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Hungry for Change?

The impact of gentrification upon residents' dietary health

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Abstract

The term gentrification is dynamic; the multitude of causes and implications related to the process mean interpretations differ according to location and context. In current academic literature, the term is decreasingly understood as one which is wholly positive *or* negative, but instead as a process which results in both positive and negative consequences dependent on the specific situation and group being measured. Overwhelmingly, however, debate surrounding gentrification concern the process at a structural level, failing to take in to account the lived experience of those whose lives are affected by urban developments. One group which is consistently excluded from gentrification literature is those that live through the process without being displaced. This group, termed non-gentrifiers, are the subject of this research.

In order to establish a greater understanding of the intricacies of gentrification impacts, it is necessary to perform a range of in depth studies covering a breadth of issues. This thesis approaches one important aspect of this; health. The dietary health of non-gentrifying residents in two gentrified neighbourhoods of Amsterdam (De Baarsjes and De Pijp) has been studied.

Land-use analysis of two neighbourhoods over the period of gentrification showed where physical accessibility to healthy food resources has been altered. Surveys carried out amongst non-gentrifying residents showed how this change has been perceived and whether their dietary health has been affected by changing physical proximity and affordability of healthy food.

Results suggest that gentrification has had a negative impact upon accessibility to food resources in both neighbourhoods, and this in turn has had negative impact upon dietary intake. This impact was particularly apparent amongst those with limited mobility and those in the lowest income bracket. Affordability was not perceived as a barrier to healthy food resources. The process of gentrification in the Netherlands, despite being considered mild in academic literature, was mostly considered as a negative process amongst non-gentrifiers.

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1. Introduction

1.1. Contextual overview

Gentrification, an urban restructuring process, can be defined as the transformation of space for more affluent users (Hackworth, 2002), bringing about change to the physical environment at a local scale. An important aspect of this change is alterations to the local food environment.

The causes and impact of gentrification are varied and case-specific, as is exemplified by on-going debates between literature in the search for a sufficiently universal definition (Lees and Davidson, 2005; Ley, 1981; Atkinson, 2000). In order to consider the particularities of the Netherlands, as is relevant to this research project, Van Gent's (2013) work will be capitalised upon for explanation of policy and processes in Dutch cities. Van Gent's exploration of gentrification in Amsterdam suggests that the city is undergoing accelerated state-led gentrification resultant of the neo-liberalisation of the housing market. A manifestation of this is the municipality's pursuit of middle-class space and urban growth (2013, p519).

The local food environment is an area of ascending academic interest within Geography. Researchers involved in place and health studies have made links between the local food environment and the dietary intake of residents. Studies (Moore et al, 2008; Morland et al, 2001) establish that physical accessibility to healthy food has a positive influence on resident's health. Black et al (2014) explore the notion of the Community Nutrition Environment where access to food is measured in terms of proximity and travel time using GIS technology, showing that lower income groups tend to have less access to healthy food. It is possible, however, that following urban restructuring in low-income neighbourhoods, this fact is changeable. This is an area of investigation which is, to date, immature.

The lack of research which considers the food environment as dynamic is notable. As studies of gentrification show, neighbourhoods, including in cities in the Netherlands, are being restructured. Resultantly, the local food environments are changing, and accessibility to healthy food may be altered. It is important that the link between urban processes and individual resident's health is considered, and the results may be of use to policy makers looking at the indirect effects of gentrification. As emphasised, the link between gentrification and changes in the local food environment is an understudied area. The purpose of this research project is to provide insight in to how the nutritional health of residents is affected when their neighbourhood is gentrified. This topic of investigation was derived following exploration in to current academic publications on the topics of

gentrification and place and health, in which a lack of literature was found connecting the two fields of study despite the apparently significant interconnectedness.

This thesis will attempt to add a meaningful insight in to the links between gentrification and health of residents, and will fill the existing gap in academic literature. If a causal link is suggested from the investigation, this can be used to inform policy makers on the positive or negative consequences of gentrification strategies.

This thesis will focus on the individuals who have remained in the gentrified neighbourhood- termed 'non-gentrifiers' by Doucet (2009). In order to gauge how gentrification and resultant changes in the food environment have influenced the food intake of residents, it is necessary to engage with those who have lived in the neighbourhood throughout the gentrification process. Differing policy across the researched neighbourhoods will be investigated so as to uncover any apparent influence that macro level (governmental) has on micro level (individual).

1.2. Societal relevance

The societal relevance of this project is validated by the potential to advise and improve current policy discourse regarding gentrification. The local food environment plays a significant part in the daily lives of all local residents, particularly those of lower mobility who are more dependent on locally accessible resources. Greater understanding of how these residents are affected by urban restructuring could allow their needs to be more successfully addressed in future policy. Where residents' needs and wants are taken in to consideration, urban developments can be undertaken in a more sensitive manner, resulting in less resistance to change and an overall more inclusive approach. Slater et al (2004) argue that the existing population are often overlooked in gentrification research- this project puts this group at the centre of the study, thus filling a gap in academia which requires more attention.

1.3. Academic relevance

Slater et al (2004) content "The great challenge for the current and future generation of gentrification researchers is to describe, explain, and most importantly respond to and challenge reinvestment that is geared only to the incoming middle class rather than to extant social groups". This call for greater understanding of the impact of gentrification gives this project academic relevance, as it begins to tend to the request of Slater et al. Researching specificities of gentrification is a vast and broad endeavour which relies on the effort of many researchers to piece together a

bigger and more comprehensive picture explaining the complex impacts. This thesis will play a part in building this picture by providing insight in to one important aspect of the phenomenon. The insight offered from residents who have lived through this change will allow a thorough understanding of impacts which perhaps have previously gone undetected.

1.4. Project framework

Restructuring of the urban food environment will be investigated with the use of datasets supplied by Locatus showing changes in land use across Amsterdam. Furthermore, residents' responses will be analysed through surveys assessing perceived accessibility through the period of gentrification.

The result of this research will meet the aim of allowing insight in to how the nutritional health of residents is affected when their neighbourhood is gentrified.

This research project focuses on two neighbourhoods in Amsterdam, the Netherlands, which have undergone gentrification over the past decade; De Baarsjes in Amsterdam Oud-West and De Pijp in Amsterdam Zuid. These neighbourhoods were selected as areas where gentrification is employed as a named restructuring device. Additionally, both neighbourhoods already had extensive food environments prior to gentrification, making them suitable examples of where change has occurred.

1.5. Thesis structure

This thesis begins with a theoretical framework investigating existing themes and arguments relating to the overarching themes of the project; gentrification, place and health, accessibility and health, local food environments, and connections between these topics. The theoretical framework highlights discourse on these themes as well as disparities between academics. From this, three research questions are derived which aim to add a new dimension to this topic and investigate the missing gap which links the topics together.

The methodology for this project is then presented. Quantitative research methods are primarily utilised as a means for data collection, with some qualitative aspects to gauge further insight. The research process is approached per research question. Firstly, the rate and scale of gentrification is analysed with the use of Locatus datasets showing details of land use in 2003 and 2015. These are analysed by division in to categories which allow more thorough insight in to the changing food environment. The impact of this change on residents is best analysed with the input of individuals who have lived through the gentrification process. Therefore, quantitative surveys were carried out in

both neighbourhoods assessing resident perception to neighbourhood changes. These surveys gave respondents the opportunity to respond to issues regarding gentrification and the food environment, allowing an insight in to resident perception.

The justification for neighbourhood choice is presented in the following chapter. This includes an introduction to the neighbourhoods, key statistics, a brief insight in to the history and socio-demographic characteristics, and particularities which make the neighbourhoods appropriate case studies.

The results of the research investigation are then presented. The first results chapter refers to the analysis of the Locatus dataset and is presented in a series of tables and maps identifying change. The following discussion chapter justifies the chosen points of comparison and conducts an in depth study in to what the impact of these changes are on the local environment and what are the likely impacts of such changes in relation to existing literature. Specific cases of neighbourhood upgrading are also presented.

The second results chapter refers to responses to the resident surveys which were analysed using SPSS. A significant number of surveys were carried out with residents who had lived through neighbourhood change based on length of residence. Individual characteristics were also analysed to identify where these may alter explanatory assumptions from the data. The response frequencies were first measured and patterns were highlighted. Surveys were used to see to what extent alterations to dietary intake could be attributed to gentrification, and if the effects of neighbourhood gentrification had a positive or negative influence on daily lives.

Integrated alongside results, an in depth discussion considers the results of these surveys alongside the results of the dataset analysis and the overview of policy impact. In correlating these fields, it is possible to identify a causal link from policy to behavioural patterns and link the micro and macro implications of gentrification. Such patterns will be explained in the concluding chapter, in which future considerations for gentrification will be reflected upon.

2. Theoretical Framework

2.1. Contextualising the study of gentrification and dietary intake within geographic study

The connections between place and humans are intrinsic to the study of Geography. Place is a dynamic notion, continually changing as a consequence of, and to tend to, the needs of the population. This is particularly precedent in urban areas which are densely populated and adapting to advancements in modern society. Gentrification is a process whereby an urban area undergoes redevelopment to entice more affluent users (Hackworth, 2002). The relationship between health and place is a field of multidisciplinary significance. Kearns and Moon (2002) discuss the rise of the 'new geography of health', stating that the duality of the two previously separate matters has gained precedence in social science academia in the past decade, offering a development in understanding the relations between place and health. The greater the understanding of place effects on behaviour, the greater extent to which these effects can be controlled and amended. Therefore, it is important for geographers to explore multiple aspects of health to build a picture of whether these have spatial significance at a local, regional or national scale. One particular aspect of health which may be spatially determined is dietary intake. A significant consequence of gentrification is an alteration to the local food environment which may, as will be explored, alter the dietary intake of local residents.

This review of existing literature will explore and critique common trends and discourse relating to gentrification, place and health, and local food environments.

2.2. Gentrification

Gentrification is an area of geographical interest which, since termed by urban sociologist Ruth Glass (1964), has received increasing amounts of academic attention. The urban restructuring process has a multitude of direct and indirect effects. Directly, and of specific interest to urban geographers, is gentrification's impact on the local social and built environments. This, in turn, has influence over the daily lives of individuals living in gentrified areas, though the ways and extent to which these effects are manifested is a broad and, as yet, understudied matter.

It is difficult, however, to make generalisations regarding the consequences of gentrification. The process and impacts of gentrification are case-specific, dependent on policies at national and local

levels of government and the level of disrepair prior to development (Hamnett, 1991). Urban restructuring varies from top-down governmental policy implications to community-led grassroots renewal (Niedt, 2006). Developments also vary in accordance with levels of local resistance. Due to this, there are inconsistencies between academics looking for the starting point of gentrification. Often, changes in the housing market are seen as the catalyst for gentrification to begin.

Neil Smith (1979) offered a significant assessment of gentrification causes, attributing the process mostly to economic factors. Smith attributed initial gentrification developments to the rent-gap theory, offering an economic justification for the process. The rent-gap model plotted the current rental income of a property against its potentially achievable income; this ignited the interest of investors who could develop property, and often neighbourhoods as a whole, to maximise rents and profit. From this, the reputation and appeal of the neighbourhood increases and invites a more affluent base of residents. However, Smith developed this theory to later assert that gentrification goes beyond the upgrading of housing and retail by means of private investment, and is resultant of a shift in political economy and culture (Smith, 1996).

The role of the housing market is supported by Lees and Davidson (2005), who contend that new-build housing developments on London's riverside are an example of gentrification. Housing developments, whether upgraded or new-built, are, for Lees and Davidson, exemplary of the mutation and maturation of an area. By focusing primarily on housing, however, the social dynamics of the area and the manifestations of gentrification on social wellbeing may be overlooked.

Alternative to these economic explanations of gentrification is Atkinson's (2000) suggestion that gentrification is attributable to the socio-demographic make-up of an area. Atkinson's study also uses London to emphasise where place has been transformed to suit wealthy professionals. In this case, gentrification is sparked by governmental policies striving to create ethnically integrated neighbourhoods as a means to encourage inter-ethnic social mixing and alleviate potential problems of segregation. To achieve this, developments such as new amenities for shopping, eating and drinking are created to attract a new socio-demographic group to the area. In the process of making areas more attractive to entice affluent users, the original groups are excluded from the community, which can result in displacement. Displacement may be consequence of increased rent prices or changes in the local environment which do not suit the lifestyles or meet the needs of a less affluent group.

Similarly, Cameron's (2003) study of Newcastle Upon Tyne's urban renewal project 'Going for Growth'

puts a 'balanced' population at the centre of renewal plans which aim to undertake positive gentrification.

David Ley (1981) opposed Smith's (1979) opinion on the causes of gentrification, suggesting that changing societal needs were the root cause of gentrification processes. Ley (1981) offers explanation from a Canadian perspective. The article offers a comparison and analysis to assess the most prominent cause of gentrification, stating that the result of the multiplicity of small scale gentrification studies is *"a large number of valuable but usually noncumulative case studies, as differences in theoretical perspective, methodology, disciplinary background, geographical focus, and policy orientation tend to introduce an eclectic pluralism to the discussion"* (1981, p521). This supports the notion that it is difficult to make generalisations about the renewal process. Ley offers an insightful review over a large number of studies, attributing the explanations of gentrification to four factors; demographic change, housing market dynamics, the value of urban amenity and the economic base. Which factor is the most prominent is dependent on the particularities of that locality. Whilst the inclusion of housing market demands as a prominent feature would seem to be in alignment with Smith's (1979) article, Ley strongly argued that urban change is initially instigated as a result of new affluent groups- 'white-collar workers' seeking an upgraded base of amenities in urban areas.
Smith (1979) and Ley (1981) offer explanations of causality which are opposing, creating two schools of thought in understandings of gentrification. Both may be critiqued for not offering an empirical means by which to measure these economic or societal influences, without which it is difficult to assess which influence is greater. Moreover, although Ley acknowledges the eclectic pluralism of case-studies, neither author justifies that their understanding of gentrification may be suitable to just a fraction of cases. To solve this, there is need for an integrated theory approach, as called for by Hamnett (1991).

An emerging line of debate questions whether gentrification is always inherently state-led. Alternative to economic or social explanations, some gentrification processes find their roots in community-led projects as a means to rebuild community. An example of this is coined 'suburban revanchism' (Niedt, 2006), looking in particular at examples from the USA where locals reclaim their right to urban space. In examples given by Niedt, it is argued that antigentrification activism has waned (2006, p101) and some locals are in support of displacement of undesirable neighbours, or see the process as a means to upgrade their own business. Regardless of levels of support for gentrification by locals, the urban developments are still initiated by government and so it is not possible to contend that these are indeed examples of community-led renewal. However, gentrification is more likely to be thorough and

successful in areas where residents pose little resistance.

Whether the root causes lie in economic or social policies is determined by the individual case and the influencing factors which initiate renewal. This research project centres on urban developments in The Netherlands, so this case-specific approach will be considered.

2.2.1. Gentrification in The Netherlands

Hackworth and Smith (2001) dictate that gentrification in the USA follows a series of 'waves', and these waves are applicable across the neo-liberal economies of Western Europe and Australia. The first wave of gentrification took place in 1950s-70s and centred on the renovation of degraded housing. Second wave gentrification took place after the economic recession of the late 1970s. In this case, the role of the state was laissez-faire and gentrification became increasingly globalised. The third wave of gentrification is where The Netherlands is placed by many authors (Teernstra, 2015; Van Gent, 2013; Hackworth and Smith, 2001). At this stage, the market is typically neoliberalising and housing associations play a prominent role in initiating development.

It is apparent that, as Ley's (1981) review contended, gentrification in The Netherlands is resultant of a mixture of economic and societal policies. Uitermark (2007) highlights the Dutch government's push for greater levels of social mixing as a prominent factor in gentrification in Rotterdam, stating that economic factors come secondary to this approach. It is argued that social control can be gained through gentrification of disadvantaged neighbourhoods where levels of social cohesion are low, and anti-social behaviour is rife. The example of Hoogvliet, Rotterdam is used to show where state-led measures aimed to reduce the concentration of specifically challenging demographics. 400 dwellings were demolished and 100 were renovated, meaning high levels of displacement (2007, p.130). Following this, new residents were housed in Hoogvliet in an attempt to increase social cohesion between all groups. This approach was justified as a means to avoid the area becoming a ghetto, the likes of which have been acknowledged as a result of ethnic and social segregation in the United States. Uitermark concludes that the case of urban restructuring in The Netherlands tends to follow a different pattern to North America. In The Netherlands, it is argued, gentrification takes place as a means to improve the liveability of gentrified neighbourhoods (2007, p138).

The improvement of liveability is, in fact, a matter of central importance to regeneration policies in The Netherlands. Whilst national government designate regeneration and urban development matters to local government and housing associations, by law any developments which take place must strive to improve liveability for residents (Teernsta, 2015). Increasingly, gentrification is used as a policy tool.

With the neo-liberalisation of the political economy in The Netherlands (Teernstra, 2015; Van Gent, 2013), the role of housing associations becomes increasingly significant. Typically, neoliberalisation is seen to prioritise market needs above societal needs (Van Gent, 2013, p508) which can lead to profit-driven private actors taking advantage of the high demand for housing regardless of the welfare of residents. Measures are in place in The Netherlands, however, which act as a buffer against such negative consequences. Due to this, Dutch gentrification has been mild and received with relatively low levels of resistance. Such measures include regulations on rent and maintenance requirements which alleviate levels of displacement and act as tenant protection. These measures also make private renting less appealing to private landlords, meaning that a significant amount of housing in The Netherlands is either owner-occupied or social-rental (Van Gent, 2013). Moreover, following the deregulation of the Dutch housing market in 1995, it was ruled that surplus income generated by selling social housing must be reinvested in dwellings. This prevents the decline of social housing and limits the power of housing associations. However, high concentrations of low income groups are considered by government to be a cause of social problems. Whilst social housing is maintained, some areas, as exemplified by Uitermark's (2007) Hoogvliet case, may face displacement.

The particularities of gentrification in Amsterdam are further considered. Amsterdam policy outlines that retaining an urban lifestyle and attracting 'urbanites' through cultural amenities and a diverse night life is a key matter in urban regeneration (Van Gent, 2013). Cultural amenities include new, trendy restaurants, bars and cafés which alter the local food environment. The upgrading of neighbourhoods in Amsterdam, much like the rest of The Netherlands, is, Teernsta (2015) contends, led by housing associations. Amsterdam's housing is in high demand and so housing associations seek to use this to strengthen their own economic position. Whilst social strategies would increase liveability, it is apparent that housing strategies take precedence in regeneration plans. Policy dictates that the centre of Amsterdam should be expanded upon- termed the 'rollout' of the city centre, and high density housing and amenities are encouraged. This, alongside attempts to brand and market the city and establish a competitive image, are indicative of a neoliberalising approach to development which puts financial capital at its centre. This development has many impacts on the daily lives of residents, including their health.

2.3. Place and Health

There is multidisciplinary interest in the ways and extent to which place shapes health. Health geography gained precedence as an independent field. In part, this development was due to the neoliberalisation of academia and increasing competitiveness for funding; geographical investigations

have to prove relevance and importance in order to receive funding and scientifically driven projects are considered more 'sellable' (Kearns and Moon, 2002, p618). Kearns and Moon (2002) attribute the rise in a 'new geography of health' to this matter. Central to this new geography of health is the centrality of the influence of place. Uniting the fields of medicine and geography has given place/health studies a role in wider social sciences.

Jones and Moon (1993) contend for an appreciation of the locality beyond its definition as a contained space in which events happen, but also a means by which health status and health related behaviour are managed. The extent to which place controls health related behaviour is explored in academic Geography (Blaxter, 1990; Duncan et al, 1999; Ecob and Macintyre, 2000; MacIntyre et al, 2008; MacIntyre et al 2002). The importance of place's influence on health is presented by Blaxter (1990) who claims that areas of residence do dictate the physical health of residents. It is acknowledged across studies that there are significant geographical variations in health-related behavioural practices, though it is important not to assume that the role of place has significance in its own right. Contrary to Blaxter's opinion that place has independent influence over health, variations in health-related behaviours may also vary as a result of a large concentration of certain individuals who possess a shared character trait residing in one area (Duncan et al, 1999), and so causality becomes complex to assess. Moreover, to investigate place-related determinants in relation to residential location alone is to ignore the mobility of individuals and the influence that other factors, such as workplace or accessibility to transport, may have in controlling patterns of consumption or health behaviours.

Duncan et al (1999) assess the place related variations in smoking behaviour as a result of both contextual and compositional effect. Contextual effect refers to effects determined only by place, whereas compositional effect refers to effects determined by individual characteristics. Using multilevel analysis, it was determined that area effects on health behaviour are related to the level of deprivation in area of residence, thus a contextual effect was uncovered as most significant in the UK. Although Blaxter (1990) did contend that contextual effects are most important, Duncan et al (1999) argue that this cannot be proven without controlling for individual characteristics first, which was achieved in this study through multilevel analysis.

A development of this debate is provided in Ecob and MacIntyre (2000) who align with Duncan et al's (1999) use of multilevel analysis as a means to assess area variations in health. This is extended, however, to establish that variations which are attributable to the health-related behaviour itself (such

as smoking, alcohol consumption, exercise or dietary intake) are dependable upon its measurement, or on personal characteristics. Ecob and Macintyre (2000) found that the only factor which showed significant correlation to the local area after controlling for personal characteristics was a bad dietary intake. Interestingly, it was found that residents living in a deprived area tend to have a lower quality of dietary intake regardless of their income status. Similar to Duncan et al (1999), Ecob and Macintyre's investigation works to support Blaxter's (1990) theory relating place and health, despite the use of multilevel analysis. From the assessment of these studies overall, it is strongly suggested that contextual effect takes precedence over compositional effects.

It is important to assess place effects on health as an increased understanding of this complex and varying relationship may be used to inform policy-makers who have the power to alleviate the impact of detrimental health inequalities. Contextual effects are given precedence across a number of studies despite varying compositional make up. It is noted, however, that contextual effects are not consistent across all areas and across all health attributes, and variations could be attributable to methodological difference (Curtis and Jones, 1998). This is not to undermine the individual variances in behaviour but, as noted, many studies (Ecob and Macintyre, 2000; Duncan et al, 1999) found that health behaviours relate more significantly to context than to composition. The effect of the local environment, accessibility to resources and availability of healthy lifestyle choices do tend to have the greatest impact on the health outcome of the individuals living there. To make this assumption across all contexts, however, creates a danger of ecological fallacy. It is not to be assumed that all individuals hold the qualities which are common in their locality, and to avoid this it remains necessary in studies to account and control for individual characteristics as previous studies have done. Once composition has been controlled for, it is possible for contextual effects to be isolated. From this, policy-makers can understand and work with place effects at a local scale. Curtis and Jones (1998) endorse policy which is formulated to target specific areas.

2.3.1. Accessibility and health

In addition to acknowledging the association between health and place, it is necessary to examine the ways in which place attributes can determine health. Accessibility to resources is a significant factor which determines health outcomes. Where an individual's access to healthy lifestyle choices is restricted or, perhaps, non-existent in the immediate locality, it is deducible that the individual will be less likely to possess healthy lifestyle behaviours. However, this relationship between health and place becomes more complex when other factors are considered; for example, personal mobility, access to a car, resources near the workplace, or access to amenities in a neighbouring area all have influence on

accessibility beyond physical distance.

A review of neighbourhood socioeconomic context and health outcomes found that 92% of reviewed studies found a statistically significant association between environment and health. Neighbourhood variations are attributed to physical mechanisms which influence availability and accessibility. (Pickett and Pearl, 2001, p111).

Advances in Geographic Information Systems (GIS) technology allow increasingly specific investigations in to the material characteristics of neighbourhoods and how these relate to health inequalities. In this case, accessibility is assessed by measurement of physical distance from home to resource. A New Zealand based study was conducted by Pearce et al (2005) which used GIS techniques to allow researchers to assess spatial variations in the built environment and specific health outcomes. It is contended that increased accessibility, where accessibility is denoted in terms of distance and financial cost, allows greater opportunity for healthier lifestyle choices (2005, p389). Pearce et al consider physical accessibility to health-related resources to be a prerequisite to a healthy lifestyle. Although the authors acknowledge that car ownership will heavily influence accessibility, this is not accounted for in their investigative stage.

Measuring accessibility by proximity may give a superficial indication of reality. By measuring proximity alone, other factors which determine accessibility, such as family income, feelings of belonging, or the availability of healthy lifestyle options elsewhere, like close to the workplace, are overlooked. These factors may have significant impact on determining lifestyle and health behaviours of individuals but there is no possibility for consideration when looking at physical distance alone. Moreover, factors such as personal preference for lifestyle choice are not considered in Pearce et al's (2005) study.

In order to overcome superficial assumptions of proximity and use, Cummins et al (2007) call for a shift away from Euclidean understandings of space toward a relational understanding of space. Euclidean space, or 'absolute space' is a Newtonian understanding of fixed space and time as a grid in which events occur and objects move as discreet phenomena (Harvey, 2006, p2). By contrast, understandings of relational space are more abstract; “There is no such thing as space outside of the processes which define it” (Harvey, 2006, p4). Moreover, relational space is associated with applying meaning to space- collective memories associated with certain places construct an understanding of place beyond its physical dimensions. Cummins et al's (2007) relational perspective on place brands

the contextual and compositional assessment of effect as two-dimensional, arguing instead that people and place shape each other in a reciprocal manner. Additionally, and important in place and health geographies, is the role of power relations in shaping accessibility; different actors, such as local business owners, local government, as well as the local population, have context specific social and political interactions and power struggles which have differing outcomes for personal accessibility. Cummins et al challenge Pearce et al (2005) by dictating that "access to resources is not synonymous with geographic proximity" (2007, p1830). Resources are not always accessed from within neighbourhood boundaries, and neighbouring places may influence behaviour. Individual socio-demographic factors also have significant influence over health-based activities, and these vary depending on place and time, as place and time are not a constant. Acknowledgement of this through focusing on differences at an individual level allow a more accurate picture of place consequences to be built.

Although definitions of accessibility differ across studies, there is consistency in the argument for a positive relationship between accessibility and health. It can be determined that where there is lack of accessibility to healthy lifestyle options, the health of the local population is likely to suffer, though this varies by personal circumstance. One notable aspect of health studies is the accessibility to healthy food options and how this determines the dietary intake of local residents.

2.4. Local food environment

The local food environment is defined as the places it is possible to buy food within a neighbourhood, including supermarkets, grocers and convenience stores. It is suggested that the food available in a locality determines the dietary intake of residents, thus having impact upon their health. Therefore, when changes to the food environment occur, the dietary quality of residents may suffer.

The lowest-income groups within a locality are the most likely to depend upon their local food environment as the main source of food (Morland et al, 2002) as lack of access to private transportation means that they must shop locally. Studies (Morland et al, 2002; Sallis et al, 1986; Moore et al, 2007; Diez Roux and Mair, 2010) have found that supermarkets often offer the widest opportunities for healthy food options at reasonable prices, though to use supermarkets as a proxy to determine health poses a challenge; the presence alone of a supermarket does not determine what local residents choose to buy. This poses the query of whether accessibility shapes diet.

A means to overcome this is to measure residents' perceived accessibility; by conversing with

individuals to uncover the extent to which they believe healthy food options are available in their daily lives (Caspi et al, 2012). Black et al (2014) suggest that accessibility, when measured using GIS techniques considering proximity, density and diversity, has a weak association with dietary quality across a range of studies, with only a quarter of reviewed studies showing a correlation. Perhaps these results are due to the dependence on physical proximity, and may differ when a relational perspective of accessibility is incorporated.

Caspi et al's (2012) systematic review of articles regarding the local food environment and dietary intake also counter-intuitively found that there was often no significant relationship established between proximity to healthy food options and diet, and an association was found only when complex measurements of produce content at stores and distance were used. However, when considering self-reported access of residents, this changes. When using fruit and vegetable intake as an outcome measure of a healthy diet, it was often determined that those with self-reported easy access to supermarkets consumed considerably more fruit and vegetables than others (Caspi et al, 2012). In this case, studies considering physical proximity and self-reported accessibility have different results. This outcome works to show that using proximity alone as a determining factor may lead to misleading results, and perceived accessibility may prove to be more of an influencing factor on healthy food intake. This is reflective of Cummins et al's (2007) relational space understanding; accessibility is determined beyond spatial measurements and the individual's own assessment of accessibility is more significant in determining distance. One possible drawback of relying on individual's assessment is the risk that individuals may not report correctly about their intake. This may be overcome to an extent by allowing anonymity of surveys, where respondents do not feel that healthy behaviour needs to be exaggerated.

Moore et al (2007) measure the local food environment by three factors; supermarket density, participant-reported assessments and aggregated survey responses of independent informants. The findings in this case showed a positive relationship between the local food environment and dietary intake. This was in part determined by proximity to supermarkets, but supported by participant responses which give insight in to personal accessibility, supporting that relational distance (in this case measured by participant-reported assessments) can affect dietary intake with equal relevance to physical proximity.

It can be concluded after reviewing multiple studies looking at the relationship between food environment and diet, that there exists a causal influence between the two factors. This influence is

uncovered when looking beyond the superficial measure of proximity, by engaging with how individuals assess their own perception of accessibility.

2.4.1. Gentrification and the local food environment

Luckins (2009) contends that commercial gentrification (as opposed to gentrification's impact on the housing market) is manifested in a neighbourhood through alterations to the food environment. Whilst the food environment does not necessary expand, the variety of dining opportunities becomes more 'cosmopolitan', offering a mix of different cultures, flavours and experiences which are new and exotic to the restaurant scene. Moreover, an increasing association between restaurants and leisure is important in establishing a successful hospitality sector (Luckins, 2009, p272). Therefore, dining out is rebranded as an attractive commodity to be afforded only by a more affluent resident. It is also suggested that efforts to become increasingly cosmopolitan are sometimes met with resistance by local, non-gentrifying residents who feel their local food environment, such as traditional pubs and cafes, have been removed in favour of less affordable trendy and cosmopolitan options.

Breyer and Voss-Andreae (2013) offer an association between food accessibility and gentrification from a North American perspective. The authors respond to previous studies which measure accessibility based on the abundance of food stores in a locality without considering the price of the food on offer. By disregarding affordability, previous studies have given false impressions of food availability. This is termed as a 'food mirage'. Areas which are gentrifying tend to have high levels of low-income residents as well as high prices in local food stores, particularly for fresh and healthy produce. Breyer and Voss-Andreae find significant potential for food mirages to develop in gentrifying areas, exemplifying Portland, Oregon. Though an association is highlighted, the article measures accessibility only on affordability and proximity, and does not consider the impact of this on health behaviours. The role of the individual is not considered, meaning it is difficult to assess the impact that lack of accessibility has on daily lives and health related behaviours. However, the link between gentrification and food environments is an important association and something that has been overlooked in other literature regarding place and health.

A worthwhile extension of Breyer and Voss-Andreae (2013) would be to extend the association between gentrification and the local food environment to consider both the macro and micro level implications of this. Macro level structural forces control how gentrification is implicated, the power relations which control this process (i.e. local government, local businesses, levels of resistance by residents) and the role of policy. Micro level impacts consider how the daily lives of individuals are

affected by gentrification, such as health behaviours including dietary intake. This association, particularly where gentrification policy is given precedence, will vary significantly between countries and regions depending on specific policy measures for that place, as gentrification is case-specific. Despite varying particularities, the patterns of behaviour following urban development may still be transferable across case studies.

Further implementation of notions from previous place and health literature would also be beneficial in this extension. As noted, Breyer and Voss-Andreae (2013) rely on measuring accessibility in terms of proximity and affordability. Cummins et al's (2007) call for the use of relational space could be implemented at this point to allow an in-depth understanding of other influences which control the residents' relationship to their local food environment, avoiding the superficial associations of proximity and use. This is achieved by interaction with individuals, gaining insight in to the influence of personal mobility, neighbouring locations and workplace, amongst other examples.

As suggested in the literature, lack of access to healthy food options has impact upon the dietary intake of residents. However, little research has been done in to the impact of systemic urban changes on the health of individuals. In order to build upon existing health and place literature, it is necessary to move beyond the confines of a direct place-health relationship and view a wider picture; linking place-building processes (gentrification) to individual health determinants (dietary intake). Investigating both macro and micro processes offers the opportunity to gauge an understanding of how urban policy shapes daily lives. This may be used to inform policy makers and perhaps help to alleviate detrimental but previously overlooked impacts of gentrification on the health of residents.

2.5. Resultant research questions

Investigation in to existing literature has highlighted existing discourses relating gentrification and residents' health. This investigation has provided insight in to areas of academia which have not yet been addressed; most significantly, the link between macro and micro processes in place and health studies. Resultantly, research questions have been formulated which address this link, focusing on gentrification neighbourhoods in The Netherlands. The focus of the thesis is to answer the question;

- **What structural changes affect behavioural outcomes in relation to gentrification and dietary intake?**

This will be approached by means of the following sub research questions;

Research Question 1

- To what extent has gentrification had significant effect on the rate and scale of changes to the local food environments of De Baarsjes and De Pijp?

Research Question 2

- In what way has the individual food environment of non-gentrifying residents of De Baarsjes and De Pijp been altered since pre-gentrification levels, in terms of self-assessed accessibility and food consumption patterns?

3. Methodology

This chapter entails a detailed description and justification of the research and analysis techniques used to allow the formation of conclusions regarding gentrification and health outcomes. Limitations of the research design are also addressed. The methodology was designed to answer in turn each research question. Appropriate research methods were influenced by existing place and health literature and adjusted according to the suitability of the context in which the research was conducted.

Research methods were developed with the intention of answering the main question:

> **What structural changes affect behavioural outcomes in relation to gentrification and dietary intake?**

The answer to this research question should become evident following investigations in to the following sub research questions. The purpose of the main question is to draw a link between macro-level structural forces and micro-level individual outcomes, which can be achieved when conclusions are built regarding the materialisation of policy measures compared with any apparent barriers to fruit and vegetable consumption which will become clear following survey analysis.

3.1. Research Question 1

The first sub research question investigates macro level changes to the studied neighbourhoods;

> **To what extent has gentrification had significant effect on the rate and scale of changes to the local food environments of De Baarsjes and De Pijp?**

3.1.1. RQ1 Data collection methods

The aim to explore the extent to which gentrification had effect on the rate and scale of changes to the local food environments of De Baarsjes and De Pijp was met by investigation in to the implementation of policy measures in these specific neighbourhoods, beginning with a review of the appropriate policy documents. The rate and scale of changes is dependent on national policy, local policy and neighbourhood resistance to gentrification practices. 'Summary National Policy Strategy for Infrastructure and Spatial Planning' dictates that the implementation of urbanisation plans will be left to local authorities (Ministry of Infrastructure and the Environment, 2011), meaning that in this

context, national policy will not play a significant role on the rate and scale of changes between the neighbourhoods in Amsterdam which are central to this study. Local policy documents were accessed, articulating how urban renewal measures were implemented. The policy documents articulating urban renewal policy in Amsterdam are publicly available online (Gemeente Amsterdam, 2011) and were translated with support from Dutch colleagues. These were reviewed in advance of neighbourhood selection in order to identify specific neighbourhoods where gentrification is implemented as a named development measure. From these documents it is possible to uncover the particularities of how and why gentrification is used as a policy measurement in this context.

Secondary research was performed by summarising, collating and synthesising existing data. The rate of change Is visible in the changes in land use. Datasets supplied by Locatus gave evidence of changing land use across Amsterdam, focused on the changing food environment between the years 2003 and 2015. Datasets displayed branch type, allowing comparisons to be made across time in terms of food retail and service industries and specificities of establishments in each neighbourhood. Detailed insight was gauged by categorising establishments and comparing pre-gentrification and post-gentrification environments. Figures were counted across Amsterdam as a whole as an indicator of average change and compared with changes in De Baarsjes and De Pijp. This research method allowed insight in to the physical changes that gentrification has had upon two local food environments.

Furthermore, this data was presented using ArcGIS software which served as a visual representation of neighbourhood changes. Buffer points were created around which an area of walking distance from retail units was measured for the years 2003 and 2015. This aids in highlighting that neighbourhood change is not equally distributed and that residents in certain areas of the neighbourhoods may feel the effects of change more than others.

3.2. Research Question 2

The second research question addressed in this thesis is;

- **In what way has the individual food environment of non-gentrifying residents of De Baarsjes and De Pijp been altered since pre-gentrification levels, in terms of perceived accessibility and food consumption patterns?**

In order to investigate how the individual food environments of residents living in gentrified neighbourhoods have been altered since pre-gentrification levels, a relational approach to accessibility was undertaken. This was influenced by Cummins et al (2007), who contend that a relational perspective- where space is understood in terms of individual relationships between time and place, rather than Euclidean dimensions- is more appropriate in gauging how people assess their own accessibility to neighbourhood resources.

3.2.1. RQ2 Data collection methods

In order to conduct this investigation, interaction with individuals is imperative. This interaction was performed through surveys. Most answers to the survey were formatted in the form of a Likert scale, benefiting the respondent in terms of the time taken to complete the survey, and benefiting the researcher in terms of ease of analysis. However, open questions were also included in the survey as a qualitative investigation allows deeper insight to the extent to which respondents attribute changes in behaviour to gentrification processes. Without the inclusion of qualitative data at this point, any associations would have been the assumption of the researcher.

The survey was administered in the Dutch language only, as the original formatting which included both Dutch and English translations was deemed too long and may appear off-putting to potential respondents. To ensure a sufficient response rate it was decided that a Dutch-only version of the survey would be administered. All willing respondents were capable of understanding and completing the survey in Dutch, which was most often their native language. Translation of the original English version of the survey was carried out by a Dutch colleague. As responses were mostly based on a Likert scale, translation back in to English was unnecessary. For the open questions, a Dutch colleague translated responses back in to English for the benefit of the researcher as the researcher's understanding of Dutch is limited. The full survey is included in the thesis appendix in both English and Dutch.

The development of questions used in the survey was directed by existing theory in place and health literature and existing surveys investigating in nutritional health (NEMS, 2016). The questionnaire was developed with the intention of investigating the link between food accessibility and related health outcome based on measurements of dietary intake. Furthermore, it was important to establish whether residents attributed any changes in their dietary intake to the process of urban redevelopment in their neighbourhood. The first section of the questionnaire indicates the residents' awareness of urban redevelopment processes and the impact of these on the local food environment,

but aims to do so without creating leading or suggestive questions which may cause the respondent to feel obliged to answer in a certain way. Therefore, the respondents were asked to what extent they agree with statements regarding proximity and price which purposefully did not convey a negative assumption. Respondents were asked to consider changes to the neighbourhood in the past 10 years, to ensure that changes referred to those over the period of gentrification in both neighbourhoods.

Caspi et al's (2012) review of place and health review of the local food environment and diet indicates that a large number of studies found the use of fruit and vegetable intake alone to be an efficient measurement of quality of health in dietary intake terms (Boder et al, 2008; Cummins et al, 2005; Gustafson et al, 2011; Jeffrey et al, 2006; Michimi and Wimberly, 2010; Pearce et al, 2009; Pearce et al, 2008;, Pearson et al 2005; Powell et al, 2009; Rose and Richards, 2004; Sharkey et al, 2010; Thornton et al, 2010; Timperio et al, 2008; Williams et al, 2010; Wrigley et al, 2003; Zenk et al, 2005; Zenk et al, 2009). These studies tended to produce significant associations between food environment and diet, and so can be considered a suitable measurement to be adopted in this research when employed in combination with GIS measurements and dataset analysis.

The second section of the questionnaire relates to the respondents' lifestyle and dietary intake and so questions the fruit and vegetable intake of residents and gauges whether this has decreased since pre-gentrification levels, and, importantly, whether it has decreased as a result of gentrification. The questions in this section were derived in relation to the 2013 Behavioural Risk Factor Surveillance System Questionnaire (CDC, 2013) which was conducted in the USA to assess public health. Section 11 questions respondents' fruit and vegetable eating habits in terms of volume and frequency of consumption and contains guidelines on what should be considered fruit and vegetables (for example, it is important to articulate that the respondent should exclude fruit drinks with added sugar, or in the form of condiments such as ketchup, from their fruit and vegetable intake). Articulating these regulations in the questionnaire ensures that differing interpretations of the questions are limited, thus increasing the reliability of results. Respondents are asked to reflect on changes in their diet since pre-gentrification levels.

Moreover, this section of the questionnaire reflects on individual lifestyles which may have implications on dietary intake. For example, respondents' mobility is assessed by asking if they have regular access to personal transport such as a car, or if they often buy groceries in another neighbourhood. Respondents also have the opportunity at this point to offer qualitative explanation for why they may choose to buy groceries elsewhere. These factors are included so that external influences relating to dietary intake may be controlled for at the analysis stage and do not cause false associations to be made between urban processes and dietary intake.

Other potentially influencing factors to food accessibility are controlled for using the third section of the questionnaire. This section relates to individual characteristics of the respondents, such as age, gender, education level and income. Respondents were assured of anonymity at this point of the questionnaire to minimise levels of non-response whilst dealing with potentially sensitive information such as income level.

3.2.2. The sample

Non-gentrifying residents were chosen as the respondent group as these individuals have lived through the gentrification process in the neighbourhoods and thus will have the greatest insight in to the impact of these changes, and potentially will have seen alterations to their daily lives. These individuals were identified as the residents who have lived in the neighbourhoods since pre-gentrification, suggested in the datasets as 2003. Data protection laws in Amsterdam prevented the researcher from accessing census data which could locate these specific individuals, though statistical data accessed via publically accessible 'fieten in cijfers 2015' (Gemeente Amsterdam, 2015) showed that current residents of De Baarsjes have an average length of residence of 7.9 years and De Pijp 8.8 years, similar to the Amsterdam average length of residence of 8.5 years. Finding residents who have lived in the neighbourhood since 2003 was therefore a challenge, and has resulted in the limitation of a smaller sample size than desired in the neighbourhoods. In total, 147 surveys were completed; 80 in De Baarsjes and 67 in De Pijp.

To maximise the response rate, questionnaires were administered in a number of ways. Primarily, the researcher administered questionnaires via door-to-door visits in the neighbourhoods. Door-to-door visits were targeted in areas with high densities of residential land-use. Although this method of selection does not ensure randomness in the sample, it was necessary to scale down the selection area. Once specific streets had been identified, the researcher attempted to randomly sample this population by approaching every third door. Residents who had indeed lived in the area since 2005 were asked to participate in the survey. In total, 37 responses in De Baarsjes and 28 responses in De Pijp were gained this way. Residents who did not respond to the first visit were revisited the following week to ensure a maximum response rate. Moreover, respondents were accessed in public spaces within the neighbourhoods including shopping streets and public parks in an attempt to maximise respondents.

Frequency of demographic qualities of survey respondents are outlined in Table 3.1.

			Frequency	Percentages
Gender	De Baarsjes	*Male*	45	56.3%
		Female	35	43.8%
	De Pijp	*Male*	34	50.7%
		Female	33	49.3%
Age	De Baarsjes	*18-25*	23	28.7%
		27-64	43	53.8%
		65+	14	17.5%
	De Pijp	*18-25*	19	28.4%
		27-64	38	56.7%
		65+	10	14.9%
Employment	De Baarsjes	*Student*	5	6.3%
		Unemployed	9	11.3%
		Part-time work	10	12.5%
		Full-time work	32	40.0%
		Self-employed	12	15.0%
		Other	1	15.0%
	De Pijp	*Student*	7	10.4%
		Unemployed	6	9.0%
		Part-time work	7	10.4%
		Full-time work	30	44.8%
		Self-employed	10	14.9%
		Other	7	10.4%
Education	De Baarsjes	*High School Diploma*	39	48.8%
		University/HBO	41	51.2%
	De Pijp	*High School Diploma*	33	49.3%
		University/HBO	34	50.7%
Income	De Baarsjes	*< 10000*	6	7.5%
		10000-25000	31	38.8%
		25000-40000	34	42.5%
		40000-55000	3	3.8%
		>55000	6	7.5%
	De Pijp	*< 10000*	9	13.4%
		10000-25000	25	37.3%
		25000-40000	24	35.8%
		40000-55000	5	7.5%
		>55000	4	6.0%
Access to car	De Baarsjes	*Yes*	30	37.5%
		No	50	62.5%
	De Pijp	*Yes*	27	40.3%
		No	40	59.7%

Table 3.1: Frequency of demographics of respondents

Frequency demographics are reasonably well distributed in both neighbourhoods. Some categories are an exception to this. In the case of income, for example, it is apparent that there is a greater proportion of low-income residents. This is reflective of the fact that the neighbourhoods were selected on the basis of previous levels of disrepair. The low amount of respondents with access to a car can also be credited to the high number of low-income residents. It is also worth noting that a high proportion of respondents have a university level education in both neighbourhoods. In part this may be attributed to the fact that in general, the Netherlands has a high proportion of the population having completed higher education (CBS, 2013).

Using a variety of methods; surveys with quantitative and some qualitative elements, dataset analysis, GIS mapping of changing land use and policy reviews; a thorough insight in to gentrification, the local food environment and resultant resident health outcomes has been possible. Whilst previous studies have chosen to focus on one element of this relationship, or have relied on the use of one method to gauge insight, this project chose to investigate a number of lines of enquiry in order to identify a pattern in the relationship between urban processes and health outcomes. If a pattern and potential causal pathway exists, it will become apparent following the analysis of the abundance of data collected.

3.3. Analysis

Surveys were analysed using IBM SPSS Statistics programme. Statistical analysis highlighted which factors relating to neighbourhood development or individual lifestyle had the most significant effect on the amount of fruit and vegetables consumed by residents.

Each statement from the survey was entered in to the programme and answers were given a numerical value ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), or coded as 1 and 2 where appropriate (for example, Gender, Car Ownership). Descriptive frequency statistics were first obtained to allow an overview of the profiles of respondents. It was found that in both neighbourhoods, individual characteristics were reasonably evenly distributed. In the case where this is not apparent, for example in the income category where 46.3% (De Baarsjes) and 50.7% (De Pijp) are classed as earning below average income, this is an accurate representative of the local population considering that the project focuses on non-gentrifying residents in previously predominantly low-income areas.

Following the obtainment of frequency statistics, it is necessary to investigate the extent to which perceived accessibility and affordability impact upon healthy dietary intake. The dependent variable

used to determine healthy dietary intake was the statement 'I eat five types of fruit and vegetable every day'. This was justified as an appropriate indicator of healthy diet by use in previous health and place studies. Statements determining self-perceived accessibility were identified as 'I would eat more fruit and vegetables if they were available closer to my home', 'There are fewer places for me to buy fruit and vegetables in my neighbourhood' and 'Changes in my neighbourhood have caused a change in my diet'. Relationships between respondents' scores on each of these statements and respondents' healthy food intake were measured with a series of independent sample- t-tests. These results highlighted where a significant relationship existed between variables, leading to an understanding of whether physical accessibility has worsened food access through gentrification.

This practice was repeated for statements regarding affordability of healthy food; 'Food prices have risen more than average in my neighbourhood', 'Access to affordable food in my neighbourhood has improved' and 'I would buy more fruit and vegetables if they were less expensive'.

Furthermore, individual characteristics were also tested to see whether a relationship exists between dietary intake and individualities. As highlighted in the theoretical framework, behavioural patterns relating to health may be the consequence of a place-effect (Blaxter, 1990), or could just give this false impression due to the number of people with a shared behavioural trait living in one given area (Duncan et al, 1999). These individual characteristics were controlled for in the investigation by their inclusion in regression models.

Following the series of t-tests, an impression has been constructed of which factors show a relationship with food intake. In order to investigate the extent to which these factors may be suitable predictor variables for a healthy dietary intake, a logistic regression was performed with the binary transformation of the statement 'I eat five types of fruit and vegetables every day' as the dependent variable. Three statements relating to accessibility were combined in to one new variable using the mean scores (from the 1-5 Likert scale) to create the variable Average_Accessibility. This was performed again to create the variable Average_Affordability. When creating the new affordability variable, scores for the statement 'Access to affordable food in my neighbourhood' were inverted so that the positively worded statement reflected negative views, so that it aligned with the other negatively worded statements relating to affordability. These new variables were included in the model alongside income and self-assessed importance of health. Income was included as gentrification literature considers non-gentrifiers as typically low-income residents. Self-assessed importance of health was also considered important, as without barriers to accessibility, this variable should have a positive correlation with healthy food intake, as those who consider a healthy diet to be

important to them would, it is logically assumed, eat a healthy diet when possible. A lack of correlation between these variables indicates that another factor is preventing access.

3.4. Limitations

Some limitations to this investigation have become apparent throughout the process of data collection and analysis. One apparent limitation arose from the reliance of a small sample of respondents. The small sample can be attributed to the difficulty in locating respondents who met the profile of residing in either De Baarsjes or De Pijp for a long enough period of time that they may be considered non-gentrifiers, whilst ensuring a random selection of participants. This may impact the analysis process by undermining validity of the results. However, even with a small sample it is possible to draw associations and patterns which indicate apparent barriers which can be replicated across the neighbourhoods and to other gentrified areas in the Netherlands and beyond.

Another possible limitation is the use of fruit and vegetable intake as the sole indicator variable for a healthy diet. This causes all respondents who do not have a high intake of fruit and vegetables to be categorised as unhealthy, disregarding that these respondents may be lead health conscious lifestyles. However, it is necessary to have a proxy indicator of dietary health in order to allow ease of analysis, and fruit and vegetable intake is a factor which has been utilised in many previous health studies published in reputable journals.

4. Neighbourhood explanation

This chapter is intended to give an overview and justification of the chosen research sites for this project. This will include a brief social and economic history of the neighbourhoods, an insight in to the housing sector, and an assessment of how gentrification was employed.

De Baarsjes and De Pijp neighbourhoods in Amsterdam were selected as appropriate study sites following an investigation in to urban renewal policy in the Netherlands which highlighted examples of areas where gentrification was utilised as a named policy measure. Following this, visits to several neighbourhoods named in urban policy documents published by Gemeente Amsterdam allowed initial assessment of the extent of local food environments in these neighbourhoods. Research sites with visibly extensive food environments were identified as appropriate subjects.

Figure 4.1 shows the diversity of age structure in Amsterdam in 2007. The graph demonstrates that there is a disproportionate amount of working-age adults living in Amsterdam. It is young professionals in this age group that are regarded as the driving force of gentrification, creating a market for the creative and food oriented enterprises which arise during urban regeneration. The over-representation of this age group may be attributed to working-age people being drawn from smaller towns in the Netherlands by the employment opportunities offered by the capital.

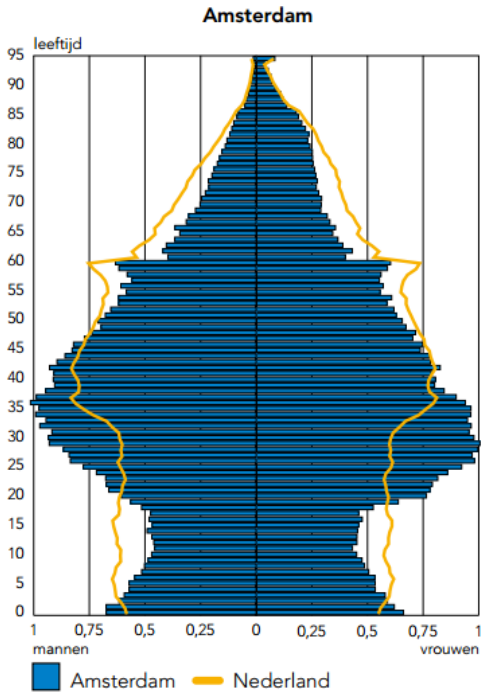


Figure 4.1: Age structure in Amsterdam, 2007 (Source: CBS)

4.1. De Pijp

Figure 4.2: Images of De Pijp food scene (Source: yourlittleblackbook, 2014)

The neighbourhood of De Pijp, in Amsterdam's Zuid district, was established in 1891 and has a historic reputation of housing working-class residents, students and low-income artists. Of the total population, 18.9% are of non-Western origin. Compared with the city average of 34.7%, this figure is relatively low. Table 4.1 demonstrates some key statistics of De Pijp comparing 2009 and 2015 figures.

	2009	2015	% increase
Population (total)	25220	27215	7.33
Population Male	12520	13415	6.67
Population Female	12700	13790	7.90
Total number of households	16930	17935	5.60
Average household size	1.5	1.5	0.00
Average number of cars per household	0.35	0.3	-16.67
Surface land and water (ha)	123	123	

Table 4.1: De Pijp population statistics

Figure 4.2 shows the neighbourhood's location within the context of wider Amsterdam. Borders shown in black on the map show the division of 'buurtcombinatie' borders in Amsterdam. De Oude Pijp and De Nieuwe Pijp are highlighted in red.

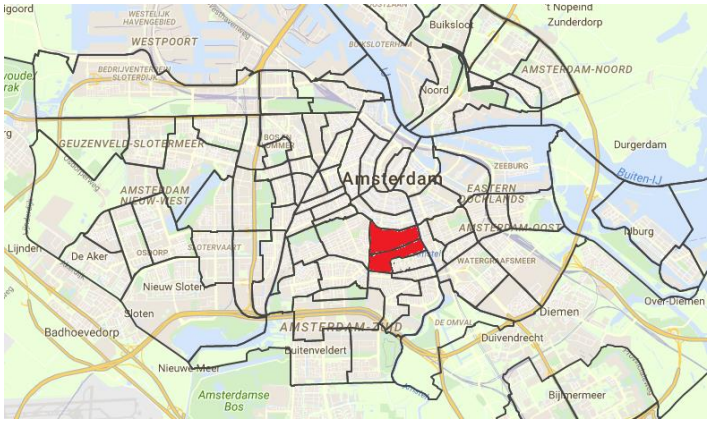


Figure 4.3: De Pijp as a buurtcombinatie (Source: Gemeente Amsterdam, opendata)

Figure 4.3 demonstrates land use functions in De Pijp excluding housing. The borders of De Pijp have been highlighted by the author.

Figure 4.4: Land use in De Pijp (Source: Gemeente Amsterdam)

Land use in De Pijp is dominated by the category 'retail' which, in this context, includes chain stores, independent stores and shopping malls as well as supermarkets and food stores. Following this, it is apparent that there is a significant quantity of hotels, restaurants and bars in the neighbourhood. This extensive food network makes De Pijp an appropriate example on which to focus for this investigation.

4.1.1. Historical development of De Pijp

In the late 19th Century the neighbourhood De Pijp expanded rapidly in terms of population, filling the abundance of low-standard but affordable housing which had been established by housing contractors capitalising on the high number of low-income artists, immigrants and students living in Amsterdam. The result was an eclectic population. Later expansion to the South of the area saw the establishment of Nieuwe Pijp, where housing was built to a higher standard. Sarphatipark divides the neighbourhood. (The Guardian, 2012). The neighbourhood's appearance contrasts with much of Amsterdam due to the lack of canals and water in the area.

In the 20th Century, De Pijp's population densified furthermore. New housing was built to accommodate a labour force which served the local Heineken Brewery and the diamond industry.

In the present day, gentrification is spurred by this abundance of housing and the neighbourhood's eclectic image. The population is continually growing and urban developments have seen a change toward catering to this new, more affluent population of young professionals and families. This is expected to be accelerated by the introduction of a metro line running through the neighbourhood which will increase the flow of population in the area. (iamsterdam, 2016).

4.1.2. Gentrification in De Pijp

This study intends to investigate the consequences of gentrification on residents who have lived in the neighbourhood since before the process began. With the neighbourhood's reputation as a previously working class area, it is expected that many non-gentrifiers will fall in to the low-income category. Population data provided by the municipality indicates that De Pijp has an average of 35.7% low-income households (Gemeente Amsterdam, 2015). The average amount of households classed in the low-income bracket across Amsterdam is 29.4%. Records of gentrification, particularly in the USA, but also apparent in outer-city Rotterdam, see some level of displacement in gentrified areas as housing and living becomes unaffordable to residents. De Pijp has a low level of displacement despite gentrification in the neighbourhood; this fact is attributable to tenant protection laws in place in the Netherlands which buffer the negative impacts of urban renewal policies as seen in the USA (Van Gent, 2013). Resultantly, there are a number of residents in De Pijp who may be classed as 'non-gentrifiers', having lived through the gentrification process without displacement. This group will serve as an appropriate respondent base to offer insight in to the changes to daily life and diet which may be attributable to the gentrification process.

4.2. De Baarsjes

Figure 4.5: Images of De Baarsjes food scene (Source: yourlittleblackbook, 2016)

The neighbourhood of De Baarsjes lies in Amsterdam's Oud-West district. Similar to De Pijp, it is historically viewed as a working-class neighbourhood. The neighbourhood was established in the 1900s and much of the architecture from this time remains (iamsterdam,2015). The location of the neighbourhood is evident in Figure 4.4.

	2009	2015	% increase
Population (total)	33620	36920	8.94
Population Male	16560	18225	9.14
Population Female	17070	18690	8.67
Total number of households	19970	22100	9.64
Average household size	1.675	1.65	-1.52
Average number of cars per household	0.375	0.35	-7.14
Surface land and water (ha)	163	163	0.00

Table 4.2: De Baarsjes population statistics

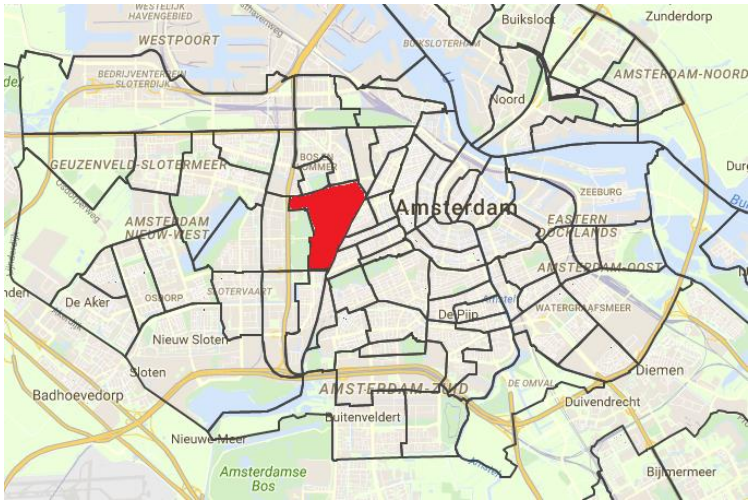


Figure 4.6: De Baarsjes as a buurtcombinatie (Source: Gemeente Amsterdam, opendata)

Figure 4.4 demonstrates De Baarsjes proximity to the city centre. Borders in black show the municipality's division of 'buurtcombinatie' where De Baarsjes is understood to be composed of Van Galenbuurt, Hooftweg e.o., Westindische buurt, Geuzenbuurt and Chassaburt. The proximity of the neighbourhood to the city centre will be considered as a factor which may have influence over dietary intake and this will be accounted for at the data analysis stage.

Land use of De Baarsjes is demonstrated in Figure 4.5.

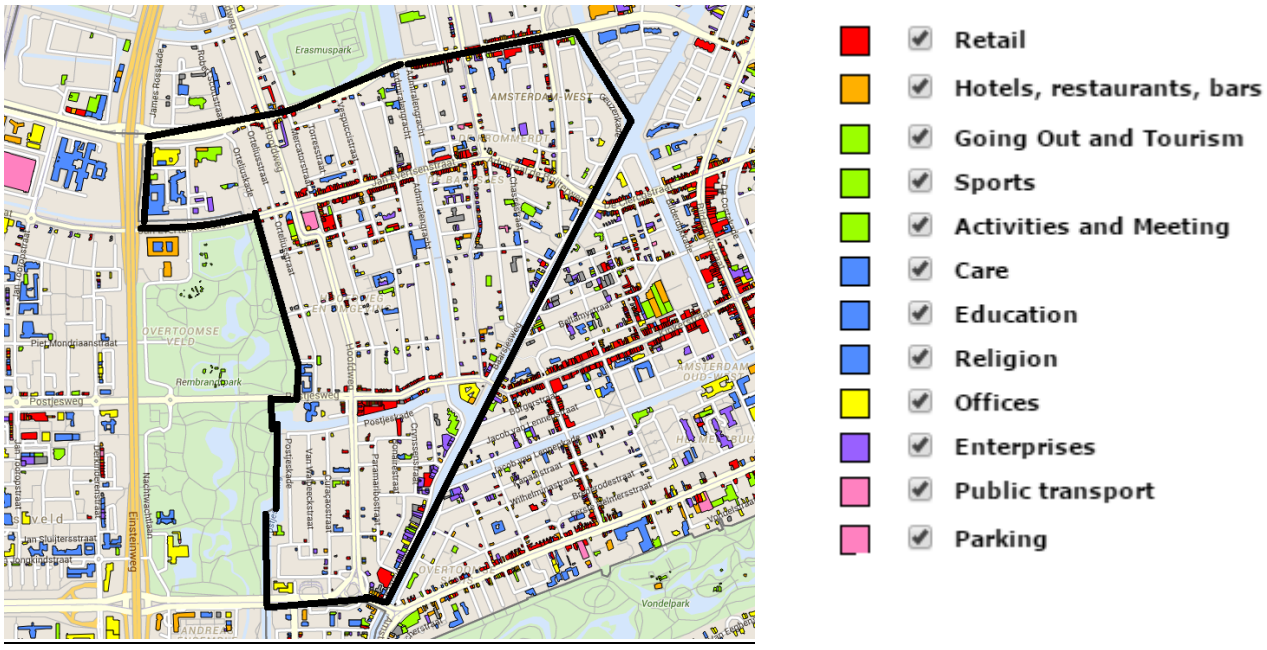


Figure 4.7: Land use in De Baarsjes 2014 (Source: Gemeente Amsterdam)

Land use in De Baarsjes is less dominated by retail in comparison with De Pijp. Much of the land is utilised for residential use. Difference in land use between De Baarsjes and De Pijp is an interesting point of comparison between the two case studies which may return differences in results. Despite

differences in land use, gentrification and renewal policy in the neighbourhoods have corresponding goals; to densify amenities and increase liveability. The impact of such difference on residents' perceptions of neighbourhood change will become apparent following survey analysis.

4.2.1. Historical development of De Baarsjes

The neighbourhood was designed and developed as part of an expansion plan of the city centre in the 1920s to be resident to commuters. Much of the housing and original buildings survived damage incurred during the second world war and was renovated in the following decades, preserving the original façade of the streets which is typical of the Amsterdam School architecture. The later established Rembrandtpark is the biggest green space in the neighbourhood.

The time in which the neighbourhood was created was a time of taboo around the culture of drinking alcohol, meaning that there are comparatively fewer historical bars and cafes evident in the neighbourhood, which is reflected in the scale of the local food environment in the present day. (iamsterdam, 2016).

The 1970s and 1980s was a time of urban renewal in De Baarsjes. However, much of this took place in the form of renovation as opposed to demolition and re-building. Also included in this renewal plan were efforts to instil a more community-oriented atmosphere to the neighbourhood by closing down businesses associated with crime and disorder. This development spurred the popularity of the neighbourhood for new residents such as young professionals in to the 1990s, thus sparking the gentrification process.

4.2.2. Gentrification in De Baarsjes

The reputation of the neighbourhood of De Baarsjes has changed through gentrification. The neighbourhood is steadily detaching itself from its prior image of a neighbourhood of above-average crime levels and general disrepair. At the earliest temporal stage of gentrification in De Baarsjes, 2004, reports from the municipality of Amsterdam demonstrate that life quality for residents was continually decreasing (Gemeente Amsterdam, 2005). The aim of gentrification policy is to reverse this trend. A rise in creative industries has become apparent in the neighbourhood, attracting creative classes to the area and building new demand for amenities which suit the needs of this group. The high quality of infrastructure in the neighbourhood attracts housing investors which spur gentrification further.

5. Research Question 1 Empirical Findings

This chapter presents results obtained from the analysis of datasets regarding land use of the food environment across Amsterdam. Alongside results, discussion in to how food environments in De Pijp and De Baarsjes have been affected will be initiated with reference to relevant theory. The purpose of this chapter is to answer the following research question:

> To what extent has gentrification had significant effect on the rate and scale of changes to the local food environments of De Baarsjes and De Pijp?

Datasets supplied by Locatus were utilised to assess changing land use in terms of local food environments in Amsterdam's neighbourhoods. The datasets provided information outlining the function of plots in 2003, 2009 and 2015, alongside the branch type at that location. Branch types were categorised under the following headings;

Hospitality, Party centre, Fruit and Vegetable shop, Baker, Asian Supermarket, Chocolatier, Coffee/Tea retail, Delicatessen, Cheese shop, Convenience store, Foreign food store, Nut shop, Luxury butchers, Butchers, Eco/Biological supermarket, Off-license, Supermarket, Tobacco, Fast-food, Take-away, Kebab shop, Ice-cream, Lunchroom, Pancakes, Café-Restaurant, Fishmongers, Sweetshop, Hospital shop, Other food store, Café, Coffeeshop, Discotheque, Nightclub

Locatus provided location data based on '*wijkbuurt*' in Amsterdam. The *wijkbuurt* categories which make up De Pijp were selected as Oude Pijp and Nieuwe Pijp, and those making up De Baarsjes were selected as Van Galenbuurt, Hoofdweg e.o. and West Indische Buurt, as defined in 'Stadsdelen in Cijfers 2005' (Gemeente Amsterdam). Local food environment statistics for these neighbourhoods were compared with levels for Amsterdam as a whole.

With the aim for the research project in mind- to provide insight in to how the nutritional health of residents is affected when their neighbourhood is gentrified- it is necessary to compare pre- and post-gentrification data. Third-wave gentrification in Amsterdam, spurred by the newly deregulated housing market's priorities to take advantage of the high demand for accommodation in the city (Teernstra, 2015) is identified as taking place in the late 1990s and early 2000s. The data for 2003, therefore, is an appropriate indicator of the food environment at the earliest temporal stage of the gentrification process. Data for 2015 provide evidence of the post-gentrification food environment.

Branch types, as named in the dataset, were grouped in to broader categories to allow logical comparison and analysis. This was repeated several times to allow insight in to where the most significant changes have occurred. The categories are divided in to those indicative of gentrification in the neighbourhoods, relating to the distribution and quantity of food retail and service establishments. Then, accessibility is assessed in relation to the affordable food scene and the availability of fruit and vegetables. Following this, a deeper discussion of how these patterns relate to the wider context and other literary investigations will be employed.

5.1. Physical alterations to food environment

Categories relating to food retail and service distribution were considered to be relevant as they make up the substance of the local food environment, thus, changes here are indicative of how gentrification has altered the nature of the food environments. Whilst a changing food retail and service scene does not directly imply less accessibility (as affordability and availability are not considered), this is nonetheless a valuable insight in to the physical alteration that residents have experienced through gentrification. These changes are highlighted to exemplify the differing nature of gentrification in the neighbourhoods.

Distinctions were drawn between the food service industry and the food retail industry to identify how levels of each in gentrified neighbourhoods had been altered. It was expected based on investigations in to existing literature regarding gentrification, that a gentrified neighbourhood would see a divergence away from food retail and toward food service. This hypothesis was based on Van Gent's (2013) exploration of gentrification in Amsterdam, where adding cultural amenities was seen as a means to upgrade the neighbourhood and attract 'urbanites'. Moreover, despite gentrification in Amsterdam being inherently led by the neoliberal housing market (Teernsta, 2015), it is acknowledged that increasing the density of amenities in non-city centre locations is another key component to Dutch gentrification. To allow the expansion of the food service industry, it was thus expected that the food retail industry would be pushed in to decline.

Firstly, the data sets were grouped according to food retail and food service industry. Table 5.1 indicates how branch types were grouped;

Food Retail	Food Service	Other
Chocolatier, Coffee/Tea, Delicatessen, Eco/Biological Food store, Nuts shop, Cheese shop, Luxury butchery, Butchers, Fishmongers, Fruit and Vegetable shop, Baker, Asian supermarket, Supermarket, Convenience store, Other food store	Fast food, Takeaways, Kebab shop, Ice-cream, Sweet shop, Restaurant, Lunchroom, Pancakes, Café-Restaurant, Café, Coffeehouse, Hospitality, Hotel-Restaurant	Tobacco, Off-license, Coffeeshops, Party centre, Discotheque, Nightclub, Hospital shop, Hotel

Table 5.1: Categorisation of food retail and service industry

Table 5.2 displays the changes in the food retail and food service industries in Amsterdam, De Baarsjes and De Pijp in 2003 and 2015 based on the number of establishments in each category as listed in the land-use data.

Area	Food Retail			Food Service			Other	
	2003	2015	% change	2003	2015	% change	2003	2015
Amsterdam whole	1091	1185	8.6%	3047	3131	2.8%	883	839
De Baarsjes	34	38	11.8%	72	68	5.5%	19	19
De Pijp	59	75	27.1%	229	274	19.7%	39	51

Table 5.2: Changes to food retail and service industries 2003-2015

De Baarsjes has seen growth in both retail and service industries at a slightly higher rate than the city average. De Baarsjes is branded by Amsterdam's tourism board as an 'up and coming' district and the neighbourhood is recurrently mentioned in urban renewal policy documents, suggesting gentrification is reshaping De Baarsjes. It was expected that food service growth in this area would increase through gentrification in attempts to improve the appeal of the neighbourhood to locals in the wider city area. According to Amsterdam's tourism board, figures for the food service industry in De Baarsjes are historically low in the area due to its creation in the 1920s when bars and cafes were more taboo (iamsterdam, 2016).

In De Pijp, the food retail industry has seen growth at a much higher rate than that of the city average. It is worth considering whether this growth is in line with population growth in the neighbourhood. However, in 2005, the population of De Pijp stood at 25288 and in 2013, this figure had risen by just 4.7% to 26489. The growth in food retail (27.1%) is much higher than population

growth and so this cannot be attributed to tending to the needs of the population, and is instead suggestive of an attention to increasing amenities, typical of gentrification. De Pijp's popularity as a trendy yet affordable neighbourhood continually grows. This is mirrored in the growth of the food service industry.

Overall changes to the food environments of De Pijp and De Baarsjes have been mapped using data supplied by Locatus and ArcMap. The following maps present a visual aid to provide an overview of alterations to the neighbourhoods. Data points on the map have been divided in to four categories; a category showing where establishments have closed since 2003; a category showing where establishments have changed ownership; a category showing where new establishments have opened; and a category showing which establishments have kept the same function. These categories are presented by the symbols as follows:

✕	Closed establishment
●	Establishment under new ownership
●	Unchanged establishment
●	New establishment

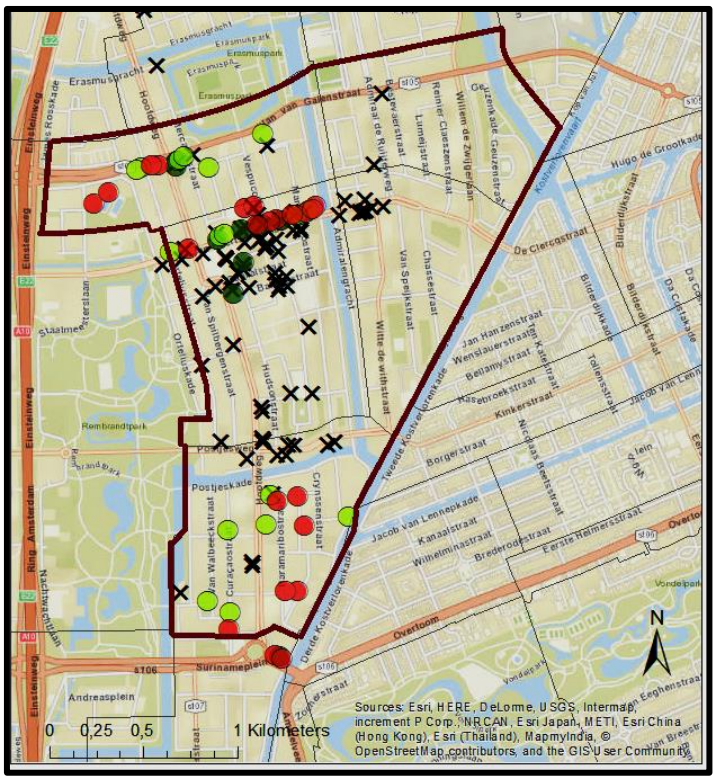


Figure 5.1: Map showing transformation of the local food environment of De Baarsjes 2003-2015

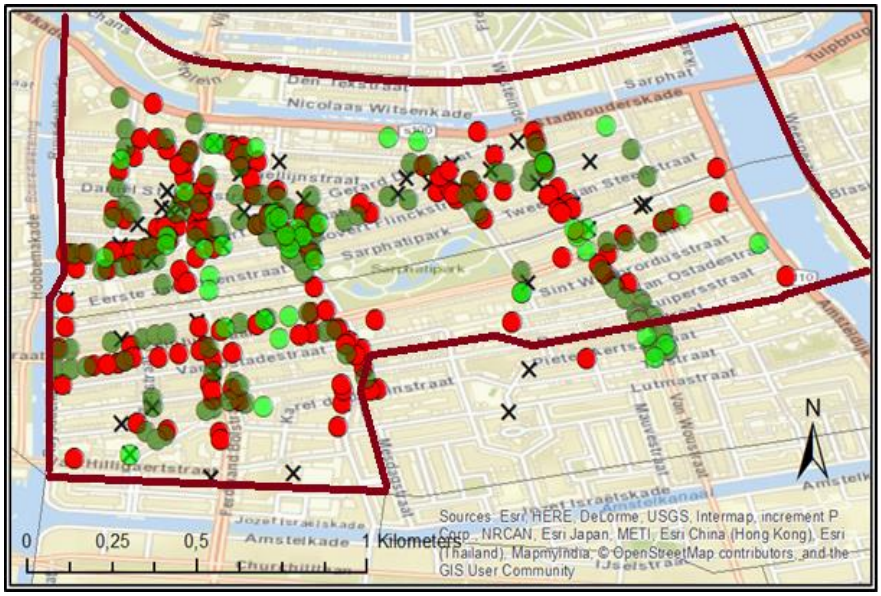


Figure 5.2: Map showing transformation of the local food environment of De Pijp 2003-2015

Implication of physical alteration to the food environment

Some studies (Pearce et al, 2005) investigating place and health outcomes utilise geographical distance to resource as the primary indicator of accessibility. Whilst this approach to accessibility provides limited insight, it is a useful starting point from which to view neighbourhood changes. Figures 5.1 and 5.2 provide a visual representation of alterations over time to the food retail and service environments in De Baarsjes and De Pijp, highlighting which areas of the neighbourhoods may feel the greatest impact of gentrification. De Baarsjes in particular shows significant change, with a vast number of closed establishments apparent on the map despite a growing food environment (Table 5.2). New establishments and those which have changed ownership are shown to be closely clustered around the neighbourhood's main commercial street, Jan Evertsenstraat. Pearce et al (2005) contend that greater proximity to resources results in better health outcomes for residents. Figures 5.1 and 5.2 shows that food retail establishments in both neighbourhoods have become less widely distributed in geographical terms, despite the total number of such shops increasing. Remaining establishments cluster in the neighbourhoods' commercial area, as is typical of urban structure, and do not spread across the neighbourhood. This uneven distribution of resources may result in worsened accessibility for residents living on the outskirts of the neighbourhood despite figures suggesting that the retail environment has improved.

The distribution of establishments perceived as examples of gentrification may have impact upon residents' perception of neighbourhood change; for example, residents living on a street which has seen significant renewal, or residents living in an area of the neighbourhood where food retail establishments have closed, are more likely to be aware of gentrification in their daily lives compared with those living on a street where little change has occurred.

5.2. Gentrification and accessibility

Of central importance to this thesis is the impact of these changes on residents' health outcome. To decipher this, it is necessary to look at specific changes in the food environment by categorising the data to see which branch types have experienced the most significant alterations through gentrification.

5.2.1. Affordable and luxury food retail

Firstly, the data has been categorised in to affordable and luxury food retailers in the following way;

Affordable Food Retail	Luxury Food Retail
Butchers, Fishmongers, Fruit and Vegetable shop, Baker, Asian Supermarket, Supermarket, Convenience Store, Other food store	Chocolatier, Coffee/Tea, Delicatessen, Luxury Butchers, Eco/Biological Food Store, Nuts shop, Cheese shop

Table 5.3: Categorisation of food retail environment in to affordable or luxury

Table 5.4 displays the changes in the affordable and luxury food retail industries in Amsterdam, De Baarsjes and De Pijp in 2003 and 2015.

Area	Affordable Food Retail			Luxury Food Retail		
	2003	2015	% change	2003	2015	% change
Amsterdam whole	900	959	6.60%	191	226	18.3%
De Baarsjes	32	33	3.10%	1	3	200.0%
De Pijp	43	62	44.20%	13	13	0.0%

Table 5.4: Changes in affordable/luxury food retail 2003-2015

Figures show that whilst the number of affordable food retail establishments has risen in both neighbourhoods, growth in De Baarsjes was slower than average for the city, whilst growth in De Pijp far exceeded the average. Changes in numbers of such branches in De Baarsjes, De Pijp and overall for Amsterdam were compared for pre- and post-gentrification years. It was expected that luxury food retailers would increase at a higher rate than affordable food retailers in the gentrified

neighbourhoods. This would be in accordance with the suggestion that urban renewal aims to cater to a more affluent resident, in line with Hackworth's (2002) definition of gentrification.

The luxury food retail scene has grown at a higher rate than the affordable food retail scene across Amsterdam as a whole. At a neighbourhood level, number of luxury outlets have shown little/no change despite seemingly large percentages. This fact is attributable to the small scale of the neighbourhood and the limited number of luxury food retail outlets in the sample; 200% change in De Baarsjes refers to an increase from 1 shop to 3 shops.

Implication of changing affordability

Figures for De Baarsjes show that the affordable food industry increased below city average whilst the luxury food environment increased by a figure of 200%. The expansion of the luxury food environment refers to growth from 1 to 3 stores. However, relative to neighbourhood size this may still be considered a notable increase. This increase is in line with predictions based on Hackworth (2002) that amenities will be adjusted to cater for a more affluent resident. The creation of luxury food outlets both caters to and attracts new, affluent residents. Moreover, Luckins (2009) suggests that during gentrification, food environments do not necessarily increase in size, but change in character to become more cosmopolitan and commodified. This change can be identified in De Baarsjes where there is evidence that food has become more specialised, but has not reduced in number.

De Pijp's growth is entirely within the affordable food retail industry. The luxury food retail environment in De Pijp did not expand, contrary to predictions and the pattern seen in De Baarsjes. With reference to Table 5.2, it is apparent that gentrification in De Pijp is materialised more prominently in the form of new food service establishments.

Table 5.4 shows that in Amsterdam as a whole, the affordable (6.6%) and luxury (18.3%) food retail industries both experienced growth. Retaining that the city's population growth stood at 12.3% over this time period, the affordable retail industry does not grow at a rate which is relative to the population growth. However, the luxury food retail industry grows at a rate which outstrips population growth, meaning there are more opportunities to shop at luxury food outlets per individual.

Whilst growth in the food retail industry is initially suggestive of an improvement to physical food accessibility (where proximity alone is used to determine accessibility), it is necessary to consider Breyer and Voss-Andreae's (2013) notion of a food mirage. This idea is developed specifically in

reference to gentrified neighbourhoods in the USA. Food mirages occur when food retail numbers increase but the goods stocked by such retailers increase in cost, and so become unaffordable to low income residents. Assessment of whether this is the case in De Baarsjes and De Pijp is allowed by comparison between actual change and perceived change, and will be addressed in chapter 6. By further dividing the food retail industry in to categories of affordable and luxury retailers, initial impressions may be gauged indicating whether a food mirage may be apparent in Amsterdam's gentrified neighbourhoods.

5.2.2. Dining-out establishments

Van Gent (2013) contends that in Amsterdam urban regeneration is, in part, focused on increasing cultural amenities in urban centres, including the likes of trendy restaurants, bars and cafes. To assess this, the numbers of such amenities are considered, though to what extent they could be considered 'trendy' cannot be established through numbers alone.

Firstly, a number of comparisons will be made of growth in industries associated with urban regeneration which are perhaps indicative of an upgraded neighbourhood. These include cafes and restaurants and food retail stores catering towards a more affluent user. Secondly, accessibility to healthy food options will be assessed, taking number of stores as a proxy indicator, as information on store size is not included in the dataset. Whilst proximity is an important indicator of accessibility, the results will be analysed in accordance with residents' perceived accessibility to ensure a relational approach to distance is managed.

Table 5.5 considers the branch types: coffeehouse, cafe, café-restaurant, restaurant, hotel-restaurant and hospitality.

Area	Dining-out establishments		
	2003	2015	% change
Amsterdam Whole	2165	2292	5.90%
De Baarsjes	42	39	-7.10%
De Pijp	160	182	13.80%

Table 5.5: Dining-out establishments 2003-2015

Implication of expanding food service industry

An in depth analysis of Amsterdam's food environment was carried out to establish a thorough understanding of how the neighbourhood figures compare with average change. In order to gain

greater insight in to the impact of Van Gent's (2013) depiction of Dutch gentrification as a means to increase amenities, specific amenities have been considered. Luckins (2009) also contends that a gentrified neighbourhood will include more cosmopolitan dining-out opportunities. While it is evident that the overall food service industry (inclusive of fastfood, kebab shops and ice cream shops) has shown various levels of change in the researched neighbourhoods (Table 5.2), this category has been filtered to include only branches which relate to dining-out establishments. The purpose of this is to see whether cosmopolitan dining opportunities have increased in accordance with expectation from gentrification literature.

Table 5.5 indicates where these changes are most visible. The average increase in dining-out opportunities for Amsterdam is 5.9%. Compared with the figure for overall increase to the food service industry of 2.8%, this shows that there is an increasing demand for dining-out opportunities in comparison with other food service branches such as less healthy fast food outlets. This could be considered an example of how the city has upgraded amenities away from an unhealthy, low cost foodscape toward a more service oriented, commodified version of dining.

Decrease in food service was already evident in De Baarsjes in Table 5.2, but here it is possible to see the extent to which this decrease was in dining-out industries as opposed to other, typically less expensive, food service industries such as kebab shops and fast-food. The decrease in dining-out establishments in De Baarsjes is atypical compared with the pattern for the city overall, and not what was expected of a gentrified neighbourhood, though 7.1% represents the closure of only 3 establishments. The decrease in the food service industry should not be interpreted as negating De Baarsjes' status as a gentrified neighbourhood, however. Whilst literature suggests that gentrified neighbourhoods will be subject to increasing amenities (Van Gent, 2013; Hackworth, 2002), this is not the only criteria for gentrification.

In De Pijp, figures for the dining-out industry are more in line with expectations for a gentrified neighbourhood and show a much more significant increase in dining-out opportunities when compared with the city average. Here, a 13.8% increase is evident. De Pijp also saw a large increase in the food service industry as a whole, at 19.7%. It can be considered that De Pijp's food environment is following a pattern of gentrification more typically in line with existing literature.

Luckins (2009) suggests that, through gentrification, neighbourhood food environments are altered but not necessarily expanded. Alterations typically transform traditionally style pubs and cafes which catered to non-gentrifiers in to cosmopolitan restaurants which commodify dining-out as an exclusive experience. It is possible that this type of gentrification has occurred in De Baarsjes, yet this may not be reflected in figures alone as the dataset utilised for this investigation does not take in to account

the affordability of dining-out ventures. It could be the case that whilst numbers of establishments have decreased, affordability and accessibility to such amenities have also decreased. This limitation in the dataset may mask significant barriers to affordability; for example, traditional Dutch 'brown' cafes are categorised under the same branch as exclusive Michelin star awarded café-restaurants. This has been investigated later in this thesis with the use of specific case study examples of the changing food environment in De Baarsjes and De Pijp. In De Pijp, an expansion of the food service sector also exemplifies the commodification of food, but in this case amenities were added instead of converted. From residents' responses it will be possible to assess the impact of these differing trends in gentrification.

Implication of expanding food retail industry

The growth in the food retail industry may be indicative of an improvement to food accessibility in Amsterdam, though could also be attributable the demands of an increasing population in the city. In 2016 the population of Amsterdam stood at 833 624, compared with 731 288 in 2000 (Central Bureau voor Statistiek, 2016). This is a growth of 12.3% and so it is valid to assume that the expansion of the food retail industry is necessary to serve this new population. However, as growth of population has increased at a higher rate than growth of the food retail shops, there are actually less food retail opportunities relative to the size of the population.

This growth was predicted as a consequence of gentrification due to suggestions amongst academics that gentrification will increase amenities aimed at enticing more affluent residents to an area (Atkinson, 2000; Hackworth, 2002). Datasets show evidence of this development occurring in De Pijp, though data for De Baarsjes works to oppose this theory. This may be attributed to the context of De Baarsjes growth, in that it was an area traditionally lagging in food service, or it could be the case that although numbers of outlets are not increasing, the character of outlets may be changing. One gentrification characteristic which may support this can be found in the food mirage explanation (Breyer and Voss-Andreae, 2013).

5.2.3. Fruit and vegetable availability

Further investigations in to the food environment concentrate on the means by which healthy eating habits may be altered by gentrification. In line with numerous previous studies assessing place and health as affirmed by Caspi et al (2012), fruit and vegetable intake is used in this study as an indicator of a heathy diet. Therefore, fruit and vegetable availability in the neighbourhoods is measured. Firstly, numbers of greengrocers in Amsterdam, De Baarsjes and De Pijp are considered.

Area	Fruit and Vegetable shop		
	2003	2015	% change
Amsterdam Whole	83	49	-41.00%
De Baarsjes	3	1	-66.70%
De Pijp	2	1	-50.00%

Table 5.6: Change in number of fruit and vegetable shops 2003-2015

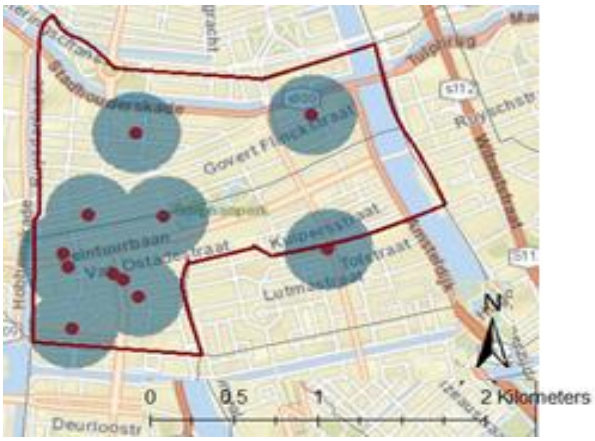
However, the sale of fruit and vegetables is not limited to these shops. This category is expanded to include the branches: supermarket, foreign food store and other food store. These branches also supply fruit and vegetables to the local community. Results are displayed in Table 5.7.

Area	Fruit and Vegetable Availability		
	2003	2015	% change
Amsterdam whole	281	333	18.5%
De Baarsjes	11	5	-55.5%
De Pijp	26	19	-26.9%

Table 5.7: Change in fruit and vegetable availability 2003-2015

Figures in Table 5.6 and Table 5.7 show a notable decrease in fruit and vegetable availability in the neighbourhoods. Results in Table 5.6, though important, are limited by a small sample size (3 and 2 fruit and vegetable shops in De Baarsjes and De Pijp respectively). By including other store types which also commonly supply fresh fruit and vegetable options, a more realistic representation of availability is possible. When studying availability, proximity is an important factor. This has been investigated using ArcGIS. Aggarwal et al (2014)'s study of accessibility and fruit and vegetable consumption uses a radius buffer of 0,1miles to analyse distance travelled to supermarkets. A radius buffer of this size was implemented using ArcGIS software's Buffer tool around each point representing fruit and vegetable availability in the studied neighbourhoods. This buffer distance is considered an appropriate indicator of the distance those with limited mobility (no access to a car) may comfortably travel on foot to reach local amenities. In the sample surveyed in this investigation it is apparent that a mean average of 61.1% of respondents across both neighbourhoods do not have access to a car. Moreover, a mean average of 48.3% of respondents across both neighbourhoods earn lower than the average income for the Netherlands (Table 5.3). This suggests that many residents in the studied neighbourhoods have low mobility and so may be more reliant on resources local to their

home. Thus, the buffer distance of 0,1 miles is applicable in this context. The following maps are a visual aid allowing insight in to which areas of the neighbourhood are most affected by the closure of establishments supplying fresh fruit and vegetables.

	2003	2015
De Baarsjes	 *Figure 5.3: Map showing fruit and vegetable accessibility in De Baarsjes, 2003*	 *Figure 5.4: Map showing fruit and vegetable accessibility in De Baarsjes, 2015*
De Pijp	 *Figure 5.5: Map showing fruit and vegetable accessibility in De Pijp, 2003*	 *Figure 5.6: Map showing fruit and vegetable accessibility in De Pijp, 2015*

Implication of changes to healthy food access

Both De Baarsjes and De Pijp showed notable levels of decrease in terms of fruit and vegetable availability. Decrease in both neighbourhoods is higher than the city average, and also may be indicative of a changing shopping culture. This is taken into account by considering numbers of other food retailers which are also likely to stock fresh fruit and vegetables. Included in this group are supermarkets, foreign supermarkets and the category 'other food store', in addition to fruit and vegetable stores.

De Baarsjes has shown the most significant decrease in fruit and vegetable availability of 55.5% (6 shops). This is particularly outstanding considering that De Baarsjes saw an increase in the food retail industry as a whole. This could suggest that the food retail industry in De Baarsjes, although expanding, is not focused on retaining healthy options for the lowest income residents. Though a decreasing availability in local healthy food sources may be considered to impact upon all residents, not just the non-gentrifiers, it is noted that more affluent residents are more likely to have access to personal transport such as a car, and so are not restricted by the boundaries of their own neighbourhood. This is reflective of Morland et al (2002)'s contention that lower income residents are more reliant on local food sources, and therefore are more likely to be affected by a decreasing availability of healthy and affordable options.

Similar results are seen in De Pijp where there is a 26.9% decrease (7 shops) in stores offering fruit and vegetables. Though this decrease initially seems less momentous, the closure of stores is expected to impact upon residents' self-assessed accessibility to fruit and vegetables. When this is considered alongside figures 5.4 and 5.6, it is apparent that the closure of stores is spatially distributed in a way which worsens accessibility for those living in the centre and the East of the neighbourhood, whereas those living in the West where most remaining stores are clustered, are likely to be less affected by store closures.

Overall in Amsterdam, fruit and vegetable stores have decreased 41% between 2003 and 2015. This may be indicative of a changing culture in the way people choose to shop, with a shift away from a traditional shopping trend of visiting multiple stores (butchers, greengrocers, bakers etc.) toward the convenience of supermarket shopping where a range of produce is available under one roof. The increase in fruit and vegetable availability overall (Table 5.7) supports this notion. However, a decrease in fruit and vegetable availability within an area where low income residents are reliant on local food resources (Morland et al, 2002) is likely to impact diet. A report published by the Global Agricultural Information Network (GAIN) investigating retail food trends in the Netherlands affirms that changing food shopping trends has affected numbers of fruit and vegetable shops;

> *"Grocery stores, butcher stores, bakeries etc. increasingly face competition from food retail chains. Through extra service, sales of high-quality added value products and the service of niche markets, they try to survive. Traditional butcher shops and fruit & veggie shops are becoming specialty shops and high-end caterers, while traditional bakery shops are moving into pastry and artisanal specialty breads"* (GAIN, 2015)

This move toward high-end catering is indicative of a food environment designed to meet the demands of more affluent residents, thus excluding low income residents from accessing affordable fresh produce.

5.3. Reflection on findings

The purpose of this chapter was to answer the research question:

- To what extent has gentrification had significant effect on the rate and scale of changes to the local food environments of De Baarsjes and De Pijp?

This has been answered by firstly investigating the material nature of the changes to the food environment by considering alterations to the retail and service establishments in the neighbourhoods, gaining insight in to the overall structure of the food environments. Secondly, specific aspects of the food environments which are identified as having particular influence over resident accessibility were then measured. Comparisons were made against overall figures for Amsterdam.

Figures from the Locatus dataset show physical alterations to the local food environment have occurred in two of Amsterdam's gentrified neighbourhoods. Closer study of these figures show that gentrification, though evident in both cases, has manifested in different ways. In De Baarsjes figures suggest that the changing food environment is most prominent in the food retail sector with a turn toward more specialist and exclusive food retailers, whereas in De Pijp changes are most prominent in the food service sector with a large increase in dining out opportunities for locals. These changes are in line with existing gentrification literature. Further investigation in to these datasets extends beyond considering how the changes have materialised, in to specific aspects of the food environment which determine accessibility. In particular, fruit and vegetable accessibility has decreased in the gentrified settings.

Changes are apparent in both neighbourhoods, but the impact of these changes on residents' health can only be assessed following an investigation in to residents' relational proximity to their food environment. To investigate this, residents were surveyed and results have been discussed in the following chapter.

6. Research Question 2 Empirical findings

Presented in this chapter is the analysis and discussion of survey respondents' perceived accessibility to healthy food, taking in to consideration the extent to which gentrification may be attributed as a controlling influence in the relationship between urban regeneration policy and healthy dietary intake. The research question

> **In what way has the individual food environment of non-gentrifying residents of De Baarsjes and De Pijp been altered since pre-gentrification levels, in terms of perceived accessibility and food consumption patterns?**

is addressed in this chapter. Moreover, connections will be drawn between the significance of these results and results from previous dataset analysis and existing literature. Following this, links will be drawn between the two sub research questions to construct an answer to the main research question;

> **'What structural changes affect behavioural outcomes in relation to gentrification and dietary intake?'**

The distributed survey (Appendix 1) consists of a number of statements where respondents were asked to respond on a five-point Likert Scale ranging from 1-5; Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5). For the purpose of analysis, responses have been grouped in to nominal categories of 'accept' and 'reject'. Neutral statements were grouped alongside those who disagree on the justification that the statement was not accepted.
'Reject' is coded as 0, 'Accept' is coded as 1.

In each case, a distinction is made between neighbourhoods by splitting the data file.

The distribution of responses to statements is presented in the following graphs. In each case the following legend is applicable:

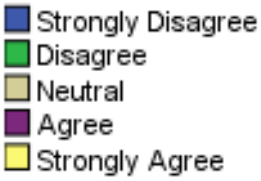


Figure 6.1 shows frequency of responses relating to accessibility and Figure 6.2 shows frequency of responses relating to affordability.

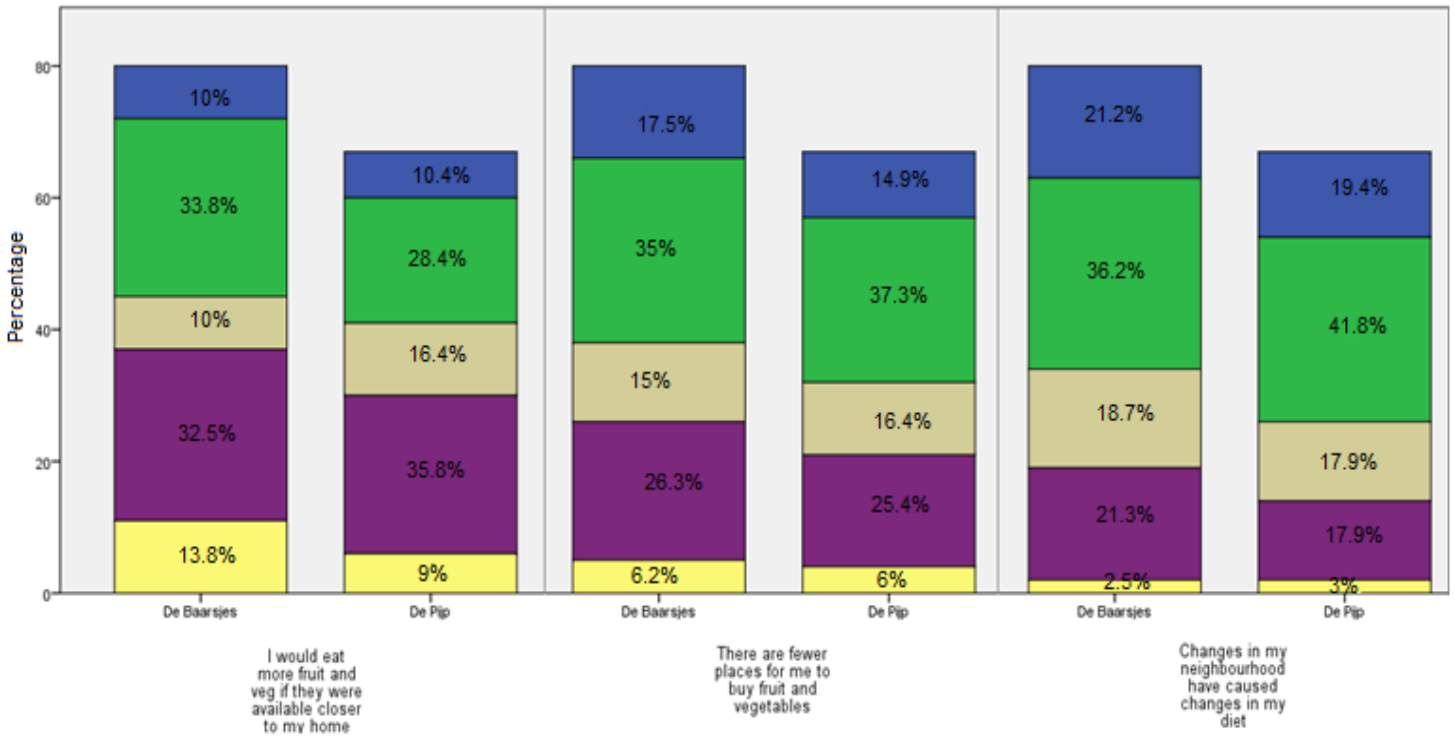


Figure 6.1: Frequency of responses to statements relating to accessibility

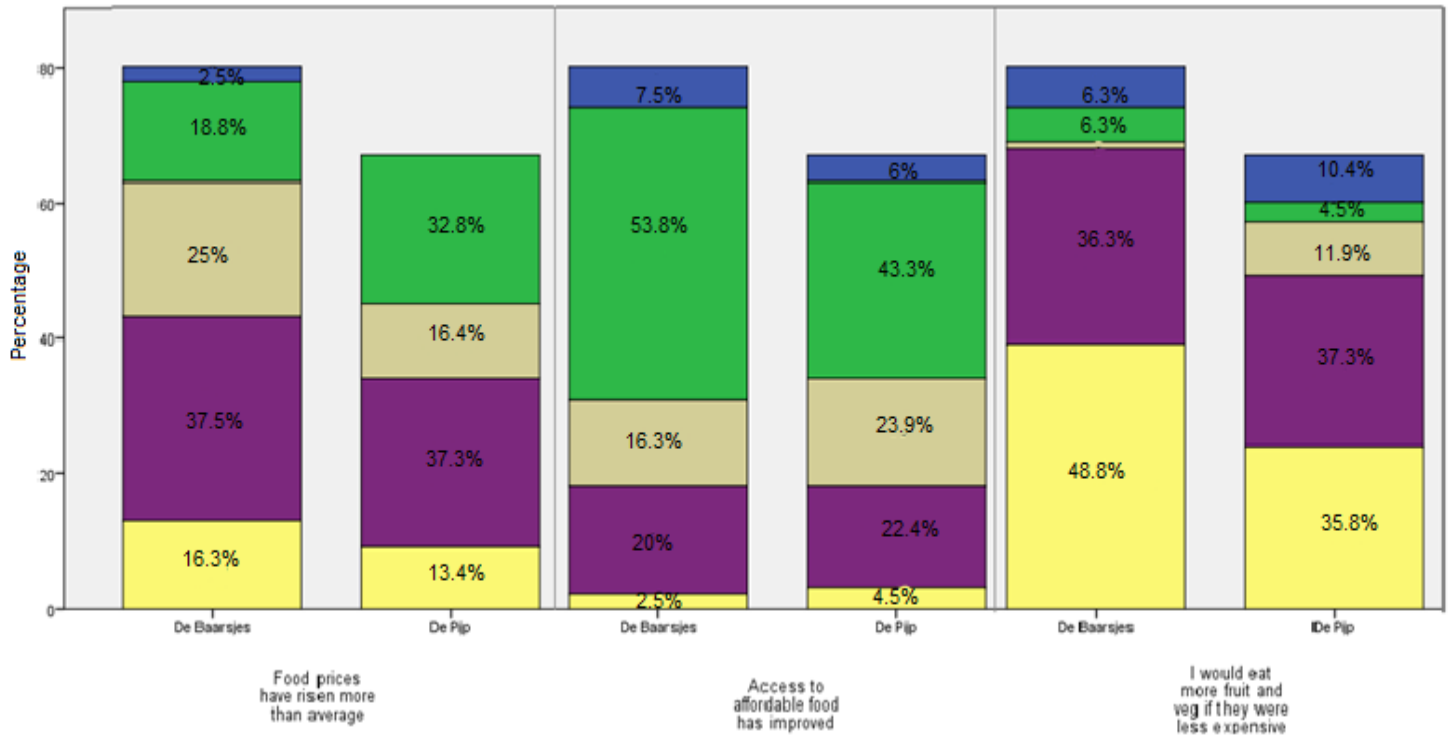


Figure 6.2: Frequency of responses to statements relating to affordability

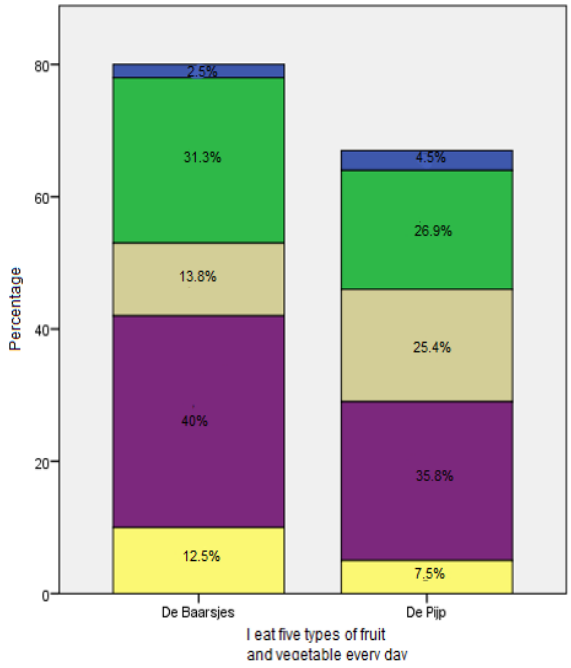


Figure 6.3: Fruit and vegetable intake frequency

At the outset, an independent-samples t-test has been performed to check for a neighbourhood effect on dietary intake by including De Pijp and De Baarsjes alongside dietary intake. No significance was found between the mean value of intake and neighbourhood where n=145, Tvalue=0.769, p=0.191. This is aligned with expectation as both neighbourhoods have undergone the process of gentrification led by the same policy guidelines. In order to attribute outcomes of the process back to policy measures, it is insinuated that direct policy outcomes will not be largely disparate between neighbourhoods.

6.1. Individual characteristics as a determinant of accessibility

Data regarding the respondents' individual characteristics was gathered in order to establish whether there is significant relationship between such factors and healthy dietary intake. It is critical to assess the impact of such characteristics in order to ensure that their influence is not controlling factors relating to affordability and accessibility, allowing false causation to be ascribed. For example, the income of the individual may influence the perception of affordability. Independent-sample t-tests were run using the binary transformation of the statement 'I eat five pieces of fruit and vegetables every day' as the dependent variable. Tests were run for the variables: age, gender, car ownership, income, education and personal preference. Results are displayed in Table 6.1.

						T - test		
		n	var	mean	SD	Mean difference	T-value	P-value
Age	De Baarsjes	80	Under 26	1.8696	1.68696	-1.72693	-3.755	.010
			27+	3.5965	1.92595			
	De Pijp	67	Under 26	2.0526	1.80966	-.94737	1779	.000
			27+	3.0000	2.02116			
Gender	De Baarsjes	80	Man	2.9556	2.02210	-.33016	-.727	.361
			Woman	3.2857	2.00839			
	De Pijp	67	Man	1.8235	1.64170	-1.84314	-4.234	.022
			Woman	3.6667	1.91485			
Car ownership	De Baarsjes	80	Owns car	3.6667	1.91785	.90667	1.989	.057
			Does not own car	2.7600	2.00571			
	De Pijp	67	Owns car	3.3704	2.00285	1.07037	2.215	.215
			Does not own car	2.3000	1.89737			
Income	De Baarsjes	80	Low income	1.2000	.89443	-2.53333	-5.804	.000
			Ave-High Income	3.7333	1.87641			
	De Pijp	67	Low Income	1.3333	1.12932	-2.17829	-4.999	.000
			Ave-High Income	3.5116	1.95633			
Employment	De Baarsjes	80	High School	2.7143	2.05421	-0.46753	-0.789	.689
			Uni/HBO	3.1818	2.00698			
	De Pijp	67	High School	2.5385	2.02548	0.23932	-.385	.355
			Uni/HBO	2.7778	2.00628			
'Health is important to me'	De Baarsjes	80	Accept	3.0952	2.01378	.02241	0.41	.932
			Reject	3.1176	2.05798			
	De Pijp	67	Accept	2.8824	2.01640	-.63235	-1.107	.010
			Reject	2.2500	1.91485			
Independent variable: *'I eat five types of fruit and vegetable every day'*								

Table 6.1: Independent Sample T-Tests between individual characteristics and intake

Appendix 2 shows a correlation matrix including variables relating to individual characteristics and the variable food intake. Significant associations are apparent in the matrix, many of which can be explained by logical reasoning. A significant correlation is apparent between the variable income and the variables car ownership, age, employments and fruit and vegetable intake. Figures show that a higher income is associated with higher car ownership, higher age, full-time employment, and fruit and vegetable intake in both neighbourhoods, plus further education in De Pijp. Unexpected results here suggest that there is a significant correlation between car ownership and gender; in both neighbourhoods, males are more likely to own a car. Of interest is the variance between neighbourhoods in correlations with food intake. In De Baarsjes, a positive correlation is apparent between fruit and vegetable intake and the variables income, car ownership, age and employment. In De Pijp, this correlation is only significant for the variables income and gender.

Age

Age groups are recoded so that category 1 refers to the age groups Under 18 and 18-26 and category 2 refers to the age groups 27-64 and 65+. Age of respondent plays a significant role in fruit and vegetable intake in De Baarsjes, but not in De Pijp. This is apparent in the correlation matrix (Appendix 2) and in the independent t-test between age and fruit and vegetable intake (Table 6.1). Respondents aged 27+ eat more fruit and vegetables than younger respondents. This could be attributed as a trend in personal taste among this age group, an awareness of or desire to eat more healthily. Or, in part, this association could be altered by the correlation between age and income; in this sample older respondents tend to have a higher income and this has an influence over fruit and vegetable intake.

Gender

In De Baarsjes, gender shows no association with healthy dietary intake. In De Pijp, women are statistically more likely to consume fruit and vegetables. This result was unexpected as previous studies on the topic of place and health have not given gender precedence as an influential characteristic. Though interesting, this finding is not central to this project's investigation and is something which could be considered in future expansions on this topic.

Car ownership

In both neighbourhoods it is apparent that car ownership and healthy food intake are significantly related. Those who own a car currently eat five types of fruit or vegetable every day. Personal mobility is an influence which has been considered in previous studies. With the opportunity to access resources which are located further from the home by use of a personal vehicle, physical proximity is likely to be considered as less of a barrier in terms of accessibility. Therefore, those who have access

to a car may not report that their accessibility to healthy food resources has worsened, despite less availability within the borders of their neighbourhood. This is in line with Morland et al's (2002) suggestion that the lowest income groups with no access to a car are more reliant on their local food environment and are more likely to be affected by alterations at a neighbourhood scale.

Income

Income results were recoded so that category one refers to low income respondents- those whose average yearly income is lower than 25000 euro. Category 2 refers to respondents of average-high income (25000+). Statistically different means of the variables income and fruit and vegetable intake were apparent in both neighbourhoods, suggesting that lower income respondents tend to eat fewer fruit and vegetables. This corresponds with the relationship apparent in the correlation matrix (Appendix 2).

Income is a factor of influence considered in previous studies as particularly relevant. A higher income may enable consequences including increased personal mobility- either in terms of car ownership, money available to spend on travelling further to resources using public transport, or a higher budget allocated for groceries- so affordability is considered less of a barrier in determining intake. Neighbourhoods undergoing gentrification have a high proportion of low-income residents; in De Baarsjes 46.3% of respondents are classed as low-income, and in De Pijp this figure is 50.7%. The association between income and diet is particularly interesting in this case, as survey analysis suggests that residents do not perceive changing affordability as a barrier to fruit and vegetable intake. This could be in part explained by the notion that prices of fruit and vegetables have not increased as a direct result of the process of gentrification, and perhaps another factor exists which restricts intake for low income groups. It is difficult to determine what this causal factor could be without further interaction with residents, though speculation is possible.

Respondents were given the opportunity to leave comments regarding neighbourhood change after completion of the survey. Responses from both neighbourhoods often highlighted that fruit and vegetables were an expensive commodity, though, interestingly, one respondent explained that rising prices of fruit and vegetables, though undesirable, did not restrict their intake but instead meant that more money would be budgeted for groceries and less money would be spent on other aspects of their life, for example dining out. This explanation could be replicated across income groups to offer some explanation toward the fact that respondents have, in general, not considered affordability to have altered dietary habits despite low income groups consuming fewer fruit and vegetables. Residents in the low-income bracket may have, since pre-gentrification years, budgeted a smaller

amount for fruit and vegetables, and thus have always consumed fewer. Therefore, throughout gentrification in De Baarsjes and De Pijp, these residents would not agree with statements that dictate that affordability is restricting their intake, despite consuming fewer fruit and vegetables than is considered satisfactory.

The notion that gentrification can negatively impact upon household income is something which is rarely applicable in the Netherlands where urban renewal is undertaken in a way which does not often cause direct displacement. However, in the context of the USA, there are cases apparent where local business owners are ousted from neighbourhoods where gentrification is being undertaken. An example of this is evident in Austin, Texas, where protests were held following the sudden closure of a local business selling piñatas in favour of a 'cat café', something locals perceived as typical of gentrification in the neighbourhood. In this case, the piñata business owners were forced out of their jobs and subsequently their income drastically decreased. Similar cases where local business owners have been damaged by neighbourhood upgrading are likely across gentrified neighbourhoods of the USA. By forcing residents in to the low-income bracket, impact on their dietary intake is likely.

It can be argued that in the case of De Baarsjes and De Pijp, income does have influence over dietary intake, but that does not necessarily alter perceptions of affordability through gentrification if healthy produce has always been unattainable. The survey used in this case focused on respondents' attitudes to how affordability had altered over the past decade of living in the neighbourhood, which offers an explanation as to why affordability has not changed, yet price remains a barrier. Thus, gentrification cannot be attributed as the force which instigates this barrier.

Education

Education results were recoded so that category 1 refers to those who completed high school education or lower, and category 2 refers to those who completed further education. In either neighbourhood, education has no influence over fruit and vegetable intake. Although it may be the case that education could raise awareness to the necessity of eating a healthy diet and therefore have some influence over dietary intake, no respondent in De Baarsjes or De Pijp had lower than a high school education so this is unlikely to be a determining factor in this case.

Individual preference

Frequency statistics relating to the individual dietary preference of residents are considered important to this study in order to negate the notion that fruit and vegetable intake in residents is low

due to a preference for a less healthy diet. If this was fact, then accessibility and affordability barriers would be undermined as the factors controlling intake. However, it is apparent that in De Baarsjes, 78.8% of residents agreed or strongly agreed that a healthy diet is important to them. In De Pijp, 76.1% agreed or strongly agreed that a healthy diet is important to them. In a scenario where it is assumed that there are no barriers to accessibility, the relationship between this statement and 'I eat five fruit and vegetables a day' should be highly significant. A t-test between these statements reveals that there is no apparent significance between means. Moreover, the correlation matrix (Appendix 2) shows that there is no correlation between this variable and intake in either neighbourhood. It is apparent, therefore, that in De Baarsjes and De Pijp, another factor is preventing residents who wish to eat a healthy diet from accessing fruit and vegetables. The reason for this can be further investigated using logistical regression to highlight which factors have most influence over dietary intake.

6.2. Food intake and accessibility

In the following analyses, the dependent variable is derived from the statement 'I eat five types of fruit and vegetable every day' which has been converted to a binary variable indicating a healthy diet. Values have been categorised as 0 (No) and 1 (Yes). Six independent-sample t-tests were run to investigate whether a significant difference in means is apparent between the dependent variable measuring fruit and vegetable intake and three statements relating to accessibility plus three statements relating to affordability. Answers are grouped according to neighbourhood by splitting the data file on SPSS. Results of these t-tests are displayed in Table 6.2.

						T - test		
		n	**var**	**mean**	**SD**	**Mean difference**	**T-value**	**P-value**
Statement 1: *'I would eat more fruit and vegetables if they were available closer to my home'*	De Baarsjes	80	Accept	2.4054	1.93591	1.29227	3.010	.004
			Reject	3.6977	1.89655			
	De Pijp	67	Accept	2.3333	1.91785	0.72072	1.482	.143
			Reject	3.0541	2.02685			
Statement 2: *'There are fewer places for me to buy fruit and vegetables in my neighbourhood'*	De Baarsjes	80	Accept	1.9231	1.71868	1.74359	3.957	.000
			Reject	3.6667	1.90332			
	De Pijp	67	Accept	1.7619	1.60950	1.41201	2.823	.004
			Reject	3.1739	2.01444			
Statement 3: *'Changes in my neighbourhood have caused a change in my diet*	De Baarsjes	80	Accept	2.0526	1.80966	1.37360	2.703	.008
			Reject	3.4262	1.97027			
	De Pijp	67	Accept	1.8571	1.70326	1.10512	1.877	.049
			Reject	2.9623	2.01878			
Statement 4: *'Food prices have risen more than average in my neighbourhood'*	De Baarsjes	80	Accept	2.9535	2.02312	0.31678	0.701	.486
			Reject	3.2703	2.00899			
	De Pijp	67	Accept	3.0000	2.03008	-0.54545	-1.120	.267
			Reject	2.4545	1.95402			
Statement 5: *'Access to affordable food in my neighbourhood has improved'*	De Baarsjes	80	Accept	3.4444	2.00653	-0.44444	-0.824	.412
			Reject	3.0000	2.01633			
	De Pijp	67	Accept	2.3333	1.34029	0.72072	1.482	.326
			Reject	2.8776	2.01694			
Statement 6: *'I would buy more fruit and vegetables if they were less expensive'*	De Baarsjes	80	Accept	2.9412	2.01400	1.05882	1.702	.093
			Reject	4.0000	1.80907			
	De Pijp	67	Accept	2.8776	2.01694	-0.54422	-0.989	.326
			Reject	2.3333	1.94029			
Independent variable: *'I eat five types of fruit and vegetable every day'*								

Table 6.2: Independent-sample t-test results between statements and intake

A logistic regression analysis with fruit and vegetable intake as the dependent variable and affordability, accessibility, income, and importance of health as the independent variables shows the extent to which healthy diet can be predicted by these factors. The correlation matrix of statements (Appendix 3) shows that three statements regarding affordability were significantly correlated with each other, as was the case for accessibility statements. As such, two indexes of affordability and accessibility were created based on the average score for the relevant statements. Logistic regression was chosen as an appropriate means to measure this relationship due to the numerical nature of all responses which act as independent variables and the binary nature of the dependent variable.

The logistic regression analysis shows that physical accessibility and income are both significant predictors of a healthy dietary intake (Table 6.3). Affordability and self-determined importance of a healthy diet did not produce statistically significant results in this model. The average scores given to physical accessibility related statements returned a P Value of .001 in De Baarsjes and .033 in De Pijp. The odds ratios were .361 (De Baarsjes) and .492 (De Pijp). The B value is negative; this can be understood to mean that residents of De Baarsjes and De Pijp who perceive accessibility as a barrier are .361 and .492 times, respectively, more likely to eat fewer fruit and vegetables than is considered necessary. Additionally, income has a P Value of .001 in both neighbourhoods. In De Baarsjes the odds ratio for income is 3.603 meaning that those who earn an average-high income are 3.603 times more likely to eat the recommended amount of fruit and vegetables, and in De Pijp this figure is 2.907 times.

Variables in the Equation

Location			B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
De Baarsjes	Step 1[a]	Afford_Ave	-.126	.386	.106	1	.744	.882	.414	1.879
		Access_Ave	-1.019	.313	10.615	1	.001	.361	.196	.666
		Income	1.282	.377	11.539	1	.001	3.603	1.720	7.549
		HealthIsImportant	.058	.292	.039	1	.844	1.059	.597	1.878
		Constant	-.717	1.856	.149	1	.699	.488		
De Pijp	Step 1[a]	Afford_Ave	.682	.516	1.746	1	.186	1.978	.719	5.439
		Access_Ave	-.710	.333	4.541	1	.033	.492	.256	.945
		Income	1.067	.328	10.584	1	.001	2.907	1.528	5.529
		HealthIsImportant	.037	.310	.014	1	.905	1.038	.565	1.905
		Constant	-3.999	2.203	3.296	1	.069	.018		

a. Variable(s) entered on step 1: Afford_Ave, Access_Ave, Income, HealthIsImportant.

Model Summary

Location	Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
De Baarsjes	1	78.517[a]	.331	.442
De Pijp	1	71.248[b]	.263	.352

Table 6.3: Output from logistic regression variable where Dependent value= Fruit and Veg intake and Independent variables= Affordability average, Accessibility average, Income and Self-reported importance of health

A correlation matrix was created with the intention of highlighting which variables are significantly correlated, thus strengthening any evidence of association which is apparent through the independent-samples t-tests. This matrix is presented in Appendix 3 and significant P Values have been highlighted. A number of significant correlations between variables are apparent. Some associations are intuitive; for example, a negative correlation between those who score highly on the Likert scale for the statement food prices have risen, and those who score highly for the statement that access to affordable food has increased in the neighbourhood. Another notable point is the correlation between all accessibility variables and fruit and vegetable consumption where a significant negative relationship is apparent. This reiterates the relationship which is apparent between variables measured in the independent-samples t-test and also evident in the logistical regression output; that physical accessibility is a determinant of dietary intake.

The following discussion takes in to account these suggested correlations and relationships to identify the extent to which the individual food environment of residents has been altered. Moreover, the extent to which this alteration may be attributed to gentrification is also considered. Accessibility is divided in to physical proximity and affordability.

6.2.1. Proximity as a determinant of accessibility

Physical accessibility to resources was addressed in the previous discussion chapter with reference to changing land-use and distance to resources. However, it is imperative that residents own self-perceived accessibility is also measured to ensure that a relational approach to distance is taken in to account. Cummins et al (2007) contend that the use of a relational understanding of distance is more appropriate in determining accessibility. This was gauged via a number of statements relating to changing food access which were presented for respondents to dictate the extent to which they agree. These statements were analysed in comparison with fruit and vegetable intake to see if a

relationship exists between the two; if this relationship is apparent, it can be argued that gentrification has caused or alleviated barriers to resident accessibility, and has thus had impact upon healthy food intake.

I would eat more fruit and vegetables if they were available closer to my home

In each neighbourhood, residents that agreed that they would eat more fruit and vegetables if they were available closer to their home are the ones that currently eat less than five types of fruit and vegetables per day. This could be indicative that accessibility is a boundary influencing healthy food intake. However, the P-Values in Table 6.2 show that this relationship is only statistically significant in De Baarsjes. It can be argued that in the case of De Baarsjes, residents feel that distance to resources is a barrier which inhibits their healthy food intake. This is in accordance with existing literature such as Moore et al (2007) which argues that the local food environment has influence over residents' dietary intake.

When considered alongside land use data, a justification becomes apparent for the variation in residents' perceptions between the neighbourhoods. It is evident that fruit and vegetable availability has decreased by a greater amount in De Baarsjes (55.5%) in comparison with decrease in De Pijp (26.9%). Moreover, Figures 5.1 and 5.2 show that remaining, new and transformed food establishments in De Pijp are more evenly distributed across the neighbourhood. Taking this in to account, residents of De Pijp are less likely to perceive accessibility as a barrier, as accessibility has not decreased to the same extent as is witnessed in De Baarsjes. Studying the relational distance to resources reinforces initial conclusions which were constructed based on physical proximity alone, and in this case support that accessibility has worsened more in De Baarsjes in comparison with De Pijp.

There are fewer places for me to buy fruit and vegetables in my neighbourhood

In both neighbourhoods there is an association between those who eat fewer than five types of fruit and vegetables and those who agree that they have noticed food stores closing in their neighbourhood. The statement is in reference to the past ten years in the neighbourhoods. In both neighbourhoods, a significant relationship was observed between those who eat fewer fruit and vegetables and those who agree with the statement. It is possible that the reason fewer fruit and vegetables were consumed is due to the fact that stores have closed. This change in diet as a result of the changing local food environment is the first indication that gentrification may have worsened dietary intake.

Taking in to consideration results from land-use analysis, it is possible to understand to what extent perceived neighbourhood changes are accurate. Cummins et al (2007) suggest that there may be disparities between perceived and actual change, though each may be considered equally important when assessing the health impacts of gentrification. Figures 5.4 and 5.6 demonstrate that fruit and vegetable availability in both neighbourhoods has indeed decreased by a notable amount since pre-gentrification levels. It is rational that those who feel most strongly affected by these neighbourhood changes are residents who live in areas of the neighbourhood where a large amount of fruit and vegetable shops have since closed; the north-east corner of De Baarsjes and the centre-east area of De Pijp for example. Under this assumption, however, it is further assumed that lack of mobility is a restriction to the lives of residents. This postulation is somewhat validated by frequency statistics (Table 3.1) indicating that 61.2% of all respondents do not have access to a car. Pearce et al (2005) acknowledge the influence of car ownership over physical accessibility to health-related outcomes as a significant determinant. This skews the importance of physical distance to resources, as relational distance to a shop which is located a further distance from home may be more accessible with the use of a personal vehicle. However, in a neighbourhood where car-ownership is minimal, physical proximity is likely to be correlated with resident's perceived distance, as has been suggested in the above results, where perceived changes are aligned with changes in land-use.

Changes in my neighbourhood have caused a change in my diet

In both neighbourhoods there is a significant correlation between those who eat fewer than five types of fruit and vegetables and those who agree that neighbourhood changes have caused a change in their diet.

In order to advise on gentrification policy, it is necessary to uncover the intricacies of not just how physical land-use is adjusted by urban renewal, but residents' perception of these changes. The extent to which residents attribute changes in their own health to changes in their neighbourhood is of central importance to this study. It allows a determination to be made regarding the magnitude of influence of neighbourhood effects on individual behaviours; by asking residents to explicitly state that their health related behaviours are controlled by neighbourhood changes, these links between micro and macro scale influences can be made without biased assumption, and conclusions can be drawn on the reciprocal nature of health and place.

It is apparent from considering the relationship between healthy food intake (as measured in terms of fruit and vegetable intake) and statements relating to accessibility, that in De Baarsjes and De Pijp the process of gentrification is limiting physical accessibility to healthy food resources. In turn, limited

physical accessibility restricts a healthy dietary intake. Thus, links can begin to be drawn between gentrification policy and individual outcomes.

6.2.2. Affordability as a determinant of accessibility

Affordability related variables are derived from responses to the statements 'Food prices have risen more than average in my neighbourhood', 'Access to affordable food in my neighbourhood has improved' and 'I would eat more fruit and vegetables if they were cheaper'.

Increasing food prices is highlighted as an issue which may arise as a result of urban renewal. Table 5.4 demonstrates that affordable food retail establishments did not decrease in either neighbourhood, though the introduction of luxury food outlets and other establishments aimed at enticing more affluent residents may impact the perception of this change for existing residents. This is investigated in the independent-sample t-tests (Table 6.2), testing for significance between dietary intake and opinions on affordability.

Food prices have risen more than average in my neighbourhood

In this case, neither neighbourhood shows a significant correlation or difference in menas; there is no relationship between those who observe that food prices have risen with dietary intake. Explanations for this could lie in the reasoning that food prices have not risen significantly, despite gentrification. Breyer and Voss-Andreae (2013) argue that accessibility cannot be measured without taking in to account levels of affordability, as proximity and number alone give a false impression of availability. This is particularly the case for low-income residents who may see affordability as a greater barrier in comparison to higher-income residents. The datasets which were previously analysed in this project did not provide information on the price of food retail establishments, so whether this has increased can only be assessed with interaction with residents. It is typical of gentrification, particularly from a USA perspective, for neighbourhood food prices to see an increase in cost (Krase and DeSena, 2016). However, initial results here suggest that rises in price have not affected accessibility. Further consideration of additional statements relating to an affordability barrier is thus appropriate.

Access to affordable food in my neighbourhood has improved

As with the previous statement, there was no significance between this statement and food intake in either neighbourhood. This question was purposefully worded in a non-negative way with the intention to ensure that leading questions were avoided. Bryman (2001) states that asking questions in a leading way suggests to participants that there is an implied correct answer. By mixing negative and positive statements about neighbourhood change, this is avoided. The lack of relationship

between affordability and healthy diet up until this point could be associated with income level. Affordability is a subjective notion; what one individual considers affordable is controlled by their own income, the importance they bestow upon healthy eating and personal budgeting constraints, not only dependent on whether prices have risen over time. Therefore, the lack of significance in these statements is not to suggest that prices have not increased, as would be atypical of gentrification, but that any increase in price has not caused a change in the healthy food intake of residents. Therefore, it cannot be concluded that gentrification policy is responsible for an affordability barrier.

I would buy more fruit and vegetables if they were less expensive

The third statement relating to affordability again brings back insignificant associations with residents' dietary intake.

The lack of significance regarding the role of affordability is contrary to expectations based on existing gentrification literature, in which affordability is a reoccurring topic. The broad definition of gentrification utilised in this project in itself defines cost as a central feature; "a process whereby an urban area undergoes redevelopment to entice more affluent users" (Hackworth, 2002), suggesting that less affluent users would be excluded, though in terms of affording healthy food, this does not appear to be the case. Moreover, Breyer and Voss-Andraea (2013) suggest that decreasing affordability is the cause of so-called 'food-mirages' which can be identified in gentrifying neighbourhoods in the USA. The fact that there is no significance between food intake and residents' perceptions of food affordability in De Baarsjes and De Pijp can be considered a positive attribute of the employment of gentrification in the Netherlands. Despite the possible increase in food prices, this has not occurred to the extent that healthy food options have become unattainable to a majority of residents. This is in line with earlier findings from the analysis of datasets which showed that numbers of affordable food retail establishments had indeed increased in both neighbourhoods.

6.3. Barriers to a healthy dietary intake

This analysis suggests that accessibility is the primary barrier in preventing fruit and vegetable consumption. Accessibility is defined by physical proximity and affordability, though the role of affordability in controlling food intake in these studied neighbourhoods is limited. Dataset analysis shows that physical accessibility has decreased in both neighbourhoods, and this is in line with survey results showing significant relationships between low levels of accessibility and low levels of fruit and vegetable intake. Residents report that this has worsened through the gentrification process. Neighbourhood changes in De Baarsjes and De Pijp are typical of gentrification; the number of stores offering fresh and affordable fruit and vegetable options is declining, directly impacting residents'

daily intake, especially in the case of those with limited mobility in terms of car ownership. However, another aspect typical of gentrification according to previous studies is not apparent in this case. Affordability of resources has not decreased in the neighbourhoods, and it is not apparent in this context that food prices have risen, as may be expected. Taking this in to account, it can be argued that gentrification does affect the dietary intake of residents, but the extent to which this is occurring varies depending on individual factors.

6.4. Alterations to individual food environments

The purpose of this empirical chapter was to answer the following research question;

In what way has the individual food environment of non-gentrifying residents of De Baarsjes and De Pijp been altered since pre-gentrification levels, in terms of perceived accessibility and food consumption patterns?

Perceived accessibility and food consumption patterns have been assessed by direct interaction with residents via survey. Residents of De Baarsjes and De Pijp that had lived in the neighbourhood over ten years were asked to reflect upon changes in their neighbourhood since the pre-gentrification period. Individual food environments were understood as the individual's self-assessed access to food resources. Survey results have been analysed alongside datasets demonstrating actual change in land-use over the same time period, in order to distinguish between actual and perceived changes to the local food environment. Equal precedence should be given to both sets of results in order to avoid changes being understated by apparently small land-use alterations which may in fact have unprecedented but significant impact on the daily lives of those living in the surrounding locality. In this context, accessibility is understood to include both physical proximity and affordability. Food consumption was taken as the output variable and the extent to which accessibility has altered consumption has been investigated.

Conclusions can be formed following the review of results from surveys and land use data alongside the extensive discussion which places this research alongside existing literature. Gentrification has altered land use in De Baarsjes and De Pijp, though this has been implemented in different ways despite a shared renewal policy. In De Baarsjes, changes in the food environment are apparent in the rise of specialist food retailers typically more expensive than traditional greengrocers. In De Pijp, change is manifested in the form of more dining-out opportunities. Both neighbourhoods saw a decrease in the number of affordable fruit and vegetable merchants. When studying survey results it

becomes evident that residents of De Baarsjes attribute greater weight to accessibility as a barrier in comparison to residents of De Pijp. This may be explained in part with reference to Figures 5.3-5.6 where it can be seen that remaining establishments providing fruit and vegetables are less evenly distributed across De Baarsjes compared to De Pijp. Moreover, the rise in specialist food retailers may have a greater impact on the perception of change for residents in De Baarsjes. In the case that specialist retailers have taken over from affordable retailers which residents previously utilised, the impact of change may inhibit daily life practices of walking a short distance to the local shop if this shop is now considered unaffordable. In De Baarsjes, the walking distance to the next nearest affordable shop may have increased significantly more than for those living in De Pijp, and thus accessibility is considered a greater barrier. It should be noted, however, that residents of De Pijp also consider accessibility as a significant barrier, but this is not to the same degree as those in De Baarsjes.

The association between affordability and dietary intake is, unexpectedly, limited in either neighbourhood. Each statement relating to affordability as a restricting factor showed no association with amount of fruit and vegetables consumed. This fact is made more complex when it is considered that there is a direct relationship between income and dietary intake. However, other implications of a low income, including limited mobility, may control this relationship, and it is important to note that a correlation between income and intake does not equal causation. Previous literature regarding place and health often utilises income as an explanatory factor for place effects on health behaviours. Duncan et al (1999) suggest that health behaviours are resultant of a large concentration of a population possessing a shared trait (such as low income) residing in one area. However, in this study, health behaviours are diverse; Table 6.3 shows that the frequency of fruit and vegetable intake is varied across both neighbourhoods, and so it is difficult to argue that a place-effect exists. However, survey data indicates that over the period of gentrification, health behaviours have altered in a similar way for many residents, suggesting that a place-effect does in fact exist, though it is the structural changes to place over time, and not the place itself, which is controlling this change in health behaviours. Although residents do not perceive affordability as a barrier which has altered their fruit and vegetable intake over gentrification, rising prices of fruit and vegetables in the future may have detrimental impact on the residents' diets.

6.5. Summary of empirical findings

The main aim of this project is to provide insight in to how the nutritional health of residents is affected when their neighbourhood is gentrified by answering the following question;

What structural changes affect behavioural outcomes in relation to gentrification and dietary intake?

This was approached by means of the following research questions:

To what extent has gentrification had significant effect on the rate and scale of changes to the local food environments of De Baarsjes and De Pijp?

In what way has the individual food environment of non-gentrifying residents of De Baarsjes and De Pijp been altered since pre-gentrification levels, in terms of self-assessed accessibility and food consumption patterns?

Developments to the local food environments of De Baarsjes and De Pijp have been accentuated by the process of gentrification. Typical consequences of gentrification which have been witnessed in previous studies- such as an increase in food service establishments and a shift toward the retail of more luxury food products- are apparent in De Baarsjes and De Pijp. Comparisons against average levels of development in Amsterdam show that the rate and scale of local food environment alterations is occurring at an accelerated pace. De Baarsjes has seen changes most prominently in the food retail sector, with a notable increase in luxury and specialist food retailers in comparison with pre-gentrification levels. De Pijp has seen the most notable change in the food service industry with an increase in dining-out establishments. Despite disparities is how changes to the food environment have materialised, in both cases the opportunity for healthy, affordable and physically accessible food options has decreased. GIS mapping of these changes indicates that physical access to establishments providing fruit and vegetables has decreased, with some areas of the neighbourhoods affected more than others. The objectives of Dutch gentrification policy include attracting a more affluent population to a previously deprived area now densified with attractive amenities. De Baarsjes' and De Pijp's development is typical of this. The pace of change in comparison with city average exemplifies that gentrification has altered the local food environment in these areas.

The individual food environment is understood as an individual's own perception of the availability of and accessibility to food. This differs from the local food environment in that each person evaluates accessibility differently; what is affordable for one resident may be unaffordable to another, and what

is within reaching distance of a resident who owns a car may be considered too far for a person who relies on walking to travel for groceries. Accessibility to food in turn has impact upon dietary intake. Residents in both neighbourhoods reported that accessibility- in terms of physical accessibility to local food stores- had worsened. Those who reported this observation were proven to be significantly more likely to eat fewer fruit and vegetables than is considered necessary. However, perhaps surprisingly, there was no significant relationship suggesting that those who report affordability to have worsened eat fewer fruit and vegetables as a consequence of this.

7. Conclusion

This chapter considers the results of the previous empirical chapters within a wider geographical context, and the relevance of these results for academia and gentrification policy. Limitations of the study and suggestions for future research will also be considered.

7.1. Changing food environments in a wider context

An example of gentrification of the food environment in De Baarsjes is found at Marco Polostraat 211. On this site in 2003 stood a traditional style 'brown' café, a typically Dutch establishment catering to a working-class customer base with a strong sense of community. Brown cafes are described as; "small in size, often not bigger than a living room. Their interiors are often intentionally old-fashioned in appearance…They mostly cater to a working-class Dutch clientele and can be found scattered through-out working-class neighbourhoods" (Ernst and Doucet, 2013, p193). Closure of such establishments is indicative of an upgrading neighbourhood, though leaves original, working-class residents feeling excluded and displaced in their own community. In this case, Alemci café in De Baarsjes was renowned for anti-social behaviour. In 2014 the bar was closed following an incident of extreme violence (Het Parool, 2014). In the place of café Alemci opened Amsterdam West's first 'cat café', *Kattencafe Kopjes*. In Austin, USA, the opening of a cat café in 2015 caused tensions amongst locals who felt that the café symbolised the area's ongoing gentrification and protested the opening of the business which they believed was driving away lower income residents (The Daily Texan, 2015). Although this level of contention amongst residents was not apparent in De Baarsjes, the cat café is a stark contrast to the traditional brown café which stood in its place. Kattencafe Kopjes asks visitors to pay an entrance fee and offers relatively expensive coffee and food, catering for a different clientele than that of Alemci café. However, as the closure of the previous café was due to its association with violence and anti-social behaviour, it is likely that many residents would welcome this change to the neighbourhood as one which improves neighbourhood image and feelings of safety, despite the lack of accessibility to the new business.

Similar upgrading of the neighbourhood food environment is seen in De Pijp in the following case. Data for 2003 shows that 143 Ferdinand Bolstraat was host to a toko- an Asian supermarket- named Djaja. Asian supermarkets typically provide affordable produce to cater for the immigrant Asian population whose typical produce is not necessarily available in mainstream Dutch supermarkets. The closure of such establishments may be indicative of decreasing food accessibility for low income

residents. In this case, the supermarket was replaced by lunchroom *Omelegg,* specialising in serving egg based breakfast/brunch/lunch meals. This café is described in local media as 'hipster', 'trendy' and 'pricey'. The opening of this niche type of café is in line with Luckins (2009) explanation that gentrification will cause an alteration to the type of dining-out experience previously seen in a neighbourhood.

Gentrification with the aim to increase liveability (Teernsta, 2015) is specific to Dutch policy. The above examples are indicative of such developments and have been carried out with no substantial resistance. In the USA, where increased liveability is not a primary concern for urban policy developers, gentrification is generally perceived as a more negative process and developers are faced with more public resistance. Boyle Heights neighbourhood in Los Angeles publically refuted attempts to introduce new amenities in the area for fear of exploitation, disruption and possible displacement (The Guardian, 2016). Protests by low-income Boyle Heights residents echo resistance across the USA, where development policy differs to that in the Netherlands.

Within Europe, gentrification policy differs between countries. In Germany, where gentrification is achieved, similarly to the Netherlands, by increasing the density of urban amenities in disadvantaged neighbourhoods, resistance is apparent, as measures are not in place to protect current tenants. Thus, gentrification drives out the lowest income residents. An example of this is seen in Sternschanzer, a neighbourhood of Hamburg, "The amount of bars and restaurants is still expanding in Sternschanzer at the expense of stores providing the necessary supplies for residents' everyday needs (cheap clothing, food, home supplies etc.)" (Naegler, 2012, p65), thus further gentrification was met by protests from locals.

Such resistance, however, is not apparent in the Dutch neighbourhoods under investigation in this project. This can be attributed to specificities in Dutch policy, in particular tenant protection laws which mean landlords cannot drastically increase rent when property prices increase (Van Gent, 2013). This sensitivity to the needs of original, low-income residents during urban renewal means that gentrification is not perceived with the same negativity as elsewhere in the world where gentrification is associated with the ousting of the poor. Thus, new cafes and restaurants indicative of the process are not met with fears of exploitation and disruption as witnessed elsewhere.

7.2. Generalising results beyond the neighbourhoods

Beyond the studied neighbourhoods, similar consequences of gentrification can be expected in localities where policy makers have comparable goals. Across Amsterdam, gentrification is used as a

named policy device for initiating development in deteriorating neighbourhoods. One aspect of this is to increase the density of urban amenities; this development is apparent in both De Baarsjes and De Pijp, where the food service industry has expanded at a rate above city average (Table 5.2). These neighbourhoods serve as examples typical of gentrification, therefore it can be suggested that across Amsterdam, other gentrifying neighbourhoods are experiencing similar results, with similar health outcomes for residents. Beyond this, impacts may differ depending on disparities in policy specific to each municipality. However, it is apparent that in the Netherlands, though urban renewal policy is delegated as a matter to be conducted according to municipality, that the initiation point for urban renewal across the country stems from a central focus; namely, the neo-liberalisation of the housing market as is typical of third-wave gentrification (Teernstra, 2015; Van Gent, 2013; Hackworth and Smith, 2001). One broad aim for renewal in the Netherlands is to increase the liveability of neighbourhoods. In conducting this, similar strategies of renewal are employed not just within Dutch cities, but also between them. Thus, results gauged from De Baarsjes and De Pijp are likely to uncover consequences of gentrification which are replicated across the country.

International gentrification patterns, however, are vast in variation. In the USA, as previously discussed, gentrification is received with a notable amount of trepidation and resistance from residents, who often see it as a means to eject the poorest residents. Displacement is an issue at the centre of debates regarding gentrification in the USA (Newman, 2006); something which has largely been avoided, at least in direct terms, in the Netherlands due to tenant protection laws. It should be noted, therefore, that although conclusions drawn from survey results may be generalised to be applicable at a country-wide scale, the sphere of application is limited to areas where gentrification policy is inherently similar.

7.3. Main findings

The diverse nature of urban space and its continual development is often overlooked in place and health literature. This development is particularly apparent when a neighbourhood is being gentrified and changes to land use are taking place at an increased rate. This project, therefore, highlights the importance of studying such changes over time in order to avoid the limitations of a misleading impression given when place and health behaviours are only studied at one period in time. Respondents in this investigation were asked to reflect over the time period of ten years since pre-gentrification.

Taking in to consideration the research question '**What structural changes affect behavioural outcomes in relation to gentrification and dietary intake?'** the main findings of this thesis are presented.

From data gathered in this investigation, it is apparent that the individual food environment of non-gentrifying residents of De Baarsjes and De Pijp has been altered with the result of somewhat detrimental effects on food consumption patterns due to changes in perceived and physical accessibility to food resources. Accessibility in terms of physical distance to resources apparently has a greater role in determining dietary intake in comparison with increased affordability. These findings are resultant of structural changes to the neighbourhoods as a result of gentrification policy. Gentrification in the Netherlands is employed with the purpose of densifying amenities in order to attract affluent urbanites to previously undesirable neighbourhoods. This is materialised in the form of a greater density of dining-out establishments (in De Pijp) and declining numbers of affordable food retailers (in De Baarsjes). The impact of this change on the daily lives of residents is a longer distance to travel for affordable resources, meaning that those lacking means for mobility eat fewer fruit and vegetables. Dutch gentrification policy dictates that neighbourhoods should become more liveable through the process. In this case, the problem arises that what may be considered more liveable for one socioeconomic group actually decreases the life quality of others. Whilst increased dining-out opportunities and specialist food retailers may improve the image of the neighbourhood and attract residents who will spend money and contribute to improving the local economy, other residents, as is evident in De Baarsjes and De Pijp, may suffer unprecedented health effects. In comparison with the USA, where gentrification is received less positively due to the detrimental impacts for existing populations and high levels of displacement, gentrification in the Netherlands is relatively well employed. In general, gentrification is not interpreted as a negative term in the Netherlands, to the extent that it is used as a named policy device as opposed to a term reserved to describe the exploitation of the poorest residents, as it can be in the USA. This can, in part, be attributed to tenant protection laws preventing non-gentrifiers from being directly removed from their neighbourhoods, but nonetheless, more should be done to ensure that quality of life for non-gentrifiers does not decline. Greater awareness of such consequences can only be revealed with further investigation in to other impacts of gentrification.

Residents of both neighbourhoods with low fruit and vegetable intake agreed that changes in their diet could be attributed to changes in their neighbourhood. This is an important factor to consider in this investigation as it gives precedence to the notion that urban renewal, in the form of

gentrification, does in fact have direct impact on daily lives. This fact draws a link between macro structural forces (gentrification policy) to micro individual outcomes (dietary intake) which previous studies have not linked.

It can be concluded that structural changes which are implemented in the process of gentrification have impact on dietary patterns and, therefore, residents' health. The structural process which has most significant effect in this case is land-use changes which decrease the number of establishments which provide fresh fruit and vegetables at an affordable price. Whilst gentrification is performed through densifying amenities which, although undoubtedly working to attract affluent groups of the population, may isolate others. Densifying amenities may improve the outward image of a neighbourhood and have a positive effect on those residents who can make use of such establishments, such as specialist food stores and dining-out opportunities, in turn improving the local economy of the area and providing new business opportunities, also working to increase house value in the area. It is understood, then, why gentrification may be considered beneficial**.** However, with alongside these benefits arise problematic drawbacks for others. In future policy, non-gentrifying residents should not be overlooked.

7.4. Implications for policy

Despite the intention of gentrification in the studied neighbourhoods to increase liveability and improve the overall image of the area, only 21.1% (De Baarsjes) and 40.3% (De Pijp) of non-gentrifiers would agree or strongly agree that overall changes to their neighbourhood have been positive. This suggests that more attention should be focused on this group when constructing policy measures, as for a significant proportion of the population, aims to improve liveability are not being achieved. The closure of establishments supplying basic resources to residents is perhaps just one of many issues that have arisen from developments, but that have largely gone unnoticed by the wider population who do not suffer as a result of such changes.

The development of systematic gentrification policy in the Netherlands is delegated at a municipal level and enforcement is led by housing associations with neo-liberal objectives alongside local government. The lack of uniformity in policy in urban regeneration matters across the country may make the matter of highlighting individual neighbourhoods' issues more complex, as development procedures may differ between municipalities, resulting in a variety of implications. However, with the shared intention of bringing affluence to an area, similar consequences are nonetheless likely to be encountered by the non-gentrifying population.

The primary finding of this paper is that physical accessibility to resources is worsening as a result of gentrification, particularly amongst individuals with lower income and lower mobility. To overcome issues associated with worsening accessibility, which is likely to be replicated in gentrified neighbourhoods across the Netherlands, it is imperative that future policy makers are sensitive to the needs of this often overlooked group. Whilst it is acknowledged that neighbourhood change is not wholly negative, and the transformation of stores may be necessary over time, other solutions may be applicable. For example, helping to improve the mobility of non-gentrifiers by offering low-income subsidies for public transport may combat the issue of physical accessibility for some residents. Moreover, the home delivery of groceries by supermarkets is a growing trend particularly apparent in the UK. This trend is comparatively lower in the Netherlands, but may be a useful means to improve accessibility for the least mobile residents.

7.5 Suggestions for future research

Whilst this study has highlighted some issues faced by residents of gentrifying neighbourhoods, this is limited to just one area of investigation- the food environment- and within that, only a small element of dietary health. A worthwhile extension of this study would incorporate more elements of dietary health to create a more thorough impression of residents' healthy food intake beyond quantities of fruit and vegetables consumed. This would avoid assumptions that those who eat less fruit and vegetables may be labelled categorically unhealthy.

Other barriers between gentrification and health may be highlighted in future studies. This paper considered physical accessibility and affordability to be the primary barriers for accessing resources as highlighted in previous studies of a similar nature, but this is not to say that they are the only barriers in effect.

Furthermore, additional study is necessary in order to highlight which elements of daily life are most impacted and for which groups. This reaches beyond the realm of health and place research to investigate where barriers may arise from gentrification which are not health related.

Slater et al (2004) content "The great challenge for the current and future generation of gentrification researchers is to describe, explain, and most importantly respond to and challenge reinvestment that is geared only to the incoming middle class rather than to extant social groups". This thesis has attempted to respond to this challenge by presenting a valuable but small insight in to a much wider and under-researched relationship between urban structural processes and daily lives of individuals.

8. Bibliography

Aggarwal, A., Cook, A., Jiao, J., Seguin, R., Moudon, A., Hurvitz, P., Drewnowski, A., 2014, Access to Supermarkets and Fruit and Vegetable Consumption, American Public Health Association, Vol 104, Iss 5, pp917-923

Atkinson, 2000, The hidden costs of gentrification- Displacement in London, Journal of Housing and the built environment, 15 ,pp307-326

Black, C., Moon, G., Baird, J., 2014, Dietary Inequalities: what is the evidence for the effect of the neighbourhood food environment? Health Place, Iss27, pp229-242

Blaxter, M., 1990, Health and Lifestyles, Routledge, London

Breyer, B., Voss-Andreae, A., 2013, Food Mirages: Geographic and economic barriers to access in Portland, Oregon, Health and Place, Vol 24, pp131-139

Cameron, 2003, Gentrification, Housing Redifferentiation and Urban Regeneration: 'Going for Growth' in Newcastle upon Tyne, Urban Studies, Vol 40: Iss12, pp2367-2382

Caspi, C., Sorensen, G, Subramanian, S., Kawachi, I., 2012, The local food environment and diet: a systematic review, Health Place, Vol 18, Iss5, pp.1172-1187

CBS, Deel 2 – Metropoolregio Amsterdam in beeld 2007

CDC, 2013, (http://www.cdc.gov/brfss/questionnaires/pdf-ques/2013-brfss_english.pdf), Accessed 05/2016

CBS, 2013, (https://www.cbs.nl/en-gb/news/2013/40/dutch-population-better-educated), Accessed 08/2016

Cummins, S., Curtis, S., Diez Roux, A., MacIntyre, S., 2007, Understanding and representing place in health research, a relational approach, Social science and Medicine, Vol65, pp1825-1834

Curtis and Jones, 1998, Is there a place for geography in the analysis of health inequality? Sociology of Health and Illness, Vol 20, Iss 5, pp645-672

Diez Roux, A., Mair, C., 2010, Neighbourhoods and Health, Annals of the New York Academy of Sciences, Iss1186, pp125-145

Duncan, C., Jones, K., Moon, G., 1999, Smoking and deprivation: are there neighbourhood effects? Social

Science and Medicine, Vol 48, Iss4, pp497-505

Ecob, R. and MacIntyre, S., 2000, Small area variations in health related behaviours: do these depend on the behaviour itself, its measurement, or personal characteristics? Health and Place, Vol 6, Iss4, pp. 261-274

Gemeente Amsterdam, 2005, Stadsteelmonitor De Baarsjes

Gemeente Amsterdam, Fieten en cijfers, https://www.ois.amsterdam.nl/feiten-en-cijfers/#, Accessed 05/2016

Gemeente Amsterdam, 2011, Stedelijke vernieuwing: stand van zaken in 2011

Gemeente Amsterdam, opendata, http://data.amsterdam.nl/, Accessed 06/2016

Glass, R., 1964, Introduction: aspects of change. In London: Aspects of Change, ed. Centre for Urban Studies, London: MacKibbon and Kee, xiii–xlii.

Hackworth, J., 2002, Postrecession gentrification in New York City, Urban Affairs Review, 37:6, pp. 815-43.

Hamnett, 1991, The Blind Men and the Elephant: The Explanation of Gentrification, Transactions of the Institute of British Geographers, Vol 16, Iss 2, pp173-189

Harvey, D. (2006) Space as a Keyword, in David Harvey: A Critical Reader (eds N. Castree and D. Gregory), Blackwell Publishing Ltd, Oxford

Iamsterdam, 2015, De Baarsjes, accessed online: http://www.iamsterdam.com/en/local/about-amsterdam/neighbourhoods/de-baarsjes Accessed 06/2016

Iamsterdam, 2016, De Pijp, accessed online: http://www.iamsterdam.com/en/local/about-amsterdam/neighbourhoods/de-pijp-neighbourhood Accessed 08/2016

Jones and Moon, 1993, Medical Geography: taking space seriously, Progress in Human Geography, Vol 17: Iss 4, pp.515-524

Kearns, R., Moon, G., 2002, From medical to health geography: novelty, place and theory after a decade of change, Progress in human geography, Vol26, Iss5, pp605-625

Lees and Davidson, 2005, New Build Gentrification, Population, space and place, 16, pp395-411

Ley, 1981, Alternative explanations for inner city gentrification, Annals for the Association of American

Geographers, 76:4, pp521-535

Luckins, T, 2009, Gentrification and Cosmopolitan Leisure in Inner Urban Melbourne, Australia, 1960s–1970s, Urban Policy and Research, Vol27, Iss3, pp265-275

Ministry of Infrastructure and the Environment, Summary National Policy Strategy for Infrastructure and Spatial Planning, Accessed via www.ruimtelijkeplannen.nl. Accessed 05/2016

Moore, L., Diez Roux, A., Nettleton, J., Jacobs, D., 2007, Associations of the Local Food Environment with Diet Quality- A Comparison of Assessments based on Surveys and Geographic Information Systems, American Journal of Epidemiol, Vol 167, Iss8, pp917-924

Morland, K., Wing, S., Diez Roux, A., Poole, C., 2002, Neighbourhood characteristics associated with the location of food stores and food service places, American Journal of Preventive Medicine, Vol 22, Iss1, pp23-29

Naegler, L., 2012, Gentrification and Resistance, LIT Verglag Munster

Nutrition Environments Measures Survey, 2015, Accessed online: http://www.med.upenn.edu/nems/measures.shtml Accessed: 06/2016

Niedt, 2006, Gentrification and the Grassroots: Popular support in the revanchist suburb, Urban Affairs, Vol 28, Iss 2, pp99-120

Pearce, J., Witten, K., Bartie, P., 2006, Neighbourhoods and health: a GIS approach to measuring community resource accessibility, Epidemial Community Health, Vol 60, pp389-395

Pickett, K.E., Pearl, M., 2001, Multilevel analysis of neighbourhood socioeconomic context and health outcomes: a critical review, Epidemiol Community Health, Vol 55, pp111-122

Sallis, J.F., Nader, P.R., Rupp, J.W., Atkins, C.J., Wilson, W.C., 1986, San Diego surveyed for heart-healthy foods and exercise facilities, Public Health Rep, Vol 101, Iss2, pp.216-9

Slater, T., 2004, North American gentrification? Revanchist and emancipatory Perspectives explored, Environment and Planning A, Vol36, pp.1191-1213

Smith, 1979, Toward a Theory of Gentrification a Back to the City Movement by Capital, not People, Journal of the American Planning Association, Vol 45, Iss 4

Smith, 1996, The New Urban Frontier, Routledge, Oxon

Teernstra, 2015, Contextualising state-led gentrification: goals of governing actors in generating neighbourhood upgrading, Environment and Planning A, Vol 47, pp1460-1479

The Daily Texan, 'UT alumna opens Texas' first cat café, 18/10/2015

The Guardian, 2012, De Oude Pijp, Amsterdam's Latin Quartier, 29-02-12, Accessed 06/2016

The Guardian, 2016, 'Hope everyone pukes on your artisanal treats': fighting gentrification, LA-style', 19/04/16

Uitermark, 2007, Gentrification as a Governmental Strategy, 39:1, pp125-141

Van Gent, 2013, Neoliberalization, Housing Institutions and Variegated Gentrification: How the 'Third Wave' Broke in Amsterdam, International Journal of Urban and Regional Research, Vol 32, Iss2, pp503-522

Yourlittleblackbook.me, 2014, Accessed online: http://www.yourlittleblackbook.me/nl/cityguide/amsterdam-nl/de-pijp-nl/, Accessed 08/2016

Yourlittleblackbook.me, 2016, Accessed online: http://www.yourlittleblackbook.me/restaurants-in-de-baarsjes-amsterdam/, Accessed 08/2016

9. Appendix

Wilt u aangeven in hoeverre u het eens of oneens bent met de onderstaande uitspraken |
Please indicate how much you agree or disagree with the following statements

1: Helemaal niet mee eens | ***Totally disagree***
2: Niet mee eens | ***Disagree***
3: Neutral | ***Neutral***
4: Mee eens | ***Agree***
5: Helemaal mee eens | ***Totally agree***

Veranderingen in de buurt | *Changes in the neighbourhood*	**1**	**2**	**3**	**4**	**5**
In de afgelopen tien jaar: | *In the past ten years:*					
..Voedselprijzen zijn gestegen meer dan gemiddeld in mijn buurt *..Food prices have risen more than average in my neighbourhood*	○	○	○	○	○
..Er zijn minder zetels te koop groenten en fruit in mijn buurt *..There are fewer places for me to buy fruit and vegetables in my neighbourhood*	○	○	○	○	○
..Ik heb gemerkt supermarkten sluiten in mijn buurt *..I have noticed grocery stores closing in my neighbourhood*	○	○	○	○	○
..Toegang tot betaalbaar eten in mijn buurt is verbeterd *Access to affordable food in my neighbourhood has improved*	○	○	○	○	○
..Wijzigingen in mijn buurt hebben gezorgd voor een verandering in mijn dieet *..Changes in my neighbourhood have caused a change in my diet*	○	○	○	○	○

Levenstijl | Lifestyle

De volgende vragen gaan over de groente en fruit die je meestal eten. Denkt hierbij aan alle vormen van groente en fruit inclusief gekookte of rauwe, verse, bevroren of in blik. |
These next questions are about the fruits and vegetables you usually eat. Please think about all forms of fruits and vegetables including cooked or raw, fresh, frozen or canned.

Wilt u aangeven in hoeverre u het eens of oneens bent met de onderstaande uitspraken |
Please indicate how much you agree or disagree with the following statements

Ik eet vijf verschillende soorten groenten of fruit elke dag *I eat five different types of fruit or vegetable every day*	○	○	○	○	○
Een gezond dieet is belangrijk voor mij *Having a healthy diet is important to me*	○	○	○	○	○
Ik zou meer groenten of fruit eten als ze minder duur zouden zijn *I would eat more fruit or vegetables if they were less expensive*	○	○	○	○	○
Ik eet meer groenten of fruit als ze beschikbaar zouden zijn dichter bij mijn huis *I would eat more fruit or vegetables if they were available closer to my home*	○	○	○	○	○
Ik heb toegang tot persoonlijke vervoer *I have access to personal transport*	○	○	○	○	○

Persoonlijke kenmerken | *Personal characteristics*

Geslacht | *Gender*

Man | *Male* ○ Vrouw | *Female* ○ Anders | *Unspecified* ○

Leeftijd | *Age*

Onder/ *Under* 18 ○ 18-26 ○ 27-64 ○ 65+ ○

Arbeidsregime | *Employment status*

Student | *Student* ○ Werkloos | *Unemployed* ○

Deeltijdwerk | *Part-time employment* ○ Een fulltime dienstverband | *Full-time employment* ○

Zelfstandigen | *Self employed* ○ Anders | *Other* ○

Hoogste niveau van onderwijs verkregen | *Highest level of education obtained*

Minder dan een diploma middelbaar onderwijs | *Less than a high school diploma* ○
Middelbare school diploma (of gelijkwaardig) | *High school diploma (or equivalent)* ○
Hoger onderwijs (universiteit/HBO of gelijkwaardig) | *Higher education (degree or equivalent)* ○

In 2015 het gemiddelde inkomen per huishouden in Nederland was 33.600 euro. Gelieve aan te geven of uw huishouden staat: |
In 2015 the average household income in The Netherlands was 33.600 Euro. Please indicate whether your household stands:

Veel lager dan het gemiddelde. | *Much below average* (Less than 10.000Euro) ○
Een beetje onder het gemiddelde | *A little below average* (10.000-25.000Euro) ○
Vergelijkbaar met gemiddelde | *Similar to average* (25.000-40.000Euro) ○
Iets boven het gemiddelde | *A little above average* (40.000-55.000Euro) ○
Veel hoger dan gemiddelde | *Much above average* (More than 55.000Euro) ○

Aanvullende opmerkingen | *Additional Comments*

Gebruik deze ruimte om te praten over eventuele wijzigingen die u hebt gezien in het beschikbare voedsel in uw buurt in de afgelopen 10 jaar |
Please use this space to talk about any changes you have seen in the food available in your neighbourhood in the past 10 years

_____

_____

_____

_____

_____

_____

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Appendix 1: Survey design

Correlations

Location			Income	I have a car	Gender	Age	Education	Employment	I eat five types of fruit and veg	Health is important to me
De Baarsjes	Income	Pearson Correlation	1							
		Sig. (2-tailed)								
		N	80							
	I have a car	Pearson Correlation	-.356**	1						
		Sig. (2-tailed)	.001							
		N	80	80						
	Gender	Pearson Correlation	-.008	-.254*	1					
		Sig. (2-tailed)	.945	.023						
		N	80	80	80					
	Age	Pearson Correlation	.284*	-.207	.035	1				
		Sig. (2-tailed)	.011	.066	.756					
		N	80	80	80	80				
	Education	Pearson Correlation	.161	-.239*	.306**	.023	1			
		Sig. (2-tailed)	.154	.033	.006	.841				
		N	80	80	80	80	80			
	Employment	Pearson Correlation	.302**	-.238*	-.127	.655**	-.026	1		
		Sig. (2-tailed)	.007	.034	.260	.000	.821			
		N	80	80	80	80	80	80		
	I eat five types of fruit and veg	Pearson Correlation	.562**	-.265*	.112	.363**	.163	.222*	1	
		Sig. (2-tailed)	.000	.018	.322	.001	.149	.048		
		N	80	80	80	80	80	80	80	
	Health is important to me	Pearson Correlation	.170	.105	.166	.244*	.183	.128	.190	1
		Sig. (2-tailed)	.133	.356	.142	.029	.104	.259	.092	

		N	80	80	80	80	80	80	80	80
De Pijp	Income	Pearson Correlation	1							
		Sig. (2-tailed)								
		N	67							
	I have a car	Pearson Correlation	-.312*	1						
		Sig. (2-tailed)	.010							
		N	67	67						
	Gender	Pearson Correlation	.214	-.286*	1					
		Sig. (2-tailed)	.082	.019						
		N	67	67	67					
	Age	Pearson Correlation	.398**	-.077	.020	1				
		Sig. (2-tailed)	.001	.536	.872					
		N	67	67	67	67				
	Education	Pearson Correlation	.247*	-.262*	.373**	-.066	1			
		Sig. (2-tailed)	.044	.032	.002	.593				
		N	67	67	67	67	67			
	Employment	Pearson Correlation	.405**	-.054	-.024	.701**	-.084	1		
		Sig. (2-tailed)	.001	.665	.846	.000	.500			
		N	67	67	67	67	67	67		
	I eat five types of fruit and veg	Pearson Correlation	.587**	-.233	.375**	.119	.170	.014	1	
		Sig. (2-tailed)	.000	.058	.002	.337	.169	.908		
		N	67	67	67	67	67	67	67	
	Health is important to me	Pearson Correlation	.172	.282*	.074	.391**	.103	.300*	.238	1
		Sig. (2-tailed)	.163	.021	.553	.001	.408	.014	.052	
		N	67	67	67	67	67	67	67	67
**. Correlation is significant at the 0.01 level (2-tailed).										
*. Correlation is significant at the 0.05 level (2-tailed).										

Appendix 2: *Correlation matrix for individual characteristics variables*

Correlations

Location			I eat five types of fruit and veg	Changes in my neighbourhood have caused changes in my diet	Access to affordable food has improved	There are fewer places for me to buy fruit and vegetables	Food prices have risen more than average	I would eat more fruit and veg if they were available closer to my home	I would eat more fruit and veg if they were less expensive
De Baarsjes	I eat five types of fruit and veg	Pearson Correlation	1						
		Sig. (2-tailed)							
		N	80						
	Changes in my neighbourhood have caused changes in my diet	Pearson Correlation	-.221*	1					
		Sig. (2-tailed)	.049						
		N	80	80					
	Access to affordable food has improved	Pearson Correlation	.059	.318**	1				
		Sig. (2-tailed)	.605	.004					
		N	80	80	80				
	There are fewer places for me to buy fruit and vegetables	Pearson Correlation	-.250*	.470**	-.042	1			
		Sig. (2-tailed)	.025	.000	.713				
		N	80	80	80	80			
	Food prices have risen more than average	Pearson Correlation	.058	-.038	-.439**	.262*	1		
		Sig. (2-tailed)	.611	.737	.000	.019			
		N	80	80	80	80	80		
	I would eat more fruit and veg if they were available closer to my home	Pearson Correlation	-.271*	.358**	-.059	.599**	.373**	1	
		Sig. (2-tailed)	.015	.001	.604	.000	.001		
		N	80	80	80	80	80	80	
	I would eat more fruit and veg if they were less expensive	Pearson Correlation	-.208	-.158	-.461**	.245*	.114	.119	1
		Sig. (2-tailed)	.065	.162	.000	.029	.313	.292	
		N	80	80	80	80	80	80	80

De Pijp	I eat five types of fruit and veg	Pearson Correlation	1						
		Sig. (2-tailed)							
		N	67						
	Changes in my neighbourhood have caused changes in my diet	Pearson Correlation	-.362**	1					
		Sig. (2-tailed)	.003						
		N	67	67					
	Access to affordable food has improved	Pearson Correlation	.020	.204	1				
		Sig. (2-tailed)	.874	.098					
		N	67	67	67				
	There are fewer places for me to buy fruit and vegetables	Pearson Correlation	-.159	.514**	.104	1			
		Sig. (2-tailed)	.198	.000	.403				
		N	67	67	67	67			
	Food prices have risen more than average	Pearson Correlation	.079	-.027	.194	.039	1		
		Sig. (2-tailed)	.526	.828	.115	.754			
		N	67	67	67	67	67		
	I would eat more fruit and veg if they were available closer to my home	Pearson Correlation	-.054	.414**	.021	.609**	-.046	1	
		Sig. (2-tailed)	.666	.000	.864	.000	.710		
		N	67	67	67	67	67	67	
	I would eat more fruit and veg if they were less expensive	Pearson Correlation	.030	.063	-.397**	.434**	-.084	.365**	1
		Sig. (2-tailed)	.808	.610	.001	.000	.498	.002	
		N	67	67	67	67	67	67	67

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix 3: Correlation matrix for statements relating to accessibility and affordability