Bachelor Project – Final Version

Sustainable Transformation of Urban Regions in Europe (STOURIE)

Development of Urban Gardens: Relevant Spatial and Demographic factors

Colophon

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Abstract

This research investigates how spatial and demographic factors explain the development of urban farming in Groningen and Berlin. Additionally, the reasons for people to engage in urban gardening are analyzed. The Groningen data is gathered in the Volkstuin Vinkhuizen and Tuinwijk and the Berlin data at Tempelhofer Feld. At all locations, a survey is used to gather primary data. Further insight is gathered via an interview with a board member of Tuinwijk. Following the results that density and distance to city center are beneficial, a neighborhood in Groningen that is suitable for a new urban garden is identified.

Based on a multiple linear regression it was found that especially dense living conditions contribute to the development of urban gardens. These factors are amplified by a lack of private greenery. It was found that a travel time of 10 minutes from home to the garden was a reoccurring characteristic of the sample, similar to findings in other research.

It appears from the sample that women are more present in the gardens and there is a slight tendency toward people within 10 years of retirement age or older in the sample. Participants seem to engage in urban gardening firstly to be in nature but also to be physically active. A majority of participants disagree that they go to the garden to learn new skills. Most participants would not like to continue gardening if the garden would be located in the city center. According to research on urban gardens, spatial proximity of the garden users to the garden is important when establishing urban gardens.

Based on survey results, interviews, and the current body of literature, the most suitable location for a new urban garden in Groningen was found to be Selwerd since it is outside of the city center and in a densely populated neighborhood that is currently lacking urban gardening. Relevance and implications for future research are discussed.

1. Introduction

The recent summary for policymakers of the IPCC report highlights a decrease in food security and biodiversity as a result of human-induced climate change (IPCC, 2022).
Furthermore, they report increasing urbanization which might contribute to climate-resilient development (IPCC, 2022).
Urban farming can be a part of that. It can be a useful tool to overcome food shortages as the Victory Garden Campaign in the US during the Second World War showed (America's Patriotic Victory Gardens, 2018). This government-led program managed to grow up to 40 % of the US fresh fruit and vegetable supply in allotments. Spaces for urban farming can also be used to educate people about farming while increasing biodiversity (Bohn and Chu, 2021). Much of the emissions produced by conventional farming and food supply via supermarkets occur through cooling and transport (Coley, 2009). When producing their own food people can reduce their carbon footprint since much of the transportation and cooling emissions do not apply here, especially when the gardeners live close by. Furthermore, urban gardening can have benefits on physical and mental health by being physically active and being in nature (van den Berg et al., 2010; White et al., 2019, Harada et al., 2021).
Based on the necessity of climate-resilient development and the promising potential of urban gardens in increasing the health of its users and the environment this paper investigates some of the contributing spatial and demographic factors to the development of urban farming. These factors include demographic factors such as age and gender in order to better understand, which population group participates in urban farming. The choice of factors includes has been made based on prior findings related to spatial proximity (Wesener et al., 2020), density of neighborhoods (Smith et al. 2021) as well as service areas, and travel time (Yang & Diez-Roux, 2012). Further variables which might impact urban farming are studied through statistical tests of the survey results. Since this Bachelor thesis is conducted at the University of Groningen most of the data is gathered locally. This is done through surveys conducted in two local urban gardens in Groningen and a garden in Berlin, as well as a semi-constructed interview from Groningen. The findings from these surveys as well as existing literature will be used to estimate an optimal location for a new urban garden in Groningen.

Research on this topic might contribute to finding a more holistic approach to building sustainable neighborhoods or changing existing ones. According to Codispoti (2021), this is a missing factor in sustainable neighborhood development. This along with the potential effect on individuals and the environment makes this a highly relevant topic to research. Furthermore, while prior research addresses the optimal placement of gardens, all found studies do not address the reasons for people to participate in urban gardens (demographic factors) or their type of housing or available green space (spatial factors).

This leads to the following research questions:

Main research-question:
How do spatial and demographic factors explain the development of urban farming?

Subquestions:
Which demographic characteristics explain the participation in urban farming and why?

Which spatial factors explain the development/existence of urban gardens? ,

Based on the lessons learned in Berlin and Groningen, which neighborhood in Groningen has the most potential to develop urban farming in the future?

To answer these questions the paper will follow the structure below. First, the theoretical framework will be established in combination with a conceptual model. Then the methodology will be discussed to explain the data collection process. The following chapter will present the results and discuss them in the context of the research questions. This will be followed by a discussion of the results in the context of the literature and a conclusion answering the main research question as well as recommending further research. The paper will end with a reflection on the limitations of the research and the research process as a whole.

2. Theoretical Framework

The theoretical framework is based on examples of urban gardens and their benefits. Furthermore, concepts relevant to the research will be discussed.

There are several studies with regard to spatial factors and urban farming. Wesener et al. (2020) for example found that spatial proximity between the garden and its community is a vital factor for its success. Additionally, Smith et al. (2021) found that urban garden development in dense neighborhoods is much more favored by the community. The same study chose a 10-minute threshold to determine the service area of urban gardens. This is supported by Yang and Diez-Roux (2012) who identified 10 minutes to be the median walking trip length. During this time an average adult walks between 780 m and 850 m (Bohannon & Andrews 2011). This suggests the importance of spatial proximity to the garden.
Also, Wiek and Albrecht (2022) and Thapa et al. (2021) analyzed the optimal placement and implementation of urban agriculture based on several factors, however, all found studies miss the reasons for people to participate in such projects in combination with spatial factors such as their type of housing or availability to private green space, thus making it relevant for this research.
Urban farming can come in many forms and is part of many cities all over the world. Tokyo for example has around 4000 hectares of urban farmland (Harada et al., 2021). According to Lal (2020) 15-20 % of the global food supply is produced by urban agriculture. Food productive greenways (Bohn & Chu, 2022), food forests (Wiek & Albrecht, 2021; Jose, 2009), or allotments (volkstuinvinkhuizen.nl, Harada et al., 2021) are some examples.
Greenways are a type of green infrastructure originally used for recreation and improvement of environmental qualities that often connect different types of landscapes (Bohn & Chu, 2021). Combining this type of green infrastructure with a food productive function could satisfy both the need for food supply and environmental development (Bohn & Chu, 2021).
Another type of urban garden are food forests. Among their most important functions are improvement of water quality, soil enhancement, biodiversity conservation, and carbon capturing (Jose, 2009). According to Wiek & Albrecht (2021), food forests can also be effective in an urban environment. One of the most common types of urban gardens are allotment communities. Tokyo

for example had 434 in 2018 (Harada et al. 2021). In Groningen there are a number of allotment communities like Volkstuin Vinkhuizen, Tuinwijk in Helpman or Piccardthof. In this type of garden, the community typically rents the land from the municipality (Harada et al., 2021). Allotments offer several benefits like social contact, food provision, or space to relax (Harada et al., 2021; van den Berg et al., 2010). These examples show that urban gardens can be very diverse and provide many benefits for the environment and the gardeners.
Types of urban gardens like food forests can contribute to sustainable urban development (Wiek & Albrecht, 2022). However, an issue in sustainable neighborhoods is that many do not follow a holistic approach related to the whole city (Codispoti, 2021). The study also highlights that these neighborhoods achieve clear advancements in terms of sustainability but lack a holistic approach to urban morphology.
Since a great number of people live in cities urban farming can be a relevant factor to tackle the decrease in food security the recent IPCC report highlights (IPCC, 2022). Food production via urban farming can significantly improve the nutrient intake of people suffering from poverty or food shortage and make food systems more secure (Talukder et al., 2010; Lal, 2020). Urban garden will be used to describe all types of urban farming locations in the remainder of this paper.
The IPCC report further mentions a global trend of urbanization that can be utilized to increase development for climate resilience as well as a critical need for protecting biodiversity and ecosystems (IPCC, 2022) and urban gardening can be a tool in this process. Bohn and Chu (2022) describe how food-productive greenways, a type of urban agriculture, can increase local biodiversity. According to Bohn and Chu (2021), food-productive greenways can also provide the necessary education to engage in farming.
Other benefits of urban gardens concern health. Van den Berg et al. (2010) report positive health effects of urban gardening, especially for older gardeners, as well as improved well-being through socializing, also found by Harada et al. (2021). Further health benefits can be achieved by spending at least 120 minutes per week in nature (White et al. 2019). 'Urban gardens can be a place to be physically active, socialize and be in nature.
The following benefits of urban farming were identified: Increased food security, several environmental benefits like biodiversity, and improved health of gardeners by being active and being in nature. The following conceptual model is made to illustrate these findings.

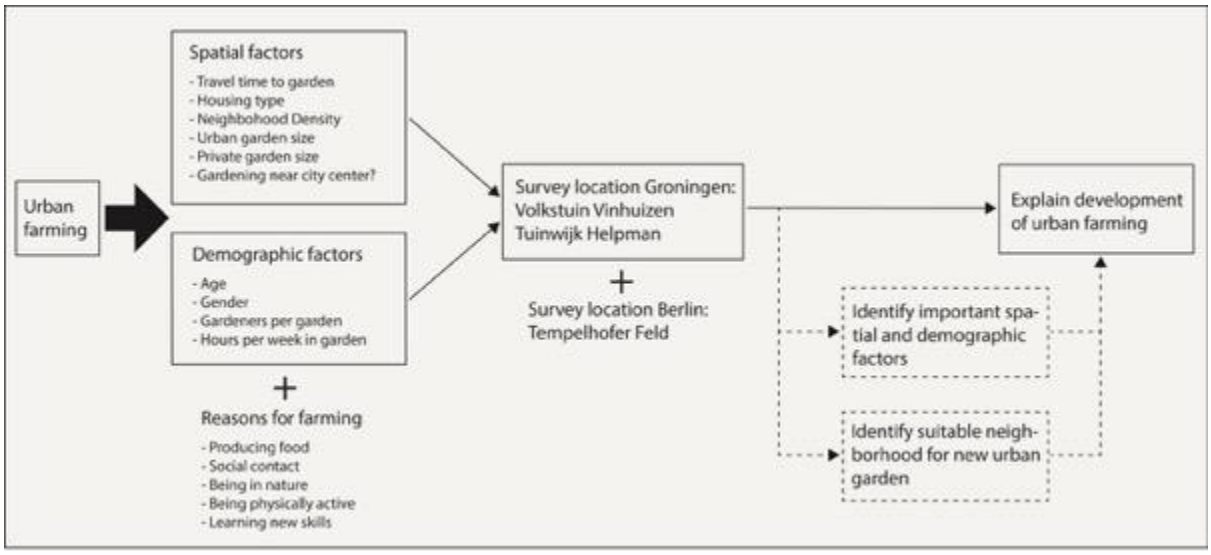


Figure 1: Conceptual Model

2.2 Hypothesis

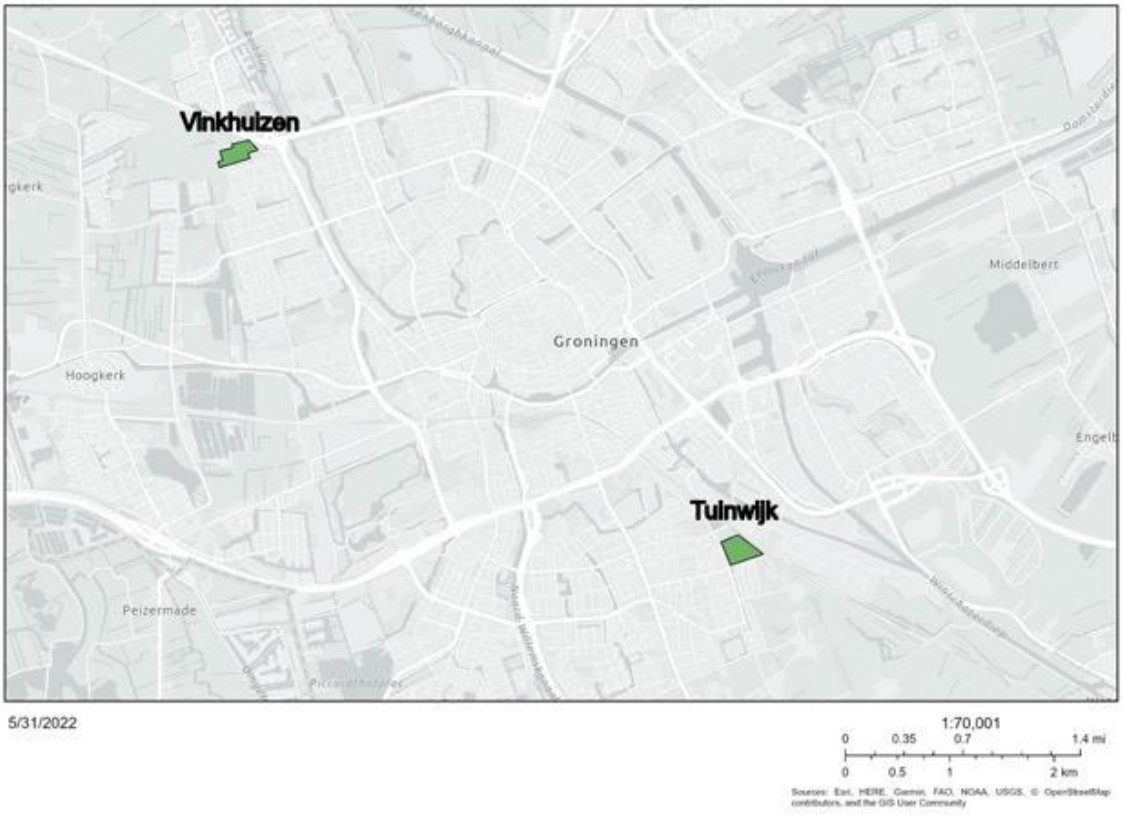
It is expected by the author that urban gardens are mostly used for growing food. In research on allotment gardeners conducted by van den Berg et al. (2010) 54 % of participants indicated that they eat food from the garden regularly. That suggests that growing food is one of the main functions of urban gardens. Harada et al. (2021) also mention urban gardens mostly in connection with food production.

According to van den Berg et al. (2010) especially people over 62 (average retirement age in 2010) benefit from the physical activity and social contact the garden provides. It is therefore expected by the author that there is a tendency toward people close to retirement age in the garden. The current retirement age in the Netherlands is 67 (Sociale Verzekeringsbank Bank, 2022). Furthermore, it is expected that participants live relatively close to the garden since spatial proximity was established as relevant.

3. Methodology

This research is part of a Bachelor thesis in Spatial Planning and Design at the University of Groningen. Furthermore, this research is part of the STOURIE (Sustainable transformation of Urban Regions in Europe) program which is an Erasmus-funded research collaboration between the University of Groningen, Humboldt University Berlin, Stockholm University, and Politecnico di Milano.

Statements in this research will be made based on primary data gathered using surveys, interviews, and non-participatory observations. This will be explained in detail under *Data Collection Instrument*. The data was collected in Groningen and Berlin. The data from Groningen was collected only by the author and the data in Berlin by the author and two students from Stockholm University and one student from Humboldt University.



The Groningen data was collected at the Volkstuin Vinkhuizen and the Tuinwijk in Helpman (Map 1). GIS will be used to visualize the neighborhoods that could potentially be used for urban gardening.
Map1: Survey locations Groningen

3.1 Data Collection Instrument

This research is based on quantitative and qualitative primary data collected via a mixed-methods approach to answer the research question mentioned under *Research Problem*. It is supported by secondary data from articles and policy papers. A mixed-methods approach is used to mitigate the risk of not finding participants for one of the methods. This includes a survey among users of the urban gardens, an interview with a board member of the Tuinwijk, and non-participatory observations. The data gathering took place between April and May 2022. This period is very well suited to collect data from urban gardens because it is the start of the planting season and therefore very busy. The data gathered in Groningen will be compared with data gathered in Berlin during the first week of May for sub-question 3.
The participants for the surveys will be contacted in the urban farming environment via face-to-face surveys or posters with QR codes. Beforehand the farms were contacted to get the permit to research their property.It is important that the data is anonymized and is only accessible to the researchers relevant to the research.

Map 2: Survey location Vinkhuizen

3.2 Quantitative data

Quantitative data was collected via a survey (Appendix 1 & 2). It includes six open questions asking for ratio data and two questions asking for nominal data. The other questions consist of a Likert scale from 1 (completely disagree) to 5 (completely agree) producing ordinal data. Dutch surveys were used in Groningen (Appendix 1) as well as an English online version. In Berlin, slightly

different questions were used, to fit research questions of other STOURIE students (Appendix 2). However, since the vast majority of questions are identical, the surveys are still comparable.
Participants in Groningen could access this survey by a QR code on a poster (Appendix 3) that was put up in the garden communities Tuinwijk and Vinkhuizen. Other online participants accessed the survey over the Facebook group of the Volkstuin Vinkhuizen. Due to the relatively low number of participants (60), the answers from both garden communities were included in the same dataset since this paper aims to make general statements about urban gardening and not to compare the two Groningen sampling locations.
The survey produced several ratio and Likert scale outputs. The Groningen dataset has three missing values which were added using impute by mean of dataset for one missing ´age` value and impute by median of dataset for two missing ´number of people in garden values`.
The survey data will be analyzed via multiple linear regression. Before conducting the regression analysis two outliers with over 56 hours spent in the garden per week were removed to prevent skewing the data. Eight hours per day (or 56 hours per week) was chosen as the cutoff value because that equals a standard working day. This reduced the valid N to 58. Due to the low number of responses in some of the Likert scale categories, the data were recoded into ´disagree or neutral` (0) and ´agree` (1). Since ´houseboat` only recorded one response it was combined with ´other`. There was no response for ´free-standing house` (single-family home). Therefore, it will not be included in the multiple linear regression. For housing type, dummy variables were created with rowhouse as the reference value as this was the most common type of housing in the sample.

Map 3: Survey location Tuinwijk

3.3 Qualitative data

Qualitative data was collected via an interview and non-participatory observations. Of the four originally scheduled interviews only one could be realized. An interview in Berlin, as well as research at the Prinzessinnengärten, were not possible due to uncertainties about the consent of members. Consequently, the research in Berlin focused on surveys at Tempelhofer Feld. In

Groningen, a board member of the Tuinwijk garden in Helpman was interviewed. Two other interviews that were scheduled in the Volkstuin Vinkhuizen could not be realized due to time constraints of interview partners.
The interview was voice recorded, with the agreement of the participant, and transcribed with otter.ai (2022) and manual transcription. Data about the history, structure, and usage of the garden was gathered via the interview. The history of the gardens will help to understand why they emerged at their current location. After the interview, the interviewee gave the author a tour through the garden where the structure and usage were further explained.

4 Results and Analysis

This section will discuss the findings in the context of the research questions based on descriptive statistics and statistical tests. Other insights will come from the interview. The interview was conducted with a board member of the Tuinwijk in Helpman on 12.05.2022 (Appendix 5). First, the demographic characteristics will be discussed, followed by the spatial factors and a short discussion of the findings in Berlin. Finally, based on these findings a suitable neighborhood in Groningen for a new urban garden will be identified.
60 participants completed the survey for Groningen with a population of approximately 400 members in the two gardens that were surveyed (ca. 245 in Vinkhuizen and 143 in Helpman). The Berlin dataset consists of 33 participants. It is unclear how big the population for the Berlin dataset is since it also includes visitors. These relatively low sample sizes limit the significance of the data and the statistical test that can be made. The survey included a Likert scale ´I would still engage in urban gardening when the garden would be closer to my home`. During the research, it became clear that the formulation of this question was confusing for many participants since they often lived in the vicinity of the garden. This led to very different interpretations of this question which limits the statements that can be made about this variable.

		Hours per week	(Allotment) garden size (m2)	Travel time (min)	Private garden size (m2)	Age	Gardener number
N	Valid	58	58	58	58	58	58
	Missing	0	0	0	0	0	0
Mean		12.69	189.03	12.55	30.02	55.22	1.90
Median		11.00	170.00	10.00	4.00	57.00	2.00
Std. Deviation		8.796	113.440	9.052	47.868	16.059	1.119
Range		34	570	49	250	63	5
Minimum		1	30	1	0	21	1
Maximum		35	600	50	250	84	6

Figure 2: SPSS descriptive statistics

4.1 Demographic characteristics

Which demographic characteristics explain the participation in urban farming and why? To answer this sub-question the factors of age distribution, gender, and the reasons of participants will be considered. The users of the sampled gardens are on average around 17 years older than the

average Groningen citizen. The mean age of the sample is 55.22 (figure 2) years whereas Groningen municipality has a mean age of 38 (Gronometer, 2022). The same is true when comparing it to the neighborhoods adjacent to the gardens (Gronometer, 2022). The current retirement age in the Netherlands is 67 years (Sociale Verzekeringsbank, 2022). 30 % of the sample are older than retirement age and 20 % are likely to retire within the next 10 years. In Groningen municipality, only 12.6 % are older than 65 and 21.3 % are between 45 and 65 (CBS, 2022). Retirement age, therefore, seems to be an important factor when considering which demographic group is using the gardens. The garden does however attract people from all age groups with participants ages ranging from 21 to 84.

There is a majority of women in the sample with 63.3 % (Figure 2). According to the CBS (2022), there is an increase of women per man the older the population becomes in the Netherlands. Especially in the age groups above 65, there is a clear majority of women in the population. In Groningen municipality, there are 91 men for every 100 women in the age category of 70 to 80 (CBS, 2022). In the sample, however, the number of men and women over 65 is equal. Therefore, it appears that the majority of women in the sample cannot be explained by a demographic majority of women.

In terms of reasons for participants to go to the garden, being in nature seems to be the most important reason with 93.1 % of the participants agreeing (Figure 3). Learning new skills seems to be the least important reason for the sample with 60.3 % being neutral or disagreeing. This might be due to the relatively high percentage of older participants that often already have a lot of skills. All other reasons were agreed with by at least 50 % of the sample which makes all of them relevant.

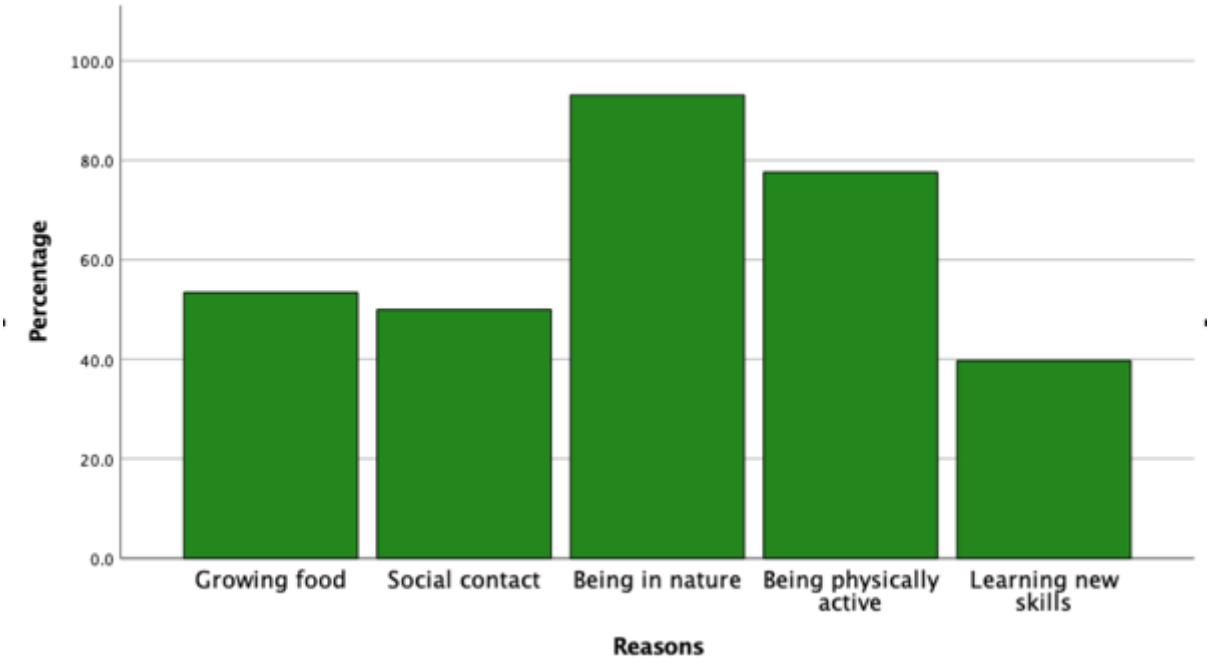


Figure 3: Percentage of participants agreeing with reasons

In terms of gardeners per garden in the Groningen sample 43.1 % garden alone and another 39.7 % with only one other person. During the interview, it did not become clear if social contact is a big factor for people to come to the garden. The interviewee mostly mentioned relaxation and connecting with nature as the main reasons. Socializing seems to be a secondary reason. This also matches the original function of the garden in Helpman as a cheap option for factory workers to

relax and have holidays. According to the interviewee, Tuinwijk was founded in 1913 by a factory owner that wanted to provide space for his workers to relax and have cheap holidays. Additionally, it was used to grow food in its early stages.

Figure 4: Different land use functions Tuinwijk

Low income can therefore be regarded as another demographic characteristic that explains the development of urban gardens. The interviewee mentioned however that there is a change in demographics. He observed that the people are becoming richer and often use the garden houses as an investment. Nowadays it appears to be a mixed demographic group in terms of age and income.
It is important to mention that the structure of the two surveyed gardens differs. The Tuinwijk contains houses where people are allowed to live during the summer and combines land types and uses such as fields, ponds, gardens, and houses (Figure 4). The garden in Vinkhuizen only consists of fields and sheds or greenhouses with canals in between (Figure 5). Therefore, the motivations of the people to come to these gardens might differ.

Figure 5: Different land use functions Vinkhuizen

4.2 Spatial Factors

Which spatial factors explain the development/existence of urban gardens?

To answer this sub-question the factors of time spent in the garden, size of private and community garden, housing type, travel time to garden, and several questions about the opinion of the participants about the placement and accessibility of the garden in relation to their home/city center will be discussed. Statistical tests will be used to make statements about this data. Other insight will come from the interview.

A multiple linear regression was calculated to predict hours spent in the garden per week based on all variables in the survey except the perception of density and the gardening behavior with more private green space (Appendix 7). This regression was explored with a backward model. After removing the two left-out variables the model was significant.

(Allotment) garden size and living in a housing block were the only significant predictors of hours spent in the garden per week. A significant regression equation was found ($F(17,1.921)$, $p < .045^{b}$), with an R^2 of .449.

Participants predicted hours spend in the garden per week is equal to -6.917 + 0.033 (hours) + 8.272 (housing block), where hours per week is measured in hours and housing type is coded in 1 = rowhouse, 3 = apartment, 4 = housing block and 6 = other. Participants' time spent in the garden per week increased by 0.033 hours (2 minutes) for every square meter.

Logically, a bigger garden requires more maintenance. However, since most other variables are insignificant, it is unclear if demographic factors influence the size of a participant's garden. On average people from the sample spend 12.69 hours per week in the garden with a median of 11 hours, the range however is 1 to 34 hours (Figure 2). Two outliers with 70 and 80 hours per week were removed previously.

Participants' time spent in the garden per week increased by 8.272 hours if they live in a housing block compared to a rowhouse. Housing block is the densest type of housing in the survey (Example: Figure 6). This dense type of housing seems to influence the participants to spend more time in the garden than other housing types. This could be an indicator of a bigger need for gardening and being in nature for participants in dense housing. This is supported by the fact that most participants have limited availability of private gardens with 50 % of the dataset having 5 or fewer m^2 of private greenery and 38 % having no private greenery at all. Furthermore, no participant lives in a free-standing house (single-family home) which typically has an adjacent garden.

Figure 6: Housing block in Vinkhuizen

Another multiple linear regression was calculated to predict the (allotment) garden size in square meters based on all variables in the survey (Appendix 8). Hours spent in the garden per week and perception of density were the only significant predictors of (allotment) garden size. A significant regression equation was found ($F(19, 38) = 1.982$, $p < .0.036^{b}$, with an R^2 of .498.

Participants predicted (allotment) garden size is equal to 304.972 + 5.212 (hours per week) – 76.251 (density perception), where hours per week is measured in hours and density perception is coded in 0 = I disagree or am neutral (about living in a dense neighborhood) and 1 = I agree. Participants' garden size increased by 5.212 m^2 per hour spent in the garden. As already discussed, garden size and time spent in the garden are closely related. It could be argued however that participants of retirement age have generally more free time than others and therefore tend to have bigger gardens. However, age is insignificant in the regression, and therefore seems to be irrelevant regarding the garden size. Also, with a limited supply of urban garden space, it is unclear if gardeners always have a choice in the size of their gardens.
Participants perceiving their neighborhood as dense have 76.251 m^2 smaller gardens than people with another perception. Possibly, participants that are used to dense neighborhoods tend to get smaller gardens due to being accustomed to less space than people from less dense neighborhoods. Therefore, it could be argued that urban gardens in dense neighborhoods need less space. 74.1 % of the sample perceive their neighborhood as dense. In combination with dense housing types being more present in the sample, it leads to the conclusion that urban density is one of the most important factors for the development of urban gardens. Furthermore, most participants appear to live rather close to their garden with the average travel time being just under 13 minutes. Spatial proximity, therefore, appears to be relevant as well.
Another important spatial factor is probably the availability of space. On average each (allotment) garden covers an area of 189 m^2. According to the interviewee, the garden in Tuinwijk has a total area of 6 hectares, and the garden in Vinkhuizen has a similar size. The structure of the Tuinwijk was explained as the following: The garden community rents the land from the municipality. This land is divided into 143 parcels of differing sizes dedicated for housing with attached gardens. 20 additional parcels exist that are meant for growing vegetables. Other land uses the interviewee mentioned and that was observed by the author were a butterfly garden (many flowers and insect hotels), several ponds, a playground, an open field, a compost, and a cafeteria. It could be argued that available land with potential for different land-use functions can also contribute to the development of gardens such as Tuinwijk.

4.3 Case study - Tempelhofer Feld, Berlin

The urban garden in Tempelhof, Berlin is a public space which is the main difference from the garden in Vinkhuizen. During the day the access to the garden is not restricted and many non-gardeners spend time there (Example: Figure 7). Therefore, also visitors got included in the survey since they make up a big part of the users. This difference in users however can have an impact on the reasons people go to the garden in Berlin.
The mean age of the Berlin sample is 38,67, which is 16 years lower than the one in Groningen. Berlin itself has a mean age of 42.9 (Berlin.de, 2022). A possible explanation for this age difference is the age of the garden. Tempelhofer Feld is a much newer garden than the one in Vinkhuizen. Many gardeners in Groningen mentioned that they are garden members for many decades, whereas the garden in Berlin has only existed for around 10 years (Tagesspiegel, 2019). The Berlin sample has a 60 % majority of women. Participants spend 7 hours on average in the garden.
A majority of participants in Berlin mentioned that they do not go to the garden to grow food. That stands in opposition to the Groningen dataset where the majority of people agree with going to the garden to grow food. The Berlin sample however also included visitors to the garden who do not take part in the planting process. This could explain the low number of people growing food. Furthermore, many members of the garden mentioned that food got stolen in the past years. This

is one limitation of a public urban garden. The main motive for the majority of participants is to be in nature and to relax.

Figure 7: Public entrance of garden at Tempelhofer Feld

4.4 Suitable neighborhood in Groningen

Based on the lessons learned in Berlin and Groningen, which neighborhood in Groningen has the most potential to develop Urban Farming in the future?

In this section, the data from Groningen that was discussed above will be compared with the data collected in Berlin. The findings of Berlin and Groningen can be used to determine which neighborhood in Groningen would be suitable for a new urban garden. Therefore, it is important to analyze the demographic and spatial preconditions that were identified to be important. Additionally, observations in all three gardens made by the researcher will be discussed. The outcomes of this analysis will be visualized using a GIS map.

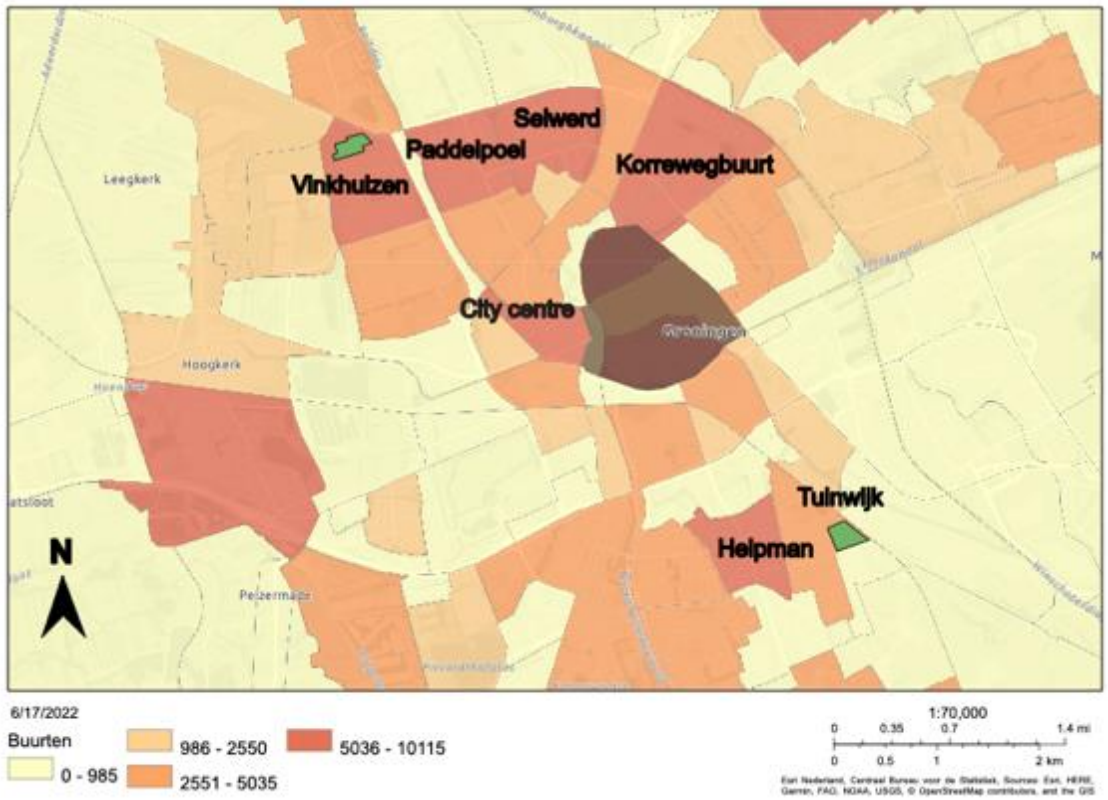


Figure 8: Population density Groningen and proposed urban garden location

Both datasets show a median travel time of 10 minutes. According to both samples, this appears to be the most common travel time that people are willing to take to visit an urban garden. Since not everybody can bike, walking time will be used as a basis for finding the service area of a new urban garden in Groningen. Therefore, the 10 minute travel time is used as an indicator for the placement of the garden in relation to housing areas.

Other important factors are as follows.
Participants from densely perceived neighborhoods generally have smaller urban gardens. Furthermore, people from the densest housing type in the survey spend more time in the garden. From a planning perspective, when looking for maximum utility it would therefore make sense to develop a new urban garden in a dense neighborhood.
However, 81 % of participants would not agree with continuing gardening if their garden was located close to the city center. It is unclear if this is because they already live close to their garden or because the city center is an unsuitable place for an urban garden for the participants. Regardless, it indicates that another location would be more suitable. According to the CBS (2022) the densest neighborhoods outside of the center are Vinkhuizen, Paddelpoel, Selwerd, South-Hoogkerk, and Helpman indicated in red (Figure 8).
Two of these neighborhoods already contain the surveyed urban gardens and Hoogkerk is a rather rural settlement with a lot of surrounding nature. Paddelpoel is located very close to the garden in Vinkhuizen, however, it could be one suitable location. Korrewegbuurt is arguably the most suitable since it has a high density and comparatively little green space. However, due to the size of urban gardens, availability of space was analyzed to be one enabling factor for urban gardens. Selwerd seems to fulfill several factors identified as important such as availability to the users (travel time), density of neighborhood, and the relation to the city center and other urban gardens. Furthermore, it is in 10 minute walking distance to Paddelpoel and the edge of Korrewegbuurt.

5. Discussion

The amount of people above retirement age found in the surveys is in line with existing literature (van den Berg et al., 2010). At the time of the study, the average retirement Dutch age was at 62 years whereas today it is 67. Nonetheless, retirement age appears to be an important factor. Interestingly, the same study by van den Berg et al. (2010) found that social contact is one of the least important reasons for the participants with only 17 % indicating it. Social contact was important for 50 % of the sample of this study, which is less than for being in nature and physical activity. This is also supported by the board member of Tuinwijk who only mentioned it secondarily. This indicates that different motivations for urban gardening might be found in different populations, but that similar patterns might be found.

In terms of spatial factors, median travel time to the garden was found to be the same in Groningen and Berlin at 10 minutes. Furthermore, a study by Yang & Diez-Roux (2012) found that the median walking trip duration of different kinds of trips is 10 minutes. It is important to mention that the trips in the sample were made with different travel modes. However, many participants indicated in the additional comment section of the survey that they walk to the garden. The 10-minute

walking threshold therefore can serve as an indicator for the service area of urban gardens. Smith et al. (2021) chose the same threshold when researching strategic planning of urban gardens.
According to Bohannon & Andrews (2011), an average 56-year-old person (mean age of sample) walks around 822 meters in 10 minutes (Women 786 m/10 min, men 858 m/ 10 min). Therefore, the potential new urban garden in Selwerd could be reached by foot from Paddelpoel or the edge of Korrewegbuurt in 10 minutes. Considering other literature this way of measuring the service area of an urban garden makes a lot of sense. As discussed under *Theoretical Framework,* spatial proximity of the gardeners to the garden is very important, and dense neighborhoods are favored by the community for new urban garden development (Wesener et al., 2020; Smith et al., 2021). That could be one explanation for the additional time participants from dense housing spend in the garden.

6. Conclusion

The main aim of this research was to find how spatial and demographic factors can explain the development of urban farming. Furthermore, participants were asked which reasons they have to go to the gardens. During the research, these were regarded as demographic factors. Primary data was gathered via a survey and an interview with an urban garden board member. Several spatial and demographic factors were found that explain the development of urban farming. Namely living in dense housing increases the time participants spend in the urban gardens. Based on density being the factor that was identified to lead to more time spent in the garden, Selwerd was chosen as the most suitable location for a new urban garden. Furthermore, Selwerd is located outside of the city center which was identified to be desired as well.
Furthermore, the development of urban farming depends on the availability of space as it is very area intensive in the observed forms. It also depends on spatial proximity to its users as well as a certain density of housing. A 10-minute travel distance was found to be the median travel time of the sample. Additionally, participants residing in housing blocks indicated that they spend considerably more time in the garden than residents in rowhouses.
Furthermore, the sample indicates that lack of private green space is very common among urban gardeners. The age of the participants in the sample shows a tendency toward people close to retirement age or older, which is following the expectations of the researcher. Additionally, it appears from the sample that more women participate in urban farming than men. The most important reason participants go to the garden is to be in nature. Therefore, the hypothesis that gardens are mainly used for food production is disproven.
Additionally, the gardens are often used to relax as the interviewee indicated. The other tested reasons are essential to a majority of participants as well. Only ´learning new skills` is not an essential reason for a majority of participants.
Consequently, it can be assumed that as long as an urban garden provides a calm environment with a natural appearance it will get accepted by the community. In the case of the Tuinwijk, the original reason for its development was to provide exactly this.
The spatial conditions for this development are enough space, spatial proximity to users, and a relative density of the neighborhood. The development of urban gardens can also partially be explained by a lack of private greenery.
It is unclear if the results can be generalized to other cities as well. Demographics in cities differ as well as the urban structure. Groningen is a comparatively small city and has access to a lot of greenery relatively close by. The mean age of the Berlin sample for example is 16 years lower than

the Groningen sample even though Berlin has a higher mean age than Groningen. This shows that it is probably difficult to generalize the results for other cities as well. Furthermore, there are many different types of urban gardens as explained under *Theoretical Framework*. The motivations for urban gardens that differ from the ones in Groningen might be different.

6.1 Further research

While this research supports documented importance of spatial factors such as short distance to the garden and density of nearby neighborhoods, further research should be conducted. Future research should also take the amount of experience into account. During the research, it was noticed that knowing the years a participant spent in the garden could help to explain the reasons people go to the garden for. Furthermore, it would be helpful to include travel mode to put travel time into perspective. The lack of this variable limited the analysis of travel time.
A surprising finding was that participants who perceive their neighborhood as dense have around 76 m^2 smaller urban gardens. Future research could investigate this correlation.
It would also be interesting to conduct further research on the garden service area based on travel time. It was found that the median travel time to Groningen gardens is 10 minutes which is the same median travel time as in the Berlin sample. It would therefore be interesting to find out which service area based on different transport modes the gardeners have. Based on the service area, models could be developed on strategic urban garden placement. These models could be a part of city development plans which aim to increase greenery in cities.

7. Reflection

7.1 Limitations of research

This research is subject to several limitations. The list of reasons in the survey is limited to five due to the already extensive list of questions (two pages). The author aimed to keep the survey at two pages to not make it too imposing for the participants. During the research, it became clear that especially the factor "coming to the garden to relax" was missing as this was mentioned by a lot of participants. However, the research already had progressed too much to include it in the survey. Initially a factor for experience measured in ´years of having a garden` was included. Due to the length of the survey, it was removed. In hindsight, it would probably have been better to remove another factor instead to be able to make statements about the impact of experience. Taking the limitations of research into account the research was successful. First, it was difficult to conduct the surveys in Dutch but during the research, it got easier. Having unlimited access to the survey areas proved vital to ensure successful data gathering. Most participants were open to the research and nearly every approached person participated. One of the biggest difficulties was finding enough participants since the number of gardeners in the garden varied. It was very interesting to encounter so many diverse people and conduct research on different types of gardens.

Further limitations concern the number of participants in Berlin and partially in Groningen. The number of respondents was only 33 and therefore only made it possible to use descriptive statistics for this part. In Groningen, the sample size was 60. With a higher number of participants, more significant claims could have been made. The research was conducted in two places, namely Volkstuin Vinkhuizen and Tuinwijk in Helpman. Respondents from both places were combined in the dataset which limits the potential to compare the two groups. Having two separate datasets with

enough respondents to make a reliable statistical test for both groups could have improved the quality of the research.

7.2 Reflection on research

Taking the limitations of research into account the research was successful. First, it was difficult to conduct the surveys in Dutch but during the research, it got easier. Having unlimited access to the survey areas proved vital to ensure successful data gathering. Most participants were open to the research and nearly every approached person participated. One of the biggest difficulties was finding enough participants since the number of gardeners in the garden varied. It was very interesting to encounter so many diverse people and conduct research on different types of gardens.

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Appendix 1 – Dutch survey

Enquête over stadstuinieren

Beste tuinder bedankt voor uw deelname aan deze enquête. Ik ben Luca Spalteholz, student Ruimtelijke Planning en Ontwerp. Dit onderzoek is onderdeel van mijn bachelorscriptie aan de Rijksuniversiteit Groningen.
Deze enquête is gemaakt voor leden van een stadstuingemeenschap.

Ik doe onderzoek naar de demografische en ruimtelijke factoren die mensen motiveren om stadstuinieren te doen bij stadstuingemeenschappen. De enquête bestaat uit 19 vragen en de antwoorden worden geanonimiseerd. Als u een vraag niet wilt beantwoorden, kunt u deze leeg laten. U kunt altijd een antwoord raden als u het niet zeker weet.

Voor vragen kun u contact met mij opnemen via: l.spalteholz@student.rug.nl

Hoeveel uur breng je per week door in de gemeenschaps tuin? _____

Hoe groot is je gemeenschaps tuin?
(in vierkante meters) _____

Hoeveel minuten reist u van huis naar uw gemeenschaps tuin? (Tijdens het seizoen) _____

In welk type woning woont u?

1=Rijhuis, 2=Vrijstaand huis, 3=Apartment in stadhuis, 4=Flatgebouew, 5=Woonboot, 6=andere

1	2	3	4	5	6
◯	◯	◯	◯	◯	◯

Hoeveel vierkante meter eigen groen heeft u thuis? _____

In hoeveel bent u het eens met de volgende stelling?

1=Ik helemaal mee oneens, 2=Ik deels mee oneens, 3=Ik ben neutraal over, 4=Ik deels mee eens, 5=Ik helemaal mee eens

	1	2	3	4	5
Ik woon in een dichtbevolkte buurt	◯	◯	◯	◯	◯
Ik zou nog steeds aan stadstuinieren doen als ik meer privé groen zou hebben	◯	◯	◯	◯	◯

Wat is uw leeftijd? _____

Wat is uw geslacht?

1=Vrouw, 2=Man, 3=Anders, 4=Wil ik niet zeggen

1	2	3	4
◯	◯	◯	◯

Sla alsjeblieft de pagina om

Pagina 1

Met hoeveel mensen doe u mee in uw ge - meenschaps tuin? (inclusief jezelf) _____

In hoeveel bent u het eens met de volgende stelling?

1=Ik helemaal mee oneens, 2=Ik deels mee oneens, 3=Ik ben neutraal over , 4=Ik deels mee eens, 5=Ik helemaal mee eens

	1	2	3	4	5
Een reden dat ik naar de gemeenschaps tuin ga is **om mijn eigen voedsel te produceren**	◯	◯	◯	◯	◯
Een reden dat ik naar de gemeenschaps tuin ga is **voor social contact**	◯	◯	◯	◯	◯
Een reden waarom ik naar de gemeenschaps tuin ga is **om tijd doos te brengen in de natuur**	◯	◯	◯	◯	◯
Een reden waarom ik naar de gemeenschaps tuin ga is **om fysiek actief te zijn**	◯	◯	◯	◯	◯
Een reden waroom ik naar de gemeenschaps tuin ga is **om nieuwe vaardigheden te leren**	◯	◯	◯	◯	◯

In hoeveel bent u het eens met de volgende stelling?

1=Ik helemaal mee oneens, 2=Ik deels mee oneens, 3=Ik ben neutraal over , 4=Ik deels mee eens, 5=Ik helemaal mee eens

	1	2	3	4	5
Ik vind mijn gemeenschaps tuin gemakkelijk toe - gankelijk	◯	◯	◯	◯	◯
Ik zou vaker tuinieren als de tuin dichter bij mijn huis zou zijn	◯	◯	◯	◯	◯
Ik zou vaker tuinieren als de tuin dichter bij het centrum zou zijn	◯	◯	◯	◯	◯
Ik ben tevreden over de gedeelde faciliteiten	◯	◯	◯	◯	◯

Ruimte voor eigen opmerkingen

_____

_____

Bedankt voor uw deelname aan deze enquête!
Als u iemand kent die ook geïnteresseerd zou zijn in deze enquête, alsjeblieft verwijs ze dan naar de enquêtes in de kantine.

Appendix 2 – German survey

Umfrage über Urban Gardening

Lieber Gärtner, vielen Dank für Ihre Teilnahme an dieser Umfrage. Wir sind Katharina, Luca, Emma und Klara vier Studenten aus Berlin, Groningen und Stockholm. Diese Umfrage ist Teil unserer Bachelorthesen/Kurse an unseren jeweiligen Universitäten.
Diese Umfrage ist für Mitglieder in einem Gemeinschaftgarten gedacht.

Wir untersuche die demografishen Faktoren die Menschen dazu motiveren Gemeinschaftsgärten zu betreiben. Diese Umfrage besteht aus 20 Fragen und die Anworten sind anonym. Falls Sie eine Frage nicht beantworten wollen, können Sie das Fald fre lassen. Wenn Sie sich bei einer Antwort nicht sicher sind können Sie die Antwort raten.

Für Fragen und Anmerkungen können Sie uns unter der folgenden Mail Adresse erreichen: l.spalteholz@student.rug.nl

Seit wie vielen Jahren nutzen Sie den Garten? _____

Wie viele Stunden verbringen Sie pro Woche im Garten? _____

Was ist der wichtigste Grund für Sie in den Garten zu gehen? _____

In wie weit stimmen Sie den volgenden Aussagen zu?

1=Ich stimme überhaupt nicht zu, 2=Ich stimme teilweise nicht zu, 3=Ich stehe der Aussage neutral gegenüber, 4=Ich stimme teilweise zu, 5=Ich stime voll zu

	1	**2**	**3**	**4**	**5**
Ein Grund warum ich zu meinem Garten gehe **ist um meine eigene Nahrung zu produzieren**	○	○	○	○	○
Ein Grund warum ich zu meinem Garten gehe **ist sozialer Kontakt**	○	○	○	○	○
Ein Grund warum ich zu meinem Garten gehe **ist um Zeit in der Natur zu verbringen**	○	○	○	○	○
Ein Grund warum ich zu meinem Garten gehe **ist um körperlich aktiv zu sein**	○	○	○	○	○
Ein Grund warum ich zu meinem Garten gehe **um neue Dinge/Fähigkeiten zu lernen**	○	○	○	○	○

Was ist Ihr Alter? _____

Was ist Ihr Geschlecht?	**1**	**2**	**3**	**4**
1=Frau, 2=Mann, 3=Divers, 4=Möchte ich nicht sagen	○	○	○	○

Was ist Ihre Postleitzahl? _____

Bitte drehen Sie die Seite um

Seite 1

Wie viele Minuten reisen Sie zu Ihrem Garten?
(Während der Saison) _____

Wie wohnen Sie?

1=Reihenhaus, 2=Freistehendes Haus, 3=Apartment in Stadthaus, 4=Wohnblock, 5=Hausboot, 6=Andere

1	2	3	4	5	6
◯	◯	◯	◯	◯	◯

Wie viele Quadratmeter private Grünfläche haben Sie zu Hause? _____

In wie weit stimmen Sie den volgenden Aussagen zu?

1=Ich stimme überhaupt nicht zu, 2=Ich stimme teilweise nicht zu, 3=Ich stehe der Aussage neutral gegenüber, 4=Ich stimme teilweise zu, 5=Ich stime voll zu

	1	2	3	4	5
Ich wohne in einem dichtbevölkerten Viertel	◯	◯	◯	◯	◯
Ich würde weiterhin im Gemeinschaftgarten gärtnern wenn ich mehr priate Grünfläche hätte	◯	◯	◯	◯	◯
Ich finde einen Garten gut erreichbar	◯	◯	◯	◯	◯
Ich würde öfter gärtnern wenn der Garten näher zu meiner Wohnung wäre	◯	◯	◯	◯	◯
Ich würde öfter gärtnern wenn der Garten näher zum Stadtzentrum wäre	◯	◯	◯	◯	◯
Ich bin mit den geteilten Einrichtungen zufrieden	◯	◯	◯	◯	◯

Platz für eigene Anmerkungen _____

_____

Vielen Dank für Ihre Teilnahme an dieser Umfrage!

Appendix 3 – Survey poster

university of groningen

Enquête Stadslandbouw

Survey Urban Gardening

Beste tuinders, dit enquête is onderdeel van mijn bachelor thesis. Ik doe onderzoek naar de drijfveren van stadstuinders op basis van ruimtelijke en demografische factoren. Het zou mij enorm helpen als uonderstaande vragenlijst zou kunnen invullen! Bedankt voor je ondersteuning.

Dear gardeners, this survey is part of my bachelor thesis. I conduct research into the motivations of urban gardeners based on spatial and demographic factors. It would be of great help to me if you could fill in the questionnaire below! Thank you for your support.

Als u de enquête liever online doet, kunt u de onderstaande qr-code scannen.

If you prefer to do the survey online you can scan the qr code below.

Nederlands

English

Appendix 4 - Interview guide

Interview guide urban gardening Groningen

Main questions in bold and follow-up questions in normal text

What main reasons for people coming to the garden did you observe?

What do you think leads to these reasons?

How many members does the garden have?

How much gardening space does the average gardener here have?

What activities do gardeners usually engage in this garden?

What characteristics of the people in the garden could you observe?

Which age groups are present in the garden?

Could you observe a change in people in your time in the garden?

How far away do people live?

How do you think the space could improve?

Do you think Groningen could use more garden space or another garden community?

If so where and which type?

Appendix 5 – Interview transcript

Transcription interview 1 at Tuinwijk
12.05.2022

Luca 0:11
So welcome to this interview. Of course the the answer at the end will be anonymized so I will not mention any names or where you from. Any personal information.

Luca 0:20
If you don't want to share anything that I asked you that's also no problem. And as I already explained, it's about the motivations of people to do gardening in relation to the spatial and demographic factors.

Luca 0:43
You said you're a board member of the garden here?

Interviewee 0:46
Yes.

Luca 0:48
And how long are you already a part of this garden?

Interviewee
Well, I bought this place in March 2021.

Luca 0:57
Okay.Just a year?

Interviewee 1:00
Yeah. And since November I am part of the board.

Luca 1:08
Okay. So here everybody kind of buys the place and you don't rent it?

Interviewee 1:17
well yeah. You become a member of this community
and the community rents it from the municipality of Groningen.
But you buy the house, and everything is on the garden.

Luca 1:35
Okay.

Interviewee 1:38
So when we are leaving this community you can sell your everything what is on your parcel.

Luca 1:49
What are the main reasons that you could identify or observe of the people that come here to this garden? It can also be your own reasons, but I can assume that I can imagine that you know a lot of people here in the garden right now.

Interviewee 2:03
Yeah. So what are their reasons to have a place like this?

Luca 2:04
Yeah, yeah.

Interviewee 2:12
I think most of the people want some connection with with nature and garden actually but it's also a place to relax to hang in your hanging mat or sleep and cook and live in your,in your house,in my house. And also to meet other members of this community. We have 143 houses here.

Interviewee 2:55
And then we also have I think 20 parcels for gardening

Luca 3:00
Okay.Gardening parcels and you also know how many members are in the in the community ?

Interviewee 3:13
143

Luca 3:16
So okay, every house is one member.

Interviewee 3:18
But, of course. People do it mostly with their partner or the family. So I think the community is bigger than those 143.

Luca 3:31
But it's of course hard to say because only one member is signed up?

Interviewee 3:34
Yeah.

Luca 3:36
Yeah, that makes sense. And what could you imagine, like these two reasons why people come here like why do they have to come here to do this?

Interviewee 3:45
Well in the city there is not such a space. We have six hectares. So, it's quite a big space with the main reason to garden ecologically and

Interviewee 4:03
Yeah, have this connection with nature. It's silent here when you enter the game it's it's like a peaceful place to be.

Unknown Speaker 4:13
Yeah, come come to your mind and it's a place to relax mostly I think.

Luca 4:24
Which you can’t find in the city.

Luca 4:30
If you would describe like the main activities of the gardeners here like you said they… You basically said it already like its relaxing philosophy of gardening. Some people even live here say you said. During the summer.

Interviewee 4:42
Yes.

Luca 4:3
Okay.

Short pause to turn a page

Luca 4:52
Are there any like characteristics of the people that are in the garden or which character could you observe?

Interviewee 5:00
(laughs) It is a good question.

Interviewee 5:05
Yeah, I think there has been a transition. Well, maybe it's nice to know that this place was ahm

Interviewee 5:15
This place in 2013, (…) two zero one three

Interviewee 5:25
This place was 100 years. Existed.

Luca 5:29
Okay.

Interviewee 5:30
So this is more than 100 years old. It used to be on another place in Groningen.

Interviewee 5:43
And it is (searching for word) obgericht?

Luca 5:46
Like build?

Interviewee 5:47
Yeah, build by Scholten, it was (thinking)

Interviewee 5:53
A rich person in Groningen who had a lot of factories. He was a big person in the industry here and had a lot of people working for him.

Interviewee 6:07
And instead of his workers to go to cafe, he wanted them to, to garden to grow their own vegetables.

Interviewee 6:23
And it was also a place for his workers to, to relax, because they're weren't rich, of course, they couldn't go on holiday. So this was their place to go to holiday and (thinking)

Interviewee 6:37
and also grow their own vegetables.

Interviewee 6:42
So it used to be a place for poor people basically.

Interviewee 6:52
And I think in the 90s, I think 20 - 25 years ago,there was an ecological revolution, I think, in general, but especially here at the time back.

Interviewee 7:07
That (thinking)

Interviewee 7:09
you don't plant a plant, and then 30 centimetres of black grounds, a plant, 30 centimetres.

Interviewee 7:22
So now we let things grow and think that every flower is valuable to our bees, and insects. And biodiversity is important. But that wasn't the case here.

Interviewee 7:41
I think, along with this ecological revolution, this place also became more a place for people to just have a second house.

Interviewee 7:54
To have a place to be when it's nice weather where you can create something, what's your own, in nature, in this green environment.

Interviewee 8:07
And (thinking)

Interviewee 8:12
So now people are becoming a bit more rich.

Interviewee 8:20
I spoke to one member of this place who has been here for a while. And she was talking about Chardonnay gardeners. So they come only on Sunday with their newspaper and the Chardonnay to enjoy this place. And then they leave. And you have the persons who are very much (…) they are basically every time here when they when they have free time they are here on gardening and those other hard workers and

Interviewee 8:50
and another member said to me and yeah.

Interviewee 8:54
There is a saying in Dutch. If I look at your garden, I can tell you who you are.

Interviewee 9:03
So that's her philosophy of the the personality of yourself will reflect in the way your garden looks like.

Luca 9:15
Oh, it's beautiful.

Interviewee 9:116
Yeah, yeah.

Luca 9:17
It's interesting.

Luca 9:18
So that sounds like this very diverse group of people.

Interviewee 9:20
Yeah.

Luca 9:22
Nowadays, not only the workers, but actually like it's a bit mixed.

Interviewee 9:25
Yes. It's really mixed.

Luca 9:27
And would you say that that's also reflected in the age groups? Are there diverse age groups?

Interviewee 9:30
Yeah. I think we are pretty young. [redacted] So…

Interviewee 9:38
but there are a lot of families here and

Interviewee 9:44
it's basically a tiny

Interviewee 9:48
society. So from young to very old,

Luca 9:55
kind of all age groups.

Interviewee 9:56
Yes. A lot of families

Interviewee 9:59
who have this place.

Interviewee 10:02
Also, for the children to play. And we have a lot of open places here and public places on this terrain, which is quite unique for a Volkstuin Vereeniging.

Interviewee 10:17
Most other facilities like these, have only parcels for people to feel.

Interviewee 10:30
To do whatever they want.

Luca 10:34
but efficient

Interviewee 10:35
Yes, exactly. But here we have a lot of open spaces we have

Interviewee 10:38
A pool for frogs. And we have here

Interviewee 10:42
quite a big (unclear in voice recording) we call it. So, everything can grow there the way it wants. We have an open space fields there.

Interviewee 10:54
So we have a garden for butterflies and butterfly garden we call it.

Interviewee 11:02
and those places the public places we maintain together with the community. So when you became a member of this community, you have to do three times a year (thinking)

Luca 11:18
Community work?

Interviewee 11:20
Yeah, yeah.

Luca 11:22
Would you say that there was like one age group that sticks out?

Interviewee 11:27
I think (thinking)

Interviewee 11:32
well, it's quite an interesting question. I don't know exactly. But as I

Interviewee 11:37
can make a wild guess the biggest age group is I think between 40 and 60 years old.

(Short pause to write down the answer)

Luca 11:51
And do you (mumbling) have an imagination of how far away people live
Interviewee 11:57
You have to live in the municipality of Groningen to become a member here.

Interviewee 12:07
And people are from almost all municipalities. So close by but also in Vinkhuizen.

Interviewee 12:18
And you have also the other allotments community which is called Piccardhof.

Interviewee 12:27
And they have the rule that you have to live between the cycle of 30 kilometres. Because here you have to be from Groningen.

Interviewee 12:40
Quite recently, to other municipalities have joint Groningen and so our range is a bit larger.

Luca 12:54
How do you think could the space here improve?

Interviewee 12:59
What makes it better?

Luca 13:00
Yeah.

Interviewee 13:02
Well, we are now thinking about (thinking)

Interviewee 13:11
How do you say that? we are having since I think January a group of people are thinking about the ilogical (thinking)

Interviewee 13:23
infilling

Luca 13:27
Infilling? Like setting something?

(Unclear recording)

Interviewee 13:31
(Starts mid-sentence) of their public spaces and how can we even do that more in an ecological way. So we can (sentence ends).

Interviewee 13:41
This place is also part of the ecological structure of the municipality. So it's quite important in that case, it follows on the…

(Points out a woodpecker, which we look at for a few seconds)

Interviewee 14:03
It follows the green line in the city and there's going to build the Zuiderplantsoen, a new park.

Interviewee 14:13
So the green line will continue there.

Interviewee 14:18
So we are thinking about how to improve that.

Interviewee 14:23
That's a big thing of this place. And what we are working on to improve that.

Interviewee 14:31
And I think the power of this place is that you can build your own house and and the diversity of this place. Every house and every garden is different. And of course every member is different.

Interviewee 14:47
And this diversity and everything can exist next to each other.

Interviewee 14:52
That's I think (thinking)

Interviewee 14:58
something you don't (thinking)

Interviewee 15:02
And there's nothing to improve in that.

Luca 15:06
Okay. You probably want to keep it I can imagine?

Interviewee 15:08
Yeah, yeah.

Luca 15:12
I have one last question and that is do you think Groningen can use more garden space or another community garden? And if so, where and which type?

Interviewee 15:25
That's a good question. This is an allotment place, and it is different than growing your own vegetables.

Interviewee 15:34
And I know a lot of people want to become member.

Interviewee 15:38
We only have space for 143 members.

Interviewee 15:45
So, I think there are. (pauses) We don't have actually a waiting list, but I know in other countries

Interviewee 15:53
they have a waiting list of 4000 people.

Interviewee 15:57
So that's a big question for places like this.

Interviewee 16:02
And what is nice about this place is that it is quite near the centre. So, in five minutes I'm (pauses)

Interviewee 16:11
Five minutes biking and I'm home or I'm here.

Interviewee 16:19
But I think people also I would like to

Interviewee 16:24
do that more in the in the

Luca 16:27
Peripheries?

Interviewee 16:33
Yeah. We also have some tiny house places. In Vinkhuizen you also have tuin in de stad. Garden in the city. And next to this you have (a) place of tiny houses

Interviewee 16:48
There are a lot of people thinking about other ways of living and

Interviewee 16:55
filling your life and how you want to (pauses) (inaudible)

Luca 17:03
so would you say there is like a change in the mindset towards a more ecological like living?

Interviewee 17:10
Yeah. (inaudible) live more closely to nature and environment (pauses)

Interviewee 17:16
which you can

Interviewee 17:20
(inaudible)?

Interviewee 17:23
That you can relate to. That you can understand what your relation is with nature more. If that makes sense.

Luca 17:32
So, if I understood that correctly, you mean that it's probably more popular in the outskirts of the city, so the peripheries but it's nice to be close to the centre as well?

Interviewee 17:45
Yeah, okay.

Luca 17:47
So it's not really in the centre but around the centre basically.

Interviewee 17:50
Yeah, I can imagine that when you have an open space in the centre you can. In the Oosterpoort we have a garden which is being maintained by the neighbours and they enjoy it together.

Interviewee 18:07
I mean Antwerpen you see that a lot you have gardens in the different (pauses) areas of the cities. (pauses)

Interviewee 18:18
Where you can just join and help the garden grow.

Interviewee 18:28
And this is a place where you have your own piece of ground.

Luca 18:35
Do you think there is more demand for something like this where you have your own house and you have to really own private space or more for (pauses)

Luca 18:43
somewhere to grow vegetables or be in like a community where you only focus on the on the plants?

Interviewee 18:52
I think both.

Luca 18:54
Okay.

(Writing down answer)

Interviewee 19:00
And I think growing vegetables is more (thinking)

Interviewee 19:06
You have to work harder for that than when you are gardening.

Interviewee 19:09
You can do it in the way you like.

Interviewee 19:15
So that's a piece of gardening we don't do a lot.

Interviewee 19:20
We just let it grow and maybe mow some grass.

Luca 19:30
Do you have anything else like that comes to your mind when talking about this topic? Because I am done with my questions. So, if you have any more comments?

Interviewee 19:44
Yeah, maybe we can have a tour on this park. So, you get the vibe of this place.

Luca 19:50
That would be really nice.

Interviewee 19:52
And I can maybe tell you something about (pauses)

Interviewee 19:54
what our thoughts are on this place or philosophies. And you can see all the different stuff

Interviewee 20:00
types of houses and gardens.

Luca 20:04
That would be great. Okay, I will stop the recording now.

Luca 20:06
Thank you very much for your for your answers.

Transcribed by https://otter.ai

Appendix 6 – Interview consent form

Interview Consent Form

Participants Name: Interview Date:

Project title: Development of Urban Gardens: Relevant Spatial and Demographic factors

Project description
This research investigates the relevant spatial and demographic factors that lead to the emergence of urban gardens. Additionally, the motivations of people engaging in urban gardening/farming are analysed. The main research question is: How do spatial and demographic factors explain the development of urban gardening/farming?
Based on the identified relevant factors a possible location in Groningen for a new urban garden should be identified.

1. I agree to be interviewed for the purposes of the student named above.
2. The purpose and nature of the interview has been explained to me, and I have read the assignment of the study as provided by the student.
3. I agree that the interview may be electronically recorded.
4. Any questions that I asked about the purpose and nature of the interview and assignment have been answered to my satisfaction.
5. Choose a), b) or c):
    a. I agree that my name may be used for the purposes of the assignment only and not for publication.
    b. I understand that the student may wish to pursue publication at a later date and my name may be used.
    c. I do not wish my name to be used or cited, or my identity otherwise disclosed, in the assignment.

    Name of the interviewee:

    Signature of the interviewee:

6. I have explained the project and the implications of being interviewed to the interviewee and I believe that the consent is informed and that he/she understand the implication of participation.

    Name of interviewer:

    Signature of interviewer:

Appendix 7 – Multiple linear regression

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-6.917	8.239		-.840	.406
	(Allotment) garden size (m2)	.033	.011	.430	3.035	.004
	Travel time (min)	.155	.143	.160	1.088	.283
	Age	.107	.080	.196	1.338	.188
	Gardener number	-.370	1.090	-.047	-.339	.736
	Private garden size (m2)	-.019	.027	-.104	-.711	.481
	Reason: growing food	2.835	2.419	.162	1.172	.248
	Reason: social contact	.737	2.753	.042	.268	.790
	Reason: nature	1.282	4.772	.037	.269	.790
	Reason: being active	-1.907	3.481	-.091	-.548	.587
	Reason: learning skills	2.641	2.457	.148	1.075	.289
	Accessibility	6.836	4.602	.220	1.485	.145
	Garden closer to home	-4.748	2.829	-.270	-1.678	.101
	Garden closer to center	2.229	3.423	.100	.651	.519
	Facility perception	-5.590	3.241	-.260	-1.725	.092
	Apartment	5.063	3.161	.272	1.602	.117
	Housing block	8.272	3.503	.372	2.362	.023
	Other	6.319	4.020	.221	1.572	.124

[a.] Dependent Variable: Hours per week

Appendix 8 – Multiple linear regression

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	304.972	114.805		2.656	.011
	Hours per week	5.212	1.815	.404	2.872	.007
	Travel time (min)	-1.744	1.809	-.139	-.964	.341
	Age	-.251	1.108	-.035	-.226	.822
	Gardener number	-25.720	13.624	-.254	-1.888	.067
	Private garden size (m2)	-.240	.344	-.101	-.698	.490
	Reason: growing food	-16.385	32.278	-.073	-.508	.615
	Reason: social contact	-2.537	35.651	-.011	-.071	.944
	Reason: nature	-61.686	62.895	-.139	-.981	.333
	Reason: being active	48.825	48.881	.181	.999	.324
	Reason: learning skills	-43.985	31.022	-.191	-1.418	.164
	Accessibility	-30.116	59.764	-.075	-.504	.617
	Garden closer to home	37.746	37.228	.166	1.014	.317
	Garden closer to center	-33.214	43.598	-.116	-.762	.451
	Facility perception	58.385	41.989	.210	1.390	.172
	Apartment	7.484	41.272	.031	.181	.857
	Housing block	-56.148	46.825	-.196	-1.199	.238
	Other	-59.086	51.487	-.160	-1.148	.258
	More private greenery	-2.310	33.062	-.010	-.070	.945
	Density perception	-76.251	37.322	-.297	-2.043	.048

[a.] Dependent Variable: (Allotment) garden size (m2)