# HOW THE LIVING ENVIRONMENT COULD CONTRIBUTE TO HEALTHY AGEING

GRADUATION RESEARCH PLAN

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# 01 INTRODUCTION

### PROBLEM STATEMENT

The Netherlands are dealing with an ageing population. In 2015 the population aged 65 and over consisted of 3,6 million people. This number is expected to rise to 4,8 million in 2040 (Stoeldraijer et al., 2022). Moreover, the number of individuals aged 90 and above will increase from 117.000 in 2015 to 340.000 by 2040, according to data from the Dutch National Institute for Public Health and the Environment (RIVM) (2018). Within Dutch elderly care, three critical issues have emerged.

Firstly, life expectancy is increasing, but the additional years are not necessarily free from chronic diseases (RIVM, 2018). In fact, the number of years lived without chronic diseases has decreased over time (De Klerk et al., 2019). In the 1980s, the average lifespan without chronic diseases was 55 years, but by 2022, this had decreased to 40 years (Van Mersbergen, 2022). Nowadays, 10 percent of the population aged 65 and older is dealing with complex medical conditions. According to experts this percentage is expected to rise to 22 percent in 2040 (Baâdoudi, 2023). The existence of these diseases, including cardiovascular diseases, obesity, hypertension, osteoporosis and type 2 diabetes, finds its origin in the mismatch between the adoption of the modern western diet and lifestyle that differs very much from what shaped the human genome for over 2 million years. In short, a person's environment and accompanying lifestyle have a larger influence than their genetics on their chances to develop chronic diseases (Carrera-Bastos et al., 2011; Universiteit van Nederland, 2018).

Secondly, the ageing society is confronted with a shortage of caregivers to meet the needs of a growing population (Langerveld, 2022). To maintain the current level of care in the Netherlands in 2040, it is estimated that one out of four people will need to work in the healthcare sector. In 2022, one out of seven people worked in the healthcare sector (Langerveld, 2022). The future shortages cannot be addressed only by informal caregivers, such as adult children, taking care of their parents. In 2015, there were ten potential caregivers between the ages of 50-64 for each person aged 85 or older. However, by 2040, the expectancy is that this will decrease to only four caregivers per person aged 85 or older due to changes to the demographic (RIVM, 2018).

Lastly, the current healthcare system focuses on treatment rather than prevention, where individuals receive care only when they are already ill. This approach is becoming unsustainable due to rising healthcare costs and the ageing population (Nivel, 2012).

To sum it up, without intervention, the ageing population will face three major challenges:

- 1. An increase in non-communicable diseases.
- 2. A shortage of healthcare staff.
- 3. Rising healthcare costs, which makes the healthcare system unsustainable.

### **RELEVANCE**

This research is relevant as there is an urgent need for change within the Dutch healthcare system. The ageing population is facing increased health issues, and the number of caregivers is insufficient to meet these demands. The Dutch government has written policies for preventative measurements, but there are not enough concrete projects realised. Architects and urban planners play a crucial role in shaping the living environment and should be an integral part of the solution for creating a health-promoting living environment.

### **RESEARCH GOAL**

The goal of this research is to provide architects and urban planners with practical design guidelines that they could use in their design projects, to contribute to a health promoting living environment. By making the living environment health-promoting, healthcare cost (McNutt, 2022) and the amount of people with chronic diseases will decrease (Baâdoudi, 2023).

KEYWORDS: HEALTHY AGEING | QUALITY OF LIFE | VITALITY | BLUE ZONES | PREVENTION

**WORDCOUNT** (EXCL. BIBLIOGRAPHY AND APPENDIX): 2.396

# 02 THEORETICAL FRAMEWORK

Healthy ageing is associated with Blue Zones, which are regions in the world where people typically enjoy long and healthy lives. These regions are Loma Linda in the United States, Nicoya in Costa Rica, Sardinia in Italy, Ikaria in Greece, and Okinawa in Japan (Buettner & Skemp, 2016). These areas are characterised by a low rate of chronic diseases and cognitive decline (iPH, 2020). Buettner and Skemp (2016) conducted a study on these five Blue Zones and identified nine key lifestyle attributes that were present in each of these areas:



Figure 1. Healthy lifestyle habits of the Blue Zones. Potential spatial elements are highlighted (Koes, 2023).

These nine elements do not all have a direct connection to the built environment, as some are specific to the choices individuals make regarding their beliefs and dietary preferences. It is also important to recognise that the success of these Blue Zones is related to the specific environments and cultures of these regions. Most Blue Zones have traditional lifestyles and rely on physically demanding traditional economic activities such as farming, shepherding, and agriculture (Herbert et al., 2022).

In the Netherlands, there are initiatives focused on healthy ageing and promoting a healthy lifestyle, by drawing inspiration from the Blue Zones. For instance, the 15 villages and neighbourhoods known as the BloeiZones in Friesland have adapted the key elements and modified them to their local environment. They have been working with themes including citizenship, access to green spaces, active leisure, healthy mobility, healthy living, healthy diet, and financial well-being (HANNN, n.d.). These elements are more relevant to the modern Western environment, where physical activity and stress reduction must be consciously incorporated in one's lifestyle, rather than occurring naturally. However, it is essential to critically assess this approach, because it is implemented in small villages in the northern part of the Netherlands, a setting quite different from the urban landscape of the western part of the country. Moreover, technology has not been included, which could also contribute to healthy ageing. Additionally, like the Blue Zones, some elements are non-spatial.

Another example of translating the Blue Zone principles into the Netherlands is the Cartesius neighbourhood in Utrecht. This is a new urban neighbourhood that prioritises physical activity, healthy food, community, purpose, and relaxation (Muis, 2018). This project is particularly interesting because it is set in an urban environment. However, this project aims to develop a new neighbourhood and therefore does not deal with existing communities. Furthermore, it has not been realised yet, with an expected completion date in 2028. So it is not yet possible to draw any conclusions from this project.

The relationship between the living environment and public health has been studied in existing literature. The environment can either encourage or hinder physical activity, foster social interactions, influence behaviours and motivations and reduce stress (Glandon, 2020; Kuppen et al., 2023; Zantinge et al., 2011). Building on the principles of Blue Zones and existing literature on healthy ageing, this study will investigate three spatial domains that are relevant to this context: Physical activity, Green Spaces and Connection (figure 2).

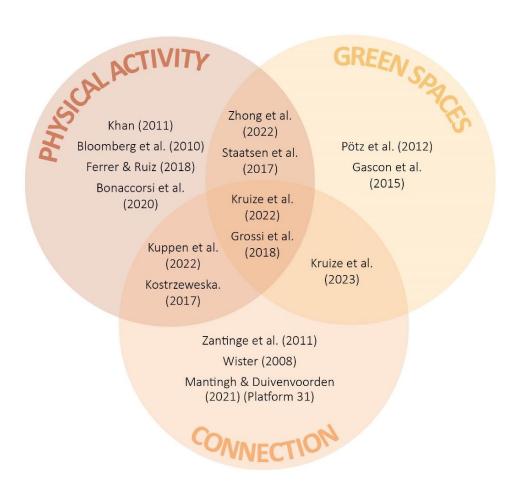


Figure 2. Existing literature positioned in the three domains of healthy ageing (Koes, 2023).

| PHYSICAL ACTIVITY  | GREEN SPACES  | CONNECTION   |
|--|---|--|
| Access to structures (shops, com-  | Availability, size, connectedness   | Shops, cafes, schools, childcare,                            |
| mercial, public stransport, parks<br>and recreational places                   | of space, ease of accessibility   | community centers, care facilities, sportfacilities, streets |
| Open / Green spaces  |   | Open / Green spaces  |
| Aesthetics of the environment  | Attractive and well maintained  | Shared facilities  |
|  | Suitable for different groups   | Mixed usergroup  |
| Grocery stores and open space within walking distance                          | Within (perceived) walking<br>distance  | Multi-purpose use of (public) buildings and areas            |
| Walkability of neighbourhoods  | Walkability and bikability  |  |
| Safe and visible bicycle and walking paths to parks or open spaces             | Suitable infrastructure (side-<br>walks, bicycle paths) and<br>minimal obstruction                        | Pathways for pedestrians and bicycles                        |
|  |   |  |
| Paths, running tracks, play-<br>grounds, sportcourts and<br>drinking fountains | Shade and shelter, water featu-<br>res, birdlife, sporting facilities,<br>playgrounds, sportfields, water | Playgrounds, sportfields,<br>benches, streets                |
| Bicycle storage (secure, sheltered, and accessible)                            | Community gardens   | Community gardens  |
| Car free zones   | Car free zones  | Car free zones   |
| Buffer that separates pedestrians from cars                                    | Awereness: clear signs, (route) information and nature education  | Intermediate zone  |
|  |   |  |
| Safety   | Safety  | Safety   |
| Exterior lighting  | Exterior lighting   |  |

Figure 3. First findings out of literature. Some elements already overlap (Koes, 2023).

### **HYPOTHESIS**

By exploring these spatial terms, insight will be gained into how the living environment in existing neighbourhoods can be optimised to promote healthy ageing and well-being, especially in urban contexts of a city such as Delft in the Netherlands. By using the built environment to nudge older adults into making healthier choices, it is expected that their overall health will improve. This should result in a reduction of chronic diseases among this demographic, ultimately easing the burden on the health care system through a preventive approach.

# **03 RESEARCH QUESTIONS**

### MAIN RESEARCH QUESTION

How can Dutch living environments be adapted or designed to promote healthy ageing and assist the elderly in maintaining their vitality?

### **SUB QUESTIONS**

- What are the key elements that influence the health and well-being of the ageing population in Blue Zones and other examples?
- How can those key elements that contribute to health and well-being be integrated into urban planning and housing design?
- How can the Blue Zone concept be implemented within existing Dutch urban living environments?
- What architectural features can encourage healthy lifestyle choices within residential buildings?

### INCLUDE | EXCLUDE

This research will include the living environment in Dutch urban landscapes, including cities like Delft. The primary focus of this paper will be on older adults, but other demographic groups will not be excluded, as community engagement is one of the key factors in promoting healthy ageing.

# 04 DEFINITIONS

**BLUE ZONES** | Blue zones are areas in the world where people typically enjoy long, healthy lives. These zones are characterised by a low rate of chronic diseases and mental decline (iPH, 2020).

**HEALTHY AGEING** | Healthy ageing includes the ability to carry out basic or complex daily activities, high functioning in tests of physical and cognitive assessments, and the absence of diseases and mental health issues (Peel et al., 2005).

RIVM | The Dutch National Institute for Public Health and the Environment (RIVM) aims to improve the health of the population and ensure a sustainable, safe, and healthy living environment. They achieve this by independent scientific research, and provide advice to the government, professionals, and citizens based on their findings (RIVM, nd).

**VULNERABLE ELDERLY** | The most common definition of vulnerability in the context of the elderly is a decrease in physical reserves in multiple organ systems. This reduction can result in adverse outcomes, such as an increased risk of falls, declining mobility and mortality. Risk factors contributing to vulnerability include chronic diseases, low cognitive function, polypharmacy, and higher levels of pain (De Breij et al., 2021).

VITAL ELDERLY | In social sciences, vitality is an important aspect of well-being in old age. Vitality is described as the competency that enables people to use their functional abilities. It consists of having the motivation to take responsibilities, the knowledge, and skills to execute them, and, ultimately, the capacity to enjoy the results. The absence of vitality can hinder the experience of well-being. Vitality has many aspects, including resilience, engagement, energy, resilience, self-esteem, coping mechanisms, autonomy, and a sense of purpose. These aspects contribute to reaching a satisfactory life (Westendorp & Schalkwijk, 2014). In 2021, De Breij and her researchers found several factors that influence vitality and vulnerability in individuals aged 75 and older. These include age, depressive symptoms, the presence of chronic diseases and self-assessed health. Moreover, being male, a moderate alcohol intake, receiving greater emotional support and not experiencing hearing problems were identified as predictors of higher levels of vitality.

NON-COMMUNICABLE DISEASES (NCDs) | Non-communicable diseases (NCDs), also known as chronic diseases, tend to be of long duration. They result from a combination of genetic, physiological, environmental, and behavioural factors. The main types of NCDs include cardiovascular diseases (such as heart attacks and stroke), certain cancers, chronic respiratory diseases (such as COPD and asthma) and diabetes (WHO, 2023). The adoption of a modern, convenient lifestyle is a significant contributing factor to the development of chronic diseases (Balwan, 2021; Dekkers, 2022).

# 05 METHODOLOGY

### LITERATURE RESEARCH / CASE STUDIES

A literature study will be conducted to gain insights into the key factors contributing to the health and well-being of an ageing population. This study will primarily focus on the Blue Zones, the Dutch government's "Nationaal preventieakkoord", and other sources related to spatial elements that influence the health and well-being of older adults. The research will focus mostly on the implementation of physical activity, green spaces, and connections in the living environment. This investigation will include different scales, including the overall living environment and the scale of residential buildings.

Furthermore, case studies will be researched to understand how various projects in the Netherlands have implemented the principles of Blue Zones and/or the promotion of physical activity, social interactions, and the usage of green spaces. These case studies will include new examples such as the Cartesiusdriekhoek in Utrecht and examples that implemented the principles in existing living environments such as the BloeiZones in Friesland.

### **QUESTIONNAIRE**

To gain some basic insights of the health of elderly residents in a housing community, a questionnaire will be developed. Approximately 100 questionnaires will be distributed within the building complex, with in mind that not all the residents may return them. The questionnaire will include approximately 20 questions about participant's daily routines, levels of physical activity and social interactions.

### **OBSERVATIONS**

An observational study will be done to observe the behaviour of individuals in various settings. During the stay at the housing community, residents' behaviour related to physical activity, social connections and green spaces will be observed. These observations will provide insight into their behaviour and help identify essential elements needed to promote and encourage healthier choices.

- Day in a life: Approximately five elderly residents will be asked to describe a typical day in their life. This will be documented in a journal-like format. This will provide insight into the daily activities of the elderly.
- Walking route: A group of 5-10 elderly residents from the housing community will be joined on their walks. The routes they walk will be mapped. During the walk, they will be asked questions about their reasons for choosing that specific route and what could encourage them to walk more or for longer distances. This observation will also be done among elderly people in Delft-West.
- Garden usage: The usage of the housing community's garden will be observed for a few hours to understand how it is used by residents.
- Stair usage: The use of the stair within the housing community will be observed for several hours to determine how many people choose for stairs instead of the elevator. Participants will also be interviewed to understand their reasons for choosing the stairs over the elevator. This study will explore how many people use the stair instead of the elevator.

### **INTERVIEWS**

During the fieldwork week at the housing community, 5-10 residents will be interviewed regarding their daily routines. These interviews will provide insights into how older adults perceive their own health and their views on health-promoting aspects in their living environment. The fieldwork preparation and the questions can be found in the appendix.

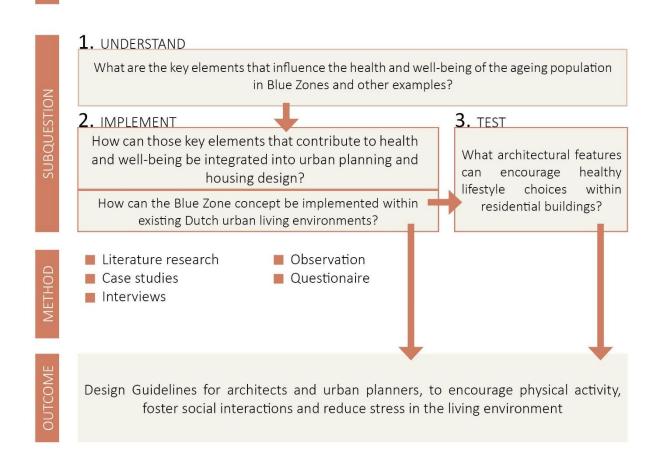
Additionally, interviews will be conducted with professionals who work on creating healthy living environments. This will include professionals in the field of greenery in the living environment, experts who have implemented Blue Zone principles in existing neighbourhoods in the Netherlands (such as the Bloeizones in Friesland), and policy makers to gain their perspectives on health-promoting architecture in the living environment.

## Unsustainable healthcare system

- 1. An increase in noncommunicable diseases
- 2. A shortage of healthcare staff
- 3. Rising healthcare costs

Different disciplines have to work together: this research gives architects and urban planners guidelines

How can Dutch living environments be adapted or designed to promote healthy ageing and assist the elderly in maintaining their vitality?



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# 08 APPENDIX

### FIELDWORK PREPARATION

QUESTIONNAIRE | Together with the other three students, we will develop a questionnaire. This questionnaire contains questions about the resident's previous housing situations, their perspectives on their current living conditions, their usage of the community facilities, their physical activity levels and their social interactions within and outside the housing community. We will limit the open-ended questions to make it easier to draw conclusions. We plan to distribute the questionnaires by placing them in the resident's mailboxes. We also plan to attach the invitation of the workshop to the questionnaires.

### Materials needed:

- 100 questionnaires
- Workshop invitation

**WORKSHOP** | We will organise an interactive workshop for the residents of the housing community. This workshop is about their preferences for nearby facilities. During this workshop, participants will have the opportunity to place stickers of facilities on a board. This board features different scales of their living environment, such as home, housing community, walking distance and neighbourhood. We will be present to assist and talk with them about their preferences.

### Materials needed:

- Stickers
- Boards with different layers of surroundings
- Coffee + cookies

**OBSERVATION** | During the observations, I will watch resident's behaviour related to physical activity, social interactions and green spaces.

### Materials needed:

- Sketchbook + drawing tools
- Mobile phone for tracking the walking route

**INTERVIEWS** | I want to conduct 5-10 interviews with elderly residents about their daily routines. These interviews will focus on their healthy or unhealthy habits and their perspectives on health-promoting aspects in their living environment.

### Materials needed:

- Notebook
- Sketchbook

### Voorbeeld vragen voor interviews tijdens de fieldworkweek

De exacte invulling van het interview en de formulering van de vragen hangt af van de antwoorden die de persoon geeft en de tijd die de persoon heeft. De vragen zullen zich op deze onderdelen focussen.

### Sociale contacten

- Bent u tevreden met uw sociale kring, en waar bevindt deze zich? (in of buiten de woongroep?)
- Maakt u gebruik van de gezamenlijke faciliteiten in het gebouw?
- Hoe vaak en waarom?
- Wat heeft u nodig om meer gebruik te maken van de gezamenlijke faciliteiten?

### Gebruik van groene ruimtes

- Hoe vaak komt u buiten het gebouw, en waarvoor?
- Maakt u gebruik van de gezamenlijke tuin?
- Wat heeft u nodig om meer gebruik te maken van groene ruimtes?

### **Beweging**

- Hoe vaak beweegt u op een dag en wat doet u?
- Maakt u gebruik van de gezamenlijke fitnessapparaten in het gebouw?
- Wat heeft u nodig om meer te gaan bewegen?

### Health promoting architecture

- Zou u gezonder willen leven?
- Op welke punten zou u dat willen doen?
- Denkt u dat de leefomgeving (appartement, gebouw, wijk) hierbij kan helpen? En hoe?