WINTHER, Arup, Denmark
Ezgi Su GÜL, Arup, Turkey

Abstract

This case study report reflects on some of the main challenges of the paradigm shift from an urban focus on wealth and sustainability to a focus on health as the main driver for sustainable urban (re)development. As more and more cities and urban planners realize the significance of Health as the main driver for urban development, 3 key questions arise:

- *What are the actions that create the strongest immediate health impact?*
- *How would a tool that can measure and communicate the health impact look like?*
- *What are the strategic indicators that can inform the urban planning toward long-term health benefits?*

The report will also cover key challenges related to Healthy Cities and show how strategies can be turned into goals and actions, how data, KPIs, and benchmarks can support these, and how this can be practically used in urban planning.

Keywords

Healthy neighbourhoods, KPIs, health indicators, 15 Minute City

1.Introduction: Health within Urban Planning Practice

Historically, the notion of health has been a central concept in city planning. There are three significant moments in history where public health and town planning met under a "sanitary movement". First, in the 1840s, town planning focused on streets with good ventilation, since the urban areas were suffering from high-density agglomerations around coal mines, which created the concept of "Coal City" (Mumford 1961). Second, in the 1940s, the paradigm shifted towards creating healthy neighborhood units with procreation (Hebbert 1999). And third, in 2020, we came across a long-lasting pandemic which lighted a bulb on active travel and mobility side of health and town planning: This generated new names for well-known models: 15-Minute City, 20-Minute neighborhood…etc. And health has become once again very central in our planning and design practice, with a dimension of "measuring health impacts of urban settings".

Today, The World Health Organization (WHO) suggests that indicators and KPIs (as measures) are one of the strong tools that can inform urban policymakers about the environment's impact on health, including

health inequalities. When health indicators are compiled and shared internationally, usually through an index or framework, they provide a comparison of how cities perform against one another, which can raise awareness of urban issues, shape debates and dialogue (Clark et al. 2014, Klopp and Petretta 2017). Even the most rigorous approaches to indicator development are likely to suffer from challenges of data availability and quality, creating potential problems for interpretation and application. Some potential challenges are associated with using indicators, particularly those that compare cities through an index.

1.1. Problem definition

The health benefits of planning actions, which increase active mobility and life, can also be linked to other strategies such as personal security and reduced risk of collision and casualties, access to green space, decreased noise and air pollution, improvement of social connectivity fostering community development. Yet, beyond quantifying the active life as separate actions and impact, no tool enables to assess the health impact of a neighborhood in a holistic approach, or any indicator tools have rarely compared cities internationally.

The case studies and the design practices that are the concern of this paper reflect a set of factors that a tool /index seeks to address. It reflects actions' impacts related to the broader health and well-being determinants considering the change in mobility patterns and active lives practices based healthy cities actions that integrate urban design components.

Health assessments are complex and diverse (Fehr et al., 2016). There is a need for a standardized approach that can help to unite different models to project impact assessments. The developed project by Arup have mainly provided insight into possible health impacts for the in-depth literature review to understand the profound interdependency between health and environmental issues.

There is a search for certainty through measurement and evaluation in positive sciences. But cities are complex structures that cannot be measured and evaluated only with scientific data. Cities are contextual. It has its own facts and circumstances. Nevertheless, today there are hundreds of sustainability measurement systems and tools produced by different states, institutions, and companies: They show us that a common language is possible to achieve urban sustainability.

Measurability has now become crucial in demonstrating the progress necessary to achieve the goals of both national policies and international commitments regarding these enforced borders. The main purposes of the projects developed by Arup are to first measure the effects of urbanization on the environment, and then to reveal sustainable urbanization actions. Measuring, "What happened? Caused? How was it coped or not?". The base of our design methodology is to ask questions and to seek answers to questions with indicators that will lead them to further design solutions.

2. Methodology

Planning and designing gathering spaces in the public space increases the opportunities for social interaction, community engagement and, consequently, good health (van Breukelen, 2016). Again, the presence of green areas within walking distances from one's living and working environment linearly correlates to self-reported happiness levels (Maas et al., 2006). The study conducted by Maas et al. (2006) constitutes evidence related with physical and mental well-being to one's surroundings.

Another example is active mobility. Previous research on mobility behavior has typically focused on population-level patterns (e.g., commuting and air travel patterns; (Anderson, 2015; Crawford & Campbell, 2012), while comparatively less is known about individual mobility behaviors (e.g., the route a person takes

as they travel during a day, the places they spend time in; González et al., 2008; Mcinerney, Stein, Rogers, & Jennings, 2013). Many models mainly focused on a narrow set of active life, precluding a thorough understanding of the range of everyday mobility behaviors that may be linked to different health indicators.

Thus, it is crucial to emphasize how the environment affects the lifestyle and activity of people and has the potential to integrate environmental indicators into the health impact assessment. In the different determinants of health, we can see the role played by the built environment in Figure 1.
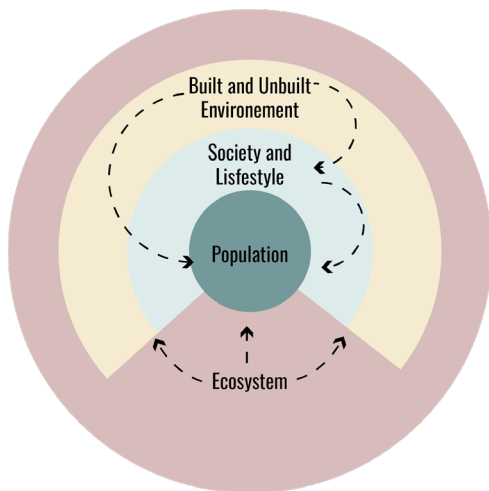

Figure 1. Determinants of health and well-being in cities. SOURCE: Adapted from Barton and Grant 2006

Each approach responds to the four dimensions, explaining the key concepts and accompanied by actions defined by Arup in this research. We accepted "Healthy City" as a starting point for our literature review and broadened it to a holistic view of sustainability on a scale from district and city scale to national scale to European and international scales The review of the models, literature review and the research of the alternative models to cover the data gap is made based on the four main dimensions of the to quantify the change in active life patterns.

3. Case Studies

The case study report will be based on two connected projects developed by the same Arup team and with the same key sponsors. The studies below demonstrate, compare, and discuss two inter-linked approaches to creating healthy cities, and how the two approaches can be used by different stakeholders and at different stages of urban (re-)development.

3.1. Modelling the health benefits of the 15 Minute City (15MC) in relation to active travel.

It is a project developed in collaboration with C40 and Novo Nordisk Foundation. C40 asked Arup to solve how the existing C40 Walking and Cycling tool can integrate urban design in order to quantify how urban design interventions can change mode shares and mobility patterns in a given area. This work builds on the review of mobility models that identify how available methodologies, metrics, and datasets can be used to update C40's existing Walking and Cycling tool by integrating identified urban design components. The tool will help cities and planners measure the expected impact of potential or implemented urban interventions. (see Figure 4 for research steps about urban indicators and health impact)

Variables of the built environment can be classified into two broad categories: macro and micro-scale factors. Macroenvironmental factors can be regarded as 'raw' urban planning features, such as connectivity of the street network, residential density, and land use mix diversity. These factors are difficult to change in existing environments because of their large scale and complexity and different levels of authority that shape them. On the other hand, liveability factors can be defined as relatively micro-environmental factors. These factors are influenced by individuals or local actors. They are less complex, which make them more open to modification in existing neighborhoods (i.e. lower cost and shorter time frame) than the reconfiguration of the macro-scale structural design. In the literature, research has been mostly conducted on macro-scale environmental factors. There is now an evidence-based fact that macro-environmental factors such as connected and compact street networks, mixed-use land-uses positively affect active travel (cycling and walking). For assessing the 15MC mobility changes, a combination of the following frameworks is proposed to model macro and micro changes to the system: Walkability Index, Cyclability Index, and Life Quality Assessment.
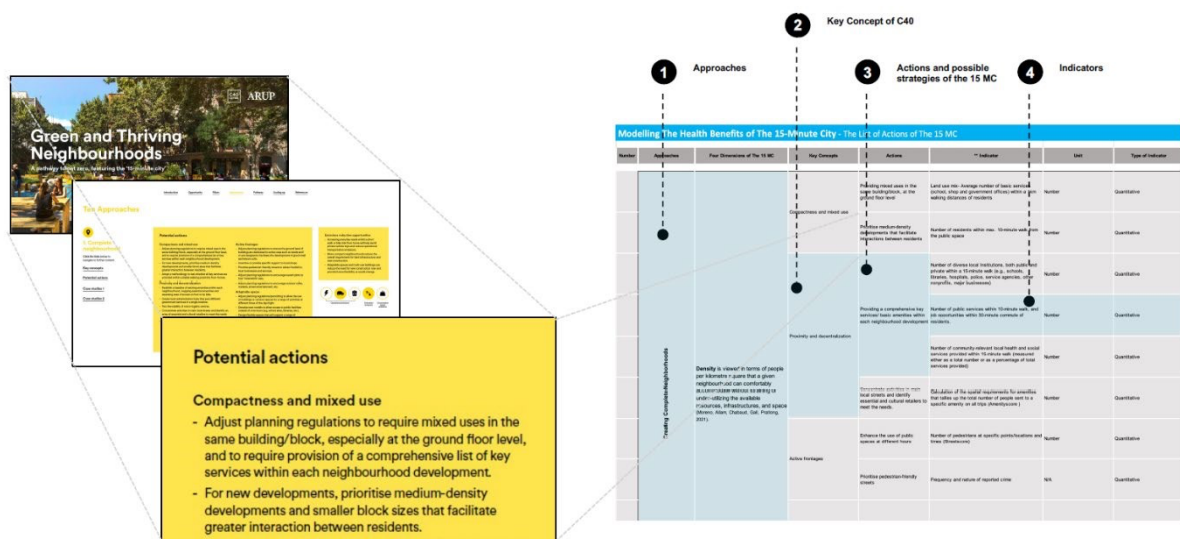

Figure 2. Indicators extracted from 15 MC key concepts. SOURCE: Arup.

The proposed holistic approach aims to combine a mobility score with a livability score to reflect the multifaceted key concepts of the 15MC. The walkability and cyclability score four different component indicators into an index score. However, the macro-level approach requires a standardization process which means that the index cannot be compared year by year as a performance measure. However, the component indicators such as life quality assessments are shown as absolute measures. They can be compared year by year by making the component indicators appropriate city-wide performance measures. Thus, liveability score will be the multiplying factor of the mobility score as shown a proposal for a holistic approach in Figure 5.
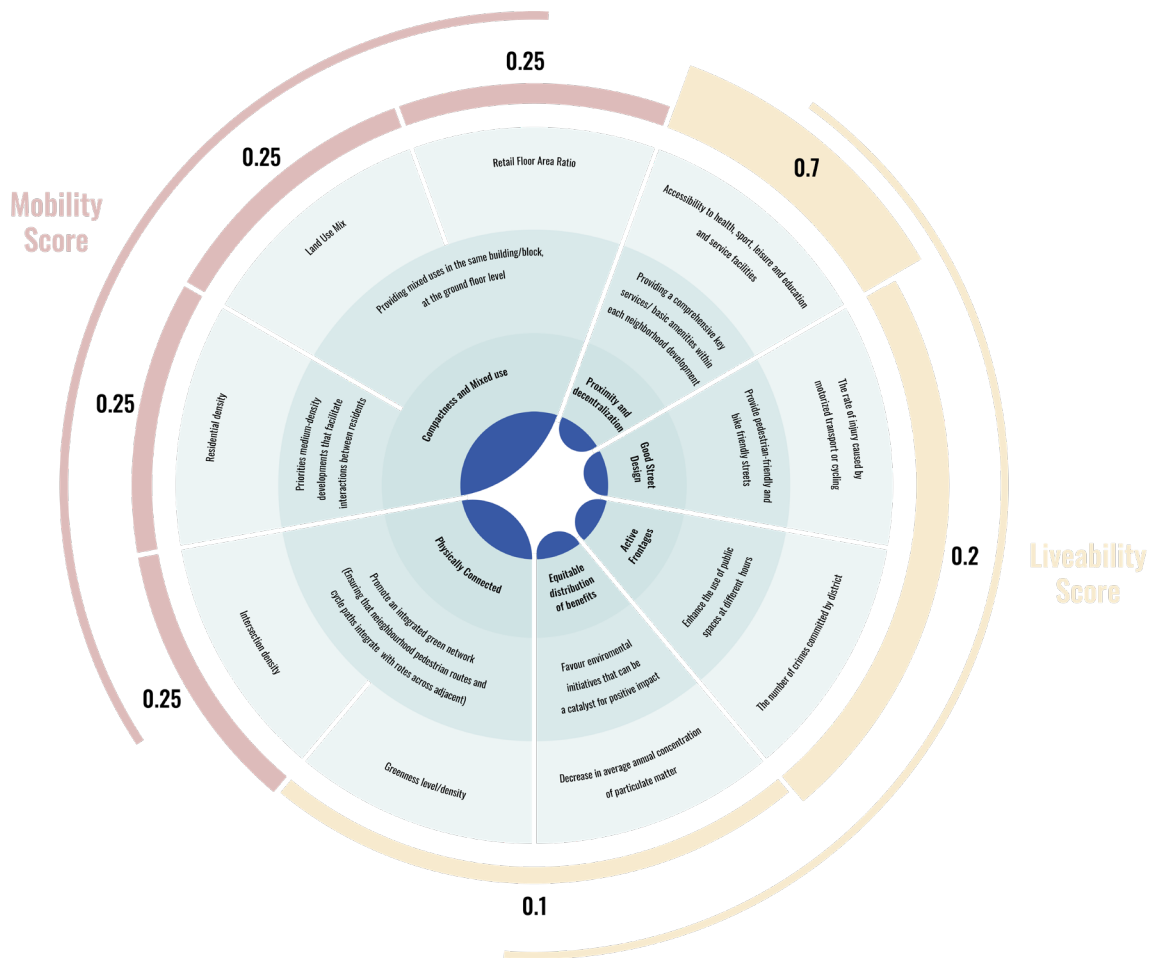
Figure 3. Proposal of Two Pillars: Arup.

Our findings and work included in the project:

- Background research about different models for active mobility.

- Research about urban indicators and health impact.

- 30 indicators for urban design interventions that have an impact on active mobility and the related health impact.

- A mock-up of an updated "walking and cycling tool" to include 15 Minute City principles.

- Liveability and mobility indexes that can be used to measure the impact of the 15 Minute City principles.

3.2. The healthiest neighbourhood in the world – the healthy neighbourhood index.

It is a project developed in collaboration with NREP and Novo Nordisk Foundation. NREP asked Arup to create an index for the healthiest neighbourhood in the world. The index can be applied universally but will also be tested on "Jernbanebyen", a current urban re-development of the former rail yards area in central Copenhagen. The project looks at urban health from a 360-degree perspective and includes principles for urban spaces and transport solutions that support active mobility, healthy buildings, healthy food (retail,

growing, preparing, eating), safe and inclusive spaces for all, locally available of healthcare facilities, and urban interventions to prevent mental diseases and stress. The index will support the planning process and the development of the different parts of the area.

Cities have been on the frontline of pandemic response during 2020 and 2021. It is too early to predict the long-term impacts that the pandemic will have on our cities, but some of the emerging trends for city planning include:

• The desire to spend more time in local parks, businesses, and green spaces,

• An emphasis on health and outdoor living,

• The need for commercial office space to work harder to attract workers out of their homes and into offices, and

• The expectation for retail spaces to offer more in terms of experience.

This context presents many challenges and questions for city stakeholders who are trying to maintain and develop viable city centres and create safe environments to live during a great uncertainty. Thus, it is aimed that Jernbanebyen will be a place that continually improves people's physical, social, mental health and wellbeing - where the city's environments continually expand the community's resources which enables people to mutually support each other in performing all the functions of life and developing to their maximum potential. As such, Arup recommend that NREP adopts WHO's definition of a healthy city for Jernbanebyen and developed "8 Goals for a Healthy, Safe and Inclusive Jernbanebyen" as illustrated in Figure 6.
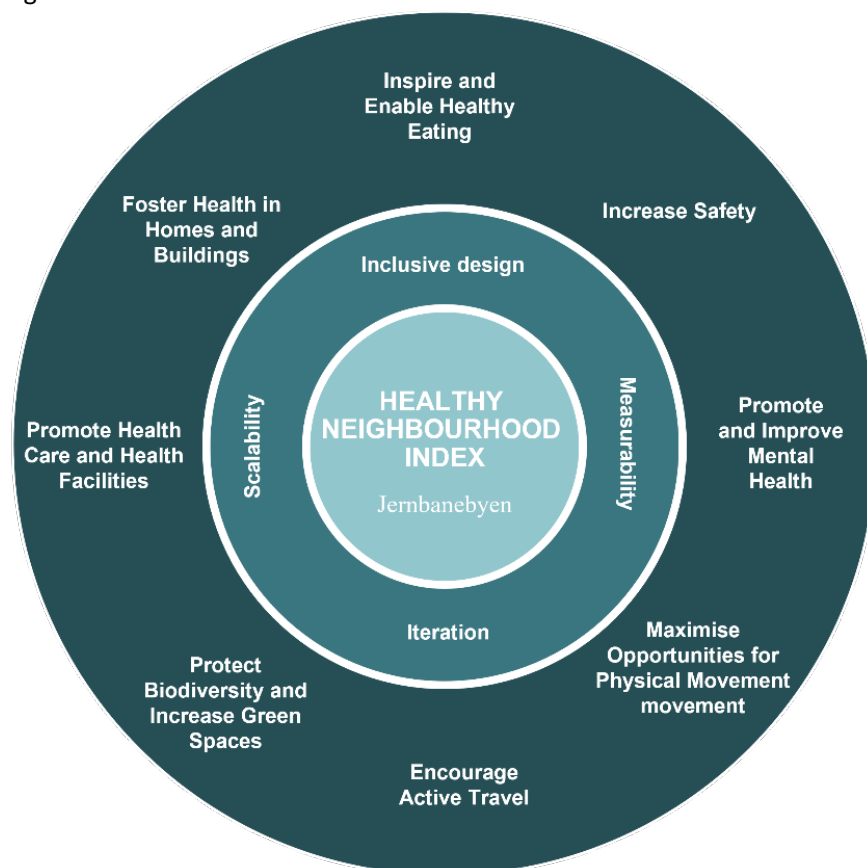
Figure 4. Proposal of Two Pillars. SOURCE: Arup.

The approaches across many of the frameworks are very user centric, human-centred, behaviour-driven – learnings and research say that a sustained impact is made if you design solutions with the user in focus. So, including users in the planning in workshops and in pilots makes a real impact on their lifestyle choices and habits which ends up making them healthier – and it also increases their sense of wellbeing and belonging to the neighbourhood. In relation to the human-centred approach it, understanding the relation between urban design interventions and healthy neighbourhood can be a complex and labor-intensive task. Thus, as illustrated below in Figure 7, we developed a practical tool model and healthy city index that shows this relation and the health impact of active life.
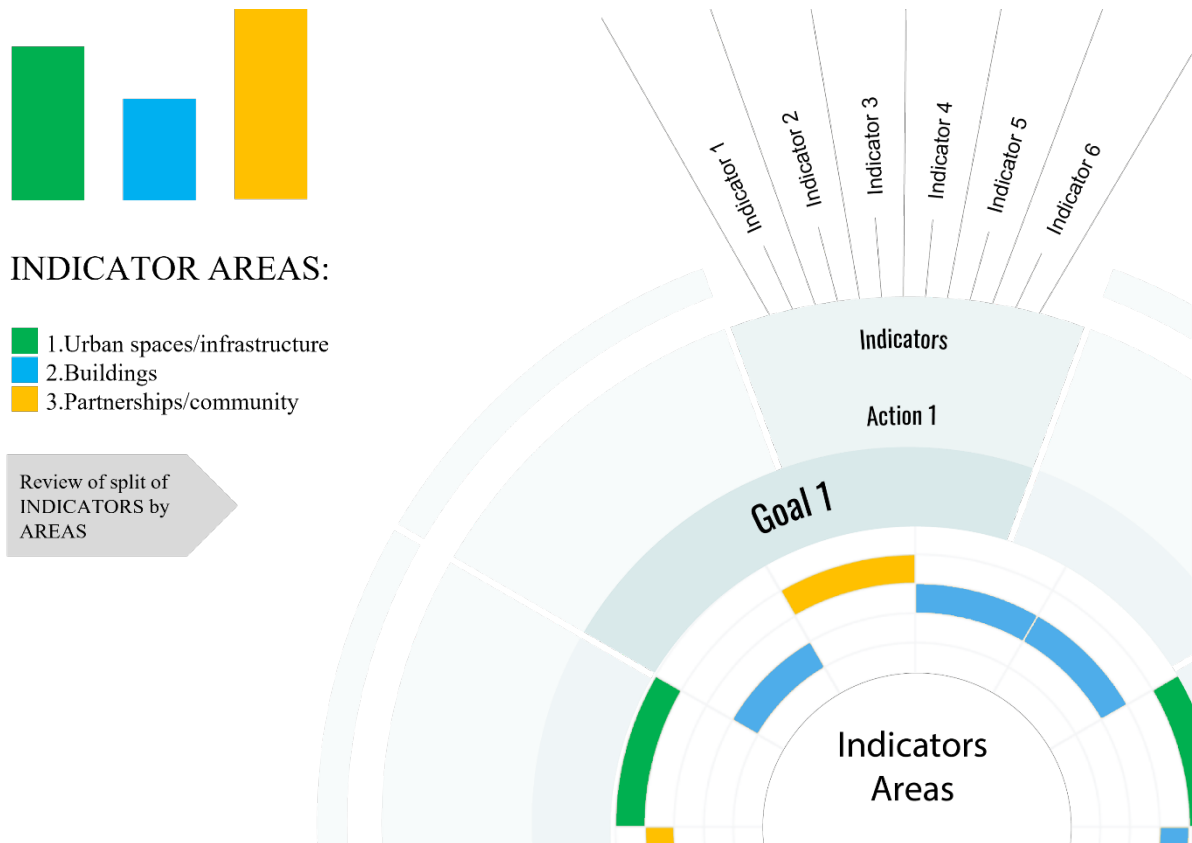

Figure 5. Healthy Neighbourhood Index. SOURCE: Arup.

Our findings and work included:

- A healthy city index.

- 8 goals for a healthy city.

- 32 indicators reflecting the goals and grouped in relation to stakeholders to ensure accountability and buy-in both within the developer's organization and from external stakeholders.

4. Conclusion

Despite focusing on people-centred urban development, the existing models are based primarily on highlevel spatial and environmental observations and neglect socio-economic, socio-demographic and small scale urban aspects, such as social composition, employment, income, and urban interventions. In contrast to their opportunities, it is also subject to significant criticism. Since social inequalities and service equities are visible in the urban structure and sprawling, less compact settlement structures are hardly considered. However, urban design interventions must be understood and implemented with socially inclusive and cityled strategy development processes. It is worthwhile to investigate further the applicability of the proposed concepts for city-wide and between scales while considering the granularity of data.

5. References

Andersson, E., Tengö, M., McPhearson, T., & Kremer, P. (2015) 'Cultural ecosystem services as a gateway for improving urban sustainability', *Ecosystem Services*, 12(165), p168.

Barton, H. & Grant, M. (2006) 'A health map for the local human habitat'. *The Journal for the Royal Society for the Promotionof Health*, 126 (6), p. 252-253. ISSN 1466-4240. https://doi.org/10.1177/1466424006070466

Clark, A., Scott, D., & Yiannakoulias, N. (2014) 'Examining the relationship between active travel, weather, and the built environment: a multilevel approach using a GPS-enhanced dataset', *Transportation*, 41, p325–338. https://doi.org/10.1007/s11116-013-94763

Crawford, M. H., & Campbell, B. C. (eds.). (2012). *Causes and consequences of human migration: An evolutionary perspective*. Cambridge University Press.

Fehr,R., Mekel, O.C.L., Hurley, J.F., Mackenbach, J.P. (2016) 'Health impact assessment – A survey on quantifying tools', *Environmental Impact Assessment Review*, 57, p178-186. ISSN 0195-9255. https://doi.org/10.1016/j.eiar.2016.01.001.

González, M. C., Hidalgo, C. A., & Barabási, A.-L. (2008) Understanding individual human mobility patterns, *Nature*, 453, p779–782. https://doi.org/10.1038/nature06958. Hebbert, M. 'A city in good shape', TPR, 70 (4), p433.

Hebbert, M. 'A city in good shape', TPR, 70 (4), p433.

Klopp, J.M., & Petretta, D.L. (2017) 'The urban sustainable development goal: Indicators, complexity and the politics of measuring cities', *Cities*, 63, p92-97. ISSN 0264-2751. https://doi.org/10.1016/j.cities.2016.12.019.

Maas, J., Verheij, R.A., Groenewegen, P.P., De Vries, S., & Spreeuwenberg, P. (2006) 'Green space, urbanity, and health: how strong is the relation?', *Journal of Epidemiology & Community Health,* 60(7), p587–592.

Mcinerney, J., Stein, S., Rogers, A., & Jennings, N. R. (2013) 'Breaking the habit: Measuring and predicting departures from routine in individual human mobility', *Pervasive and Mobile Computing*, 9, p808–822.

Mumford, L. (1961) *The City in History*. Harcourt, Brace and World.

Van Breukelen, E. (2016) Gezonde Verstedelijking. Een Onderzoek Naar hoe Beleidsvormingsprocessen Kansen Voor sociale Cohesie Stimuleren. Academie van de stad and University of Utrecht master thesis, University of Utrecht, the Netherlands