The influence of particular neighbourhoods on an individual's food waste behaviour, in the municipality of Groningen

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Master's thesis Economic Geography
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Picture on front page: Volt (2020).

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“Throwing away food is like stealing from the table of those who are poor and hungry”

-Pope Francis-

Abstract

Food waste is a globally recognized dilemma which can be understood as an environmental problem. Therefore, the United Nations set up the Sustainable Development Goal 12.3 "To halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, by 2030" (FAO, 2021). However, the drivers and barriers behind food waste reduction remain undetermined as individuals keep wasting food. This research is focused on the role of geographical differences between neighbourhoods in the municipality of Groningen and its influence on the food waste behaviour of individuals.

By the use of mixed methods, a conducted survey and focus group discussions, this study investigates geographical differences between seven neighbourhoods in the municipality of Groningen. The analysis of the quantitative data is done via STATA/SE and the analysis of the qualitative data is done via Atlas.ti. From the results it became clear that, many factors influence an individual's food waste behaviour, as they are statistically significant variables. The most important findings of this study are that supermarket proximity, separating garbage and food waste initiatives influence an individual's food waste behaviour. Additionally, the study showed that severe behavioural change is needed to reduce the amount of food waste produced by individuals. The main reason for individuals to have leftovers is due to preparing too much food.

Out of this study it cannot be concluded which neighbourhood in the municipality of Groningen is most likely to have food waste, because the influencing factors can be cancelled out within neighbourhoods. Moreover, to specify the exact impact of the geographical differences on someone's food waste behaviour, more data is required, and more profound research is needed.

Keywords: Food waste, geographical differences, supermarket proximity, separating garbage, food waste initiatives.

Acknowledgement

This research on food waste behaviour in neighbourhoods of the municipality of Groningen has been performed to fulfil the conditions of the Master Economic Geography at the Faculty of Spatial Sciences (University of Groningen).

My interest in development, environment and sustainability date back to approximately fifteen years ago when I became a member of the non-profit organisation Green Peace. Together with my father I visited the boat, I was really impressed of this non-profit organisation and its goals for the environment. Furthermore, my mother's family lives in Malawi and visits there made me become aware of the fact that certain parts of the world are seriously lagging behind in development.

In October 2020, I decided to participate in the University SDG Challenge 2021, together with a group of students from the University of Groningen we were asked to find with solutions for companies to embrace the Sustainable Development Goals of the United Nations. During this process I became familiar with the SDG 12.3, to halve per capita global food losses and food waste in 2030. To link this research interest to the Master Economic Geography, differences between and within neighbourhoods are included in this study and this is examined in relation with food waste behaviour of various households.

Besides, my interest in sustainable topics and development will remain as I will continue with another master's degree in September 2021. Where I intent to apply my gained knowledge from the Master Economic Geography and to implement my experiences from this master's thesis research process.

I would like to thank all individuals who participated and contributed to this research. In addition, I am very thankful to my family and friends on their guidance, patience and confidence in this research process. Last but not least, a special word of appreciation to my supervisor dr. Aleid Brouwer, thank you for all the support and feedback in the past six months. I really appreciate the exceptional time we spend via online meetings, which were very helpful and insightful.

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List of tables

List of figures

Table of Contents

1. Introduction

1.1 Problem definition

The end of the Covid-19 pandemic is in sight; however, an even bigger crisis is waiting for us. The crisis of climate change and the decrease in biodiversity and essential resources. Almost one third of the global food produced is wasted each year due to human consumption (Lemaire and Limbourg, 2019). A serious reduction of food waste is needed to decrease greenhouse gas (GHG) emissions and freshwater use (Lemaire and Limbourg, 2019). In addition, land and water use for food production ensure a global biodiversity loss (Beretta and Hellweg, 2019). The global food waste can be estimated at about 1.6 billion tonnes per year (FAO, 2021) and about 42 percent of the total food waste is generated by households in Europe (Szabó-Bódi, 2017). The Netherlands is responsible for annually 2 billion kilograms of food waste, which is more than 100 kilograms per inhabitant (Timmermans, 2021). Moreover, global food waste has an enormous impact on the increase of GHG emissions, it ensures for almost as much emissions as the United States and China together (Timmermans, 2021). A solution for reducing environmental loss could be better linkages between regions, like urban and rural areas, which ensures food production more closely to the regions (Dubbeling et al., 2016).

Food waste can be considered as a multifaceted problem (Canali et al., 2017) it can be globally seen as an environmental, economic, social and food security dilemma. Furthermore, a continuous growth in population, an increased demand for food and inefficient resource use and food distribution ensures huge environmental impact due to food waste at all stages of the food production and consumption (Jurgilevich et al., 2016). The United Nations have set up the Sustainable Development Goals (SDGs), where SDG 12.3: Global Food Loss and Waste, is set up to reduce the environmental impact of food waste. The goal is to halve per capita food waste at the retailer and consumer levels and to reduce food losses along production and supply chains by 2030 (FAO, 2021). However, there are huge differences between regions and countries in the amount of food waste and food losses across several stages of the supply chain (Schanes and Stagl, 2019). According to Timmermans (2021) countries will only pursue their goals for reductions in GHG emission by strict measurements for losing resources and a reduction of food losses at the production side and food waste at the consumer side. Lemaire and Limbourg (2019) examined how food waste and food loss management could achieve the Sustainable Development Goal, solutions for achieving the goal are for instance awareness raising, consumer education and global coordination and information sharing.

Food waste can be seen as a serious crisis and raises several questions, for instance: How is it possible that this enormous amount of food is wasted, while millions of people are suffering from hunger and malnutrition? In the coming decades the global population continues to grow, continues urbanizing, leading to growing demand for food (Lemaire and Limbourg, 2019) and is becoming wealthier which is even leading to different food patterns (Thyberg and Tonjes, 2016). Strict measurements and a better understanding of the consequences are needed to generate the behavioural change of individuals and companies, and to develop proper solutions and policies for preventing food waste (Attiq et al., 2021). Food waste and food losses are globally recognized dilemmas, but how food waste can be prevented and what the exact drivers and barriers are to a reduction remain undetermined. This study investigates what the impact of geographical differences is on a local level, in neighbourhoods in the municipality of Groningen, on an individual's food waste behaviour.

1.2 Research objectives

1.2.1. Research problem

The above discussed studies show the problem of food waste, having a large impact on the global environment. The SDG 12.3 tries to halve per capita food waste at the retailer and consumer levels (FAO, 2021). However, it remains unclear what drivers and barriers are behind the food waste behaviour of individuals. Although, it is clear that, to change food waste behaviour of individuals and to achieve a reduction of food waste, strict measurements (in behavioural change) and policies are needed (Lemaire and Limbourg, 2019; Timmermans, 2021).

1.2.2. Research goal

This research focuses on the seven neighbourhoods of the municipality of Groningen. With the goal to examine the role of geographical differences (like supermarket proximity, separating garbage and food waste initiatives) between residential areas on the food waste behaviour and the amount of food waste of individuals. The goal of this research is to investigate factors that influence an individual's food waste behaviour. Additionally, to determine which neighbourhood in the municipality of Groningen is most likely to have food waste, and how this is influenced. Lastly, based on the findings, possibilities to raise awareness to individuals, and to municipalities to develop policies for improving the food waste behaviour of individuals will be explored.

1.2.3. Research questions

The main focus of this research is to investigate if geographical differences are influencing the amount of food waste and the food waste behaviour individuals and to examine the impact of several factors on the amount of food waste and food waste behaviour of various households in the municipality of Groningen. In order to do this, the main research question is:

What is the impact of geographical differences in residential areas on the amount of food waste and on the behaviour of various households in the municipality of Groningen?

Different neighbourhoods within the municipality of Groningen are examined in this research. The distinction between neighbourhoods is made in order to reveal differences in food waste amount and behaviour in the municipality of Groningen. In order to reveal the differences, the following sub questions are provided:

1. Which factors could influence an individual's food waste behaviour?
2. Which neighbourhood in the municipality of Groningen is most likely to have food waste?
3. Does the number of supermarkets in a neighbourhood influence an individual's food waste behaviour?
4. Is there less food waste in neighbourhoods of the municipality of Groningen where households are asked to separate organic from residual waste?

1.3 Structure of the research

The structure of this thesis is as follows, the next chapter reviews the existing literature regarding food waste behaviour of individuals. This is followed by a conceptual model, clarifying relevant concepts of the study, and showing the relationship of three factors and food waste behaviour. Based on the literature and the conceptual model the hypotheses are stated.
The methodology chapter explains, on the following sequence, the choice for mixed methods (surveys (quantitative) and focus groups (qualitative)) as research methods. This chapter also clarifies the research area, the municipality of Groningen, and highlights important information of the municipality for this research. Furthermore, the methodology chapter pays attention to the data quality, validity, and reliability of the study.
The results chapter presents an outcome from the survey, in the form of descriptive statistics and regression analyses, followed by an outcome from the focus group discussions. The analyses and interpretations of the results are based on the concepts and relationships presented in the conceptual model.
The discussion and conclusion chapter discusses the findings, in the same order as the sub research questions, in relation to the theories and the hypotheses. Lastly, the main research question is answered, the limitations of the research are discussed, recommendations for further research are given and the research process is reflected.

2. Literature review

2.1 Definition of food waste

This research investigates food waste and its corresponding drivers, but also barriers to food waste reduction. Food waste and food losses are understood differently, Thyberg and Tonjes (2016) and Porpino et al., (2015) mention *food losses* as happening during production, post-harvest and storage, and during the processing stage. Whereas *food waste* happens after production at the retailing and consumption stages (see figure 1) where the focus of this research is based upon. Jurgilevich et al. (2016) mention that food waste is higher in developed countries than in developing countries. Furthermore, they state that for developed or high-income countries most food is wasted at consumption level, and for developing or low-income countries the food waste and losses occur mainly in the production stage. This is due to insufficient technologies, poor storing conditions and inefficient transportation and logistics.

This research focuses particularly on food waste, the waste due to retailing, distribution and consumption. Attiq et al. (2021) state that the main contribution to food waste is at the household level. Schanes and Stagl (2019) state as well that the stages contributing the most to food waste are consumption of households with about 53% and processing with about 19%, while the retail and distribution stage have much lower contribution to food waste with 17%. In addition, Lemaire and Limbourg (2019) note that food wasted in the last stages of the supply chain generates more environmental impacts than the food losses in earlier stages.

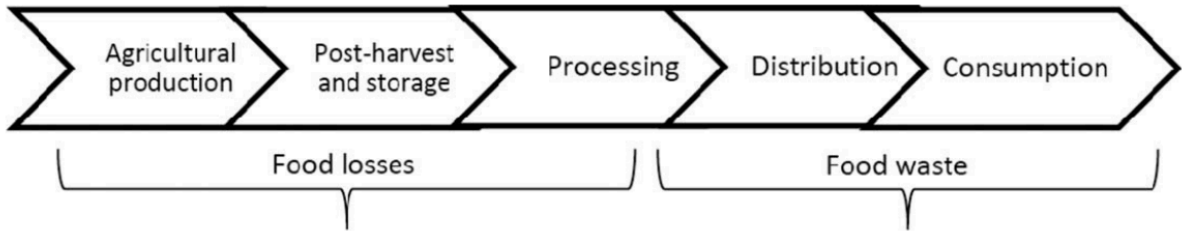


Figure 1: Food losses and food waste. Source: Porpino et al. (2015).

Food waste is not the result of one single factor, but a combination of different influencing factors that also influence each other (Thyberg and Tonjes, 2016). Carmo Stangherlin and de Barcellos (2018) state three subgroups of influencing factors: societal, behavioural and personal factors. They clarify the three subgroups as follows: *societal factors*, are external contexts influencing an individuals' behaviour. Societal factors are divided in this research into historical, regulatory, supply chain and geographical factors. This research will in particular focus on the geographical factor (existing of the concepts neighbourhood initiatives, proximity to supermarkets and separation of garbage). Secondly, *personal factors*, which are in this research the demographic (age, gender, income, education and household composition) and the psychological factors (intrinsic values of each individual like peer group influences and an individual's social norms). And lastly, *behavioural factors*, which are in this study about food planning, food purchase, food storage and food preparation within the consumption cycle. The conceptual model (figure 2, p.17) shows an overview of the concepts used in this research.

2.2 Behavioural drivers of food waste

Porpino et al. (2015) state five categories of food waste: antecedents, excessive purchasing, overpreparation, caring for a pet, avoidance of leftovers and inappropriate food conservation. Moreover, they mention subcategories: impulse buying, lack of planning and preference for large packages. In this research special

attention is given to the lack of *planning* (the use of a shopping lists to decrease excessive purchasing and overpreparation), daily or weekly *purchasing* (to avoid excessive purchasing and impulse buying), the presence of a refrigerator or a freezer, food *storage*, (to reduce the avoidance of leftovers) and the way of food *preparation* (does someone over prepare, does someone reuse food and the cooking skills of an individual).
The conceptual model (figure 2, p.17) shows the four concepts in relation with food waste. Theory by Porpino et al. (2015) and Canali et al. (2017) suggests that excessive purchasing is caused by the lack of planning (unplanned "spontaneous" food purchases) and weekly purchasing (bulk shopping). Besides, when individuals are having the option of storing leftovers in a refrigerator or freezer the avoidance of leftovers or throwing away behaviour will be reduced. Lastly, the preparation of food is also a big contributor of food waste. When someone is having bad cooking skills the preparation technique is of lower level, this causes for instance overpreparation and food waste.

2.3 Geography and food waste

Following the study of Thyberg and Tonjes (2016) food waste generation is a function of several forces and one of them is geographic forces. This research is in particular interested in the geographical forces influencing food waste behaviour. The geographical factor can be considered to belong to the societal subgroup (see conceptual model: figure 2, p.17) where the geographical location may unconsciously influence an individual's food waste behaviour. In this study, the geographical factor takes the neighbourhood food waste initiatives, the potential impact of the proximity of supermarkets and the separation options of garbage (chapter 3.3, p.21) into account.

2.3.1. Neighbourhood

Think about an individual living in a sustainable friendly neighbourhood with a lot of activities relating to sustainability, this person could be more alert on the amount of food wasted compared to someone living in a neighbourhood where food waste is not acquainted at all. A neighbourhood is difficult to define precisely as it has various understandings in empirical studies. Galster (2001, p.2111) considers various understandings of a neighbourhood, like "a place with physical and symbolic boundaries" and "a physical or geographical entity with specific (subjective) boundaries".
In this research a neighbourhood can be understood as "a place with physical boundaries where people live with a feeling of communal sense" (following the definitions by Galster, 2001, p.2111). This research tries to examine the influence of a neighbourhood on the amount of food waste, with the assumption that individuals in a neighbourhood have an influence on each other, in other words: peer group pressure. And with the understanding that neighbourhoods could have different rules and regulations relating to food waste. Andersson and Musterd (2010) examine the understanding of neighbourhood effects on social outcomes by the use of different scales. According to them living conditions vary within municipalities and from municipality to municipality, although there are no radical differences. Furthermore, Galster (2001) states neighbourhoods would change by consumers and producers influencing the flow of resources to a neighbourhood. According to Russell et al. (2017) the sense of community, or a feeling of communal sense, can be positively associated with intentions towards reducing food waste.

2.3.2. The potential impact of the proximity of supermarkets

The availability and accessibility to food is having an impact on food waste (Jurgilevich et al., 2016), on a global level developed countries show more food waste having food abundancy and better access compared to developing countries. On a local level this could play a role as well. Especially, the number of supermarkets in a particular neighbourhood could have an influence on an individual's food waste behaviour. It could be that higher accessibility ensures for more visits to a supermarket. According to Miller (2018) accessibility differs per individual due to personal preferences and capabilities. Furthermore, Miller

(2018) mentions travel time as the appropriate measure of access. Farber et al. (2014) mention accessibility as the ease of travelling and interactions between people and places. Moreover, according to Farber et al. (2014) accessibility will be experienced differently by varying individuals based on the fact that the level of mobility differs between individuals. Accessibility, like neighbourhoods, is difficult to define precisely. In this research accessibility is measured by the number of supermarkets in the area and the ease of visiting a supermarket and is understood as: to what extent individuals are able to reach a certain supermarket in their neighbourhood.
Although, it is not clear if living nearby or further away from a supermarket ensures more food waste. Because, when individuals live further away, the threshold of visiting a supermarket is higher, this could end up in individuals doing weekly purchasing and bulk shopping. According to Canali et al. (2017) excessive purchasing is caused by weekly purchasing and bulk shopping. Simultaneously, when someone is living very close to a supermarket and lives in an area with many supermarkets this could also end up in excessive purchasing as individuals could do unplanned "spontaneous" food purchases (Canali et al., 2017). The threshold of visiting a supermarket for a person living nearby is lower compared to someone living further away from a supermarket. Both, living further away and nearby could influence the number of visits to a supermarket, which will influence the magnitude of groceries bought, which could again influence the amount of food wasted per individual.

2.4 Food waste and demography

Another important factor for food waste is the demographic factor, which belongs to the personal subgroup (see figure 2, p.17). This factor will measure the effect of income, education levels, age, gender and household type on the amount of food waste per person and the effect on food waste behaviour of individuals.

2.4.1. Income

Porpino et al. (2015) mention the difference in *income* as a driver of food waste, in high-income countries (with a relatively high GDP) the largest amount of food waste comes from the consumer. Whereas in low-income countries (with a relatively low GDP) the largest amount of food waste happens during the supply chain, as a consequence of bad technologies and management. Demography aspects are described by Thyberg and Tonjes (2016) as important influencing factors of food waste behaviour. As mentioned above, there is a difference in food waste patterns between low- and high-income countries (Porpino et al., 2015; Jurgilevich et al., 2016). Szabó-Bódi et al. (2017) state as well that the predictive role of income on the amount of food waste differs from country to country. Though, Szabó-Bódi et al. (2017) find evidence on household income influencing the extent of food waste, but this effect differs per food category. Thyberg and Tonjes (2016) state that when income rises people may be able to waste more food and when an individual's income rises the consumption pattern becomes different including more variation in their diet. Furthermore, in high-income countries food is seen as relatively cheap where people can afford to waste food, opposite to low-income countries (Thyberg and Tonjes, 2016). However, the consequences of income on someone's food waste remains undetermined. As there is conflicting evidence of the direction of income on food waste.

2.4.2. Level of education

Carmo Stangherlina and de Barcellos (2018) state that the higher an individual is *educated*, the more food is wasted. However, Thyberg and Tonjes (2016, p.117) mention that "extant educational campaigns may also cause differing waste patterns" and Lazell (2016) formulates that an understanding of the consequences, caused by food waste, is required in order to tackle food waste. According to Canali et al. (2017), poor knowledge about food can be a first cause of a considerable amount of food waste. In addition, Lemaire

and Limbourg (2019) state as well that customers lack knowledge about food and ensure therefore more food waste. There is general knowledge, skills and information needed about for instance the interpretation of the date labels, the right usage of refrigerators and freezers in the kitchen, knowledge about storage and transportation but also proper food handling (Canali et al., 2017). Education about and on food skills could reduce the amount of food waste.
It could be that higher education levels go together with high income patterns, although it seems not logical to conclude that higher educated individuals waste more food. It seems understandable to conclude that an individual with higher education has knowledge about the consequences of food waste, as an environmental crisis. Following that a lower educated individual has less knowledge about the global consequences of food waste. However, there is contrasting evidence on the influence of education on food waste.

2.4.3. Age

Thyberg and Tonjes (2016) state that different *ages* have different food waste patterns. Namely, their research shows that people over age 65 waste considerably less than the rest of the population. Thyberg and Tonjes (2016) clarify this phenomenon by concluding that this difference could be due to people over age 65 experienced austerity and food rationing during and following the second World War. Carmo Stangherlina and de Barcellos (2018) conclude the same phenomenon, of over 65 years old wasting less food. They mention the same pattern is happening during recession periods, less food is wasted. This could mean that older individuals (65 years and older) have higher alertness on wasting food and thus waste less food than younger individuals.

2.4.4. Gender

The study of Cantaragiu (2019) focused on the impact of *gender* on food wasted at the consumer level. Cantaragiu (2019) states that women have a lower likelihood to waste food compared to men and that when women become older, they will become more distressed about the negative consequences of food waste compared to men, as a reason for women having a lower likelihood of wasting food. However, Carmo Stangherlina and de Barcellos (2018) state that women are producing more food waste than men. Because, as they mention, when women are responsible for grocery shopping the waste produced is higher. So, there is contrasting evidence on the influence of gender on food waste.

2.4.5. Type of household

Aschemann-Witzel et al. (2015) include the *household type* in their research on consumer-related food waste. They mention that the household composition in terms of age and number of household members influence the amount of food wasted. And Carmo Stangherlina and de Barcellos (2018) refer to large household types as having more food waste. Edjabou et al. (2016) also state that the household size and housing type (single-family or multi-family) influence the amount of food waste. Following Edjabou et al. (2016) the likelihood of food waste will increase according to the number of individuals in the household. In other words, the larger the household (in number of people) the more food is wasted.

2.5 Personal drivers of food waste

This section considers the barriers and drivers for food waste reduction. Carmo Stangherlin and de Barcellos (2018) mention that feelings of guilt are a dominant motivator to reduce food waste, as well as concerns of an individual about the environment will ensure less food waste. As mentioned earlier, Lazell (2016) examines that an understanding of the consequences of food waste are required in order to tackle food waste. Additionally, Lazell (2016) explains that consumer food waste behaviour can be understood better when the practices, routines and habits of individual consumers are investigated. Schanes and Stagl (2019) state that food sharing is having a high potential on the contraction of food waste. But what are the

motivations behind collective action? Schanes and Stagl (2019) mention four participation motives: ideology and morality, emotions, identity, and instrumentality and efficacy. The next part considers the social pressure influencing someone's food waste behaviour.

2.5.1. Peer group

This study considers the influence of social norms and of *peer groups* on the participation in food waste reduction. There are several factors influencing an individual's behaviour on food waste. Although, most individuals are not adhering 'rules' on diminishing food waste. This research tries to investigate whether someone's neighbours, peer group and social norms are influencing the food waste behaviour of a particular person. As mentioned by Cerciello et al. (2019) individuals would be more likely to comply with rules on separating waste when a pressure of peer groups and social norms exists. As mentioned earlier, according to Russell et al. (2017) a sense of community could increase the intentions of reducing food waste. This could mean that the existence of initiatives against food waste in neighbourhoods could influence the behaviour and ideas of persons living in the same neighbourhood. In other words, to increase the lack of awareness about food waste (Canali et al., 2017), peer group pressure may be necessary. Moreover, the study of Xu et al. (2016) examined the success of residential food waste sorting programs in urban high-density housing and found that peer pressure has an influence on sorting behaviour of individuals. Namely, volunteers (expressing knowledge about sorting) were placed next to bins watching citizens throwing away their garbage. Respondents of the study by Xu et al. (2016) were positively influenced and motivated to participate in sorting and recycling processes. This could in the end probably lead to less food wastage because individuals will become more aware of the environmental, economic and social consequences of waste.

2.6 Conceptual model

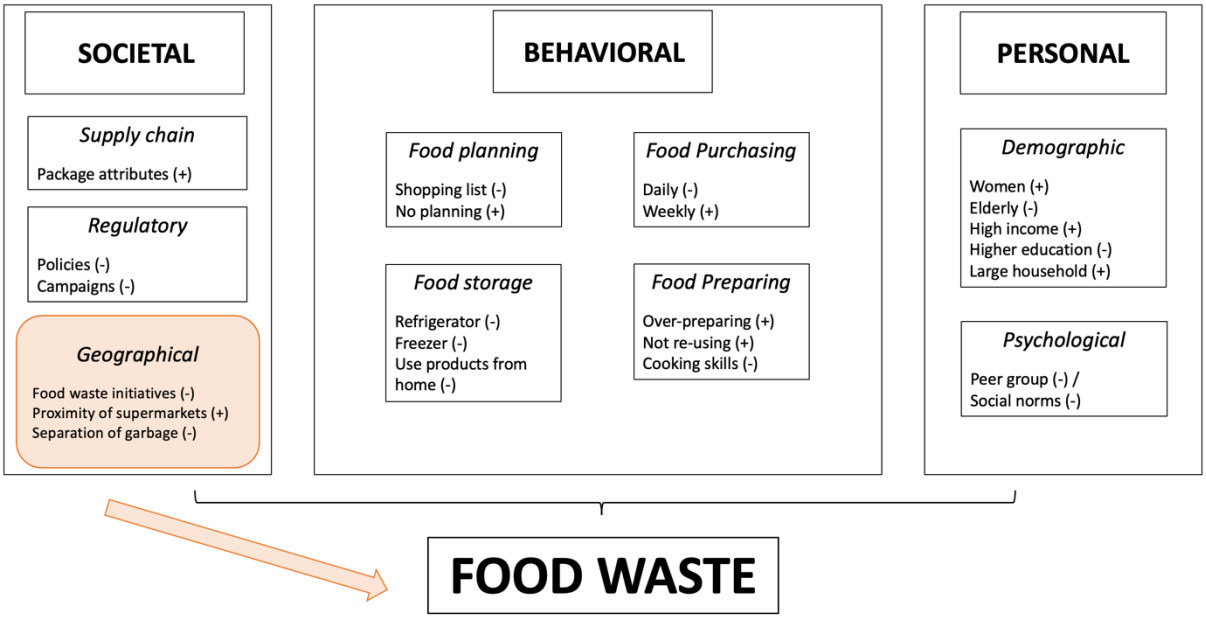


Figure 2: Conceptual model.

The conceptual model (figure 2) shows the subgroups as described before. Societal, behavioural and personal factors, which could all have an influence on the amount of food waste and the food waste behaviour of an individual. In this study the focus is on the geographical differences having an influence on someone's food waste behaviour. The geographical differences include, food waste initiatives, the number of supermarkets and separating garbage in the neighbourhoods of the municipality of Groningen. To clarify, firstly, what the impact of food waste initiatives in a neighbourhood is. Secondly, the influence of proximity of supermarkets in a particular neighbourhood. Thirdly, the fact that a municipality itself is responsible for separating garbage of households or if this is happening at the household level. Lastly, to determine which neighbourhood of the municipality of Groningen, in this study, based on the theory above is most likely to have food waste. For this research, individual characteristics of all respondents are considered as control variables.

2.7 Hypotheses

1. Societal factors, in particular the residential area of an individual, is having an influence on the amount of food waste and on an individual's food waste behaviour.
    a. The supply chain, supermarket packages for instance, ensure more food waste.
    b. Food waste policies and campaigns by the government will ensure less food waste.
    c. Food waste initiatives within a neighbourhood will ensure less food waste.
    d. A lower number of supermarkets in a particular neighbourhood is causing less food waste of individuals.
    e. When a household separates garbage, there will be less food wasted.

2. Behavioural factors (like food planning, food purchasing, food storage, food preparing) are influencing the amount of food waste and an individual's food waste behaviour.
    a. Individuals doing planned purchases (by the use of a shopping list) will waste less food than individuals who do no planned purchases.
    b. Individuals doing daily food purchases (instead of weekly) will have less food waste.
    c. Individuals who store their food in a refrigerator or freezer will have less food waste than individuals who do not store their food.
    d. Individuals who have bad cooking skills, who over prepare and who do not re-use leftovers will waste more food than individuals who have good cooking skills, who do not over prepare and who re-use leftovers.

3. Personal factors, demographic and psychological factors, are influencing the amount of food waste and an individual's food waste behaviour.
    a. A larger household will have more food waste than a smaller household.
    b. Women will have more food waste than men.
    c. Elderly individuals are having less food waste and a better food waste behaviour, than younger individuals.
    d. Individuals with high income are having more food waste and a worse food waste behaviour, than individuals with a low income.
    e. Individuals with higher education are having less food waste and a better food waste behaviour, than individuals with lower education.
    f. When an individual's peer group is active with reducing food waste the amount of food waste will be less and food waste behaviour will be better for that particular individual.

The overall expectation is that individuals will become more attentive on food waste due to several geographical influences like peer groups, separating garbage, initiatives in the neighbourhood, the proximity of supermarkets and due to various behavioural and demographic factors. These influences could all have a positive or negative effect on the amount of food waste and the food waste behaviour of individuals.

3. Methodology

3.1 Research method

This study examines which factors influence the food waste behaviour of individuals and whether the residential area of an individual has an effect on their food waste behaviour. This section describes the research method of this study which is separated in two parts. The first part consists of relevant theories and literature on this topic. The second part consists of data collection via mixed methods analysis, performed through quantitative (survey) and qualitative (focus groups) methods. The reason for mixed methods analysis as research method is to adopt a sensible feeling of the research, which allows according to Gray (2013) the combination of induction (the identification of patterns), deduction (testing the theories) and abduction (for relying on the interpretations to understand the results).
The survey was meant to give meaningful insight to what extent and in what direction certain factors could influence the behaviour of certain individuals on the amount of food wasted. All elements that could have an influence on food waste behaviour (as described in the theoretical framework) are included in the survey to see which neighbourhood of the municipality of Groningen is having the highest probability of food waste. In the additional focus groups data is collected on the food waste behaviour through group discussions, where it could clarify motivations and objectives of an individual of having a certain behaviour. This seems in particular important as theory by Lazell (2016) suggested that consumer food waste is more understandable when the practices, routines and habits of individuals are examined. The focus group discussions are mainly focused on the proximity of supermarkets, the peer group pressure and separating garbage influencing an individual's behaviour. In this way the focus groups generate more insight in the directions and effects found by the analysis of the survey data.

This chapter is made up of several sections, the first section, the research focus, describes the research group and the research area. The second section consists of information and important characteristics of the municipality of Groningen. The third section explains the data collection methods. Thereafter a section which consists of a description of the data analysis, and the last section interprets the quality of the data.

3.2 Research focus

3.2.1. Research group

The focus of this research is on individuals from three different household types. Firstly, student housing, an individual student or a joint student living. Secondly, single households, someone who is living on their own or for instance elderly individuals living on their own. Thirdly, families, these households are for instance a couple or parents with children. Theory suggests that the household composition influences the amount of food wasted and thus influences the food waste behaviour of that particular individual (Aschemann-Witzel et al., 2015). According to Carmo Stangherlina and de Barcellos (2018) the larger the household, the more food wasted.

3.2.2. Research area

The research area is the municipality of Groningen (see figure 3). The municipality of Groningen consists of 233 218 inhabitants (CBS, 2021) and is made up of seven areas, Centrum, Oude Wijken, Zuid, West, Oost, Ten Boer and Haren (Gemeente Groningen, 2021). The seven areas of Groningen are considered in this research as separate neighbourhoods (see figure 3).

Food garbage collection is regulated differently in each area, some areas have containers and other areas' garbage is served by garbage trucks. For instance, the garbage in the centre of Groningen is served by containers below the ground and Beijum's and Haren's garbage is served by private containers and underground public containers (see table 1, p.21). The city centre (Centrum and Oude Wijken) separates three types of garbage, glass, paper and residual waste. While outside the city centre organic waste, residual waste, glass and paper are separated, and in some neighbourhoods, this happens via private containers instead of public ones (see table 1, p.21).

Figure 3: Map of the areas of the Municipality of Groningen. Source: Gemeente Groningen (2021).

3.3 Municipality of Groningen

As mentioned above, the municipality of Groningen consists of seven areas with different regulations in food garbage. This research tries to examine the geographical differences of residential areas as influencing factor on food waste behaviours. Some of the seven neighbourhoods in the municipality of Groningen separate organic and residual waste others do not.

Overall, garbage in the Netherlands is regulated differently per municipality. Rijksoverheid (2021) states that separated garbage is easier to recycle than garbage that is not separated. The goal of the Netherlands was to increase the amount of separated garbage from 60% to 75% in 2020. In other words, to achieve the goal of reducing garbage from 250 kilos to 100 kilos per person per year. However, the municipality of Groningen mentions that separation at the factory ensures less CO2 emissions, better separation of waste, fewer trips of garbage trucks, fewer containers and less waste on streets (Gemeente Groningen, 2021).

For this study it is important to clearly have an overview of differences in regulation of garbage within the municipality of Groningen. Table 1 shows the consideration between no separation (individuals having one garbage can with residual waste only) and separation (individuals having separated garbage cans of residual waste and organic waste). The differentiation in private or public containers of the households. Only two neighbourhoods are not separating residual and organic waste: Oude Wijken and Centrum. This could be related to the population density, as shown in figure 4 (p.22). Furthermore, both neighbourhoods are having a high amount of student households and single living households (see figure 5 and figure 6, p.23).

Neighbourhood	**Residual waste**	**Organic waste**	**Public container**	**Private container**
Ten Boer	x	x		x
Oost	x	x		x
Oude Wijken	x		x	
West	x	x		x
Centrum	x		x	
Zuid	x	x	x	x
Haren	x	x		x

Table 1: Overview of different neighbourhoods in the municipality of Groningen. ("x" displays presence). (Source: survey).

3.3.1. Neighbourhoods

The seven Groningen municipality areas: Ten Boer, Oost, Oude Wijken, West, Centrum, Zuid and Haren are considered in this research as separate neighbourhoods and are considered as having a possible influence (varying per neighbourhood) on their inhabitants and eventually on the food waste behaviour of those individuals. This section illustrates characteristics of the neighbourhoods by the use of different figures.
Figure 4 shows the distribution of population density of the municipality of Groningen. It becomes clear that most dense neighbourhoods of the municipality of Groningen are situated in the centre. These neighbourhoods are Centrum and Oude Wijken. Additionally, West and a part of Oost are light blue, these neighbourhoods can be considered as some more dense as well. Most respondents on the conducted survey are living in Centrum, Oude Wijken and Oost (see table 5, p.34).

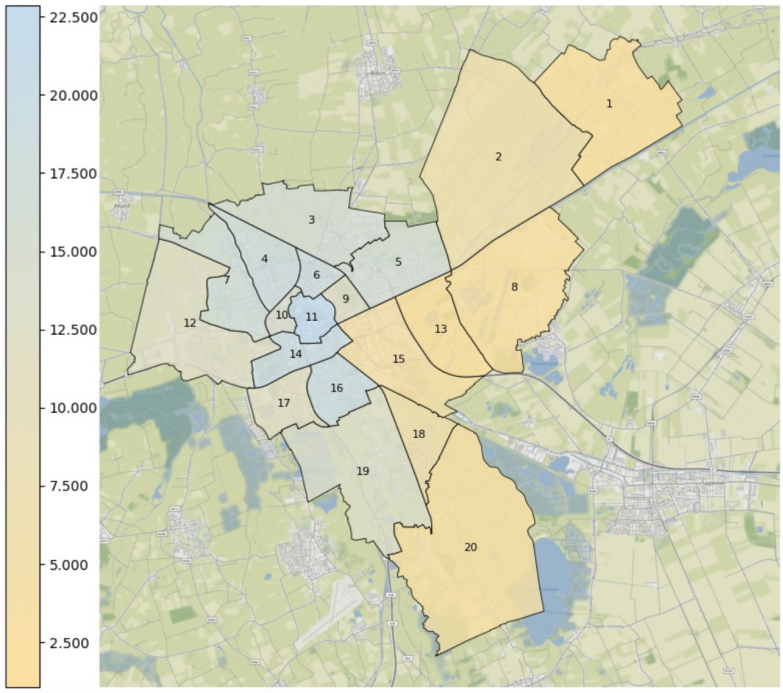
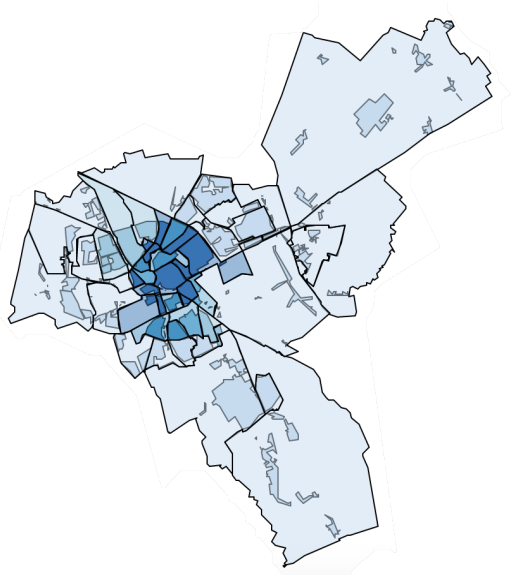
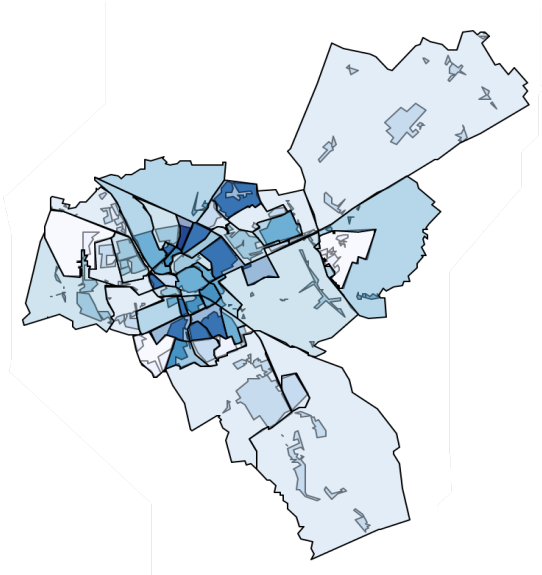


Figure 4: Map of the municipality of Groningen and population density. Source: Alle cijfers (2021).

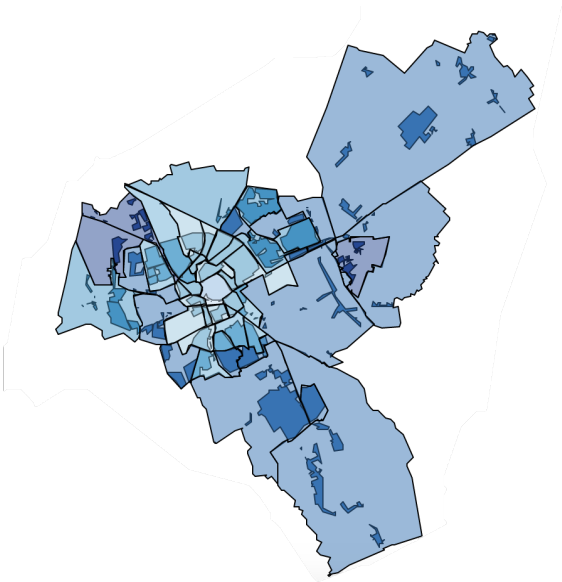
Figures 5 to 8 show the distribution of various households within the municipality of Groningen. This research makes a distribution of three types of households, single living, student living and families. Those three types are taken into consideration in figures 5-8.
Figure 5 shows the density of student households in the municipality of Groningen, the largest number of student households is located in the centre of Groningen (Centrum and Oude Wijken). Figure 6 shows the single living households in the municipality of Groningen, where the highest number is also located centrally (in Centrum and Oude Wijken) like the student household type.
Figure 7 shows the distribution of family households (with children) in the municipality of Groningen, the distribution of this household type is wider and is located in the outer areas of the municipality, in Ten Boer, Oost, Haren, Zuid and a part of West. Figure 8 shows the distribution of family households (without children) in the municipality of Groningen, this distribution corresponds with figure 7, although the neighbourhood of Haren has a slightly darker colour for the family households without children.

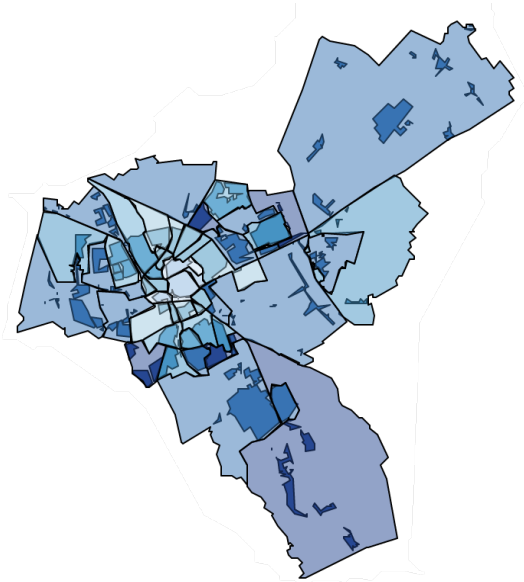




(From left to right):
Figure 5: Map of the municipality of Groningen and the percentage of student living. Source: Basismonitor Groningen (2018).

Figure 6: Map of the municipality of Groningen and the percentage of single living (age 28-64). Source: Basismonitor Groningen (2018)





(From left to right):
Figure 7: Map of the municipality of Groningen and the percentage of family living (with children). Source: Basismonitor Groningen (2018).

Figure 8: Map of the municipality of Groningen and the percentage of family living (without children). Source: Basismonitor Groningen (2018).

3.3.2. Information on the municipality of Groningen

Table 2 demonstrates the number of various wastes per inhabitant on average in the municipality of Groningen for the years 2017, 2018 and 2019. It becomes clear that the overall waste (total domestic waste) over the period 2017-2018 has decreased with about 11 kg per inhabitant and that over the period 2018-2019 the overall waste (total domestic waste) has increased with about 2 kg per inhabitant. At the same time the total organic waste has increased from 2017 to 2019. However, the amount of residual waste has decreased with about 20 kg per inhabitant (from the period 2017 to 2019).

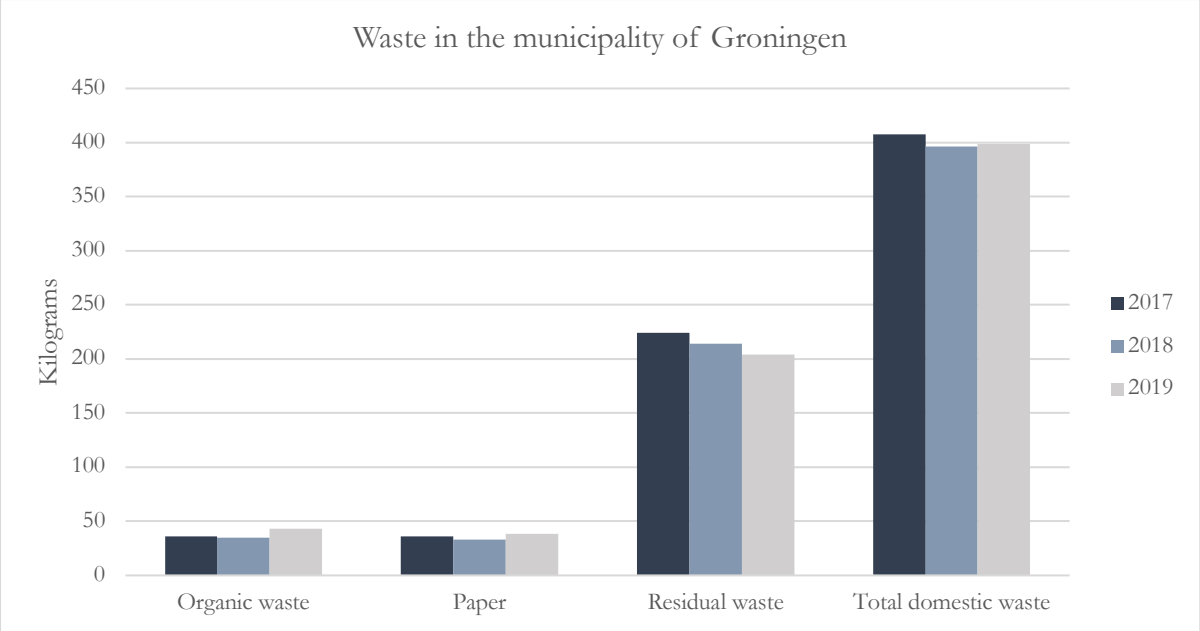


Table 2: Overview of waste in the municipality of Groningen. Source: CBS (2021).

The increase in organic waste and decrease in residual waste could have several explanations, it could be that individuals started separating more waste or that the amount of private organic containers has increased. A research by De Graaf and Oldersma (2019) examined the waste policy in the municipality of Groningen and show that individuals are aware of the positive consequences separating garbage has. The research also shows that only 35% of respondents separate residual waste from organic waste, however this does not explain the increase in organic waste from 2017 to 2019.

3.3.3. Supermarkets in the municipality of Groningen

An important aspect in this research is the proximity of supermarkets in the municipality of Groningen (figure 2, p.17). When an individual is living in a neighbourhood with high availability of supermarkets the accessibility of that neighbourhood to supermarkets increases. This availability could influence the behaviour of an individual in the amount of food wasted. Namely, an individual living in a neighbourhood with a high number of supermarkets the individual's threshold to go to a supermarket becomes smaller which could influence the times an individual visits for grocery shopping.
Hypothesis suggests that individuals living in neighbourhoods with more supermarkets have a lower threshold of visiting a supermarket and thus probably have more food waste. However, when living nearby supermarkets, individuals probably do daily purchases which ensures less food waste than weekly purchasing (figure 2, p.17). This can be since weekly purchases require strict planning. An example, when an individual (living in a neighbourhood with a small number of supermarkets) already bought food for the whole week but feels like not eating that meal due to going out for dinner or another reason, this could mean that for the next day that first meal is out of date and turns into wasted food.

Figure 9 clearly shows the neighbourhoods Centrum and Oude Wijken as neighbourhoods with a high number of supermarkets. Furthermore, Zuid and West are having quite some supermarkets, but they are more evenly distributed over both neighbourhoods. For the individuals living on edges of neighbourhoods the threshold of going to a supermarket in another neighbourhood is low. The consideration of individuals living on the edge of neighbourhoods is not included in this research. However, supermarkets in surrounding neighbourhoods could have an influence on individuals living on the edge of adjacent neighbourhoods if the distance to that supermarket is not large.

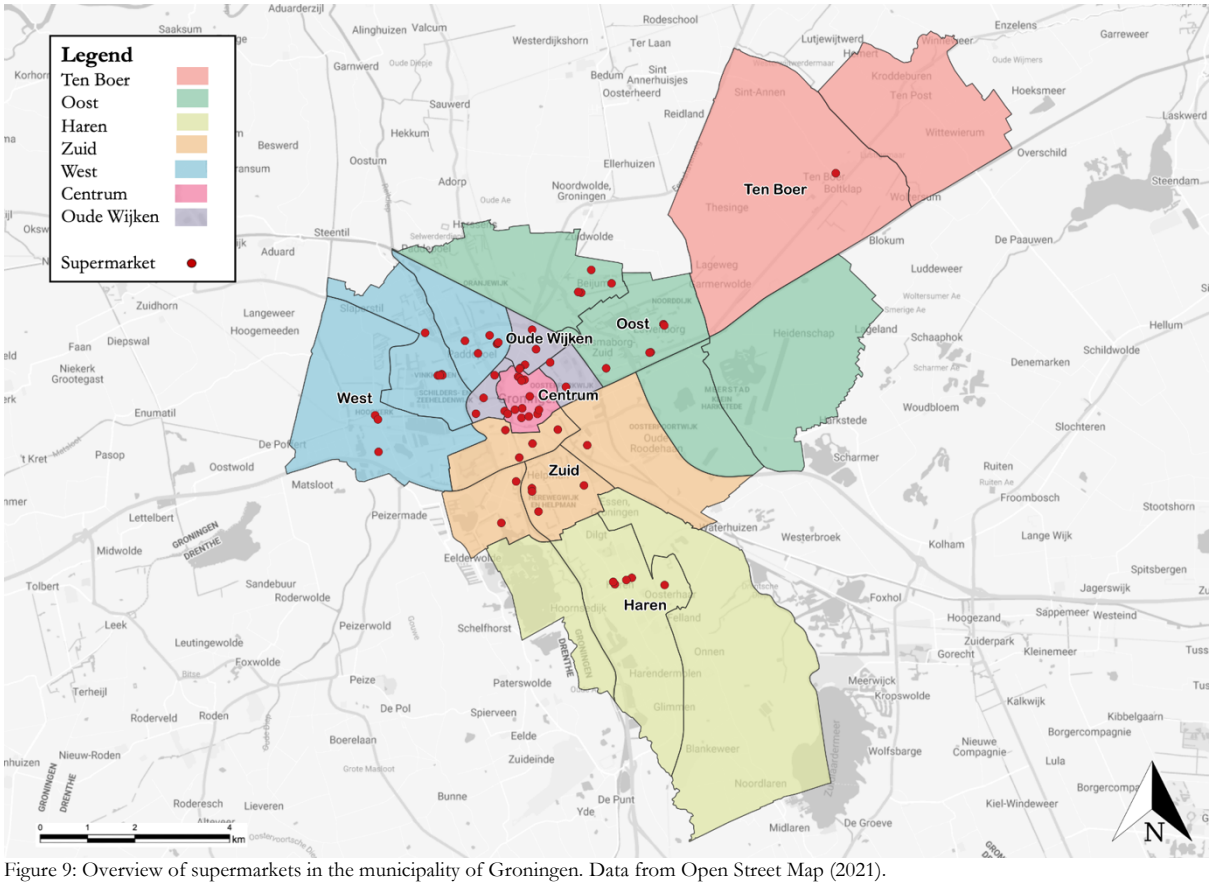


Figure 9: Overview of supermarkets in the municipality of Groningen. Data from Open Street Map (2021).

3.4 Data collection methods

The data collection process went as follows: firstly, a literature research was done, and theories were formed. Secondly, the survey was conducted by the use of the programme Qualtrics, and lastly focus group discussions were performed.

3.4.1. Literature research

The second chapter of this study, the literature review, provides a clear problem definition and a description of literature related to food waste behaviour. The literature research provides an overview of existing theories and concepts, it also tries to demonstrate how this study will fit in the broader field of study.
The objectives and research questions of this study are formulated by the use of the literature review, furthermore the survey questions are based on the concepts gained out of the literature review (Appendix I). Main keywords used in this study and used in the survey are found in relevant academic literature and can be built up in three groups (as can be seen in the conceptual model). Key concepts belonging to societal factors are "historical", "supply chain", "separation" and "neighbourhood". Key concepts belonging to behavioural factors are "food planning", "food purchasing", "food storage" and "food preparing". Key concepts belonging to personal factors are "household", "income", "age", "gender", "education" and "peer group".

3.4.2. Survey

The survey was conducted by the use of the programme Qualtrics, as a link via social media platforms to the social network on two sequential dates. The survey was shared with the social network of the researcher and supervisor. However, the survey was filled in anonymously by all respondents and the survey results were only used for research objectives.
The survey was meant for all inhabitants of the municipality of Groningen, living in a family household, single living household or student household. After one week approximately 100 inhabitants responded. The link was shared again and during the first week of May the survey, with about 180 respondents, was closed and the dataset descriptions and testing started.
According to Driscoll (2011) and Bryman (2016) surveys are used to ask participants about their opinions and behaviours through a short questionnaire. Surveys are appropriate for this research as it gains general trend information about people's behaviour (Driscoll, 2011). The survey in this research is meant to see which factors are influencing an individual's food waste behaviour and which neighbourhood in the municipality of Groningen is having the highest chance of having food waste. Appendix I gives an overview of the important concepts related to the survey questions and shows the answer categories as well.

3.4.3. Focus groups

Within the survey a question was asked to respondents for participating in additional focus group discussions, all respondents who filled in their email were asked to participate in additional focus groups. The focus groups are meant to get more insight on the respondents' thoughts about the food waste behaviour.
Focus groups are collective conversations or group interviews (Kamberelis and Dimitriadis, 2013). As mentioned by Kamberelis and Dimitriadis (2013) focus groups are offering a fruitful method for "thinking though" in qualitative research. Furthermore, a researcher is in particular interested in the ways in which individuals are discussing issues within a group, as members of a certain group, rather than as individuals (Bryman, 2016). Barbour (2018) mentions focus groups as suitable for assessing the difficult and sensitive topics. Food waste is, as mentioned earlier, a globally recognized problem where strict measurements are needed to reduce the consequences of it, is a difficult and sensitive topic for particular individuals.

Furthermore, the focus groups are meant to gain insight about people's behaviour and to understand why people feel the way they do.
Individuals may be restrained when asked to talk about their own behaviour and individuals may be influenced by each other when discussing in a group. This could lead to biases, for instance the observer bias (Mahtani et al., 2018) this can be seen as people acting different as they know the observer is watching and if participating individuals know what is expected of the research. Furthermore, this could also have something to do with the subject of this research, as food waste is a globally recognized dilemma which can arise some discomfort when someone is not really being busy with food waste.

The focus group discussions were organised on three different dates which were sent to respondents of the survey. With a maximum of six participants per focus group and a maximum duration of one hour per session. Moreover, as this study is interested in finding opinions from different household types and neighbourhoods, the focus groups are mixed. This means that in one particular session all three household types (single living, student and family) are present. Moreover, the focus groups are done online due to Covid-19. This will be different from face-to-face focus groups; however, they can still generate a considerable amount of relevant data (Bryman, 2016). The programme of the focus groups was structured as follows (Appendix IV), firstly all participants were told the terms of conditions of the focus groups and that the focus groups will be only used for research purposes. Secondly, all participants were asked permission for recording the session. Thirdly, the programme of the session was announced, and the goal of this research was shortly introduced. Thereafter, the statements were brought in one at a time and the discussion was started.

3.5 Quantitative data analysis methods

3.5.1. STATA

In order to analyse the data conceived from the survey, the programmes Microsoft Excel and STATA/SE are used. First, the data was exported to Excel and thereafter the data was imported to STATA. This section shows the survey data preparation and an analysis of the survey data.

First of all, the survey data is analysed in Microsoft Excel. Where immediately several missing data were seen. According to Bryman (2016) missing data arises when respondents fail to reply to a question, this can be done accidently or because someone does not want to answer the question. All missing data is dealt with in STATA as 'missing values' (see chapter 4.2, p.33).
Secondly, to test the data, the types of variables need to be considered (Mehmetoglu and Jakobsen, 2016). When looking back at Appendix I, almost all questions have answer options. The observations can be tested as categorical variables, representing a group of things. All answer options are nominal variables (several options without an order).
Thirdly, to test the data the hypotheses and sub questions are used to build upon the testing methods, the next bullet points show the theory predictions of having more and having less food waste:

Theory suggests that individuals have more food waste when they:

- Have a high income
- Have lower education
- Are young
- Live in a large household
- Do weekly purchasing
- Are over-preparing
- Are not re-using
- Do not planned purchasing
- Have no association with their neighbourhood

Theory suggests that individuals have less food waste when they:

- Have low income
- Have higher education
- Are elderly aged
- Live in a small household
- Do daily purchasing
- Have cooking-skills
- Have a refrigerator or freezer
- Use a shopping list while purchasing
- Have a good relationship with their neighbourhood

Both theories about more and less food waste are used after doing the crosstabs and regressions to interpret the results and to draw conclusions out of the results.

3.5.2. Multinomial logistic regression

To be able to find out if there are any significant differences in food waste behaviour between individuals and households in neighbourhoods of the municipality of Groningen, multinomial logistic regressions (MLR) will be used. Mehmetoglu and Jakobsen (2016) mention that with MLR the researcher is allowed to

explore dependent variables that have more than two categories, this makes it possible to examine a categorical dependent variable with more than two outcomes. Furthermore, the MLR technique will be of perfect use to see which factors are influencing food waste and which neighbourhoods are having the highest probability of having more food waste or a worse food waste behaviour.

Bryman (2016) states that mixed methods are useful to answer different research questions, some can be answered easily via quantitative methods and others more easily via qualitative methods. Therefore, the questions below and the next section will show the research questions for each separate data collection process. However, the sub questions will be substantiated in the discussion and conclusion section by both research methods.

For the sub question "*Which factors could influence an individual's food waste behaviour?"*, the MLR technique will be used, with food storage as the dependent variable and all other influencing variables as independent variables. One value of food storage will be set as the base outcome, and during the interpretation the outcomes will be compared to the baseline. Food storage can be seen as the variable showing if an individual stores leftovers or not, this can be associated with food waste, as when an individual does not store leftovers this can be associated as wasting food.

For the sub question *"Which neighbourhood in the municipality of Groningen is most likely to have food waste?"*, the MLR technique will be used, with neighbourhood as the dependent variable and all influencing variables that are considered statistically significant in the first MLR are included as independent variables. One neighbourhood will be set as the base outcome, and during the interpretation the outcomes will be compared to the baseline.

3.6 Qualitative data analysis methods

3.6.1. Transcripts

This section describes the analysis methods for the qualitative data, the focus groups. The focus groups were recorded, transcribed and coded. Codes used for the transcripts are concepts retrieved from the literature review (Appendix V).

The second sub question "*Does the number of supermarkets in a neighbourhood influence an individual's food waste behaviour?"* cannot be tested easily via the survey with quantitative methods, though this question is analysed during the focus groups as "My food waste will be reduced when I live in a neighbourhood with a low number of supermarkets".

The third sub question "*Is there less food waste in neighbourhoods of the municipality of Groningen where households are asked to separate organic from residual waste?"* cannot be tested easily via quantitative methods, though the question whether someone was separating in different containers can be answered more easily via qualitative methods to see whether someone's behaviour is influenced when the individual is asked to separate waste. The survey question was rather to see which neighbourhoods were making use of private and public containers and if this influences the food waste behaviour of individuals. The sub question is considered in the focus groups, where participants were asked to think about the statement: "My food waste will be reduced when I am asked to separate my garbage".

A third statement was asked during the focus groups, namely "My food waste will be reduced when I will be reminded often by the consequences of it". This will show the capability of individuals whether they are encouraged to waste less food and if they are aware of the enormous consequences of food waste. The last statement asked during the focus groups was "What inhabitants of my neighbourhood do with their garbage has an influence on my amount of food waste". This will try to see which neighbourhoods are having an influence on the behaviour and why. The third and fourth statements are asked to answer the second sub question "*Which neighbourhood in the municipality of Groningen is most likely to have food waste?".*

3.6.2. Focus group participants

Focus group 1: 27th of May 2021

Name (pseudonym)	Gender	Age	Education	Household	Neighbourhood
Isabelle	Female	< 25 years old	Scientific education	Student	Oude Wijken
Elise	Female	< 25 years old	Scientific education	Student	Centrum
Jasper	Male	25-35 years old	Scientific education	Single living	Oude Wijken
Gerard	Male	25-35 years old	Higher professional education	Single living	Oude Wijken
Remco	Male	35-45 years old	Scientific education	Family	Zuid
Chantal	Female	< 25 years old	Higher professional education	Student	Oude Wijken

Focus group 2: 29th of May 2021

Name (pseudonym)	Gender	Age	Education	Household	Neighbourhood
Linde	Female	45-55 years old	Scientific education	Family	Zuid
Sophie	Female	< 25 years old	Scientific education	Student	Centrum
Carlijn	Female	< 25 years old	Higher professional education	Student	Oude Wijken

Focus group 3: 3rd of June 2021

Name (pseudonym)	Gender	Age	Education	Household	Neighbourhood
Floor	Female	< 25 years old	Scientific education	Student	Zuid
Esmee	Female	55-65 years old	Scientific education	Family	Centrum
Joris	Male	55-65 years old	Scientific education	Family	Haren
Julia	Female	< 25 years old	Scientific education	Student	Oude Wijken
Roos	Female	< 25 years old	Scientific education	Student	Oude Wijken

3.7 Data quality

The survey was sent to social networks via social media. Approximately 180 individuals responded to the survey. All individuals are living in the municipality of Groningen. The survey should be representative for the whole municipality because the respondents were from different households, single living, students and families and the survey was based on several ages. Reports of the survey were looked upon and it became clear that about 140 respondents were women and about 40 were men (table 4, p.34). Furthermore, most of the respondents have a high level of education (table 5, p.34). This could lead to biases, however as mentioned earlier, this skewed distribution is probably due to the social network of the researcher and supervisor.

The focus group discussions were mixed between the type of household, age and gender. The participants of the focus group discussions mainly lived in Centrum, Oude Wijken and Zuid. Furthermore, the education level of the participants corresponds to the survey results, as all participants of the focus group discussions have higher education. Although, the opinions of individuals can still be very useful as fourteen individuals participated and the sessions are still a fruitful method for "thinking though" (Kamberelis and Dimitriadis, 2013).

3.7.1. Reliability and validity

Bryman (2016) mentions the greater validity as a result of a combination of quantitative and qualitative research designs. Moreover, the use of mixed methods could ensure for a more credible research, as the methods could substantiate each other. Gray (2013) states that the use of mixed methods greatly reduces the uncertainty of interpreting the data, furthermore mixed methods are ideal to measure differences and overlapping elements of phenomena in the results.

The concepts validity and reliability are of importance to see whether the data collected is of certain quality. Reliability as mentioned by Lawrence (2018) is the consistency of the data. This means that a particular phenomenon is repeated or recurs under identical conditions. Validity as mentioned by Lawrence (2018) is the truthfulness of the data. This means that a certain phenomenon must fit in reality. If there is an absence of validity, the analysed ideas are not representative in the social world (Lawrence, 2018). An advantage of the mixed methods analysis is that the reliability and validity can be tested via repeating outcomes of phenomena in the descriptive statistics, the regression analysis, and the focus group discussions. When there is no validity, no conclusions can be drawn out of the research for the population of the municipality of Groningen, as this will not be fitting the real world (Lawrence, 2018).

4. Results

In this section the quantitative and qualitative research results are given. For the quantitative research this will be done by descriptive statistics and several regression analyses. For the qualitative research the focus group discussions will be analysed. Eventually, the results of the qualitative and quantitative sections will be used to substantiate each other in the interpretations section (4.5, p.57).

4.1 Survey results

The results of the conducted survey are examined via Excel and thereafter in STATA. Firstly, the data was prepared for use in STATA as mentioned above. Secondly, the data was transformed in STATA (see Appendix III) and ready to be used for several regression analyses. Thirdly, it should be noted the dependent variable will not be perfectly predicted by the independent variables in a multinomial logistic regression (MLR).

4.2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	161	3,459627	1,516549	1	6
Gender	161	1,763975	0,4259626	1	2
Education	161	3,608696	1,662731	1	5
Household	161	2,161491	0,6883006	1	3
Neighbourhood	161	3,173913	1,963941	1	7
Zip code	161	69,9441	41,15493	1	143
Container	161	11,19876	4,873166	1	21
Purchasing	161	1,795031	0,6902718	1	3
Planning	161	2,291925	1,258172	1	4
Income	161	2,372671	1,133688	1	5
Storage	161	1,78882	0,9447879	1	4
Preparing	161	3,416149	1,403384	1	5
Initiatives	161	2,428571	1,349603	1	4

Table 3: Descriptive statistics of variables included in the survey. Source: own (STATA).

When doing quantitative research attention needs to be paid to missing values (Mehmetoglu and Jakobsen, 2016). Observations with missing values were dropped in STATA, 22 observations were deleted in total and 161 observations were left (table 3; Appendix III). During the analysis of the data, therefore it has been decided that including all variables will not be very useful for answering the first two sub questions. The variable zip code is left out of the regressions, as the zip code variable does not add anything different to the regression because the variable neighbourhood is included already.

The survey was shared via social media of the writer's own network and of the supervisor's network. Both are women and higher educated, which could lead to a skewed distribution of the data. This means that more women than men would fill in the survey and that more higher educated individuals would fill in the survey than lower educated individuals. Research has shown that certain surveys of interest are harder to fill in for lower educated individuals and that women are having a higher willingness than men to fill in a certain survey in general (Blasius and Brandt, 2010). Tables 5, 6 and 7 show some reports on the collected data, it becomes clear that a higher number of women and of higher educated individuals filled in the survey. Furthermore, table 6 show that most respondents live in the neighbourhoods Oost, Centrum, Zuid and Oude Wijken.

Respondent's gender	**Freq.**	**Percent**	**Cum.**
Male	38	23.60	23.60
Female	123	76.40	100.00
Total	161	100.00	

Table 4: Tabulate of respondent's gender. Source: own (Excel).

Respondent's education	**Freq.**	**Percent**	**Cum.**
Higher professional education	39	24.22	24.22
Primary school	2	1.24	25.47
Secondary vocational education	25	15.53	40.99
Secondary school	12	7.45	48.45
Scientific education	83	51.55	100.00
Total	161	100.00	

Table 5: Respondent's education. Source: own (Excel).

When looking at table 4, the number of female respondents is much higher than the number of male respondents. However, the gender variable is included in the regression to see if it leads to any significant results. It should be noted that no conclusions can be drawn on gender for the whole municipality of Groningen as it has a skewed distribution, and this is not fitting the real world (Lawrence, 2018).
When looking at table 5, it becomes clear that the number of individuals having higher education (higher professional education and scientific education) is larger than individuals having a lower level of education. However, the number of individuals having lower levels of education (secondary vocational education and secondary school) is of reasonable amount, as Blanca et al. (2013) state the differences in slight skewness to extreme skewness and as Doane and Seward (2011) show how to measure skewness. Which means that this will not necessarily lead to biased results.
Another particular important variable which could have a skewed distribution is the neighbourhood variable. Table 6 shows the tabulate of the respondent's neighbourhood. Most participants live in the neighbourhoods Centrum, Oost, Oude Wijken and Zuid. When looking back at figure 4 (showing the population density) it becomes clear that those four neighbourhoods are most densely populated. This means that this skewed distribution will not particularly lead to any biases, however attention needs to be paid at drawing conclusions from the results, because this is not representative for the whole municipality of Groningen.

Respondent's neighbourhood	Freq.	Percent	Cum.
Centrum	47	29.19	29.19
Haren	8	4.97	34.16
Oost	52	32.20	66.46
Oude Wijken	27	16.77	83.23
Ten Boer	1	0.62	83.85
West	3	1.86	85.71
Zuid	23	14.29	100.00
Total	161	100.00	

Table 6: Respondent's neighbourhood. Source: own (Excel).

Correlations are done in STATA via the command "correlate" to examine relationships between variables. The next table shows an overview of all variables correlating with storage, furthermore the variables can have a mutual correlation which is important to keep in mind while doing regression analysis to not include both variables.

Variables	Storage	Gender	Age	Education	Household	Neighbourhood	Container	Purchasing	Planning	Income	Preparing	Initiatives
Storage	1,0000											
Gender	0,0617	1,0000										
Age	0,0769	0,1206	1,0000									
Education	-0,0450	-0,1136	0,0817	1,0000								
Household	0,1777	0,2374	0,5332	0,0829	1,0000							
Neighbourhood	-0,1485	-0,1449	-0,1571	0,0612	-0,1689	1,0000						
Container	0,1191	0,0167	0,1804	0,1886	0,2345	-0,1447	1,0000					
Purchasing	-0,2489	0,0257	-0,2975	-0,0758	-0,3245	0,1924	-0,2832	1,0000				
Planning	0,1521	-0,1155	0,1028	-0,1422	0,0607	0,0021	-0,0207	-0,2977	1,0000			
Income	0,0097	0,0668	0,0488	0,0480	0,0505	-0,1247	0,0148	-0,0056	0,0766	1,0000		
Preparing	-0,1124	-0,0124	-0,1697	-0,0824	-0,1282	0,1867	-0,1154	0,2434	-0,1046	-0,1609	1,0000	
Initiatives	-0,0511	0,0575	0,0589	-0,0473	-0,0413	0,0094	-0,1708	0,0412	0,0473	-0,1255	0,0174	1,0000

Table 7: Correlation matrix

Table 7 shows the correlation results of all variables which will be included in the regression. The table shows several relationships, positive and negative, but no mutual correlation should be worried about as there is not a correlation of (-)0.8 or higher (Mehmetoglu and Jakobsen, 2016). The only 'high' mutual correlation found is between the variables age and household of 0.5332. This seems logical as most elderly will be family households and most students will be younger than 25. This 'high' mutual correlation should not be worried about, although extra regression analyses are done to check the model fit and the robustness of the model. For the first extra regression the variable household is left out and for the second extra regression the variable age is left out. This is discussed further in section 4.3.2. (p.47) and the additional regressions can be found in Appendix II.

4.2.1. Crosstabulations

To be able to see phenomena out of the survey results, crosstabs are used. Crosstabs can be used when the dependent and independent variables are categorical (Mehmetoglu and Jakobsen, 2016). Several variables (two at a time) are included in a crosstab to examine phenomena. Like neighbourhood x household, to see a pattern of households in the neighbourhoods of the municipality of Groningen. Likewise, neighbourhood x initiatives, to see a pattern of food waste initiatives in neighbourhoods of the municipality of Groningen. Moreover, crosstabs are useful to see whether there are empty cells, when one has few or no cases the regression model may become unstable or may even not run at all (Mehmetoglu and Jakobsen, 2016).

	Respondent's age						
Respondent's neighbourhood	25-35	35-45	45-55	55-65	Younger than 25	Older than 65	Total
Centrum	9	2	0	5	31	0	47
Haren	1	2	1	3	0	1	8
Oost	2	18	19	9	1	3	52
Oude Wijken	5	1	2	1	17	1	27
Ten Boer	1	0	0	0	0	0	1
West	1	1	1	0	0	0	3
Zuid	2	7	3	7	3	1	23
Total	21	31	26	25	52	6	161

Table 8: Crosstab of respondent's neighbourhood and respondent's age.

Table 8 shows the crosstabulation of respondents age and neighbourhood. It becomes clear that for the neighbourhoods Centrum and Oude Wijken the most respondents are of age younger than 25 or of age 25-35. Most respondents of Oost are of age 35-45 or 44-45. There is also a small group of respondents age 55-65 living in Oost and Zuid.

	Respondent's gender		
Respondent's neighbourhood	Male	Female	Total
Centrum	11	36	47
Haren	3	5	8
Oost	4	48	52
Oude Wijken	9	18	27
Ten Boer	0	1	1
West	2	1	3
Zuid	9	14	23
Total	38	123	161

Table 9: Crosstab of respondent's neighbourhood and respondent's gender.

Table 9 shows the crosstabulation of respondent's gender and neighbourhood. Most male respondents live in Centrum and Oude Wijken. However, the gender variable is highly skewed which means that no conclusions can be drawn out of the results for the population of the municipality of Groningen.

Respondent's neighbourhood	Respondent's education					
	Higher professional education (HBO)	Primary school	Secondary vocational education (MBO)	Secondary school	Scientific education (WO)	Total
Centrum	13	1	0	5	28	47
Haren	1	0	0	1	6	8
Oost	15	1	21	1	14	52
Oude Wijken	4	0	1	4	18	27
Ten Boer	1	0	0	0	0	1
West	1	0	1	0	1	3
Zuid	4	0	2	1	16	23
Total	39	2	25	12	83	161

Table 10: Crosstab of respondent's neighbourhood and respondent's education.

It becomes clear out of table 10 that most respondents living in Centrum, Oude Wijken and Zuid are having higher education. For the neighbourhood Oost the achieved education differs from lower education (secondary vocational education) to higher education.

Respondent's neighbourhood	Respondent's weekly expenditure on groceries					
	100 euros or more	25-50 euros	50-75 euros	75-100 euros	Less than 25 euros	Total
Centrum	3	25	14	3	2	47
Haren	6	0	0	2	0	8
Oost	18	9	12	13	0	52
Oude Wijken	1	13	8	1	4	27
Ten Boer	0	0	0	1	0	1
West	2	0	1	0	0	3
Zuid	13	3	4	3	0	23
Total	43	50	39	23	6	161

Table 11: Crosstab of respondent's neighbourhood and respondent's weekly expenditure on groceries.

Table 11 shows that the neighbourhoods Oude Wijken and Centrum are the neighbourhoods with lower weekly expenditure on groceries (most respondents filled in 25-50 euros or 50-75 euros). This can be coupled on the fact that individuals living in those neighbourhoods are mainly students. Individuals living in the neighbourhoods Oost, Zuid and Haren are the neighbourhoods with higher weekly expenditure on groceries (most respondents filled in 75-100 euros or more than 100 euros).

Respondent's neighbourhood	Household type			
	Single living	Family	Student (individually or jointly)	Total
Centrum	9	5	33	47
Haren	1	7	0	8
Oost	8	43	1	52
Oude Wijken	7	5	15	27
Ten Boer	0	1	0	1
West	0	2	1	3
Zuid	2	18	3	23
Total	27	81	53	161

Table 12: Crosstab of respondent's neighbourhood and household type

Table 12, this crosstabulation is done for neighbourhood and households. It becomes clear that most family livings are situated in the neighbourhoods Oost and Zuid, and that most student livings are situated in the neighbourhoods Centrum and Oude Wijken. Single living households can be mainly found in Centrum, Oost and Oude Wijken. This corresponds to the comments on the previous table (table 11).

Respondent's neighbourhood	If respondent stores leftovers or not				
	Yes, in the refrigerator and I (almost) always eat it	Yes, in the freezer	Yes, but I throw it mostly away after a few days	No, I never eat it anyway	Total
Centrum	17	7	19	4	47
Haren	3	4	1	0	8
Oost	31	14	7	0	52
Oude Wijken	19	3	4	1	27
Ten Boer	0	1	0	0	1
West	2	0	1	0	3
Zuid	13	3	5	2	23
Total	85	32	37	7	161

Table 13: Crosstab of respondent's neighbourhood and storage.

Table 13 shows the crosstabulation of respondent's neighbourhood and if respondent stores leftovers or not. It becomes clear that most respondents filled in to store their leftovers in the refrigerator and almost always eat it or to store their leftovers in the freezer. However, there is a large number of respondents who filled in to store their leftovers but that it is mostly thrown away again after a few days. This can be associated with food waste, as leftovers are not eaten.

Respondent's neighbourhood	If respondent does planned purchasing				
	Yes, with use of a shopping list	Yes, I know beforehand what I am going to buy	No	Sometimes	Total
Centrum	13	18	2	14	47
Haren	4	1	1	2	8
Oost	27	7	3	15	52
Oude Wijken	6	10	0	11	27
Ten Boer	0	1	0	0	1
West	2	0	0	1	3
Zuid	8	7	1	7	23
Total	60	44	7	50	161

Table 14: Crosstab of respondent's neighbourhood and planned purchasing

Out of table 14 it becomes clear that most respondents do planned purchases by the use of a shopping list. Moreover, 50 respondents do planned purchases sometimes and 44 respondents know beforehand what they are going to buy in the supermarket. This means that there are many individuals who filled in the survey who do not planned purchases. This has an influence on the amount of food wasted.

Respondent's neighbourhood	How many times a respondent does purchasing			
	Daily	About two or three times a week	Weekly	Total
Centrum	34	10	3	47
Haren	1	6	1	8
Oost	3	34	15	52
Oude Wijken	12	13	2	27
Ten Boer	0	1	0	1
West	1	1	1	3
Zuid	7	13	3	23
Total	58	78	25	161

Table 15: Crosstab of respondent's neighbourhood and how many times a respondent does purchasing

Table 15 shows the crosstabulation between neighbourhood and purchasing. It becomes clear that in the neighbourhoods Centrum and Oude Wijken respondents mainly do daily purchasing. For the neighbourhood Oost respondents mainly filled in to do weekly purchasing or do purchases two or three times a week.

Respondent's neighbourhood	What is the respondent's reason of leftovers					
	Due to supermarket packages (packed per 4 for example)	Because I cannot estimate how much I have to prepare (I have bad cooking skills)	Because I do no planned purchasing	Because I prepare too much food	No reason, I almost never have leftovers	Total
Centrum	14	6	0	23	4	47
Haren	1	1	0	3	3	8
Oost	8	1	0	32	11	52
Oude Wijken	9	1	0	12	5	27
Ten Boer	0	0	0	1	0	1
West	0	0	0	3	0	3
Zuid	1	2	1	14	5	23
Total	33	11	1	88	28	161

Table 16: Crosstab of the respondent's neighbourhood and the reason for having leftovers (preparing).

Table 16 shows the crosstabulation of respondent's neighbourhood and the reason for having leftovers. It clearly shows that most respondents mention to prepare too much food as the reason for having leftovers. The second biggest reason is due to supermarket packages, that respondents have leftovers due to too large packages in the supermarket.

Respondent's neighbourhood	Neighbourhood initiatives				
	I don't know, I am not very involved in my neighbourhood	Yes, and this inspires me	Yes, but I actually never participate	No, there are no initiatives in my neighbourhood	Total
Centrum	25	1	2	19	47
Haren	1	0	1	6	8
Oost	14	7	23	8	52
Oude Wijken	17	0	1	9	27
Ten Boer	0	0	0	1	1
West	2	0	0	1	3
Zuid	11	0	0	12	23
Total	70	8	27	56	161

Table 17: Crosstab of respondent's neighbourhood and food waste initiatives

Table 17 is showing that many neighbourhoods in the municipality of Groningen are not having food waste initiatives like campaigns or initiatives organised in the neighbourhood (namely 56 respondents filled in that there are no initiatives). Furthermore, table 17 shows that 70 respondents do not know if there are initiatives in their neighbourhood because of low involvement. Mainly only respondents living in the neighbourhood Oost mention to have food waste initiatives.

If respondent stores leftovers or not	Household type			
	Single living	Family	Student (individually or jointly)	Total
Yes, in the refrigerator and I (almost) always eat it	13	49	23	85
Yes, in the freezer	9	17	6	32
Yes, but I throw it mostly away after a few days	5	12	20	37
No, I never eat it anyway	0	3	4	7
Total	27	81	53	161

Table 18: Crosstab of if respondent stores leftovers or not and household type

Table 18 shows the crosstabulation between storage and household type. Most respondents, 85, answered to store their leftovers in the refrigerator. However, 37 respondents answered to store the leftovers but that it is almost always thrown away after a few days. The family household type is having a high number of respondents storing their leftovers in the refrigerator or in the freezer. Students are the highest amount who are storing their leftovers but throwing it away after all.

If respondent stores leftovers or not	Respondent's education					
	Higher professional education (HBO)	Primary school	Secondary vocational education (MBO)	Secondary school	Scientific education (WO)	Total
Yes, in the refrigerator and I (almost) always eat it	19	0	14	7	45	85
Yes, in the freezer	7	1	8	3	13	32
Yes, but I throw it mostly away after a few days	10	1	3	2	21	37
No, I never eat it anyway	3	0	0	0	4	7
Total	39	2	25	12	83	161

Table 19: Crosstab of storage and education

Table 19 shows the crosstabulation of storage and highest achieved level of education. Most respondents have an achieved level of scientific education. Besides, the second largest group of respondents belongs to the achieved level of higher professional education. Although, no clear distinction can be made between education and storing leftovers because the answers are more or less equally divided over higher and lower education. In other words, respondents with high education and low education filled in that they store leftovers in the refrigerator and freezer.

If respondent stores leftovers or not	Respondent's weekly expenditure on groceries					
	100 euros or more	25-50 euros	50-75 euros	75-100 euros	Less than 25 euros	Total
Yes, in the refrigerator and I (almost) always eat it	25	26	19	12	3	85
Yes, in the freezer	8	10	5	8	1	32
Yes, but I throw it mostly away after a few days	7	12	13	3	2	37
No, I never eat it anyway	3	2	2	0	0	7
Total	43	50	39	23	6	161

Table 20: Crosstab of storage and income

Table 20 shows the crosstabulation of storage and respondent's weekly expenditure on groceries. It can be seen that all categories of income are storing their leftovers in the refrigerator or freezer. It can also be seen that all categories sometimes throw the leftovers away after a few days. There is no clear pattern in the crosstabulation of storage and income.

If respondent stores leftovers or not	Respondent's gender		
	Male	Female	Total
Yes, in the refrigerator and I (almost) always eat it	22	63	85
Yes, in the freezer	9	23	32
Yes, but I throw it mostly away after a few days	4	33	37
No, I never eat it anyway	3	4	7
Total	38	123	161

Table 21: Crosstab of storage and gender

Table 21 shows the crosstabulation of gender and storage. However, it is uncertain to see patterns in this crosstab because there is a highly skewed distribution between male and female respondents.

If respondent stores leftovers or not	Neighbourhood initiatives				
	I don't know, I am not very involved in my neighbourhood	Yes, and this inspires me	Yes, but I actually never participate	No, there are no initiatives in my neighbourhood	Total
Yes, in the refrigerator and I (almost) always eat it	32	6	17	30	85
Yes, in the freezer	15	1	8	8	32
Yes, but I throw it mostly away after a few days	20	1	2	14	37
No, I never eat it anyway	3	0	0	4	7
Total	70	8	27	56	161

Table 22: Crosstab of neighbourhood initiatives and if respondent stores leftovers or not

Table 22 shows the crosstabulation of neighbourhood initiatives and the storage variables. It does not show a very clear pattern. However, it becomes clear that when there are initiatives in a neighbourhood (as 8 respondents answered) they store it in the refrigerator or freezer. When there are no neighbourhood initiatives (or individuals do not know if there are), the respondents also show to store their leftovers in the

freezer or refrigerator. However, there are respondents who filled in that there are no initiatives (or do not know if there are) and filled in that they store food but throwing it away mostly. And respondents who filled in that they never store food as they do not eat it anyway, have all seven no initiatives in their neighbourhoods.

How many times a respondent does purchasing	Household type			
	Single living	Family	Student (individually or jointly)	Total
Daily	8	11	39	58
About two or three times a week	18	48	12	78
Weekly	1	22	2	25
Total	27	81	53	161

Table 23: Crosstab of how many times a respondent does purchasing and household type

It becomes clear from table 23 that student households are doing mainly daily purchasing and that family households and single living households do purchases about twice a week. Furthermore, the family households are having a high amount of doing purchases weekly compared to single living and student households.

4.3 Results regression analysis

This study tries to examine the influence of differences between neighbourhoods in the food waste behaviour of individuals. The first multinomial logistic regression (MLR) is done with the food waste (storage) variable as the dependent variable. This variable shows if individuals store leftovers or not, this can be associated with food waste, when individuals do not store or do not eat their leftovers this can be associated with food waste. All independent variables included are influencing the food waste behaviour as described in the theoretical framework and methodology part.

4.3.1. Factors influencing an individual's food waste behaviour

Firstly, the formula for the MLR with storage as the dependent variable will be as follows:

$Lx = \ln(Y=1/Y=3) = \beta 0 + \beta x1 + \beta x2 + \beta x3 + \beta x4 + \beta x5 + \beta x6 + \beta x7 + \beta x8 + \beta x9 + \beta x10 + \beta x11 + \varepsilon x,$

$La = \ln(Y=2/Y=3) = \beta 0 + \beta a1 + \beta a2 + \beta a3 + \beta a4 + \beta a5 + \beta a6 + \beta a7 + \beta a8 + \beta a9 + \beta a10 + \beta a11 + \varepsilon a,$

$Lf = \ln(Y=4/Y=3) = \beta 0 + \beta f1 + \beta f2 + \beta f3 + \beta f4 + \beta f5 + \beta f6 + \beta f7 + \beta f8 + \beta f9 + \beta f10 + \beta f11 + \varepsilon f$

The outcome of the model is showed below. When looking at the regression results it becomes clear that many variables are not statistically significant. The variables considered statistically significant are interpreted and the interpretations are used to draw conclusions from the regression analyses.

For the first MLR the storage variable is set as dependent variable. This can be an approximation for food waste. The variable storage has four values. Two of them can be considered as 'no food waste' and two of them can be considered as 'food waste'. The value set as the baseline in this MLR is: "Yes, but I throw it almost always away", this means that variables are compared to the value that can be considered as food waste. The results of the regression can be interpreted as follows:

Regression I: Multinomial Logistic Regression with storage as dependent variable.

Number of observations	161
LR chi2(105)	168.42
Prob > chi2	0.0001
Pseudo R2	0.4618
Log likelihood	-98.140066

storage	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Yes, in the refrigerator and I almost always eat it						
gender						
Female	-2,058336	0,991688	-2,08	0,038***	-4,002009	-0,114663
age						
35-45	-2,804522	1,554908	-1,8	0,071**	-5,852086	0,2430429
45-55	-0,3815426	1,565413	-0,24	0,807	-3,449696	2,68661
55-65	2,023661	2,159952	0,94	0,349	-2,209768	6,25709
Younger than 25	0,7605308	1,364154	0,56	0,577	-1,913162	3,434224
Older than 65	-2,735908	1,99036	-1,37	0,169	-6,636943	1,165127
education						
Primary school	-28,66335	56732,68	0	1	-111222,7	111165,3
Secondary vocational education	-0,6981247	1,430431	-0,49	0,626	-3,501719	2,105469
Secondary school	0,8961683	1,295531	0,69	0,489	-1,643026	3,435363
Scientific education	-0,8831696	0,815911	-1,08	0,279	-2,482326	0,7159868
household						
Family	-1,146474	1,261414	-0,91	0,363	-3,6188	1,325852
Student (individually or jointly)	-0,7680302	1,464245	-0,52	0,6	-3,637898	2,101838
neighbourhood						
Haren	1,69641	2,260731	0,75	0,453	-2,734542	6,127361
Oost	4,216873	1,697742	2,48	0,013***	0,8893604	7,544385
Oude Wijken	2,477245	0,925902	2,68	0,007***	0,6625111	4,291978
Ten Boer	0,194915	373548,2	0	1	-732140,8	732141,2
West	3,065292	1,963371	1,56	0,118	-0,7828448	6,91343
Zuid	3,860912	1,594836	2,42	0,015***	0,7350905	6,986733
container	0,0583465	0,075342	0,77	0,439	-0,0893205	0,2060136
purchasing						
About two or three times a week	1,144164	0,794025	1,44	0,15	-0,4120959	2,700424
Weekly	1,605978	1,39	1,16	0,248	-1,118371	4,330327
planning						
Yes, I know beforehand what to buy	-0,4459569	0,841551	-0,53	0,596	-2,095366	1,203452
No	-2,234015	1,875751	-1,19	0,234	-5,910418	1,442389
Sometimes	-2,98371	1,110333	-2,69	0,007***	-5,159923	-0,807496
income						
25-50 euros	1,223205	1,593186	0,77	0,443	-1,899382	4,345791
50-75 euros	-0,3228956	1,278001	-0,25	0,801	-2,827732	2,181941
75-100 euros	0,7131562	1,133728	0,63	0,529	-1,50891	2,935222
Less than 25 euros	1,398077	2,189741	0,64	0,523	-2,893737	5,689891

preparing						
Because I cannot estimate how much to make	-3,607909	1,596189	-2,26	0,024***	-6,736382	-0,479436
Because I do no planned purchasing	21,37649	114305,6	0	1	-224013,6	224056,3
Because I prepare too much	-0,9223549	0,850747	-1,08	0,278	-2,589789	0,7450791
No reason, I almost never have leftovers	1,057465	1,520103	0,7	0,487	-1,921883	4,036813
initiatives						
Yes, and this inspires me	4,143824	2,296832	1,8	0,071**	-0,3578836	8,645532
Yes, but I actually never participate	3,708301	1,700456	2,18	0,029***	0,3754679	7,041134
There are no initiatives	1,498032	0,791984	1,89	0,059**	-0,0542289	3,050293
_cons	1,446162	2,235684	0,65	0,518	-2,935697	5,828022
Yes, in the freezer						
gender						
Female	-2,725164	1,176607	-2,32	0,021***	-5,031271	-0,419057
age						
35-45	-3,854583	1,845301	-2,09	0,037***	-7,471306	-0,237859
45-55	-1,139184	1,893536	-0,6	0,547	-4,850446	2,572078
55-65	2,693148	2,342359	1,15	0,25	-1,897791	7,284088
Younger than 25	-0,7781601	1,984456	-0,39	0,695	-4,667621	3,111301
Older than 65	-0,7788803	2,401659	-0,32	0,746	-5,486046	3,928285
education						
Primary school	-5,885993	3,182273	-1,85	0,064**	-12,12313	0,3511475
Secondary vocational education	0,3034565	1,577945	0,19	0,847	-2,789258	3,396171
Secondary school	1,259011	1,628701	0,77	0,44	-1,933185	4,451207
Scientific education	-1,505796	1,057836	-1,42	0,155	-3,579115	0,5675242
household						
Family	-3,104741	1,494653	-2,08	0,038***	-6,034207	-0,175275
Student (individually or jointly)	-0,8077535	2,155716	-0,37	0,708	-5,03288	3,417373
neighbourhood						
Haren	4,305489	2,504713	1,72	0,086**	-0,6036591	9,214637
Oost	5,016045	1,949704	2,57	0,01***	1,194696	8,837394
Oude Wijken	1,648904	1,327863	1,24	0,214	-0,9536589	4,251468
Ten Boer	27,46768	311799,7	0	1	-611088,7	611143,7
West	-19,76555	54418,01	0	1	-106677,1	106637,6
Zuid	3,79927	1,802825	2,11	0,035***	0,2657978	7,332743
container	0,069811	0,101264	0,69	0,491	-0,1286627	0,2682847
purchasing						
About two or three times a week	0,2337444	1,148666	0,2	0,839	-2,017599	2,485088
Weekly	1,95036	1,70442	1,14	0,253	-1,390242	5,290963
planning						
Yes, I know beforehand what to buy	-1,623754	1,060729	-1,53	0,126	-3,702746	0,4552373
No	-3,296322	2,062361	-1,6	0,11	-7,338476	0,7458317
Sometimes	-4,961552	1,361662	-3,64	0***	-7,630361	-2,292743
income						
25-50 euros	1,067283	1,824911	0,58	0,559	-2,509478	4,644043
50-75 euros	-0,7583931	1,577639	-0,48	0,631	-3,850508	2,333722
75-100 euros	1,487362	1,310537	1,13	0,256	-1,081243	4,055967
Less than 25 euros	3,086927	2,573394	1,2	0,23	-1,956832	8,130687
preparing						
Because I cannot estimate how much to make	-2,947973	1,921069	-1,53	0,125	-6,713199	0,8172537
Because I do no planned purchasing	1,287599	167848,4	0	1	-328975,5	328978,1
Because I prepare too much	-1,303494	1,069613	-1,22	0,223	-3,399896	0,7929083
No reason, I almost never have leftovers	0,8140324	1,678817	0,48	0,628	-2,476388	4,104453
initiatives						
Yes, and this inspires me	2,287848	2,42637	0,94	0,346	-2,46775	7,043447
Yes, but I actually never participate	2,71526	1,832277	1,48	0,138	-0,8759377	6,306457
There are no initiatives	0,3440151	1,036198	0,33	0,74	-1,686895	2,374925
_cons	4,035913	2,745344	1,47	0,142	-1,344862	9,416688
Yes, but I throw it almost always away	**(base outcome)**					
No, I never eat it anyway						
gender						
Female	14,63031	9801,521	0	0,999	-19196	19225,26
age						
35-45	89,60254	19498,69	0	0,996	-38127,13	38306,34
45-55	116,3914	21503,7	0,01	0,996	-42030,08	42262,87
55-65	23,96028	17928,92	0	0,999	-35116,07	35163,99
Younger than 25	-69,8279	10604,94	-0,01	0,995	-20855,14	20715,48
Older than 65	101,6883	27987,14	0	0,997	-54752,1	54955,48
education						
Primary school	115,5159	63111,89	0	0,999	-123581,5	123812,6
Secondary vocational education	112,4653	75064,82	0	0,999	-147011,9	147236,8
Secondary school	34,23712	11486,98	0	0,998	-22479,83	22548,31
Scientific education	51,14954	7813,142	0,01	0,995	-15262,33	15364,63
household						
Family	28,24806	25970,8	0	0,999	-50873,59	50930,09
Student (individually or jointly)	142,0546	29631,57	0	0,996	-57934,75	58218,86
neighbourhood						
Haren	-264,3229	30315,57	-0,01	0,993	-59681,76	59153,11
Oost	-244,4862	26227,67	-0,01	0,993	-51649,77	51160,79
Oude Wijken	-18,1985	10565,66	0	0,999	-20726,51	20690,11
Ten Boer	114,0866	786751,3	0	1	-1541890	1542118
West	-198,739	88518,39	0	0,998	-173691,6	173294,1
Zuid	-128,955	15629,34	-0,01	0,993	-30761,89	30503,98
container	4,727382	1019,914	0	0,996	-1994,267	2003,722
purchasing						
About two or three times a week	5,449143	12124,47	0	1	-23758,07	23768,97
Weekly	55,59411	15955,02	0	0,997	-31215,68	31326,86
planning						
Yes, I know beforehand what to buy	92,88253	11628,75	0,01	0,994	-22699,04	22884,81
No	141,7389	18594,49	0,01	0,994	-36302,79	36586,27
Sometimes	84,05574	19048,57	0	0,996	-37250,46	37418,57
income						
25-50 euros	-137,313	18281,71	-0,01	0,994	-35968,8	35694,17
50-75 euros	-135,3976	20720,89	-0,01	0,995	-40747,59	40476,79
75-100 euros	-97,42369	87339	0	0,999	-171278,7	171083,9
Less than 25 euros	-198,1487	48684,8	0	0,997	-95618,6	95222,31
preparing						
Because I cannot estimate how much to make	129,188	16554,14	0,01	0,994	-32316,32	32574,7
Because I do no planned purchasing	254,1812	288273,5	0	0,999	-564751,6	565259,9
Because I prepare too much	67,21438	12805,92	0,01	0,996	-25031,93	25166,36
No reason, I almost never have leftovers	143,8725	14460,9	0,01	0,992	-28198,97	28486,71
initiatives						

Yes, and this inspires me	-61,43265	89045,33	0	0,999	-174587,1	174464,2
Yes, but I actually never participate	-10,6921	75030,81	0	1	-147068,4	147047
There are no initiatives	-28,57232	8580,698	0	0,997	-16846,43	16789,29
_cons	-231,2717	42332,62	-0,01	0,996	-83201,68	82739,14

Note. Sign. Level: p*** < 0.05, p** < 0.10

- Women are *less* likely compared to men to store food in the refrigerator as opposed to storing leftovers but throwing it almost always away

- The age group 35-45 is *less* likely compared to the age group 25-35 to store food in the refrigerator as opposed to storing leftovers but throwing it almost always away

- Individuals living in the neighbourhoods Oost, Oude Wijken and Zuid are *more* likely compared to individuals living in the neighbourhood Centrum to store food in the refrigerator as opposed to storing leftovers but throwing it almost always away

- Individuals who do planned purchases sometimes are *less* likely compared to individuals who do purchases by the use of a shopping list to store food in the refrigerator as opposed to storing leftovers but throwing it almost always away

- Individuals who have bad cooking skills and cannot estimate how much to prepare are *less* likely compared to individuals who have difficulties with supermarket packages to store food in the refrigerator as opposed to storing leftovers but throwing it almost always away

- Individuals who are not very involved in their neighbourhood are *less* likely compared to individuals who know if there are initiatives to store food in the refrigerator as opposed to storing leftovers but throwing it almost always away

- Women are *less* likely compared to men to store food in the freezer as opposed to storing leftovers but throwing it almost always away

- The age group 35-45 is *less* likely compared to the age group 25-35 to store food in the freezer than storing leftovers but throwing it almost always away

- Individuals with the highest achieved education primary school are *less* likely compared to individuals with the highest achieved education higher professional education to store food in the freezer as opposed to storing leftovers but throwing it almost always away

- Family households are *less* likely compared to single living households to store food in the freezer as opposed to storing leftovers but throwing it almost always away

4.3.2. Robustness

To be sure of the robustness of the model, three additional regression analysis are done (see Appendix II). The first two additional MLRs for household and age (as can be seen in the correlation matrix that those are having a high correlation, of 0.5332). The third additional MLR with only the key variables that may (theoretically) have a high influence on food waste.

The first additional MLR will be without household to see whether this has an influence on the outcome for age and the rest of the model (Appendix II). The second additional MLR will be without age to see whether this has an influence on the outcome for household and the rest of the model. When looking at the results of the MLRs, the model is quite robust, as the coefficients do not change very much when one of the variables age or household are left out of the regression. Furthermore, almost all significant values stay significant. So, we can here conclude that there indeed is no or not a high correlation between age and household, and that the model is robust.

The third additional MLR will only be with key variables which are having (theoretically) an influence on the food waste behaviour. Namely, age, gender, income, education, household, planning, preparing and purchasing. The results of the regression (Appendix II) show that the model is a better fitting model as more variables are included. This can be completed out of the fact that the Pseudo R2 of the MLR with only key variables is 31,38%. This is lower than the Pseudo R2 of the MLR with all variables included, 46,18%. This means that the model (Regression I, p.44) with all variables included is a better fitting model.

4.3.3. Neighbourhoods of the municipality of Groningen and food waste

The second multinomial logistic regression will be run with neighbourhood as dependent variable and all variables having a statistically significant influence on food waste (out of the first regression analysis) as independent variables. These are: gender, age, household, education, preparing, planning, initiatives and storage.

The formula for the MLR with neighbourhood as the dependent variable will be as follows:

Lx (Haren vs. Centrum) = ln(Y=2/Y=1) = $\beta 0 + \beta x1 + \beta x2 + \beta x3 + \beta x4 + \beta x5 + \beta x6 + \beta x7 + \beta x8 + \varepsilon x$,
La (Oost vs. Centrum) = ln(Y=3/Y=1) = $\beta 0 + \beta a1 + \beta a2 + \beta a3 + \beta a4 + \beta a5 + \beta a6 + \beta a7 + \beta a8 + \varepsilon a$,
Lf (Oude Wijken vs. Centrum) = ln(Y=4/Y=1) = $\beta 0 + \beta f1 + \beta f2 + \beta f3 + \beta f4 + \beta f5 + \beta f6 + \beta f7 + \beta f8 + \varepsilon f$,
Lq (Ten Boer vs. Centrum) = ln(Y=5/Y=1) = $\beta 0 + \beta q1 + \beta q2 + \beta q3 + \beta q4 + \beta q5 + \beta q6 + \beta q7 + \beta q8 + \varepsilon q$,
Lt (West vs. Centrum) = ln(Y=6/Y=1) = $\beta 0 + \beta t1 + \beta t2 + \beta t3 + \beta t4 + \beta t5 + \beta t6 + \beta t7 + \beta t8 + \varepsilon t$,
Lc (Zuid vs. Centrum) = ln(Y=7/Y=1) = $\beta 0 + \beta c1 + \beta c2 + \beta c3 + \beta c4 + \beta c5 + \beta c6 + \beta c7 + \beta c8 + \varepsilon c$

The outcome of the model is showed below. The second multinomial logistic regression, with neighbourhood as dependent variable and the neighbourhood "Oost" as the baseline (due to the largest number of respondents from the neighbourhood Oost), can be interpreted as follows:

Regression II: Multinomial Logistic Regression with neighbourhood as dependent variable.

Number of observations	161
LR chi2(149)	341.03
Prob > chi2	0.0000
Pseudo R2	0.6803
Log likelihood	-80.136533

	neighbourhood	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Centrum							
	gender						
	Female	-5,853352	2,214241	-2,64	0,008***	-10,19319	-1,513518
	age						
	35-45	-8,887512	4,198838	-2,12	0,034***	-17,11708	-0,657941
	45-55	-32,68673	18906,29	0	0,999	-37088,34	37022,97
	55-65	-0,0988922	3,368798	-0,03	0,977	-6,701615	6,50383
	Younger than 25	4,721642	7,716007	0,61	0,541	-10,40145	19,84474
	Older than 65	-28,24492	69758,33	0	1	-136752,1	136695,6
	household						
	Family	-12,29242	3,721619	-3,3	0,001***	-19,58666	-4,998183
	Student (individually or jointly)	-3,827787	4,504627	-0,85	0,395	-12,65669	5,00112
	education						
	Primary school	-5,62182	3,581687	-1,57	0,117	-12,6418	1,398156
	Secondary vocational education	-34,75605	18110,78	0	0,998	-35531,24	35461,73
	Secondary school	-7,930542	7,884328	-1,01	0,314	-23,38354	7,522457
	Scientific education	1,122731	1,74507	0,64	0,52	-2,297543	4,543005
	planning						
	Yes, I know beforehand what to buy	3,127526	2,172462	1,44	0,15	-1,130421	7,385474
	No	-8,833015	8,066561	-1,1	0,274	-24,64318	6,977155
	Sometimes	-5,62939	2,58145	-2,18	0,029***	-10,68894	-0,569842
	preparing						
	Because I cannot estimate how much to make	15,72308	10729,97	0	0,999	-21014,62	21046,07
	Because I do no planned purchasing	-10,61805	1095546	0	1	-2147242	2147221
	Because I prepare too much	-3,350108	2,257901	-1,48	0,138	-7,775513	1,075297
	No reason, I almost never have leftovers	-5,269646	2,648969	-1,99	0,047***	-10,46153	-0,077763
	initiatives						
	Yes, and this inspires me	-2,147659	2,840441	-0,76	0,45	-7,714822	3,419504
	Yes, but I actually never participate	-0,9755816	5,647605	-0,17	0,863	-12,04468	10,09352
	There are no initiatives	3,203298	1,607355	1,99	0,046***	0,0529393	6,353656
	storage						
	Yes, in the refrigerator and I almost always eat it	-2,227207	2,293689	-0,97	0,332	-6,722754	2,26834
	Yes, in the freezer	-6,795225	2,858634	-2,38	0,017	-12,39804	-1,192405
	No, I never eat it anyway	30,6771	55622,32	0	1	-108987,1	109048,4
	_cons	22,21031	7,406657	3	0,003	7,693532	36,72709
Haren							
	gender						
	Female	-3,83267	3,340525	-1,15	0,251	-10,37998	2,714638
	age						
	35-45	11,47297	16317,84	0	0,999	-31970,91	31993,85
	45-55	8,852927	16317,84	0	1	-31973,53	31991,23
	55-65	11,06266	16317,84	0	0,999	-31971,32	31993,44
	Younger than 25	-4,908844	389522,9	0	1	-763455,7	763445,9
	Older than 65	2,452186	16317,84	0	1	-31979,93	31984,83
	household						
	Family	23,86656	28195,9	0	0,999	-55239,08	55286,81
	Student (individually or jointly)	4,156845	387420,4	0	1	-759325,9	759334,2
	education						
	Primary school	29,05311	171979,8	0	1	-337045,1	337103,2
	Secondary vocational education	-64,16733	62525,36	0	0,999	-122611,6	122483,3
	Secondary school	18,64082	52561,37	0	1	-102999,8	103037
	Scientific education	5,313533	2,748858	1,93	0,053	-0,0741294	10,70119
	planning						

	Yes, I know beforehand what to buy	2,281192	3,513102	0,65	0,516	-4,604362	9,166745
	No	34,43703	41548,61	0	0,999	-81399,34	81468,22
	Sometimes	5,708289	3,389422	1,68	0,092	-0,9348563	12,35143
	preparing						
	Because I cannot estimate how much to make	41,49622	43502,22	0	0,999	-85221,29	85304,28
	Because I do no planned purchasing	55,12461	2067744	0	1	-4052649	4052759
	Because I prepare too much	-1,646998	2,747208	-0,6	0,549	-7,031427	3,73743
	No reason, I almost never have leftovers	1,160562	2,542711	0,46	0,648	-3,823061	6,144184
	initiatives						
	Yes, and this inspires me	-2,513902	72053,41	0	1	-141224,6	141219,6
	Yes, but I actually never participate	24,68679	17021,07	0	0,999	-33336	33385,37
	There are no initiatives	28,21667	17021,07	0	0,999	-33332,47	33388,9
	storage						
	Yes, in the refrigerator and I almost always eat it	1,027532	3,242517	0,32	0,751	-5,327684	7,382748
	Yes, in the freezer	6,670692	5,068393	1,32	0,188	-3,263176	16,60456
	No, I never eat it anyway	-46,86542	99184,36	0	1	-194444,6	194350,9
	_cons	-64,46109	36858,93	0	0,999	-72306,65	72177,72
Oost		**(base outcome)**					
Oude Wijken							
	gender						
	Female	-4,028758	2,181436	-1,85	0,065**	-8,304294	0,246779
	age						
	35-45	-7,472962	3,844049	-1,94	0,052**	-15,00716	0,061237
	45-55	-5,160279	3,389463	-1,52	0,128	-11,8035	1,482947
	55-65	-4,909202	4,393438	-1,12	0,264	-13,52018	3,701778
	Younger than 25	5,791039	7,720851	0,75	0,453	-9,341551	20,92363
	Older than 65	-4,374451	4,485875	-0,98	0,329	-13,16661	4,417704
	household						
	Family	-10,82105	3,585208	-3,02	0,003***	-17,84793	-3,794172
	Student (individually or jointly)	-5,664122	4,522751	-1,25	0,21	-14,52855	3,200308
	education						
	Primary school	-22,15474	109317	0	1	-214279,5	214235,2
	Secondary vocational education	-1,595805	3,530865	-0,45	0,651	-8,516173	5,324562
	Secondary school	-6,859907	7,860127	-0,87	0,383	-22,26547	8,545659
	Scientific education	2,538875	1,770597	1,43	0,152	-0,9314309	6,009181
	planning						
	Yes, I know beforehand what to buy	4,657837	2,07198	2,25	0,025***	0,5968316	8,718842
	No	-30,91337	41989,63	0	0,999	-82329,07	82267,24
	Sometimes	-2,411195	2,352871	-1,02	0,305	-7,022738	2,200347
	preparing						
	Because I cannot estimate how much to make	15,28916	10729,97	0	0,999	-21015,06	21045,64
	Because I do no planned purchasing	-13,74307	1291199	0	1	-2530717	2530689
	Because I prepare too much	-2,903265	2,218343	-1,31	0,191	-7,251138	1,444607
	No reason, I almost never have leftovers	-3,999249	2,605104	-1,54	0,125	-9,105159	1,106661
	initiatives						
	Yes, and this inspires me	-22,8386	45820,44	0	1	-89829,25	89783,58
	Yes, but I actually never participate	-9,402244	4,585981	-2,05	0,04***	-18,3906	-0,413887
	There are no initiatives	1,054202	1,653378	0,64	0,524	-2,18636	4,294763
	storage						
	Yes, in the refrigerator and I almost always eat it	0,0790979	2,29607	0,03	0,973	-4,421117	4,579313
	Yes, in the freezer	-5,022336	2,847883	-1,76	0,078**	-10,60408	0,559411
	No, I never eat it anyway	30,53184	55622,32	0	1	-108987,2	109048,3
	_cons	16,78272	7,259962	2,31	0,021	2,553457	31,01199
Ten Boer							
	gender						
	Female	-6,111415	43676,32	0	1	-85610,12	85597,9
	age						
	35-45	-31,27302	48517,79	0	0,999	-95124,4	95061,86
	45-55	-22,38482	77720,08	0	1	-152350,9	152306,2
	55-65	-26,44822	71708,21	0	1	-140571,9	140519,1
	Younger than 25	-2,547243	31382,85	0	1	-61511,8	61506,7
	Older than 65	-34,92651	112108,8	0	1	-219764,2	219694,3
	household						
	Family	10,95439	61495,41	0	1	-120517,8	120539,7
	Student (individually or jointly)	-1,227743	54241,78	0	1	-106313,2	106310,7
	education						
	Primary school	9,191424	210141	0	1	-411859,6	411878
	Secondary vocational education	-13,42298	125042,9	0	1	-245093	245066,1
	Secondary school	-6,750445	85434,29	0	1	-167454,9	167441,4
	Scientific education	-17,86643	60971,36	0	1	-119519,5	119483,8
	planning						
	Yes, I know beforehand what to buy	6,691164	53541,73	0	1	-104933,2	104946,6
	No	-13,3911	96464,91	0	1	-189081,1	189054,4
	Sometimes	-3,770997	41559,8	0	1	-81459,49	81451,95
	preparing						
	Because I cannot estimate how much to make	18,94134	79219,34	0	1	-155248,1	155286
	Because I do no planned purchasing	43,80008	5496131	0	1	-10800000	10800000
	Because I prepare too much	4,215508	58818,17	0	1	-115277,3	115285,7
	No reason, I almost never have leftovers	6,45285	42471,02	0	1	-83235,21	83248,11
	initiatives						
	Yes, and this inspires me	4,412996	116785,4	0	1	-228890,7	228899,5
	Yes, but I actually never participate	-2,246735	62626,07	0	1	-122747,1	122742,6
	There are no initiatives	11,57981	35417,39	0	1	-69405,23	69428,39
	storage						
	Yes, in the refrigerator and I almost always eat it	-6,509642	87160,81	0	1	-170838,6	170825,5
	Yes, in the freezer	5,412109	58079,84	0	1	-113829	113839,8
	No, I never eat it anyway	29,14124	141120,4	0	1	-276561,7	276619,9
	_cons	-9,717857	99153,82	0	1	-194347,6	194328,2
West							
	gender						
	Female	-75,28705	32738,06	0	0,998	-64240,71	64090,14
	age						
	35-45	31,43892	28346,93	0	0,999	-55527,52	55590,4
	45-55	33,38962	32727,45	0	0,999	-64111,23	64178,01
	55-65	-20,46304	35306,34	0	1	-69219,63	69178,7
	Younger than 25	-66,33357	42659,46	0	0,999	-83677,34	83544,67
	Older than 65	-48,91205	120510	0	1	-236244,2	236146,4
	household						
	Family	-27,98835	34528,31	0	0,999	-67702,24	67646,26
	Student (individually or jointly)	65,36198	37924,92	0	0,999	-74266,12	74396,85
	education						

	Primary school	69,44077	56943,28	0	0,999	-111537,3	111676,2
	Secondary vocational education	31,33313	35917,15	0	0,999	-70364,99	70427,65
	Secondary school	-33,04103	62153,64	0	1	-121851,9	121785,8
	Scientific education	-2,761915	33425,09	0	1	-65514,73	65509,21
	planning						
	Yes, I know beforehand what to buy	6,104314	15648,33	0	1	-30664,05	30676,26
	No	0,4227908	48365,01	0	1	-94793,25	94794,1
	Sometimes	-20,94338	33720,32	0	1	-66111,56	66069,68
	preparing						
	Because I cannot estimate how much to make	36,60177	39709,58	0	0,999	-77792,75	77865,95
	Because I do no planned purchasing	137,7431	3233026	0	1	-6336478	6336753
	Because I prepare too much	22,04868	33633,44	0	0,999	-65898,28	65942,37
	No reason, I almost never have leftovers	0,8343953	18601,62	0	1	-36457,67	36459,33
	initiatives						
	Yes, and this inspires me	11,58028	51807,2	0	1	-101528,7	101551,8
	Yes, but I actually never participate	-37,53851	23120,46	0	0,999	-45352,81	45277,73
	There are no initiatives	59,76625	22829,6	0	0,998	-44685,42	44804,95
	storage						
	Yes, in the refrigerator and I almost always eat it	-33,89171	34308,96	0	0,999	-67278,22	67210,43
	Yes, in the freezer	-33,97541	37221	0	0,999	-72985,8	72917,85
	No, I never eat it anyway	-91,65715	85596,1	0	0,999	-167856,9	167673,6
	_cons	-6,740097	29036,26	0	1	-56916,77	56903,29
Zuid							
	gender						
	Female	-5,410922	1,903702	-2,84	0,004***	-9,14211	-1,679734
	age						
	35-45	-5,020958	3,546573	-1,42	0,157	-11,97211	1,930198
	45-55	-4,378425	3,390769	-1,29	0,197	-11,02421	2,26736
	55-65	-0,8779332	3,279075	-0,27	0,789	-7,304803	5,548936
	Younger than 25	2,592674	7,528566	0,34	0,731	-12,16304	17,34839
	Older than 65	-9,406293	4,530538	-2,08	0,038***	-18,28598	-0,526602
	household						
	Family	-3,598242	2,717959	-1,32	0,186	-8,925345	1,72886
	Student (individually or jointly)	-3,213729	3,976492	-0,81	0,419	-11,00751	4,580052
	education						
	Primary school	-21,55425	116360,7	0	1	-228084,4	228041,3
	Secondary vocational education	-0,1377979	2,089191	-0,07	0,947	-4,232537	3,956942
	Secondary school	-3,674973	7,811375	-0,47	0,638	-18,98499	11,63504
	Scientific education	3,55102	1,447421	2,45	0,014***	0,7141269	6,387913
	planning						
	Yes, I know beforehand what to buy	4,827112	1,88161	2,57	0,01***	1,139223	8,515
	No	-4,257188	7,373048	-0,58	0,564	-18,7081	10,19372
	Sometimes	1,555231	1,68436	0,92	0,356	-1,746054	4,856515
	preparing						
	Because I cannot estimate how much to make	21,68019	10729,97	0	0,998	-21008,67	21052,03
	Because I do no planned purchasing	22,00308	754857,1	0	1	-1479471	1479515
	Because I prepare too much	0,3495394	2,045709	0,17	0,864	-3,659977	4,359056
	No reason, I almost never have leftovers	-0,7145327	2,303993	-0,31	0,756	-5,230276	3,801211
	initiatives						
	Yes, and this inspires me	-25,66906	53787,09	0	1	-105446,4	105395,1
	Yes, but I actually never participate	-34,24126	20681,06	0	0,999	-40568,37	40499,89
	There are no initiatives	2,917609	1,297926	2,25	0,025***	0,3737209	5,461496
	storage						
	Yes, in the refrigerator and I almost always eat it	-1,835312	1,491085	-1,23	0,218	-4,757784	1,087161
	Yes, in the freezer	-2,693408	2,135357	-1,26	0,207	-6,87863	1,491814
	No, I never eat it anyway	27,55197	55622,32	0	1	-108990,2	109045,3
	_cons	7,826502	6,13795	1,28	0,202	-4,203658	19,85666

Note. Sign. Level: p*** < 0.05, p** < 0.10

- Women are *less* likely compared to men to live in Centrum, Oude Wijken and Zuid as opposed to Oost

- Age group 35-45 is *less* likely compared to age group 25-35 to live in Centrum and Oude Wijken as opposed to Oost

- Individuals living in Zuid are *more* likely as opposed to individuals living in Oost to have scientific education than higher professional education

- The family households are *less* likely compared to single living households to live in Centrum and Oude Wijken as opposed to Oost

- Individuals doing planned purchases sometimes are *less* likely, compared to individuals doing purchases with a shopping list, to live in Centrum as opposed to Oost

- Individuals who plan beforehand what to buy are *more* likely, compared to individuals doing purchases with a shopping list, to live in Oude Wijken and Zuid as opposed to Oost

- Individuals having almost never leftovers are *less* likely, compared to individuals having leftovers due to supermarket packages, to live in Centrum as opposed to Oost

- It is *more* likely to have no initiatives compared to if individuals do not know if there are initiatives in Centrum and Zuid as opposed to Oost

- It is *less* likely to have initiatives where individuals never participate compared to if individuals do not know if there are initiatives in Oude Wijken compared to Oost

- For individuals living in Centrum and Oude Wijken it is *less* likely to store leftovers in the freezer, compared to storing it but throwing it away after a few days, as opposed to Oost

4.4 Focus groups results

The focus groups were transcribed and coded in Atlas.ti to examine several relationships and to see if the outcomes are in correlation with the above-mentioned results of the descriptive statistics and regression analysis.

This chapter is structured the same as the focus groups, it starts with the question asked to the participants by email, after that it shows the results of the first, second, third and fourth statement.

Question 1: "Does my neighbourhood influence the amount of food waste I have?"
Participants were asked to think about the question beforehand, several participants had prepared some thoughts about this question. Many of the participants immediately started talking about supermarkets in their neighbourhood and some of the participants mentioned 'activities' in their neighbourhood as having an influence. Furthermore, one participant mentioned the fact that you live in a particular neighbourhood due to a particular income, which influences activities like doing purchases where different thoughts about expensiveness come to mind.

The first focus group mainly mentioned that supermarkets, food markets and delivering could influence the amount of food waste in their neighbourhood. A quote of one of the participants, Remco, is *"I live near the supermarket, this makes me waste less food as I can easily go there"* another participant of the first focus group, Elise, *"I could not easily think of something in my neighbourhood influencing my food waste behaviour, except for the proximity of the supermarket"*. Participant Isabelle answered this question differently, as she stated that the food market (on Tuesday, Friday and Saturday in Groningen) influences her amount of food waste, as at the end of the day the products on the food market are less expensive *"at the end of the day the raspberries are just one euro per bowl, this makes me buy more"*. And participant Gerard mentioned that he is always surprised by the enormous portions of food of delivering restaurants. The availability of delivery has an influence on the amount of food waste to Gerard's opinion.
Participant Jasper mentioned that he interpreted this question differently than the others, he mentioned *"I thought more about activities within neighbourhoods, like WIJ teams having food initiatives, contacting several target audiences who can share it with the inhabitants of their neighbourhood again"*. Furthermore, he mentioned that the activities within the neighbourhood will have more influence than the geographical location.

The second focus group participants also mentioned the supermarket as influencing factor in their neighbourhood on the amount of food waste. One participant, Carlijn, mentioned *"I used to live in France, we always went by car to the supermarket and now I can walk and be there within five minutes"* and *"I could easily go less often to the supermarket, but it is just in my behaviour, everyone does daily purchase here"*.
Sophie noted *"I live on the Vismarkt this obviously has an influence on my amount of food waste"*. She meant that the food market (three times a week) and the proximity of the Albert Heijn have an enormous influence on her food waste pattern.
Linde mentioned that living in a particular neighbourhood is due to a particular income. This has a consequence of how you will associate with purchases. Furthermore, she stated that the neighbourhood itself has not a particular influence, but that *"If I arrive late at home, it is very easy to order food instead of start cooking and this makes that we throw away things sometimes"*. She mentions that all supermarkets in her neighbourhood are very accessible and nearby, as well as the option of food delivery, to her opinion this is having a particular influence on someone's behaviour.

The third focus group participants mentioned likewise the supermarkets as an influence on their amount of food waste. Furthermore, one participant Esmee mentioned that in her neighbourhood a "social

refrigerator" influences her amount of food waste as she sometimes brings here food there and feels good about the deed. The social refrigerator is an alternative for storing leftovers.
The participants of this focus group mentioned the social pressure for rising awareness by individuals many times. Like, Julia mentioned *"I do not think it is in particular my neighbourhood which influences the amount of food waste generally, I think it is mainly my roommates"*. She thought that living with other students (in her case) influences her food waste behaviour. She noted that when her roommates would be alert on wasting food, she would waste less as well. Simultaneously, when her roommates would be less alert on wasting food, she would probably waste more food.

Statement 1: "My food waste will be reduced when I live in a neighbourhood with a low number of supermarkets"
The statement tries to examine what participants think about the low number of supermarkets in a neighbourhood and if this could influence the purchases and, in the end, the amount of food wasted. Almost all participants mentioned that they disagree with this statement. The overall pattern is that they think that living further away makes individuals buy more at one time which may not be eaten in the end. Furthermore, living further away from a supermarket requires a better planning and several participants mentioned that that is difficult as they sometimes go visit friends and family unplanned or go eating out unplanned.

Remco, a participant of the first focus group, started by disagreeing with the statement *"We will buy a lot of food at one time when the supermarket is far away, the consequence of this is when we are not able to cook one day, we have a lot of food left in the end of the week which we throw away"*. Moreover, Remco noted that nowadays they live close to a supermarket, while before they lived further away. He mentioned *"When we lived further away from the supermarket, we did bulk shopping"*.
Chantal agrees with Remco but mentions the size of a group and supermarket packages as a factor of leftovers and food waste as well. She notes that it is, besides living far away from the supermarket, difficult to cook for small groups as supermarket packages are mainly too large.
Isabelle agrees with the other participants and mentions that it could also be due to differences in age, she mentions that her parents do weekly purchase and do not have many leftovers, *"for my age it is not clear yet how my week will look like, so this will cause more food waste when I had lived further away from the supermarket"*. Remco adds that this clearly is a life course argument, as families with children might more easily plan their daily lives.
Elise mentions the age, group size and supermarket packages as well and agrees with the rest that living further away from the supermarket ensures more food waste. Elise: *"I would waste more food when I would have lived further away from the supermarket, yet I think other factors influence this as well like group size"*.
Jasper agrees with the fact that living further away from the supermarket the number of groceries will increase per weekly visit, this is different than living nearby a supermarket as *"You can just easily go to the supermarket when you forgot something or when you need an extra product to prepare some leftovers"*. He noted that living nearby a supermarket requires less planning, which makes it easier to finish leftovers for instance.
On the contrary, Gerard mentions that the distance to a supermarket would not influence the amount of food waste *"I think I would take the further distance to the supermarket for granted"* due to his difficulties for weekly planning.

The second focus group also stated that when living further away from a supermarket would ensure individuals to buy more groceries at a time. However, one participant, Carlijn, also noted that living nearby the supermarket ensures more food waste due to unnecessary purchases *"when I forget something in the supermarket and go back, I always arrive at home with extra unessential groceries"*. Sophie disagrees and mentions that living further away requires a better planning, this may lead to rotten groceries when going to visit friends spontaneously. Linde mentions that it does not really care for her to live further away or near by a supermarket, as they do purchase always by car, however they always do daily purchases.

All participants of the third focus group disagree with the statement. They all mention that it is more difficult when a supermarket is located further away, as this requires planning. Here again, the location further away will ensure a larger number of groceries bought at a time, participants mention that they think this could lead to more food waste. Roos: *"You have to better calculate what you need and possibly you would buy more because you have to think ahead for a longer time"*. Joris: *"I totally agree, you always have moments where you spontaneously go visit someone or go out for diner, then it will remain"*.

Statement 2: "My food waste will be reduced when I am asked to separate my garbage"

The second statement examined whether separating garbage would lead to less food waste. Participants of the various focus groups answered the statement very similarly. The overall result of this statement sounds that it would not really matter whether individuals would separate their garbage or not in reducing food waste, as most participants mentioned that the food is thrown away when it is not edible anymore.
However, some participants mentioned that separating garbage may stir up awareness of what you throw away. Some participants also mentioned separating plastic garbage which may definitely develop awareness due to the fact that all products are pact in plastic and that would set individuals thinking due to this large amount of waste.

Chantal disagreed with the statement as she stated *"Maybe this is a super easy line of thought, but if I throw something away this will not influence my food waste at all. Because this will not influence the fact if a product is rotten or not"*. Similarly, Jasper, Elise and Remco disagreed with the statement. As Jasper mentioned *"The reason for me to throw away food is when I am not going to eat it anymore, when it is out of date or rotten"*. Moreover, according to Remco *"If food is not usable anymore, we will throw this away, so separating my garbage would not affect our amount of food waste"*. All the participants make a clear distinction between throwing away leftovers or storing it, they throw food away when this is really not useful anymore.
Isabelle mentioned that separating garbage in her opinion would only be useful if she could separate plastic from the other garbage as this would to her opinion contributes to a sustainable future, but she noted that this would not have an influence on the amount of food wasted. Besides, as mentioned earlier in this research separating plastic from residual waste is not happening at the household level in the municipality of Groningen.

Linde (participant of the second focus group) mentioned dedicated that separating garbage as they do in the neighbourhood where she lives, does not influence the amount of food wasted. Here again *"We throw it away when it is not usable anymore, when it is out of date. That is when we waste food, because it is still in the refrigerator and we have not eaten it, not when we separate our garbage"*.
Although, the other two opinions of participants of the second focus group differ a bit from the before mentioned phenomenon. As both participants, Carlijn and Sophie, mentioned that separating garbage could raise awareness. In the way that they may be more aware of what they throw away everyday instead of just throwing it in one garbage can without thinking of it at all. Sophie *"I think when I should separate my garbage, when you would really see it, that it would raise awareness"*. Thereafter Carlijn mentioned *"Never thought of this actually, I always just throw everything in one garbage can, super easy and not aware of food waste at all"*.

Joris (participant of the third focus group) stated that he did not separate garbage when he was living in the centre of Groningen, now he lives in Haren for nine years already and states that *"I have not the idea that my food waste pattern changed after I came to live here"*. This demonstrates the overall pattern of the participants, noting that there will not be an enormous influence but that there could be more realization of food waste in a sense. As the other participants of the third focus group also stated that separating garbage would raise awareness of the amount of waste you throw away where again plastic was mentioned as kind of a nominator for the awareness of the amount of garbage you have.

Roos added that she has never separated garbage in her life, but that she could imagine that separating garbage could lead to awareness of wasting food *"when someone is in the possession of a private container, it must be easier to see how many cubic litres of garbage you have every week which is differently from just throwing it away in a public container"*. Julia agreed with Roos and mentioned another aspect, peer pressure, as something to do with separating garbage and food waste. Shame, as peer pressure, could influence the amount of garbage bags every week: "*I think that this shame, of having a lot of garbage, could influence individual's buying behaviour and food waste behaviour"*.

Statement 3: "My food waste will be reduced when I will be reminded often by the consequences of it"

The overall outcome of the participants opinion during the focus groups corresponds between the three separate focus groups. That is to say, that all participants agree with being influenced by the reminding consequences of food waste. However, it differs per participant what will influence their behaviour and amount of food waste. As some mention that it would influence, but only on short terms. For others it would influence, but only if alternatives for food waste are appointed. Moreover, the participating students mentioned that it would have an influence if someone in their social network would be the reminder.

Participants of the first focus group all mentioned to be influenced by the reminders. Elise mentioned *"After being reminded of it I would start reading more about it what makes me more aware of the consequences of food waste and this will have a certain effect on my amount of food waste"*. Isabelle agreed with Elise, however she said that this effect will probably not last for very long. And Chantal agreed but also stated that it would even have a higher effect if she knew what alternatives there are: *"I would reduce my food waste when I know what kind of alternatives there are, like to donate my food for initiatives by the food bank or Leger des Heils"*. Gerard mentioned that he would be triggered as well, however for him it would differ per reminder and mentions that it will be more useful when it is something like general knowledge development: *"I would not necessarily call this a reminder, more some kind of education"*.

The second focus group participants also mentioned to be triggered on the short term. Like Linde *"I am triggered very quickly, however this is gone very quickly as well"*. Carlijn agreed with Linde and mentioned that *"Advertisement works good, but I have to be busy with it, otherwise it fades away very quickly"*. Sophie agreed as well but pays attention to the fact that the statement says "often". Sophie continued and said that when one of her roommates reminded her very often it would have an effect: *"When I will be socially reminded of it often, I would pay more attention to food waste"*.

Participants of the third focus group also agreed with the statement. Julia says, *"When you will be reminded of the bad consequences, you will pay much more attention and will be more aware of the fact that you are wasting food"*. Floor mentions that she remembers a programme she watched on primary school about food waste: *"I actually remember this very good"* and she mentions that those reminders, like advertisements could learn you for instance to smell products before throwing away instead of just looking at the expiration date.
Joris and Esmee agreed with the statement, however they think that it is also important to educate individuals who waste a lot of food. Joris states *"It is important to educate individuals, this ignorance has to be improved"* and *"Just go think and reflect on food waste"*. And Esmee mentions like Chantal that it is important to be aware of alternatives: *"Are there alternatives, can it be done in another way?"* and mentions an alternative: *"The social refrigerator"* for inhabitants of Groningen to donate their leftovers.

Statement 4: "What inhabitants of my neighbourhood do with their garbage has an influence on my amount of food waste"

Opinions of participants on this statement vary over all three conducted focus groups. It is mentioned that the social network plays a role. As well as social pressure playing a role. That it would probably differ if living in a rural or urban area. That the level of intercourse with neighbours is not about garbage. That this

influence could work backward instead of forward. It is however mentioned in all focus groups that it depends on whether you know your neighbours or not.

The first focus group mainly focused on the difference between rural and urban. Elise states *"I think in a village I would be more quickly do the same as my neighbours than in a city"*. Isabelle mentions to rely quickly on group behaviour but agrees with Elise that this would be more present in a village than in a city. Remco says not to know what his neighbours do with their garbage, however when individuals virtually signal how they handle food waste, this could have an influence on his behaviour. *"We currently started with groceries in glass jars, against plastic waste, one of our friends recommended this to us" "So, the statement could be true, however we did not experience such recommendations on food waste yet"*. Jasper mentions that he has had shared food with neighbours, although this was not in the sense to waste less food, but in terms of social interaction.

The second focus group mentions two things, another level of intercourse with neighbours and the fact of knowing your neighbours well or not. Linde mentions that she has good contact with their neighbours, however not on this level and could even imagine wasting more food *"when someone offers us leftovers, as my own food will end up in the garbage can again"*. Carlijn mentions *"This would have no effect on my food waste because we have very limited contact with our neighbours"*.
Following Linde and Sophie the effect will depend on how obtrusive their neighbours are as this could also work backwards. Although Sophie mentions *"When my neighbours give me a good tip, I would seriously think about it"*.

The third focus group mainly mentioned the social pressure as having an effect. Roos said, *"When my neighbour throws away every day three garbage bags, I would feel less guilty for doing the same",* furthermore Roos thinks that it is also influential where neighbours go grocery shopping, when they do purchases at the butcher and baker instead of the supermarket this will change the food waste probably: *"In the supermarket everything is packed and everything has an expiration date, when going to the butcher or baker there is not even an expiration date on products"*.
Floor agreed and mentioned that the public containers in her neighbourhood are always full, which sets her thinking about the enormous amount of waste in her neighbourhood: *"This makes me think of it, this means that we waste or throw away a lot of food all together"*.

4.5 Interpreting results

The results of the quantitative and qualitative methods will be interpreted in this section. The main aim of this section is to examine phenomena out of the various results.

Out of the descriptive statistics several patterns become clear, the pattern of the particular household types and different neighbourhoods show that most family households are located in Zuid and Oost and that most student households are located in Centrum and Oude Wijken. For the single living household type there is no clear pattern for location in a particular neighbourhood. The results of the second MLR (with neighbourhood as dependent variable) show that family household types are less likely to live in the neighbourhoods Centrum and Oude Wijken as opposed to Oost.

The first MLR results (with the storage variable as dependent variable) show statistically significant outcomes for the variables, age, gender, neighbourhood, planning, preparing and initiatives on the leftovers storage behaviour of individuals. It can be acknowledged that individuals will waste *more* food when they are female (compared to male), when they are in the age group 35-45 (compared to 25-35), when they live in Centrum (compared to Oost, Oude Wijken and Zuid), when they have bad cooking skills (during preparation of food), when they do not make use of a shopping list during grocery shopping and when there are no initiatives (compared to if there are initiatives) in the neighbourhood.
Out of the focus group results it also becomes clear that preparing, planning and initiatives have an influence on the food waste behaviour. However, there is no clear proof of women having more food waste compared to men, and if looking at the descriptive statistics there is a skewed distribution of the variable gender. Moreover, there is no correspondence out of the focus group discussions on individuals from age group 35-45 having more food waste than the age group 25-35, although theory suggests that older individuals will have less food waste.
Furthermore, out the focus group discussions it can be acknowledged that neighbourhoods may have an influence on the amount of food waste and food waste behaviour of individuals. Almost all participants mentioned that supermarkets in their neighbourhood could be influencing for their food waste behaviour. Furthermore, some participants mentioned certain initiatives, such as the "social refrigerator", in their neighbourhood as influencing factors for their food waste behaviour. The geographical location, as noted in all three focus groups, is not having an influence per se.

The second regression shows some statistically significant outcomes for all of the seven independent variables. From the results of the second MLR, it can be acknowledged that Oost compared to Centrum is having more properties of having *more* food waste. As the variables, female, household, planning and age are statistically significantly showing that women are more likely to live in Oost (compared to men), that there live more families (compared to single living) and that there are more individuals living of the age 35-45 (compared to 25-35). In the first regression it became clear that those values have a higher chance of wasting more food. However, the variables storage and initiatives also have statistically significant outcomes, showing that individuals in Oost store their food in the refrigerator (compared to throwing it away after a few days) and that there are more initiatives in Oost. The descriptive statistics also show that Oost is the only neighbourhood of the municipality having neighbourhood initiatives.

Out of the results of the first statement from the focus groups it can be acknowledged that living further away from a supermarket could increase the amount of food waste of individuals. Several participants in all three focus groups mentioned that living further away from a supermarket will lead to weekly purchasing which requires good planning. This could end up in buying too many products, which could end up in food waste as due to bad planning behaviour food will not be eaten. Actually, all opinions overlap between the

focus groups, the overall pattern is that participants disagree with the statement that living further away from a supermarket lead to less food waste.
The fact of living far away from a supermarket cannot immediately be associated with weekly purchasing, but if individuals live further away from a supermarket, the threshold of visiting is higher due to a lower accessibility. The descriptive statistics show that in the neighbourhoods Centrum and Oude Wijken individuals mainly do daily purchases and that in the neighbourhoods Zuid and Oost individuals mainly do purchases two or three times a week or weekly purchases. This overlaps with the crosstabulation of students doing mainly daily purchases and family households doing mainly two or three times a week or weekly purchases.

Out of the results of the second statement it can be acknowledged that there are two strong opinions about separating garbage in the sense of food waste. On the one hand, participants stated that separating garbage would not make sense in having more or less food waste as they throw away food when it is out of date or rotten. On the other hand, participants stated that due to separating garbage awareness about what is thrown away is raisin.

For the third statement more or less all participants agree. It becomes clear that every participant will be triggered by advertisement and campaigns, however the trigger differs per participant for how long due to what kind of reminder. It is noted several times by participants that it is important to trigger by the use of alternative options. Furthermore, two participants state that it is important to educate more about the consequences. One of the regression results show that individuals who achieved primary school as highest education are less likely, compared to individuals who achieved higher professional education, to store food in the freezer than storing it but throwing it away after a few days. It could be that lower educated individuals generally have less knowledge than higher educated individuals. This overlaps with the opinions of the focus group participants, noting that knowledge about the consequences of food waste is partly general knowledge.

The results of the fourth statement can be interpreted as follows, at the first moment participants do not think that there is a big influence of neighbours on their amount of food waste. Because there is limited contact or by all means no contact at this level. However, some participants mention that there will be unconscious influence as feelings of guilt when neighbours are thriftier and more attentive. Out of the regression results it also became clear that when someone is not really involved in the neighbourhood this individual is more likely to throw away food than storing it in the refrigerator. Furthermore, the descriptive statistics show as well that for neighbourhoods without initiatives, individuals are more likely to just throw away food instead of storing it. However, it cannot directly be stated that initiatives are having an influence on food waste, due to a large number of respondents who still store leftovers in the freezer or refrigerator when there are no initiatives in their neighbourhood.

5. Discussion and conclusion

This section will discuss and conclude the outcome of this research on the following order, it will answer the four sub questions and subsequently answer the main research question: *What is the impact of geographical differences in residential areas on the amount of food waste and on the behaviour of various households in the municipality of Groningen?* After answering the research questions, this chapter will discuss the limitations of this research, will highlight recommendations for further research and will reflect on the research process.

Food waste

The first sub question: Which factors could influence an individual's food waste behaviour? Can be answered out of theory from the theoretical framework and can partly be confirmed by the quantitative and qualitative research results.

Theory suggests several factors influencing the food waste behaviour of individuals, as can be seen in the conceptual model (figure 2, p.17). However, the results of the quantitative research can only partly confirm the theory. The first regression analysis shows some statistically significant outcomes, for the concepts gender, age, education, household, neighbourhood, planning, preparing and initiatives. Moreover, out of the focus group discussions (qualitative research), factors that seem to influence the amount of food waste are supermarkets, separating garbage and peer group.

The concepts gender, age, education, household and peer group are demographic factors (figure 2, p.17) influencing someone's food waste behaviour. The theory of Carmo Stangherlina and de Barcellos (2018) and hypothesis 3b (H3b) can be confirmed, as the results of the quantitative research show that women have a higher likelihood (compared to men) of throwing away food instead of storing it in the refrigerator or freezer. Carmo Stangherlina and de Barcellos (2018) mention that women have more food waste than men because women are responsible for grocery shopping, thus will waste more food.

The theory of Thyberg and Tonjes (2016) and Carmo Stangherlina and de Barcellos (2018) about age and H3c, individuals older than 65 are having less food waste, cannot be confirmed by the quantitative or qualitative research results, as the results suggest that age group 35-45 is having more food waste than age group 25-35. This is not substantiating the theory and even contradictory to the theory which suggest that older individuals (or elderly) will waste less food.

The regression results show that lower educated individuals (who achieved primary school as highest education) are more likely to throw away food than storing it in the freezer compared to higher educated individuals (who achieved higher professional education as highest education), this confirms H3e, although, theory does not clearly show a distinction of education and food waste. However, Canali et al. (2017) state that poor knowledge about food is having a considerable influence on the amount of food waste, this means that more (general) knowledge about food waste will ensure less food waste. Although out of the regression results it cannot be confirmed that lower educated individuals have less general knowledge about food waste than higher educated individuals. But overall, it seems that the theory of Canali et al. (2017) can be confirmed by the focus group discussions, where participants clearly mention that for reducing food waste, skills and information about food is needed.

Theory suggests that the larger the household, the more food waste and that the household composition influences the amount of food waste (Aschemann-Witzel et al., 2015; Carmo Stangherlina and de Barcellos, 2018). However, this research does not clearly show that larger households (family households or jointly student households) waste more food, except for the statistically significant regression result, that family households are less likely, compared to single living households, to store food in the freezer as opposed to storing it but throwing it away after a few days. Family households are mainly larger households than single

living households. This confirms H3a, that bigger households waste more food, as storing food in the freezer compared to storing food but throwing it away can be connected to wasting more food.

Theory suggests that individuals could be more likely to comply with rules when peer group pressure exists (Cerciello et al., 2019). H3f suggests that individuals experiencing peer group pressure will waste less food. This can be confirmed by the focus group discussion results. If someone is reminded of the bad consequences of food waste, particularly when someone is reminded by their own social network, this will have a positive influence on someone's food waste behaviour. It is, however, not completely clear if this will have a long-lasting effect, because participants mentioned that mainly the reminders are rapidly forgotten again.

The concepts planning and preparing are behavioural factors (figure 2, p.17) influencing someone's food waste behaviour. The theory of Porpino et al. (2015) and Canali et al. (2017) can be confirmed, as both stated that doing planned purchases (by the use of a shopping list) prevents excessive purchasing and unplanned "spontaneous" purchasing (H2a). Furthermore, both stated that when having cooking skills, overpreparation is prevented (H2d). Outcomes of the regression analysis confirm the theory and hypotheses, as someone who cannot cook well (who cannot estimate how much to make) is less likely to store food in the refrigerator than someone who has cooking skills but has difficulties with supermarket packages. Besides, when someone does purchases by the use of a shopping list, this individual is more likely to store food in the refrigerator compared to someone who does planned purchases sometimes. Likewise, the theory can be confirmed by the opinions of participants of the focus group discussions, as they mentioned that planning is of importance to prevent unnecessary purchases and that skills and information about food is necessary while preparing food.

The concepts neighbourhood, initiatives, supermarkets and separating garbage are societal factors (figure 2, p.17) influencing someone's food waste behaviour. The theory of Russell et al. (2017) stating that a sense of community could increase someone's intentions of reducing food waste, can be confirmed by the quantitative regression analysis outcome where several neighbourhoods are having a higher likelihood of having more food waste than others. Namely, Haren, Oost, Zuid and Oude Wijken are more likely to store food in the refrigerator or in the freezer than throwing it away after a few days compared to Centrum. Furthermore, out of the regression analysis it becomes clear that involvement in neighbourhoods and neighbourhood initiatives will ensure less food waste, as individuals who filled in to be not involved in the neighbourhood are more likely to throw away food (after storing it for a few days) than storing it in the refrigerator. This means that, by all means, the involvement in and the sense of community of (Russell et al., 2017) the neighbourhood would have a positive influence on the food waste behaviour of an individual, this means that H1c can be confirmed.

It can be concluded that supermarkets have an influence on individual's food waste behaviour as well. During the focus group discussions participants noted to be influenced by supermarkets as part of the neighbourhood's influence on the amount of food waste. Besides, almost all participants disagreed with the fact that living further away from a supermarket will reduce someone's amount of food waste. It is not completely clear if the supermarket nearby or further away affects someone's food waste behaviour more, but it is definitely clear that a supermarket itself has an influence, this means that H1d cannot be confirmed.

Lastly, whether households that separate garbage have an influence on the amount of food waste that is produced has not been confirmed by the regression analysis nor the focus group discussions. H1e cannot be confirmed. However, the food waste behaviour of individuals will certainly be influenced, as many participants of the focus group discussions mentioned that separating garbage could raise awareness of the consequences of food waste.

Neighbourhood

The second sub question: Which neighbourhood in the municipality of Groningen is most likely to have food waste? Can be considered by different interpretations, namely via theory, via figures, via regression outcomes and via focus group discussions.

The regression analysis focused on the question which neighbourhood of the municipality of Groningen is most likely to have food waste. To answer this question the influencing factors must be enumerated: out of theory and results of this research it can be seen that various factors are influencing someone's food waste behaviour namely:

- Younger individuals are having less food waste than elder individuals
- Women are having more food waste than men
- Larger households are having more food waste than smaller households
- Individuals using shopping list while doing purchases are having less food waste
- Individuals who have knowledge about food and cooking skills are having less food waste
- Neighbourhoods with low number of supermarkets are having more food waste
- Neighbourhoods with no food waste initiatives are having more food waste
- Individuals experiencing peer group pressure are having less food waste
- Neighbourhoods who do not separate garbage are having more food waste

When considering the neighbourhoods in the centre of the municipality of Groningen, Centrum and Oude Wijken. It can be acknowledged out of the figures 4, 5 and 6 that there is relatively high population density compared to the rest of the municipality, and that there are many students and single living households (this can also be seen in table 12). This could be coupled to the fact that this area has a relatively low average age (table 8), due to the high number of student livings. Moreover, the inhabitants of both neighbourhoods do daily purchase (as can also be seen in table 15). Figure 9 shows the high number of supermarkets in both areas. Tables 15 and 17 show that individuals living in Centrum and Oude Wijken do kind of planned purchases (they know beforehand what they are going to buy) and the main reason for having leftovers is due to preparing too much food (and the second reason is the supermarket packages). Furthermore, out of table 17 it becomes clear that there are no food waste initiatives in both neighbourhoods. Lastly, table 2 shows that households in Centrum and Oude Wijken do not separate their garbage.

When considering the neighbourhood Oost. It can be acknowledged out of the figures 4, 5, 7 and 8 that there is relatively low population density compared to the centre of the municipality, that there are many family homes and some single living households (table 12). This could also be coupled to a higher average age of individuals (table 8), due to the higher number of family dwellings. In this neighbourhood individuals do weekly or two or three times a week purchasing (table 15). Figure 9 shows that there is a relatively low number of supermarkets in the neighbourhood. Tables 15 and 17 show that individuals living in Oost do planned purchasing (with a shopping list) and the main reason for having leftovers is due to preparing too much food. In table 17 it can clearly be seen that there are food waste initiatives in the neighbourhood, this is the only neighbourhood with initiatives in the municipality. Lastly, table 2 shows that the households in Oost do separate their garbage.

When considering the neighbourhood Zuid. It can be acknowledged out of the figures 4, 5, 6, 7 and 8 that this neighbourhood is middle high populated and that there is a combination of student households, family households and single living households (table 12). The average age of individuals living in Zuid differs a lot between individuals, due to the differences in household types. However, there are individuals of age 55-65 present (table 8). In this neighbourhood individuals do two or three times a week purchases (table 15), this can be the cause of the lower number of supermarkets in the area (figure 9). Tables 15 and 17 show

that individuals in Zuid do sometimes planned purchases, but mainly know beforehand what to buy and the reason for leftovers is that they prepare too much food. Out of table 17 it becomes clear that there are no food waste initiatives in the neighbourhood. Lastly, table 2 shows that some households in the neighbourhood Zuid separate their garbage, but that there is a public container as well.

When considering the neighbourhood Haren, it can be acknowledged out of the figures 4, 7 and 8 that this neighbourhood has a relatively low population density compared to other areas and that it mainly consists of family households (table 12). This could mean that the average age of individuals living in Haren will be higher compared to the average age of individuals living in Centrum and Oude Wijken. Table 8 shows the age of individuals in Haren, however due to the low response no conclusions can be drawn out of it. Individuals in this neighbourhood do weekly or two or three times a week purchasing (table 15), this can be coupled to the lower number of supermarkets in the neighbourhood (figure 9). Tables 15 and 17 show that individuals in Haren do planned purchases by the use of a shopping list and the reason for leftovers is preparing too much food or that there is no reason for it, as they almost never have leftovers. Out of table 17 it becomes clear that there are no food waste initiatives in Haren and lastly table 2 shows that households in Haren separate their garbage.

The neighbourhoods West and Ten Boer are not considered as both neighbourhoods had too few responses on the survey.

Out of all these short analyses per neighbourhood, it appears that Centrum and Oude Wijken are most likely to have food waste and that Oost is the least likely to have food waste. This is mainly due to Oost having food waste initiatives and households separating garbage, which raises awareness among individuals as also shown in the focus groups results. However, there is no precise data out of these results to conclude that one neighbourhood is having the most or the least food waste. Furthermore, due to the influencing factors levelling each other out within neighbourhoods, a definite conclusion about which neighbourhood is most likely to have food waste cannot be drawn. This comprehends to the statements by Andersson and Musterd (2010) as they note that living conditions may vary within municipalities but that there are probably no radical differences. For the question on which neighbourhood in the municipality is most likely to have food waste, more profound research must be performed and more data per neighbourhood is required, because some results for neighbourhoods, in this research, are contradictory and there is not one factor weighing heavier than another.

Supermarkets

The third sub question if the number of supermarkets in an area is having an influence on an individual's food waste behaviour is questioned. During the focus group discussions, it was noted many times that living further away from supermarkets will encourage individuals to do bulk shopping (Canali et al., 2017). Furthermore, this was connected, by participants of the focus group discussions, to the fact that living further away from a supermarket will ensure less visits to supermarkets, this can be coupled to doing weekly purchases (Porpino et al., 2015; Canali et al., 2017). Moreover, individuals participating to the focus groups ended with the fact that weekly purchasing requires good planning which will be different and more difficult for various life course stages, and good planning is again required to reduce food waste (Porpino et al., 2015; Canali et al., 2017).

There is, however, contrasting evidence on whether the proximity of supermarkets positively or negatively influences the food waste behaviour. Most participants mention that living further away from supermarkets will end up in bulk shopping. Although, some participants and theory suggest that when living nearby a supermarket someone will buy unnecessary groceries. This can be the cause of lack of planning, doing unplanned "spontaneous" food purchases (Canali et al., 2017), but it seems that living nearby a supermarket could also encourage unnecessary grocery shopping, where individuals end up buying too many products.

Separating garbage

The fourth sub question if households are asked to separate their garbage will there be less food waste in neighbourhoods of the municipality of Groningen is questioned. The municipality of Groningen consists of seven neighbourhoods, five of them are separating garbage (in organic and residual) and two of them are not. The municipality of Groningen decided to distinguish these neighbourhoods to reduce CO2 emissions and to ensure better separation at municipal level instead of at household level (Gemeente Groningen, 2021). However, out of the focus group discussions and the interpretations in this research it becomes clear that individuals may become more aware of the consequences of food waste and become more aware of what they are throwing away, if they separate their garbage. Separating garbage will thus have a certain influence on food waste behaviour. But it does not necessarily lead to less food waste, as many respondents mentioned that their food waste is caused by food that is rotten in the refrigerator due to the lack of planning and not due to separating garbage because food is thrown away when it is not useful anymore. Although, raising awareness is very important in reducing food waste as Canali et al. (2017) mention. For policy implications it could thus be very interesting to consider separating garbage for all neighbourhoods in the municipality as this is having a particular influence on someone's food waste behaviour.

Geographical differences influencing food waste behaviour

Lastly, to answer the main research question *"What is the impact of geographical differences in residential areas on the amount of food waste and on the behaviour of various households in the municipality of Groningen?"* various geographical differences are distinguished, supermarket proximity, separating garbage, food waste initiatives and demographic factors (like peer groups).

The number of supermarkets in an area is having an impact on food waste behaviour, as noted by almost all participants during the focus groups, in this way the neighbourhood, the geographical location is having an influence on someone's food waste behaviour. Furthermore, a neighbourhood is having a particular influence as due to social pressure and a social network inhabitants of neighbourhoods could be influenced by each other due to peer group pressure (Russell et al., 2017) where a sense of community positively influences someone's intentions to have less food waste. In addition, separating garbage raises awareness, this may be understood as a behavioural aspect as this phenomenon arises psychologically. In this way the neighbourhood is having an influence on someone's food waste behaviour and amount. The overall expectation, stating that individuals become more attentive on food waste due to geographical influences, like peer groups, separating garbage, initiatives in the neighbourhood, the proximity of supermarkets and due to various behavioural and demographic factors, can be accepted.

However, this study shows that the behavioural factor is having a large influence on someone's food waste. The results (from quantitative and qualitative methods) show that planning, purchasing, preparing and storing food are influencing individuals in amount of food waste and behaviour of food waste. To reduce the food waste of individuals, more food waste initiatives, reminders and peer pressure is needed in neighbourhoods of the municipality of Groningen. As the most important reason for having leftovers is "preparing too much", this could be prevented when individuals have more knowledge about the consequences of food waste (Lazell, 2016). The focus group discussions showed that all individuals state that being reminded of consequences is having an impact. Based on that a policy can be adopted, however, participants did not agree the optimal method. Some mention alternative options as important for having less food waste, others mentioned that more education about food waste is needed to improve the behaviour of individuals.

To conclude, to specify the exact impact of the geographical differences on the food waste behaviour of individuals in the municipality of Groningen more precise data on food waste (exact numbers) and more profound research is needed. With more precise data on food waste, conceptual implications could be

further developed, for instance the exact size of relationships between influencing factors can be examined, and theory on geography and food waste behaviour can be expanded. Additionally, more profound research could come up with practical implications like policy implementations in the municipality of Groningen to improve individual's food waste behaviour.

5.1 Limitations of the research

One of the limitations of this study is that the subject food waste, advocates an observer bias. As mentioned earlier in this report, Mahtani et al. (2018) mentions the observer bias as people acting differently when they know the researcher is watching. This subject is a global dilemma and almost every individual knows that wasting food is bad for the environment. This means that when individuals have to answer questions about their own behaviour knowing that food waste is a globally recognized dilemma, the answers to the questions may not be completely fair. Furthermore, during the focus gorup discussions, individuals could feel pressure from the observer (the moderator) researching the opinions and behaviour of individuals around the subject food waste. This could have ended up in false substantiations of the participants.
A second limitation of this study is the non-response of participants during the focus group discussions. This non-response, when someone is not cooperating in the research, is a recognized problem but can have impact on the research (Bryman, 2016). Two participants did not show up during the focus group discussions. One participant of the second and one of the third focus group discussion, both participants were male. This unfortunately have resulted in the second focus group with only female participants, which may changed the outcome of this research in the end.
A third limitation of this research is the supermarket accessibility analysis. The accessibility to supermarkets in other neighbourhoods on individuals living on the edge of an adjacent neighbourhood are not taken into account for this research. This means that the analysis, on supermarket proximity (where only the number of supermarkets in a neighbourhood are considered), does not precisely explain the supermarket accessibility in the municipality of Groningen. In other words, the research would have been more precisely when this limitation was taken into account.

5.2 Recommendations for further research

Interesting for future research could be to investigate two separate neighbourhoods in a rural and an urban area. It became clear out of the focus group discussions that individuals in the municipality of Groningen (an urban area) are mainly having very limited contact with their neighbours, it could be interesting to see if individuals living in a rural area are even more influenced by their peer group. In addition, studying two neighbourhoods could result in a more profound research which will more easily answer the question "Which neighbourhood is most likely to have food waste?". A quantitative research method for examining the differences between two residential areas could be interesting, followed by an ANOVA for the comparison of two areas would be applicable. Although, for this study it became clear that it could be that differences between neighbourhoods are too small to draw conclusions (as Andersson and Musterd (2010) note that it could be that there are no radical differences between and within neighbourhoods).

A second recommendation for future research would be to investigate a pattern in political preference and food waste, this could be done by adding political preference as independent variable to the regression models. Out of this research it can be concluded that food waste is caused highly by behavioural factors. It could thus be very interesting to see whether political preferences are in relation with the amount of food waste and food waste behaviour of individuals. This could also be coupled to the neighbourhoods of a particular municipality.

Lastly, out of the focus group discussions it became clear that the inhabitants of the municipality of Groningen are willing to reduce their food waste. It could be very interesting to see for the municipality of Groningen which policies are needed to achieve Sustainable Development Goal 12.3 (to halve per capita food waste in 2030). Agent-based modeling has been used to explore the effects of food waste constraining policies (as described by Chen and Gao (2020) and; Ceschi et al. (2021)). In an agent-based model the present behaviour and interactions of the actors in the municipality of Groningen can be simulated. As a result, agent-based modeling could be a suitable tool to explore what policies will be effective in changing the behaviour of the actors in the municipality of Groningen to achieve the SDG.

5.3 Reflection on the research process

It is important to note that this research depends on a mixed methods research design with the aim to examine patterns of geographical differences between neighbourhoods in the municipality of Groningen on the food waste behaviour of individuals. The research has provided several results, however the research results cannot be used as an explanation of the phenomenon, as some results are skewed and are not representative for the municipality of Groningen as a whole. This means that no definite conclusions can be drawn from the statistical methods done for this study and only the presence, size and nature of a relationship could be found (Mehmetoglu and Jakobsen, 2016). Handling the skewed distribution of the survey results was one of the difficulties during the research process.

During the research process several complications were encountered. Firstly, in the beginning of the process, it was difficult to decide which geographical factor needed to be included in the research which made the literature review a quite vague and lengthy process. However, after reading many studies on the topic (food waste) and discussing several topics and factors with the supervisor, the researcher came up with examining the influence of geographical differences on an individual's food waste behaviour. The peer group pressure was seen in several studies, the peer pressure of someone's neighbourhood had not yet (or only on a small scale) been examined.

As mentioned earlier, the limitation of the non-response, has been an issue. Individuals who did not reply to e-mails created difficulties. The researcher applied deadlines as for the planning it was necessary to complete the focus group discussions before the beginning of June. In the end there were 'enough' participants to conduct all three focus group discussions, although one focus group session only contained female participants.

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Appendix I

Overview of the important concepts and survey questions

Concept	**Question**	**Categories in survey**
Gender	I am a	Female Male Other
Age Historical	How old are you?	Younger than 25 25-35 35-45 45-55 55-65 Older than 65
Education	What is your highest education attained?	Primary school Secondary school Secondary vocational education Higher professional education Scientific education
Household	Which kind of household do you belong to?	Student (individually or jointly) Single living Family
Neighbourhood	What neighbourhood do you live in?	Ten Boer Oost Zuid Haren West Centrum Oude Wijken
Neighbourhood	What is your zip code?	*Open question*
Separation	Do you make use of: (You can select multiple options)	Public glass container Public paper container Public (underground) container Grey private container Green private container Private paper container
Food purchasing	How often do you do your shopping?	Daily About twice or three times a week Weekly
Food planning	Do you do your shopping planned?	Yes, by the use of a shopping list Yes, I know in advance what I am going to buy Sometimes No
Income	What do you spend on average per week on groceries?	Less than 25 euro's 25-50 euro's

		50-75 euro's 75-100 euro's 100 euro's or more
Food waste Food storage	Do you store food leftovers?	Yes, in the freezer Yes, in the refrigerator and almost always eat it Yes, but I throw it almost always away after some days No, I never eat it anyway
Food preparing Supply chain	What is the most common reason that you have leftovers?	Because I prepare too much Because I do not planned purchasing Because of supermarket packages (per 4 for example) Because I cannot estimate how much I have to prepare (I cannot cook very well) No reason, I almost never have food left
Peer group	Do you ever use one of the following boxes or similar ones: *HelloFresh, Marley Spoon, Eko Menu, Versh, Familiebox, Allerhande box,* and what is your reason for this (You can select multiple options)	Yes, for the ease Yes, for inspiration Yes, for less food waste Yes, because my family/friends/neighbours recommended it No
Peer group Neighbourhood	Are there initiatives for a reduction of food waste available in your neighbourhood? (Like, a WhatsApp group where leftovers are sent in to share or campaigns for the reduction of food waste)	Yes, and this inspires me Yes, but I never join these I don't know, I am not that involved in my neighbourhood No, there are no initiatives in my neighbourhood
-	Can I contact you for an additional focus group, this will take place online (end of May, begin of June)	*Open question*

Appendix II

Regression I for robustness check: Multinomial Logistic Regression with household variable left out.

Number of observations	161
LR chi2(96)	143.30
Prob > chi2	0.0013
Pseudo R2	0.3929
Log likelihood	-110.70361

storage	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Yes, in the refrigerator and I almost always eat it						
gender						
Female	-2,47215	0,932795	-2,65	0,008***	-4,300393	-0,643905
education						
Primary school	-25,046	19157,01	0	0,999	-37572,09	37522
Secondary vocational education	-0,57386	1,379091	-0,42	0,677	-3,276832	2,129106
Secondary school	0,862786	1,234137	0,7	0,484	-1,556078	3,28165
Scientific education	-0,68009	0,731503	-0,93	0,353	-2,11381	0,753628
age						
35-45	-2,54371	1,452489	-1,75	0,08**	-5,390531	0,303122
45-55	-0,50772	1,431923	-0,35	0,723	-3,314239	2,298797
55-65	1,821961	2,238197	0,81	0,416	-2,564823	6,208746
Younger than 25	0,543249	1,070799	0,51	0,612	-1,555479	2,641977
Older than 65	-2,88103	1,950428	-1,48	0,14	-6,703803	0,941735
neighbourhood						
Haren	2,016772	2,124536	0,95	0,342	-2,147242	6,180786
Oost	3,676532	1,571552	2,34	0,019***	0,5963464	6,756718
Oude wijken	2,298204	0,879502	2,61	0,009***	0,5744116	4,021997
Ten Boer	-0,10222	129242,5	0	1	-253310,8	253310,6
West	2,326941	1,824051	1,28	0,202	-1,248133	5,902015
Zuid	3,056092	1,463631	2,09	0,037***	0,1874285	5,924756
purchasing						
About two or three times a week	1,136632	0,78673	1,44	0,149	-0,4053293	2,678594
Weekly	1,315187	1,32766	0,99	0,322	-1,28698	3,917353
planning						
Yes, I know beforehand what to buy	-0,42952	0,835081	-0,51	0,607	-2,06625	1,207207
No	-1,2749	1,73942	-0,73	0,464	-4,684097	2,134302
Sometimes	-2,94754	1,093704	-2,7	0,007***	-5,091154	-0,803915
income						
25-50 euros	1,680334	1,300352	1,29	0,196	-0,8683078	4,228977
50-75 euros	0,130472	1,064728	0,12	0,902	-1,956357	2,217301
75-100 euros	0,558471	1,097385	0,51	0,611	-1,592364	2,709306
Less than 25 euros	1,873636	1,999199	0,94	0,349	-2,044723	5,791994
preparing						
Because I can not estimate how much to make	-3,98809	1,648185	-2,42	0,016***	-7,218474	-0,757706
Because I do no planned purchasing	19,03361	39707,52	0	1	-77806,27	77844,34
Because I prepare too much	-1,10143	0,842951	-1,31	0,191	-2,753581	0,550724
No reason, I almost never have leftovers	0,317992	1,352519	0,24	0,814	-2,332896	2,96888
initiatives						
Yes, and this inspires me	3,490365	2,269599	1,54	0,124	-0,9579675	7,938697
Yes, but I actually never participate	3,67211	1,593511	2,3	0,021***	0,5488866	6,795334
There are no initiatives	1,4135	0,707745	2	0,046***	0,0263454	2,800654
_cons	1,828445	1,740848	1,05	0,294	-1,583554	5,240445
Yes, in the freezer						
gender						
Female	-3,13111	1,103031	-2,84	0,005***	-5,293016	-0,969212
education						
Primary school	-3,50828	3,10189	-1,13	0,258	-9,587877	2,57131
Secondary vocational education	0,493758	1,517251	0,33	0,745	-2,479999	3,467516
Secondary school	1,190554	1,546443	0,77	0,441	-1,840418	4,221525
Scientific education	-1,43059	0,98269	-1,46	0,145	-3,356622	0,495452

age						
35-45	-3,66304	1,664999	-2,2	0,028***	-6,926379	-0,399704
45-55	-1,40025	1,683554	-0,83	0,406	-4,69996	1,899452
55-65	1,95565	2,357274	0,83	0,407	-2,664523	6,575823
Younger than 25	-0,94929	1,450241	-0,65	0,513	-3,791705	1,893135
Older than 65	-1,91279	2,275753	-0,84	0,401	-6,37318	2,54761
neighbourhood						
Haren	4,419301	2,35207	1,88	0,06**	-0,1906709	9,029274
Oost	3,931764	1,824705	2,15	0,031***	0,3554083	7,50812
Oude wijken	1,500671	1,254547	1,2	0,232	-0,958197	3,959538
Ten Boer	24,2459	107878,5	0	1	-211413,7	211462,2
West	-18,725	17603,26	0	0,999	-34520,48	34483,03
Zuid	2,86669	1,690735	1,7	0,09**	-0,4470893	6,18047
purchasing						
About two or three times a week	0,152651	1,081337	0,14	0,888	-1,96673	2,272031
Weekly	1,325982	1,587232	0,84	0,403	-1,784935	4,436899
planning						
Yes, I know beforehand what to buy	-1,64656	1,044209	-1,58	0,115	-3,693175	0,400048
No	-1,41753	1,958615	-0,72	0,469	-5,256347	2,421284
Sometimes	-4,71096	1,312545	-3,59	0***	-7,283502	-2,13842
income						
25-50 euros	2,575396	1,525821	1,69	0,091**	-0,415157	5,56595
50-75 euros	0,265424	1,331841	0,2	0,842	-2,344937	2,875785
75-100 euros	1,43666	1,263549	1,14	0,256	-1,039851	3,91317
Less than 25 euros	4,703954	2,375806	1,98	0,048***	0,0474593	9,360449
preparing						
Because I can not estimate how much to make	-3,29971	1,894338	-1,74	0,082**	-7,012543	0,413128
Because I do no planned purchasing	0,873575	58307,22	0	1	-114279,2	114280,9
Because I prepare too much	-1,62379	1,035588	-1,57	0,117	-3,653507	0,405922
No reason, I almost never have leftovers	-0,08915	1,501661	-0,06	0,953	-3,03235	2,854052
initiatives						
Yes, and this inspires me	1,857925	2,372312	0,78	0,434	-2,791722	6,507572
Yes, but I actually never participate	2,617398	1,706362	1,53	0,125	-0,7270088	5,961806
There are no initiatives	0,135328	0,961548	0,14	0,888	-1,749272	2,019927
_cons	3,60845	2,053866	1,76	0,079	-0,4170529	7,633954
Yes, but I throw it almost always away	**(base outcome)**					
No, I never eat it anyway						
gender						
Female	-1,2549	2,859939	-0,44	0,661	-6,860273	4,350483
education						
Primary school	-17,2831	51534,65	0	1	-101023,3	100988,8
Secondary vocational education	-6,76997	2644,114	0	0,998	-5189,139	5175,599
Secondary school	-15,3384	5478,192	0	0,998	-10752,4	10721,72
Scientific education	2,329879	2,747026	0,85	0,396	-3,054193	7,713952
age						
35-45	1,009498	5,990803	0,17	0,866	-10,73226	12,75126
45-55	2,811958	5,739603	0,49	0,624	-8,437457	14,06137
55-65	-2,42819	6,180489	-0,39	0,694	-14,54172	9,68535
Younger than 25	-2,01623	2,6592	-0,76	0,448	-7,228167	3,195704
Older than 65	-15,1517	14382,78	0	0,999	-28204,88	28174,58
neighbourhood						
Haren	-30,7015	4654,488	-0,01	0,995	-9153,33	9091,927
Oost	-34,1688	2862,663	-0,01	0,99	-5644,886	5576,548
Oude wijken	-1,56827	3,206932	-0,49	0,625	-7,853737	4,717206
Ten Boer	14,54287	270530,1	0	1	-530214,6	530243,7
West	-24,677	24125,01	0	0,999	-47308,83	47259,48
Zuid	-9,94314	7,183467	-1,38	0,166	-24,02247	4,136201
purchasing						
About two or three times a week	1,174171	2,514323	0,47	0,641	-3,753812	6,102154
Weekly	6,369438	4,850167	1,31	0,189	-3,136715	15,87559

planning						
Yes, I know beforehand what to buy	5,983045	4,295668	1,39	0,164	-2,43631	14,4024
No	10,08317	6,12643	1,65	0,1**	-1,924417	22,09075
Sometimes	4,236219	4,723747	0,9	0,37	-5,022154	13,49459
income						
25-50 euros	-9,73456	8,767922	-1,11	0,267	-26,91937	7,450249
50-75 euros	-10,1934	7,769686	-1,31	0,19	-25,42172	5,034888
75-100 euros	-23,681	5896,999	0	0,997	-11581,59	11534,22
Less than 25 euros	-29,0185	15733,57	0	0,999	-30866,24	30808,21
preparing						
Because I can not estimate how much to make	9,38418	9,161385	1,02	0,306	-8,571804	27,34016
Because I do no planned purchasing	16,32394	99552,02	0	1	-195102	195134,7
Because I prepare too much	6,876731	7,639916	0,9	0,368	-8,097229	21,85069
No reason, I almost never have leftovers	10,96953	9,225467	1,19	0,234	-7,112053	29,05111
initiatives						
Yes, and this inspires me	-4,42755	8602,916	0	1	-16865,83	16856,98
Yes, but I actually never participate	-17,6032	2928,032	-0,01	0,995	-5756,44	5721,234
There are no initiatives	-2,52558	2,939086	-0,86	0,39	-8,286082	3,234923
_cons	-2,7804	4,273158	-0,65	0,515	-11,15563	5,594842

Note. Sign. Level: p*** < 0.05, p** < 0.10

Regression II for robustness check: Multinomial Logistic Regression with age variable left out.

Number of observations	161
LR chi2(87)	126.61
Prob > chi2	0.0039
Pseudo R2	0.3461
Log likelihood	-119.24706

storage	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Yes, in the refrigerator and I almost always eat it						
gender						
Female	-2,10213	0,817336	-2,57	0,01***	-3,70408	-0,500184
education						
Primary school	-21,8179	11666,93	0	0,999	-22888,58	22844,95
Secondary vocational education	0,805901	1,144002	0,7	0,481	-1,436302	3,048103
Secondary school	1,517643	1,189388	1,28	0,202	-0,8135146	3,848801
Scientific education	-0,33661	0,675031	-0,5	0,618	-1,659649	0,986422
household						
Family	-1,02904	1,169781	-0,88	0,379	-3,321765	1,263694
Student (individually or jointly)	-0,2655	1,051447	-0,25	0,801	-2,326294	1,795301
neighbourhood						
Haren	1,675319	1,750461	0,96	0,339	-1,755521	5,106159
Oost	2,129919	1,208731	1,76	0,078**	-0,2391502	4,498988
Oude wijken	2,091208	0,838547	2,49	0,013***	0,4476863	3,73473
Ten Boer	1,175006	73631,99	0	1	-144314,9	144317,2
West	0,998383	1,683019	0,59	0,553	-2,300275	4,29704
Zuid	1,899707	1,181543	1,61	0,108	-0,4160754	4,215488
purchasing						
About two or three times a week	0,736102	0,695493	1,06	0,29	-0,6270398	2,099244
Weekly	1,111743	1,104264	1,01	0,314	-1,052575	3,276061
planning						
Yes, I know beforehand what to buy	-0,49128	0,747314	-0,66	0,511	-1,955988	0,973428
No	-1,34713	1,902207	-0,71	0,479	-5,075391	2,381123
Sometimes	-2,38026	0,889279	-2,68	0,007***	-4,123214	-0,637304
income						
25-50 euros	1,405098	1,219172	1,15	0,249	-0,9844355	3,794631
50-75 euros	0,057478	0,942742	0,06	0,951	-1,790263	1,905219
75-100 euros	0,237234	0,985464	0,24	0,81	-1,69424	2,168708
Less than 25 euros	1,504223	1,823899	0,82	0,41	-2,070554	5,079
preparing						
Because I cannot estimate how much to make	-3,20614	1,534868	-2,09	0,037***	-6,214424	-0,197851
Because I do no planned purchasing	19,23189	22613,5	0	0,999	-44302,41	44340,87
Because I prepare too much	-0,66235	0,741047	-0,89	0,371	-2,114771	0,790079
No reason, I almost never have leftovers	0,460687	1,183313	0,39	0,697	-1,858565	2,779939
initiatives						
Yes, and this inspires me	3,611507	2,210795	1,63	0,102	-0,7215721	7,944587
Yes, but I actually never participate	1,503627	1,116916	1,35	0,178	-0,6854874	3,692742
There are no initiatives	1,103875	0,630487	1,75	0,08**	-0,1318574	2,339608
_cons	1,864309	1,74595	1,07	0,286	-1,557691	5,286309
Yes, in the freezer						
gender						
Female	-2,99265	1,025623	-2,92	0,004***	-5,002831	-0,982463
education						
Primary school	-1,83129	2,583718	-0,71	0,478	-6,895282	3,232704

Secondary vocational education	1,715847	1,309715	1,31	0,19	-0,8511476	4,282842
Secondary school	1,326664	1,492585	0,89	0,374	-1,598748	4,252077
Scientific education	-1,08257	0,895917	-1,21	0,227	-2,838535	0,673395
household						
Family	-2,21961	1,358041	-1,63	0,102	-4,88132	0,442104
Student (individually or jointly)	-0,92477	1,360125	-0,68	0,497	-3,590562	1,741032
neighbourhood						
Haren	4,245115	1,991012	2,13	0,033***	0,3428036	8,147426
Oost	2,376927	1,501044	1,58	0,113	-0,5650659	5,31892
Oude wijken	0,97207	1,213588	0,8	0,423	-1,406518	3,350658
Ten Boer	24,98375	61460,5	0	1	-120435,4	120485,4
West	-19,1331	9595,115	0	0,998	-18825,21	18786,95
Zuid	1,853454	1,465723	1,26	0,206	-1,019311	4,726218
purchasing						
About two or three times a week	0,559714	0,961581	0,58	0,561	-1,324951	2,444379
Weekly	2,048664	1,33194	1,54	0,124	-0,5618908	4,659218
planning						
Yes, I know beforehand what to buy	-1,70505	0,934958	-1,82	0,068**	-3,537534	0,127434
No	-2,04909	2,041818	-1	0,316	-6,050975	1,952803
Sometimes	-3,97109	1,086021	-3,66	0***	-6,099648	-1,842525
income						
25-50 euros	1,877147	1,48876	1,26	0,207	-1,040769	4,795063
50-75 euros	0,204857	1,207701	0,17	0,865	-2,162194	2,571907
75-100 euros	0,949352	1,146796	0,83	0,408	-1,298326	3,19703
Less than 25 euros	3,795529	2,223355	1,71	0,088**	-0,5621667	8,153225
preparing						
Because I cannot estimate how much to make	-2,88497	1,824352	-1,58	0,114	-6,460631	0,690696
Because I do no planned purchasing	1,105456	33206,06	0	1	-65081,57	65083,78
Because I prepare too much	-1,0792	0,946907	-1,14	0,254	-2,935099	0,776708
No reason, I almost never have leftovers	0,295276	1,333176	0,22	0,825	-2,3177	2,908252
initiatives						
Yes, and this inspires me	1,849811	2,375595	0,78	0,436	-2,80627	6,505893
Yes, but I actually never participate	0,518267	1,267045	0,41	0,683	-1,965097	3,00163
There are no initiatives	0,125866	0,859716	0,15	0,884	-1,559147	1,810878
_cons	3,430116	2,061612	1,66	0,096	-0,6105694	7,470802
Yes, but I throw it almost always away	**(base outcome)**					
No, I never eat it anyway						
gender						
Female	-0,8341	2,419991	-0,34	0,73	-5,577199	3,908992
education						
Primary school	0,124517	19095,46	0	1	-37426,28	37426,53
Secondary vocational education	-11,7991	1877,087	-0,01	0,995	-3690,823	3667,225
Secondary school	-13,2662	3261,468	0	0,997	-6405,627	6379,094
Scientific education	0,837861	1,408124	0,6	0,552	-1,922011	3,597733
household						
Family	15,76055	2923,396	0,01	0,996	-5713,99	5745,511
Student (individually or jointly)	16,81192	2923,395	0,01	0,995	-5712,936	5746,56
neighbourhood						
Haren	-22,0774	3326,012	-0,01	0,995	-6540,941	6496,786
Oost	-21,6448	1394,09	-0,02	0,988	-2754,01	2710,721
Oude wijken	-0,34074	2,147206	-0,16	0,874	-4,549186	3,867706
Ten Boer	14,05415	154118,5	0	1	-302052,7	302080,8
West	-18,1605	10687,36	0	0,999	-20965	20928,67

Zuid	-4,25436	3,787284	-1,12	0,261	-11,6773	3,168576
purchasing						
About two or three times a week	2,27532	2,454345	0,93	0,354	-2,535106	7,085747
Weekly	4,743458	2,881314	1,65	0,1**	-0,9038131	10,39073
planning						
Yes, I know beforehand what to buy	4,372469	3,1492	1,39	0,165	-1,79985	10,54479
No	6,571761	4,463498	1,47	0,141	-2,176535	15,32006
Sometimes	2,200623	3,214585	0,68	0,494	-4,099848	8,501094
income						
25-50 euros	-5,0431	3,582964	-1,41	0,159	-12,06558	1,979387
50-75 euros	-3,78207	2,747774	-1,38	0,169	-9,167605	1,603471
75-100 euros	-19,7207	2984,666	-0,01	0,995	-5869,559	5830,118
Less than 25 euros	-23,0648	10246,69	0	0,998	-20106,2	20060,07
preparing						
Because I cannot estimate how much to make	2,88503	3,603514	0,8	0,423	-4,177728	9,947787
Because I do no planned purchasing	6,005075	56695,04	0	1	-111114,2	111126,2
Because I prepare too much	2,645766	3,143445	0,84	0,4	-3,515273	8,806806
No reason, I almost never have leftovers	5,899202	4,073423	1,45	0,148	-2,08456	13,88296
initiatives						
Yes, and this inspires me	-2,54934	5281,701	0	1	-10354,49	10349,39
Yes, but I actually never participate	-1,23256	3520,797	0	1	-6901,868	6899,402
There are no initiatives	-0,55424	1,633095	-0,34	0,734	-3,755047	2,646565
_cons	-19,6643	2923,399	-0,01	0,995	-5749,421	5710,092

Note. Sign. Level: p*** < 0.05, p** < 0.10

Regression III for robustness check: Multinomial Logistic Regression with only key variables.

Number of observations	161
LR chi2(75)	114.45
Prob > chi2	0.0023
Pseudo R2	0.3138
Log likelihood	-125.12933

storage	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Yes, in the refrigerator and I almost always eat it						
age						
35-45	-0,99051	1,183783	-0,84	0,403	-3,310683	1,329659
45-55	0,278318	1,25504	0,22	0,825	-2,181516	2,738151
55-65	0,864757	1,474899	0,59	0,558	-2,025993	3,755507
Younger than 25	1,263955	1,164092	1,09	0,278	-1,017622	3,545533
Older than 65	-0,52514	1,679704	-0,31	0,755	-3,817299	2,76702
gender						
Female	-1,35882	0,796842	-1,71	0,088**	-2,920604	0,202959
education						
Primary school	-24,3659	88740,34	0	1	-173952,2	173903,5
Secondary vocational education	0,747387	0,976925	0,77	0,444	-1,16735	2,662123
Secondary school	0,463303	1,11703	0,41	0,678	-1,726036	2,652642
Scientific education	-0,53766	0,645505	-0,83	0,405	-1,802822	0,727511
household						
Family	-0,03234	1,000325	-0,03	0,974	-1,992943	1,928257
Student (individually or jointly)	-1,48563	1,283853	-1,16	0,247	-4,001935	1,030678
income						
25-50 euros	0,540242	1,088843	0,5	0,62	-1,593852	2,674335
50-75 euros	-0,58139	0,896133	-0,65	0,516	-2,337779	1,174996
75-100 euros	0,062038	0,903628	0,07	0,945	-1,70904	1,833116
Less than 25 euros	0,790041	1,549146	0,51	0,61	-2,24623	3,826312
purchasing						
About two or three times a week	1,476849	0,69247	2,13	0,033***	0,119632	2,834066
Weekly	1,974785	1,027887	1,92	0,055**	-0,0398356	3,989406
planning						
Yes, I know beforehand what to buy	-0,17403	0,725422	-0,24	0,81	-1,595835	1,247766
No	-0,27796	1,674997	-0,17	0,868	-3,560892	3,004975
Sometimes	-1,41184	0,74142	-1,9	0,057**	-2,864997	0,041316
preparing						
Because I cannot estimate how much to make	-3,31745	1,423015	-2,33	0,02***	-6,106511	-0,528397
Because I do no planned purchasing	22,53433	138581,1	0	1	-271591,5	271636,6
Because I prepare too much	-0,73746	0,655014	-1,13	0,26	-2,021261	0,546347
No reason, I almost never have leftovers	0,768239	1,065459	0,72	0,471	-1,320022	2,8565
_cons	2,656998	1,68095	1,58	0,114	-0,6376039	5,9516
Yes, in the freezer						
age						
35-45	-2,83685	1,460284	-1,94	0,052**	-5,698955	0,025253
45-55	-1,32302	1,546728	-0,86	0,392	-4,354553	1,70851
55-65	0,888882	1,628482	0,55	0,585	-2,302885	4,080649
Younger than 25	-0,65652	1,530604	-0,43	0,668	-3,656452	2,343406
Older than 65	-0,09366	1,999272	-0,05	0,963	-4,01216	3,824844
gender						
Female	-1,41606	0,938311	-1,51	0,131	-3,255119	0,422993
education						

Primary school	-2,80742	3,701518	-0,76	0,448	-10,06226	4,447425
Secondary vocational education	1,413515	1,135642	1,24	0,213	-0,812302	3,639331
Secondary school	0,859234	1,397933	0,61	0,539	-1,880665	3,599133
Scientific education	-1,15167	0,82535	-1,4	0,163	-2,769323	0,465991
household						
Family	-1,46513	1,232501	-1,19	0,235	-3,880788	0,950526
Student (individually or jointly)	-1,74493	1,717289	-1,02	0,31	-5,110759	1,62089
income						
25-50 euros	0,210729	1,346089	0,16	0,876	-2,427558	2,849016
50-75 euros	-1,26569	1,17993	-1,07	0,283	-3,57831	1,04693
75-100 euros	1,174352	1,068753	1,1	0,272	-0,9203649	3,269068
Less than 25 euros	1,712486	1,999935	0,86	0,392	-2,207315	5,632287
purchasing						
About two or three times a week	0,707092	0,917441	0,77	0,441	-1,09106	2,505244
Weekly	1,98051	1,266116	1,56	0,118	-0,501031	4,462051
planning						
Yes, I know beforehand what to buy	-1,59247	0,955068	-1,67	0,095**	-3,464367	0,279429
No	-0,67521	1,886784	-0,36	0,72	-4,373242	3,022814
Sometimes	-3,20923	0,973555	-3,3	0,001***	-5,117361	-1,301097
preparing						
Because I cannot estimate how much to make	-2,50257	1,709369	-1,46	0,143	-5,852869	0,847734
Because I do no planned purchasing	2,229185	203495	0	1	-398840,7	398845,2
Because I prepare too much	-0,76334	0,844086	-0,9	0,366	-2,417713	0,891041
No reason, I almost never have leftovers	0,54399	1,243288	0,44	0,662	-1,89281	2,980791
_cons	4,886227	2,020027	2,42	0,016	0,9270469	8,845407
Yes, but I throw it almost always away	**(base outcome)**					
No, I never eat it anyway						
age						
35-45	32,42117	14115,71	0	0,998	-27633,86	27698,7
45-55	65,20606	15341,31	0	0,997	-30003,2	30133,61
55-65	33,90545	14115,71	0	0,998	-27632,38	27700,19
Younger than 25	-47,4985	6877,094	-0,01	0,994	-13526,36	13431,36
Older than 65	32,46195	41101,4	0	0,999	-80524,81	80589,73
gender						
Female	-16,5708	3128,742	-0,01	0,996	-6148,792	6115,651
education						
Primary school	13,62005	172342	0	1	-337770,5	337797,7
Secondary vocational education	-47,4855	8603,685	-0,01	0,996	-16910,4	16815,43
Secondary school	-17,4278	19964,7	0	0,999	-39147,51	39112,66
Scientific education	0,077638	1,353722	0,06	0,954	-2,575608	2,730884
household						
Family	4,036131	10817,46	0	1	-21197,8	21205,87
Student (individually or jointly)	86,05322	18528,84	0	0,996	-36229,81	36401,92
income						
25-50 euros	-1,06479	2,260268	-0,47	0,638	-5,494837	3,365249
50-75 euros	-1,64988	2,100291	-0,79	0,432	-5,766376	2,466613
75-100 euros	-48,4777	9904,045	0	0,996	-19460,05	19363,09
Less than 25 euros	-52,3365	63507,85	0	0,999	-124525,4	124420,8
purchasing						
About two or three times a week	-29,7367	4517,276	-0,01	0,995	-8883,435	8823,962
Weekly	3,963303	3,055991	1,3	0,195	-2,026328	9,952934
planning						

Yes, I know beforehand what to buy	32,56037	4517,275	0,01	0,994	-8821,137	8886,258
No	19,38021	3814,79	0,01	0,996	-7457,47	7496,23
Sometimes	-29,4383	5452,65	-0,01	0,996	-10716,44	10657,56
preparing						
Because I can not estimate how much to make	-1,29645	2,40357	-0,54	0,59	-6,007363	3,414459
Because I do no planned purchasing	89,97386	347679,1	0	1	-681348,5	681528,4
Because I prepare too much	-1,47381	1,992108	-0,74	0,459	-5,378272	2,430647
No reason, I almost never have leftovers	31,3273	4517,276	0,01	0,994	-8822,371	8885,025
_cons	-53,4606	17619,48	0	0,998	-34587	34480,08

Note. Sign. Level: p*** < 0.05, p** < 0.10

Appendix III

Do-file STATA

```
* Draft scriptie food waste
clear all
cd "/Users/pleunvanlith/Desktop/Master Economic Geography/Master's Thesis EG/Scriptie STATA"
set more off
log using scriptiedraf.log, replace
import delimited "Voedselverspilling gemeente Groningen.csv", varnames(2) rowrange(5)

* Drop unnecessary variables
drop startdate
drop enddate
drop responsetype
drop ipaddress
drop durationinseconds
drop finished
drop recordeddate
drop recipientlastname
drop recipientfirstname
drop recipientemail
drop externaldatareference
drop locationlatitude
drop locationlongitude
drop distributionchannel
drop userlanguage
drop v32

* Rename variables
rename ikbeneen Gender
rename hoeoudbentu Age
rename watisuwhoogstbehaaldeopleiding Education
rename totwelksoorthuishoudenbehoortu Household
rename z Neighbourhood
rename watisuwpostcodevoorbeeld9718gb ZipCode
rename maaktugebruikvanukuntmeerdereopt Container
rename hoevaakdoetuboodschappen Purchasing
rename doetuuwboodschappenvoorbereid Planning
rename watgeeftugemiddelduitperweekaanh Income
rename bewaartuetendatoveris Storage
rename watisdemeestvoorkomenderedendatu Preparing
rename maaktuweleensgebruikvaneenvandev Foodbox
rename zijnerinuwwijkinitiatievendievoe Initiatives

* Generate variables
encode Gender, generate(gender)
encode Age, generate(age)
encode Education, generate(education)
encode Household, generate(household)
encode Neighbourhood, generate(neighbourhood)
encode ZipCode, generate(zipcode)
encode Container, generate(container)
encode Purchasing, generate(purchasing)
encode Planning, generate(planning)
```

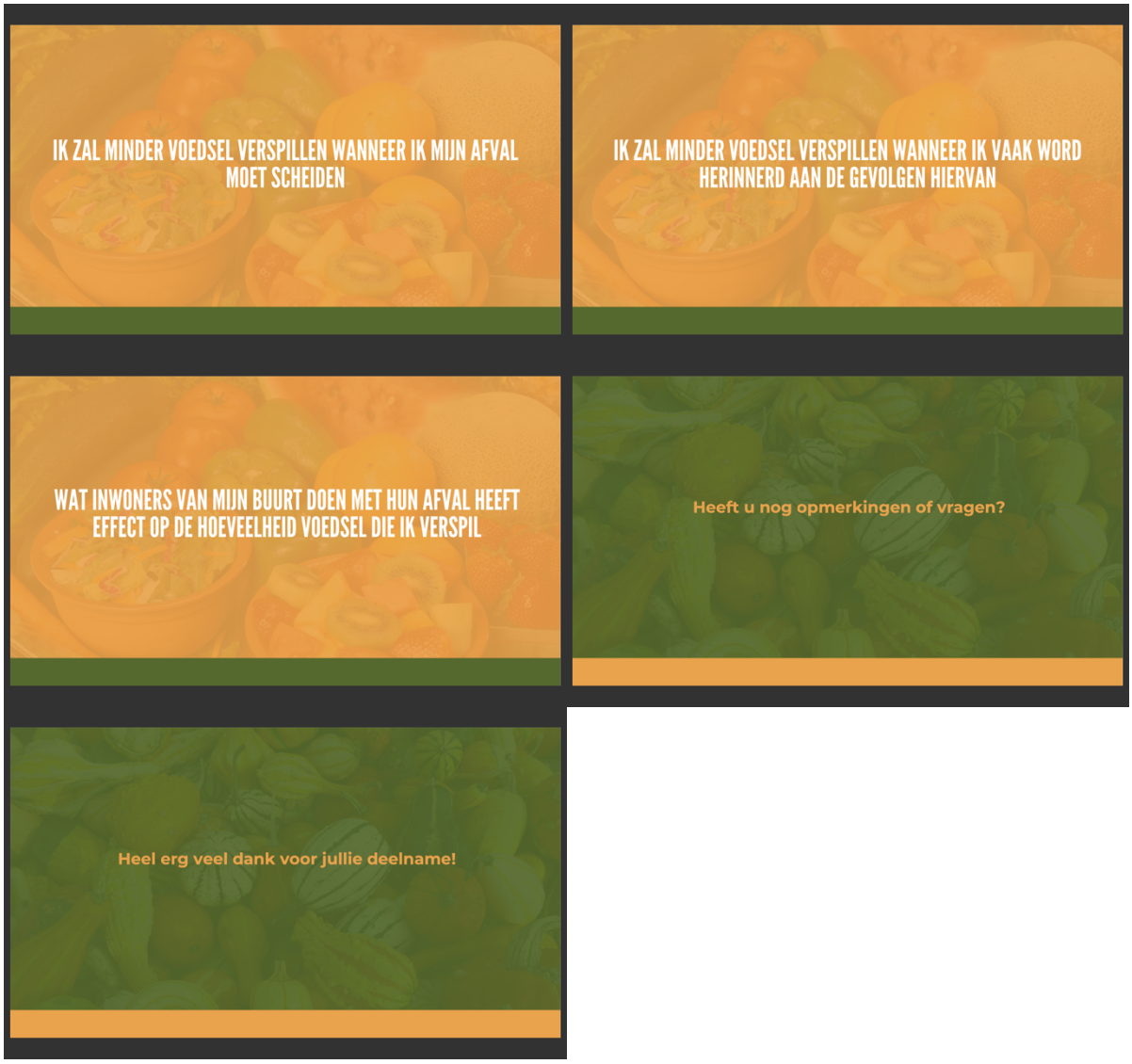
```
encode Income, generate(income)
encode Storage, generate(storage)
encode Preparing, generate(preparing)
encode Foodbox, generate(foodbox)
encode Initiatives, generate(initiatives)
encode responseid, generate(ID)

* Label variables
label var gender "Respondent's gender"
label var age "Respondent's age"
label var education "Respondent's education"
label var household "Household type"
label var neighbourhood "Respondent's neighbourhood"
label var zipcode "Respondent's zipcode"
label var container "If respondent is separating garbage"
label var purchasing "How many times a respondent does purchasing"
label var planning "If respondent does planned purchasing"
label var income "Respondent's weekly expenditure of groceries"
label var storage "If respondent stores leftovers or not"
label var preparing "What is the respondent's reason of leftovers"
label var foodbox "Familiarity with foodboxes"
label var initiatives "Neighbourhood initiatives"

* Drop variables
drop if missing(age)
drop if missing(gender)
drop if missing(education)
drop if missing(household)
drop if missing(neighbourhood)
drop if missing(zipcode)
drop if missing(container)
drop if missing(purchasing)
drop if missing(planning)
drop if missing(income)
drop if missing(storage)
drop if missing(preparing)
drop if missing(foodbox)
drop if missing(initiatives)
// 161 observations are left //

sum age gender education household neighbourhood zipcode container purchasing planning income
storage preparing foodbox initiatives

corr storage gender age education household neighbourhood container purchasing planning income
preparing initiatives
return list
matrix list r(C)
putexcel set correlationdraft.xlsx, replace
putexcel set correlationdraft.xlsx, replace sheet("correlation")
putexcel A1=matrix (r(C))

* Crosstabulations
asdoc tab neighbourhood age, replace
asdoc tab neighbourhood education
asdoc tab neighbourhood income
asdoc tab neighbourhood storage
```

```
asdoc tab neighbourhood gender
asdoc tab neighbourhood household
asdoc tab neighbourhood initiatives
asdoc tab neighbourhood planning
asdoc tab neighbourhood preparing
asdoc tab neighbourhood purchasing

asdoc tab storage household, replace
asdoc tab purchasing household, replace
asdoc tab storage education, replace
asdoc tab storage initiatives, replace
asdoc tab storage income, replace
asdoc tab storage gender, replace
asdoc tab gender initiatives

* MLRs:
mlogit storage i.gender i.age i.education i.household i.neighbourhood container i.purchasing i.planning i.income i.preparing i.initiatives, base(1)

mlogit storage i.gender i.age i.education i.household i.neighbourhood container i.purchasing i.planning i.income i.preparing i.initiatives, base(2)

// Base 3 meest significant:
mlogit storage i.gender i.age i.education i.household i.neighbourhood container i.purchasing i.planning i.income i.preparing i.initiatives, base(3)
putexcel set scriptiedraftMLR1, replace
putexcel set scriptiedraftMLR1, replace sheet("base3")
putexcel A1 = etable

* To see whether age and household are correlating too much // robustness
mlogit storage i.gender i.household i.education i.neighbourhood i.purchasing i.planning i.income i.preparing i.initiatives, base(3)
putexcel set scriptieleftoutage, replace
putexcel set scriptieleftoutage, replace sheet("no age")
putexcel A1 = etable

mlogit storage i.gender i.age i.education i.neighbourhood i.purchasing i.planning i.income i.preparing i.initiatives, base(3)
putexcel set robustleftouthousehold, replace
putexcel set robustleftouthousehold, replace sheet("no household")
putexcel A1 = etable

* Robustness // Only key variables
mlogit storage i.age i.gender i.education i.household i.income i.purchasing i.planning i.preparing, base(3)
putexcel set scriptiedraftMLR2, replace
putexcel set scriptiedraftMLR2, replace sheet("robust")
putexcel A1 = etable

* Neighbourhood MLR // with significant variables
mlogit neighbourhood i.gender i.age i.education i.household i.planning i.preparing i.initiatives, base(1)
// Doet het niet
mlogit neighbourhood i.gender i.age i.education i.household i.planning i.preparing i.initiatives i.storage, base(1) // Doet het niet
mlogit neighbourhood i.gender i.age i.storage i.planning i.preparing, base(1) // Doet het niet
mlogit neighbourhood i.gender i.age i.storage, base(1)
```

```
mlogit neighbourhood i.gender i.age i.household i.education i.planning i.preparing i.initiatives
ib3.storage
putexcel set scriptiedraftMLRneighbourhood, replace
putexcel set scriptiedraftMLRneighbourhood, replace sheet("MLR neighbourhood")
putexcel A1 = etable

* MLR neighbourhood:
mlogit neighbourhood i.gender i.age i.storage i.education i.planning i.preparing i.initiatives, base(1)
putexcel set neighbourhoodMLR, replace
putexcel set neighbourhoodMLR, replace sheet("MLR3")
putexcel A1 = etable

* MLR neighbourhood en household:
mlogit neighbourhood i.household, base(1)
putexcel set neighhousMLR, replace
putexcel set neighhousMLR, replace sheet("x")
putexcel A1 = etable

mlogit neighbourhood ib3.household, base(4)

asdoc tab gender, replace
asdoc tab education, replace
asdoc tab neighbourhood, replace
```

Appendix IV

Focus group powerpoint


IK ZAL MINDER VOEDSEL VERSPILLEN WANNEER IK MIJN AFVAL MOET SCHEIDEN
IK ZAL MINDER VOEDSEL VERSPILLEN WANNEER IK VAAK WORD HERINNERD AAN DE GEVOLGEN HIERVAN
WAT INWONERS VAN MIJN BUURT DOEN MET HUN AFVAL HEEFT EFFECT OP DE HOEVEELHEID VOEDSEL DIE IK VERSPIL
Heeft u nog opmerkingen of vragen?
Heel erg veel dank voor jullie deelname!

Appendix V

Coding scheme focus group discussions

Theme	Code	Sub code	Definition
Societal/ Geographical factors	Neighbourhood	Neighbours Social network	The neighbourhood an individual is living in.
	Supermarket	Market Albert Heijn	The supermarket an individual is visiting.
	Separating garbage	Rotten Garbage can	If the household is separating residual from organic waste.
Behavioural factors	Planning	Shopping list	If an individual plan purchasing, by the use of a shopping list.
	Storage	Refrigerator Freezer Rotten	If an individual stores leftover or not.
Personal factors	Household	Student Family Single living	The type of household an individual is living in.
	Education	Alternatives General knowledge	What the highest achieved education is.
	Age		Age of individual.
	Peer pressure	Social network	If an individual experiences peer pressure of his/her social network.
	Awareness		If individual experiences an awareness raise by several factors.
Food waste	Food waste		What does influence the food waste behaviour of an individual?

Appendix VI

Coding scheme in Atlas.ti