

Master thesis Economic Geography

Key information

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Rising fuel prices and car dependency: Coping mechanisms of households in rural areas

Car dependency – Car Related Economic Stress – Coping Mechanisms - Capabilities approach

Abstract

Recently fuel prices have been rising steadily. This rise in costs of transport often does not influence everyone equally. People living in car dependent areas are more vulnerable to the effects of rising fuel prices. Where for high-income households this is often manageable it can present new challenges for middle-income households. Furthermore, for low-income households this might mean that they have to adopt coping mechanisms that damage their potential to achieve what they aim to achieve even further than before. In this research paper the Capabilities Approach is adopted as a framework to shed light on the coping mechanisms that households in different economic groups and with different purposes of travel adopt to cope with the sudden rise in costs of traveling by car. To shed light upon these coping mechanisms a theoretical analysis was conducted to identify determinants of car dependency. Consequently, a qualitative analysis was conducted to gain insight into the priorities and values that shape behaviour in this situation of rising prices. Semi-structured in-depth interviews were conducted with participants living in car dependent areas and in addition expert interviews were conducted to identify trends and developments related to quickly rising fuel prices and coping mechanisms adopted by different families. Findings indicate that middle-income families are able to cope by adopting coping mechanisms that take place within the household such as economizing. These coping mechanisms do not impact travel behaviour and participation. Low-income families, on the other hand, are often forced to adopt coping mechanisms that do impact their ability to participate and travel. These coping mechanisms consist of cutting down on health, social and employment activities or can result in doing nothing, in other words, often going into debt. Furthermore, purpose of travel, as included in this research project, also has a significant impact on travel behaviour in times of rising prices. Being employed or having travel obligations because of children further expands the impact of car dependency and the limitations of being able to adapt travel behaviour. These concepts and findings are discussed within this research thesis as it sheds light upon the difference of impact of rising fuel prices between income groups and within income groups by taking reasoning and ability into account through usage of the Capabilities Approach.

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1. Introduction

For years researchers have been studying the difference between rural and urban environments and their effects on a range of economic, social and environmental developments. Where urban areas are growing in population density, rural areas have been experiencing the opposite (Wiersma et al., 2016). In rural environments the declining population affects the viability of businesses, travel distances and the availability of public transport (Wiersma et al., 2016). As Wiersma et al. (2016) discussed, these developments have been seen in the Netherlands too. Like in other countries around the world, in the Netherlands more and more people have relocated to urban areas taking businesses and capital with them (Wiersma et al., 2016). A consequence of this relocation is that some rural areas have become increasingly car dependent (Bastiaanssen and Breedijk, 2016). People living there have to travel further away for work, education and daily activities as these services move further away (Bastiaanssen and Breedijk, 2022). This car dependency can sometimes put them in a vulnerable position as the costs of their most reliable mode of transport are strongly dependent on the price developments of fuel (Walks, 2018). Furthermore, they are more dependent on this mode of transport to keep up with social activities and other necessary activities to help increase quality of life and are thus often unable to cut costs on their transport (Walks, 2018).

This vulnerability becomes significant when prices fluctuate quickly and rise exponentially fast. In 2022 global fuel prices rose very suddenly and quickly due to global developments, stirring up the global economy and impacting almost every individual and business in both rural and urban environments (Cohen, 2022). The costs of fuel peaked between March and June of 2022 with an average price of 2,35 euro per liter at its highest in the Netherlands in June (CBS, 2023). These price changes have wide spread effects across the globe and affect almost everyone and every sector of business (Cohen, 2022). Though fuel price fluctuations are global trends and the impact of a rise in fuel prices often are felt by almost everyone not everyone is impacted equally (Mattioli et al., 2019). Several studies over the years have been focusing on the effects of fuel price increases on an aggregate level by comparing car usage and price trends (Goodwin et al., 2004). A rise in fuel prices can result in a slight change in the volume of traffic or a more conservative or efficient use of fuel on an aggregate level (Goodwin et al., 2004). However, the inhabitants of these car dependent rural areas, who have to travel further to reach amenities than people living in urban areas, may experience the rise in prices differently than those living in urban areas (Mattioli et al., 2019). This was discussed by Mattioli et al. (2018), stating that the elasticity of fuel demand and consequently car usage is heavily dependent on various aspects such as personal features, the availability of transport options, the differences in the purposes of trips made and on geographical characteristics of the area.

When there are multiple transport mode options and a high concentration of amenities and services, such as in urban areas, the elasticity of fuel demand becomes more elastic as people can more easily adjust their car usage (Mattioli et al., 2019). The opposite can be true for more car dependent, often rural, areas. In these areas there are far less options for transport and often a lower accessibility level to services and amenities causing the demand for fuel to become more inelastic because people cannot easily switch to other modes of transport or services (Mattioli et al., 2019). This “heterogeneity” of fuel price elasticity calls for a more disaggregate research approach that considers fuel vulnerability on a household level (Mattioli et al., 2019). Such an approach takes reasoning and decision-making into account and can differentiate between and within economic groups, something that is often not the primary course of action (Mattioli et al. 2018).

Even though fuel demand elasticity in rural areas might be rather inelastic, households living in car dependent areas could make different choices than households living in areas that are not car dependent regarding fuel price increases (Belton Chevallier et al., 2018). In line with this reasoning coping mechanisms that are used to cope with a rise in costs of traveling by car could thus vary between households in different groups of economic stature because they have different resources or priorities (Belton Chevallier et al., 2018). An increase in fuel prices could affect someone who has a job or other important activities differently than someone who has less obligations (Mattioli et al., 2019).

Their coping mechanisms could then be different because of a difference in priorities for activities and participation (Belton Chevallier et al., 2018). Some households in car dependent regions have to rethink their means of travel or their distribution of household spending to keep up with their preferred or obligated daily activities (Belton Chevallier et al., 2018). They might lack the budget to keep up their “normal” daily routine because of the high costs of usage of the car and increased costs of daily consumption. With this rise in fuel prices high-income households are likely to still be able to cope with this rise in costs. Where high income families might be able to switch between different modes of transportation, increase spending on car usage or move to more central locations because they have available funds left over, middle- and low- income families might have to cope with the rising costs in a different way. Moving to more affordable regions is often not immediately possible and therefore these households have to find other ways to cope with the risen costs of travel (Belton Chevallier et al., 2018). Depending on personal factors such as occupation and purpose of trips they might develop new, or reinstate older, coping mechanisms to deal with their situation (Belton Chevallier et al., 2018). These mechanisms to cope with car dependency and car related economic stress (CRES) differ and are variously effective from one situation to another (Belton Chevallier et al., 2018).

Studies have shown that long term coping mechanisms may include residential or employment related relocation as other locations may provide more higher paid jobs or a better connection to public transport or road networks (Motte-Baumvol et al., 2009). However, as stated before, recently the costs have risen very quickly and relocation or a different employment opportunity may not be possible on such short notice (Belton Chevallier et al., 2018). In addition to this, the costs of living in general including costs for heating, groceries and other necessities, have also risen, further pressing on the economic burden that most families endure (Cohen, 2022). This study is mostly interested in short term coping mechanisms that are adopted by middle- and low-income households to relieve the economic stress of car ownership instantly. These strategies could relate to any part of the household’s daily routine and may impact social or economic opportunities and well-being if certain activities or actions related to healthcare or socialization are discarded (Luz and Portugal, 2021). While some families may choose to adapt their travel behaviour it is also possible to adopt other coping mechanisms such as economizing or doing nothing (Walks, 2018). Therefore, it is important to understand these strategies and the reasoning behind behaviour as using such information to develop future policies to help mitigate the vulnerability of these households and may help them to overcome the negative consequences associated with a loss of social or economic activities (Luz and Portugal, 2021).

These coping mechanisms could remain unseen when an aggregate approach is taken because the broad approach might overlook consequences and actions that are taken at a household level (Mattioli et al., 2019). There may be less frequent trips or a change in form of transport. People may choose to limit their social trips or try cycling more often if this is needed. In addition to this, attempting to increase income by working more could also be a form of short-term coping with the increased costs of traveling. However, when considering the impact of fuel prices on potential to participate in society and access to opportunities between middle- and low-income households a difference is expected. Where middle-income families might be able to compensate through the aforementioned means such as economizing, low-income families could have more difficulties in managing household income when prices go up (Walks, 2018). The expectation is that middle-income households are to a certain degree able to cope by compensating within the household, and that, like discussed by Chevallier et al. (2018), low-income households have to rely on their local network a lot more and might even get into financial difficulties such as car-related debt when they have to keep using a car.

Depending on what coping mechanisms are used the households may be limited in their social, educational or economic opportunities presently or in the future. Therefore, it is important to understand the coping mechanisms that these households adopt. Understanding these coping mechanisms can help identify difficulties for these households in times of price changes and could, in the future, help mitigate the CRES that they experience.

In addition to this, the developments in relation to fuel prices are very recent and current studies often lack such a short-term analysis of the coping mechanisms and their impact on daily activities. As the

price increases happened suddenly the long-term coping mechanisms usually adopted may not have been viable, therefore an analysis into the short-term coping mechanisms can be useful in forming an understanding of the coping mechanisms that are immediately applicable for these households. A more integrated approach that considers choices, capabilities and potential is used in this research thesis. The capabilities approach offers such a framework of analysis by considering what influence someone's situation has on their ability to use their resources (Vecchio and Martens, 2021). These situations can include economic status, occupation and personal features. Economic status can indicate how and why choices are made and may be explained by the adoption of the capabilities approach. Because of the sudden rise in prices middle-income families might adopt other coping mechanisms in relation to their situation than lower income families, who have experienced economic stress before (Froud et al., 2002). Middle-income families might have had no troubles in coping before the price rises, however, they might now have troubles in managing household funds (Cohen, 2022) Low-income families, on the other hand, have experience in economizing and might now find themselves unable to cope, thus impacting their ability to travel and to participate in society (Froud et al., 2002; Belton Chevallier et al., 2018). Using the capabilities approach to identify effects of fuel price increase could thus also shed light upon the impact that such a change has on different households and their ability to function to their maximum potential (Vecchio and Martens, 2021). The approach is used to determine how choices are made, how these choices influence their potential and how these choices differ between middle- and low-income groups.

In light of the recent developments in fuel prices, this paper sheds light on the short-term coping mechanisms that middle- and low-income households adopt to deal with their changed financial situation and what choices are made according to their priorities and values by attempting to answer the following main research question and sub- research questions;

What coping mechanisms are used by middle- and low-income households in car dependent regions when the costs of traveling by car increase?

To answer the main research question this research thesis aims to answer the following sub-questions;

- a) *How can a person-based perspective shed light upon the effects of fuel price increases on middle- and low- income households in car dependent areas?*
- b) *How does a rise in fuel prices impact perceived capabilities of middle- and low- income households in car-dependent regions?*
- c) *How does a rise in fuel prices impact the daily choices made by middle- and low- income families in car-dependent regions?*

To find the answers to the research questions semi-structured in-depth interviews were conducted with middle-income families. In addition to this, interviews with experts in the field of consequences of high car related economic stress were conducted. These interviews mostly focus on the impacts of fuel prices for low-income households. However, they also served as an addition of information to explain how both lower- and middle-income families manage when the costs of traveling increase.

The expectation is that while some middle-income households might be able to defer household funds from other sections of their budget to car usage low- income families might be forced to make changes to their transportation habits depending on the nature of their daily activities.

This thesis aims to answer the previously described research questions. To answer the research questions, firstly, a theoretical framework is set up and described to frame the research. In this theoretical framework car dependency is analysed and determinants of car dependency are described that are used to identify areas that can be classified as car dependent. Secondly, the coping mechanisms that are described in theory are discussed and related to the different income groups. Thirdly, the capabilities approach is introduced and connected to the concepts discussed in the car dependency and coping mechanisms subsections. Lastly, the conceptual framework is presented to

combine the theory on car dependency, coping mechanisms and the capabilities framework. In chapter 3 the research methodology is explained. The references, used theory for spatial analysis and the data collection methods are clarified. In chapter 4 the findings of the data collection from the in-depth interviews and expert interviews are described; and lastly the findings are combined with existing literature in chapter 5, the discussion. The research thesis finishes with a conclusion that is meant to summarize the research project, present limitations, and give recommendations for further research projects.

2. Theoretical Framework

Urban and rural environments have grown more apart over the years increasing differences between the two in living conditions and economic activity (Wiersma et al., 2016). The geographical features defining each of the areas have consequences for behavior and available opportunities as transportation modes and -times are redefined (Wiersma et al., 2016). Transport and accessibility in both environments have long been the subject of discussion in theory. Availability of sufficient transportation options and networks is often crucial for individuals to be mobile enough to participate in social activities, acquire job opportunities and have access to sufficient healthcare, amongst other important aspects that improve people's overall quality of life (Hickman et al., 2017). Transport and accessibility studies are often focused on the effects of trends and developments on the population as a whole or on different groups within the population. A rise in fuel prices can result in an overall more efficient use of fuel or even a drop in the usage of cars (Goodwin et al., 2004). However, the effects of a rise in fuel prices can differ between groups within the population depending on geography, participation in activities, socio-economic features and availability of transport modes (Mattioli et al., 2019). The difference in geographical characteristics is seen best when looking at how rural and urban environments shape various developments. In this theoretical framework the most important concepts used in this research thesis are discussed. In section 2.1 firstly the difference in rural and urban environments is defined. This section determines the characteristics of car dependency and the influence on movement and behaviour within these areas. The section starts with a general explanation of the differences between the two environments and continues with determinants of car dependency. These determinants of car dependency and the consequences for households living in these areas are explained and used in section 2.2. Section 2.2 builds upon the consequences of car dependency by discussing the coping mechanisms that are used to cope with high costs of travel by different income groups. Thirdly, in section 2.3, the Capabilities Approach and its use in this research, is explained. Lastly, the conceptual model is presented.

2.1 Fuel prices and car dependency in geographical context

Rural and urban environments both have specific characteristics that define economic activity and availability of opportunities (Wiersma et al., 2016). The environment dictates how people react to certain trends like rising fuel prices (Dargay, 2002). People living in either of the two environments make choices and adapt their behaviour based upon what is available to them in their area (Dargay, 2002). The most discernable differences between rural and urban areas can be seen in population density and land use (Wiersma et al., 2016).

Population density is generally higher in urban areas which means that travel distances are often shorter and elasticities in car ownership and demand for fuel are often higher than in rural areas (Dargay, 2002). In addition to this land use in urban areas is also more compact than the structure of rural areas, further decreasing travel distances and the need to use a car (Wiersma et al., 2016). Over the years more people have started living in and around urban centers, consequently fueling a cycle of centralization and increasing differences between the two environments (Wiersma et al., 2016). As stated by Dargay (2002), there is a considerable difference in how elastic demand for fuel is between the two different regions and people living in rural areas are often less sensitive to changes in prices because of the differences between the two environments. Because of this there is a higher possibility of developing Car Related Economic Stress (CRES) for people living in rural areas (Dargay, 2002). Because people living in urban areas have more variety in their choice of mode of transport the demand for fuel is more elastic (Goodwin et al., 2004). People can more easily switch mode of transport when prices get too high and are for example able to cycle to nearby facilities or use public transport to move around the city or to other urban centers (Bastiaanssen and Breedijk, 2022). Public transportation in urban areas is plentiful and often services have frequent stopping times to ease time management when traveling (Wiersma et al., 2016). However, in rural areas distances to activities and amenities are becoming much longer and cycling or using public transportation sometimes increase travel time too much to make it a feasible option of travel (Bastiaanssen and Breedijk, 2022). For these reasons fuel price demand in rural areas is much more inelastic as the car is often the most efficient mode of transport (Goodwin et al., 2004).

As populations in rural areas become smaller, their ability to carry services and businesses diminishes. As described by Wiersma et al. (2016) this can then facilitate this cycle of societal changes that reinforce each other to create more centralization in urban areas and deprivation in rural areas. Over the past years centralization has become the norm in many developed countries as this practice makes it easier to connect to more people and services in a shorter timeframe (Wiersma et al., 2016). However, where urban areas and the people living in them often benefit from these changes, households living in rural areas do not. These trends leave rural areas cope with several changes to their environment. Households living in some of these areas become more dependent on cars to overcome longer distances to get to daily amenities, employment and other services (Walks, 2018). The result of this difference in geographical features is that people living in urban areas are able to choose between transportation options and, in contrast people living in rural areas, are more dependent on the existing transport options in their living area (Wiersma et al., 2016). The car then quickly becomes one of the most important modes of transport and the economic burden associated with the costs of traveling by car could thus quickly form a considerable problem for people living in car dependent rural areas (Dargay, 2002).

The drivers of car dependency have been identified in a number of developed countries across the world and have also been identified in the Netherlands. The Dutch mobility report on car usage, “Verklaringen voor de verschillen in autobezit bij Nederlandse huishoudens” by the Netherlands Institute for Transport Policy Analysis 2021, mentions that car usage in several areas in the Netherlands has become more frequent and more necessary (Zijlstra et al., 2021c). Several areas have become more car dependent over the years and this dependency can be the result of a collection of developments that make certain areas less accessible by other modes of transport and more importantly make the car necessary to remain mobile (Wiersma et al., 2016). As Smith et al. (2012) state, because of the aforementioned urbanization and centralization the rural areas have become increasingly car dependent. Wiersma et al. (2016) also emphasize this development as one of the major drivers of car dependency. They state that while amenities and activities are more and more relocated along major road networks and central locations, they are moved away from certain areas creating spaces in which there is a deficiency of activity and supplies in addition to diminishing job opportunities and other crucial necessities. These deficiencies are the precedent of car dependency in rural areas (Wiersma et al., 2016).

There is an important notion to make when considering different forms of car dependency. An individual is not necessarily car dependent when they solely use a car as a mode of transport (Wiersma et al., 2016). There might be other modes of transport available that the individual chooses not to use but is able to use and are similarly as sufficient as traveling by car. Car dependent people however, do not have this choice (Wiersma et al., 2016). Wiersma et al. (2016) explain that people living in car dependent areas are most vulnerable when there is no sufficient substitute to traveling by car. While other transportation networks might be available an individual could define them as not sufficient enough to be able to use them for daily necessities because of costs, efficiency or other reasons (Wiersma et al., 2016). Usage of the car in these areas is thus sometimes not a choice but more of a basic need to sustain a certain level of accessibility and quality of life (Walks, 2018). Walks (2018) takes note of this necessity and describes car usage in car dependent areas as ‘compulsory consumption’.

This begs the question; when is an area car dependent? What are the determinants of car dependency? The most discussed determinants in theory are a lack of public transportation and the frequency of (bus) stops whenever there is public transport, population density and availability of local amenities. They are depicted in table 1. Though these determinants can be important in forming an understanding of car dependency they cannot be understood as the sole drivers of car dependency. Costs of transport and individual factors such as the experience of the journey can also be important indicators of the degree of car dependency of an area (Vecchio and Martens, 2021). An individual can experience car dependency because of multiple factors, not only spatial ones (Walks, 2018). Someone with a fear of driving or low mobility might have more difficulties traveling by foot and may therefore be more car dependent. In addition to this, the purpose of travels might also differ between households as their daily schedules are diverse. Because of this the effect of car dependency the influence of a fuel price increase can also differ between households depending on their lifestyle (Mattioli et al., 2019). In this research the economic status of individuals and their different motivations for travel are included in the analysis.

These nonspatial factors can influence someone’s accessibility levels and reactions to fuel price changes and are therefore important to consider when discussing car dependency (Smith et al. 2012; Vecchio and Martens, 2021). The capabilities approach helps include these factors in the qualitative phase of the research.

All of the considerations made are depicted in table 1. Some of these determinants are space specific and are therefore factors that are considered when identifying participants. Such as the public transport system and the population density. Other factors, namely distance to amenities, can be prioritized differently between households and are included in the qualitative phase of the report.

Determinant	Literature source
Train station	Zijlstra et al., 2022b, Chevallier et al., 2018 ; Nazari Adli et al., 2019 ; Walks, 2018
Distance to amenities	Walks, 2018 ; Chevallier et al., 2018, Nazari Adli et al., 2019 ; Mattioli et al., 2019 ; Wiersma et al., 2016
Bus stop frequency	Zijlstra et al., 2022b ; Chevallier et al., 2018 ; Nazari Adli et al., 2019,
Population density	Walks, 2018 ; Chevallier et al., 2018 ; Nazari Adli et al., 2019 ; Mattioli et al., 2019 ; Wiersma et al., 2016

Table 1, Determinants of car dependency in theory

Firstly, to relieve the higher costs associated with car dependency a sufficient public transportation network can be a solution (Walks, 2018). However, when considering the transportation network both public transportation and the infrastructure are important (Walks, 2018). Safe and comfortable bicycle networks can also offer an alternative to car usage when distances are relatively short (Bastiaanssen and Breedijk, 2022). However, when services move further away, like to urban areas, an efficient public transportation network is still able to cover these distances and can thus offer an alternative for rural areas to keep people living in there from becoming entirely car dependent (Nazari Adli et al., 2019).

Nonetheless, as stated by Wiersma et al., (2016) public transport systems can often not compete with car usage because of their inefficiency, costs and other characteristics that make the car a more comfortable and viable option when traveling. The smaller populations living in rural areas can cause public transportation systems to not always be feasible. Options in public transportation are therefore often less efficient than those found in central or urban areas (Zijlstra et al., 2021b; Wiersma et al., 2016). The public transport networks are often focused on central interurban travel, making traveling between larger hubs in urban areas very easy as they connect different supply and demand sides within the labour market, markets of goods and services sectors (Zijlstra et al., 2021b; Nazari Adli et al., 2019). Nazari Adli et al. (2019), emphasize the development of this trend stating that public transport systems are often based upon a costs and benefit system, creating a problem for less densely populated areas where the system might simply be too costly. Because the services are not used very often and they have often been cut down even more, prompting people still living in the area to use them even less because of longer waiting times or less frequent travel options (Nazari Adli et al., 2019).

Various substituting services have started to operate in rural areas so that they are still somewhat accessible through public services like a public transport taxi, community busses and rentable bikes, however, these services too need enough demand to keep operating and are sometimes unreliable because demand is not consistent enough to keep up with a set time schedule (Zijlstra et al. 2021b). In rural areas these services are therefore often still not very efficient and remain fairly unused (Bastiaanssen and Breedijk, 2022). Zijlstra et al., (2021b) found that there is only an effect seen on the number of cars in a neighbourhood when there is a bus that travels four or more times an hour, something that is almost never the case in sparsely populated rural areas. Because of a combination of these trends in both land use and public transport, areas outside of common transport networks and urban centers become increasingly car dependent (Zijlstra et al., 2021b; Wiersma et al., 2016; Nazari

Adli et al., 2019)

When living in a car dependent area a certainty is that the car is the most valuable asset to increase accessibility, however, it can also cause the biggest constraint (Walks, 2018). Because of the changes in some rural areas and the resulting car dependency, households living in these rural areas are far more vulnerable to various changes in trends related to car usage (Walks, 2018). As stated by Wiersma et al. (2016) car dependency can leave people vulnerable to changes in environmental policies relating to car usage or to changes fuel prices because it may not be easy to change travel habits quickly when an individual is dependent on a car (Wiersma et al., 2016). A change in fuel prices could for people living in rural areas thus have a different effect than on people living in urban areas (Goodwin et al., 2004). As Smith (2012) states, when prices rise, it is likely that, in addition to costs of travel, costs of for example groceries or heating also rise. For someone living in an urban area the latter two are likely to be more impactful than the rise in costs for travel as travel distances are often shorter in urban areas. However, for someone living in a rural area the former takes up a marginally bigger part of the budget compared to people living in urban areas because distances are longer. In addition to experiencing higher costs overall, they will be more vulnerable because their budget for travel is also heavily impacted (Smith, 2012). Nonetheless, higher fuel prices will not necessarily mean that people living in rural areas drive less and a rise in costs of travel might thus be compensated elsewhere (Goodwin et al., 2004). Therefore, there could be different coping mechanisms that are adopted by households in car dependent areas depending on a variety of household characteristics such as income and purpose of travel.

2.2 Coping mechanisms in theory

Though there are several changes that can be made by households in car dependent areas, most of them have a negative effect on either household funds or ability to participate in society (Lucas, 2012). Walks (2018) states that lower- and middle-income classes are especially vulnerable as the impact of rising costs can have crucial consequences for their spending patterns. Households may in that case have to choose to travel less when it comes to social activities or even go into debt, disadvantaging them even more (Walks, 2018). In these instances, rises in the costs of travel could lead to less participation in activities in society. As discussed by Luz and Portugal (2021) when individuals are forced to participate less in society because of developments outside of their control this could be seen as social exclusion. If people are unable to travel because of their dependency on cars and inability to afford traveling by car this could have severe consequences for their opportunities and choices (Luz and Portugal, 2021). Their ability to use resources, such as a car, is limited by the constraint that increased prices put on their situation (Luz and Portugal, 2021). As pointed out by Mattioli et al., (2019) households that experience increased CRES because of higher costs of travel could also go into debt, especially when they are dependent on traveling by car to reach basic amenities and services. Such a situation would disadvantage a household that is already experiencing a transport disadvantage even more and could close them off from participating in society even further (Mattioli et al., 2019). As Walks (2018) states such conditions either way could lead to more exclusion and more difficulties getting out of the disadvantaged situation.

There are various coping mechanisms that households may adopt to deal with their vulnerability to fuel price fluctuations. They can range from adopting small changes in household spending to having major impacts on accessibility, particularly for some households that are already disadvantaged (Mattioli et al., 2019). Economic status may be an important indicator of differences in behaviour and choices that are made when the costs of travelling increase (Hickman et al., 2017). Because people living in car dependent areas often have no alternative than traveling by car for daily activities, households can make choices related to their spending habits including housing costs or costs of groceries to compensate for the rise in fuel costs (Hickman et al., 2017; Walks, 2018).

Chevallier et al. (2018) conducted an analysis into the coping mechanisms of low-income households in the areas surrounding Dijon and Paris. They found that while the necessity to have local access to basic amenities remained, low-income households tended to focus more on the available local amenities when prices of fuel went up. In addition to this they tried to connect and rely on a network of friends in order to keep up social activities and have access to sufficient supplies (Chevallier et al., 2018). They found that the mechanisms used by these families often had no effect on their usage of the car but rather on coping with the increased costs of their car usage by economizing on other spending habits. This is because even though their situation changed, they remained dependent on cars to get a basic level of daily necessities.

Both income groups might have had to use these tactics or a combination of these mechanisms in addition to others to compensate for the increased prices (Cohen, 2021). This finding was also discussed by Rozynek et al. (2022) stating that the need for a social network for support has become increasingly important for families that experience car related economic stress. They found that while some families choose to centre their financials around keeping use of the car others centered their decision-making around an increased use of public transport and measures that could be taken within the household. They could increase time spent locally if there were at least some amenities available in the vicinity (Rozynek et al., 2022). This is also an important notation made by Chevallier et al. (2018) stating that a basic form of local amenities is crucial in keeping these families sufficiently supplied with basic necessities and a basic level of recreational options. When all amenities disappeared, the households were very reliant on both their own network and ability to cope inside of their household with the increased costs leaving them incredibly vulnerable as an individual (Chevallier et al., 2018). A result of being unable to cope with these changes in addition to having a limited network to support them could lead to debt relating to the costs of their car usage.

Though both low- and middle-income groups can be impacted through car dependency their coping

mechanisms and the resulting effects from their choices might be entirely different. As mentioned by Froud et al. (2002), where middle-income families are often able to fill up the tank of their car to the max, low-income families are often not able to do so. This means that they already know when they fill up on gas how far and to which activities, they would be able to go (Froud et al., 2002). In other words, low-income families often have to plan ahead and because there are no other funds available for more fuel they have to choose between activities. Social activities, healthcare appointments and going to work are often the first activities to go as these are often activities that require a car (Froud et al., 2002; Belton Chevallier et al., 2018). As Belton Chevallier et al. (2018) describe low-income families often resort to limiting transportation or relying heavily on local (social) networks to cope with unaffordable fuel costs for activities. A further coping mechanism adopted mostly by low-income families is going into debt (Walks, 2018). This coping mechanism is the result of a (perceived) inability to cope in any other way. All activities that these low-income families conduct seem necessary and economizing on other aspects of the household also seems impossible, for these families doing nothing, going into debt and increasing financial stress seems like the only possible way to go (Walks, 2018).

On coping mechanisms within middle-income family's theory is less clear and there seems to be a gap in how middle-income families are expected to respond to quickly and steeply rising prices. As Mattioli et al. (2018) state both upper- and middle-income classes are often able to cope with rising fuel costs and are able to adopt coping mechanisms that do not necessarily harm them such as economizing within other aspects of household spending. One of these coping mechanisms, as mentioned by Mattioli et al. (2019) is switching modes of transport. In the near future these both higher- and middle-income groups might be able to make the change in mode of transport to electric vehicles, further lowering their expenses on transportation. However, as mentioned before, the rise in fuel at this time in combination with a rise in costs of heating and supplies is so sudden and steep that some middle-income families might have to adopt coping mechanisms too (Cohen, 2022). Though these coping mechanisms do not necessarily impact traveling they can have an impact on behaviour and how decisions are made within the household as all decisions in relation to travel are often dependent on household communication and reasoning (Belton Chevallier et al., 2018).

In relation to this statement, the coping mechanisms adopted by individuals are often dependent on the construction of their household (Belton Chevallier et al., 2018). An individuals' decision will include considerations that value or prioritize their family or household.

Nonetheless, while households as a whole need to be taken into account, the overall impact of coping mechanisms on accessibility and capability to take up opportunities and activities between low- and middle-income households could also have different effects (Belton Chevallier et al., 2018).

2.3 The capabilities approach

It is important to take note of the variety in coping mechanisms that are used by both low- and middle-income households and using the capabilities approach may help identify the reasons why some of these mechanisms are adopted by including priorities and values in the analysis (Vecchio and Martens, 2021). Though some research looking into coping mechanisms of vulnerable households has been done, a more integrated approach is often lacking. The capabilities approach offers an inclusive framework that considers how coping mechanisms are chosen and from what situation they are the result (Vecchio and Martens, 2021).

2.3.1 The capabilities approach in theory

The capabilities approach, developed by Sen (1995) is a framework that was developed to assess people's potential to participate in society and to identify what choices are valued when it comes to different trends that influence people's daily lives. It includes environmental, social and physical barriers that can influence someone's ability to reach their full potential (Vecchio and Martens, 2021). While some studies solely look at economic means or a certain level of accessibility necessary to achieve a sufficient lifestyle the capabilities framework offers a more inclusive approach aiming to incorporate the choices that people might have to make in order to reach valued participation levels.

The capabilities approach was first developed as a framework to understand differences in choices made by individuals in how they want to participate in different activities by Sen (Sen, 1995; Vecchio and Martens, 2021). However, since then it has also been used to form an image of people's accessibility and travel habits in several studies. It attempts to include a set of resources, capabilities and choices. This combination results in functionings, or actions, that are explained by how an individual has valued their choices and can result in a more complete and clarifying picture of someone's accessibility level and the potential they are able to reach with it (Verd and Lopez, 2011).

Vecchio and Martens (2021) discuss various uses of accessibility being linked to capabilities in their research. As stated by Vecchio and Martens (2021) the capabilities framework can be helpful in assessing the distribution of resources that influence someone's ability to travel. Someone living in a car dependent area is subjected to a different distribution of resources than someone living in an urban area and this in turn impacts the ability to deal with changes in prices. The result could be that an individual feels that their ability to reach their full potential is impacted by the rise in fuel prices. In turn they could choose to make different choices that influence their travel habits and participation or opt for another way to deal with the changed situation (Vecchio and Martens, 2021)

The capabilities approach can offer a fitting framework for assessment of the impact of price trends in car dependent areas as it considers the ways in which access to transportation affects an individual's capabilities, their potential (Vecchio and Martens, 2021). An individual who has to resort to less car usage might now, because fuel prices have risen, have less opportunities to achieve what they want to and would otherwise be able to achieve. As a result, they might make different choices that impact their daily lives, they could change their functionings based upon an experienced difference in their capabilities (Luz and Portugal, 2021). The capabilities in the context of this research can help define impacts of fuel price increases that are linked to car dependency that could impact people's potential and daily activities or coping mechanisms (Vecchio and Martens, 2021). How the different components of the capabilities approach are used in an accessibility study on a household level is more clearly explained in the section below.

In the context of this research paper the economic burden of quickly rising fuel prices might impact the ability to make use of certain options of transportation options while the transportation system itself rarely and barely changes. As discussed by Walks (2018) fluctuations in fuel prices can arise rapidly and may influence different groups in society unequally due to different barriers. Furthermore, the impacts can be spatially unequally divided and influenced by personal characteristics (Walks, 2018). The capabilities approach could therefore better help shed a light on the influence of both general developments and an individual's values on reached potential within a particular situation such as a rise

in prices. Availability of different transport options is often a condition that is crucial in being able to attend activities and opportunities that can increase overall well-being and health (Hickman et al., 2017). The capabilities framework makes it possible to include these aspects in the analysis. The approach considers someone's resources, capabilities and functionings (Vecchio and Martens, 2021).

2.3.2 Defining the capabilities approach within accessibility context

Resources in theory are often considered to be the assets that are available to someone to develop their potential, or *capabilities* and to realize valued activities; or *functionings* (Vecchio and Martens, 2021). Vecchio and Martens (2021) consider physical resources to be the existing transport and land use system and individual available assets such as different modes of transport. Smith et al. (2012) state that resources can be understood as the items or services that are required to achieve participation in different activities. Someone living in a car dependent area has less access to resources used to achieve participation than someone who does not live in a car dependent area (Walks, 2018). Car dependency thus impacts the availability of some resources such as different modes of transport or closeness of social activities, educational institutions and health institutions and work-related facilities. Someone with access to a car has a broader set of resources to help achieve a set of satisfactory capabilities than someone who does not have access to this mode of transport (Smith et al., 2012). In this research resources are understood as the different assets that help someone achieve a certain level of potential accessibility.

To convert resources in capabilities conversion factors are needed. Conversion factors are somewhat forgotten or unused in existing theories. They are the means that are necessary when someone wants to use resources available to them such as usage of a car (Vecchio and Martens, 2021). Verd and Lopez (2011) describe conversion factors as what facilitates the conversion of resources into freedom, or in other words, capabilities. Luz and Portugal (2021) on the other hand describe them as the possibility of conversion of resources to capabilities. The general consensus in theory is that they are used to transform resources into actions or freedoms. In Vecchio and Martens' (2021) research they are understood as someone's ability to use the resources to improve their set of capabilities. For the purposes of this research they are understood as means to facilitate usage of resources that are needed to perform actions.

Conversion factors can take on a variety of different forms. Someone may have limited knowledge of the resource or have personal limitations to use the resources. An individual can have a variety of reasons not to be able to use any of the modes of transport available to them and this could then influence their capabilities while they still have access to the resources (Vecchio and Martens, 2021). An individual might be unable to drive a car because they don't possess the knowledge or have a fear of driving (Luz and Portugal, 2021). Income is also acknowledged in resource as an important conversion factor (Vecchio and Martens, 2021). A rise in fuel prices could impact a household's income and could thus have an impact on their accessibility potential and their ability to turn existing resources into capabilities (Vecchio and Martens, 2021). In other words, a change in conversion factors could impact someone's ability to participate in activities (Vecchio and Martens, 2021).

Capabilities, as stated by Smith et al. (2012), can be described as all that someone is able to achieve with available resources; their potential. Someone living in a car dependent area is dependent on their car as a resource and for example income as a conversion factor to turn both into a capability of participating in activities (Luz and Portugal, 2021). Therefore, the set of capabilities of an individual is highly dependent on geographical characteristics in combination with personal factors that influence the ability to convert the existing resources into usable assets (Smith et al., 2012). For example, in very car dependent areas access to a car can immensely increase someone's set of capabilities. A change in resources or conversion factors can thus influence someone's potential (Vecchio and Martens, 2021).

However, to measure someone's potential can be incredibly difficult as it includes all opportunities and options that someone might have (Smith, 2012). Therefore, in research perceived capabilities are often used to get an idea of how individuals feel that they have been impacted by changes (Hickman et al., 2017). Transport and mobility opportunities can be evaluated by an individual themselves, forming an

image of a persons perceived capabilities (Hickman et al., 2017). Perceived capabilities can help shed light upon the feeling of constraint that people might have when there is a sudden change in their accessibility situation and if they feel that this change has an impact on their potential to achieve what they want (Hickman et al., 2017). As Vecchio and Martens (2021) state these perceived capabilities include the values that someone attaches to actions and activities and can help identify what activities and participation should be safeguarded. Within someone's potential, or set of capabilities, individuals choose actions that they realize in functionings (Vecchio and Martens, 2021).

Functionings can be defined as the result of the choices that an individual makes within their set of capabilities (Vecchio and Martens, 2021). As discussed by (Vecchio and Martens, 2021), someone may choose to make use of certain services and travel options available to them or may choose not to use them even though they are available. The functionings can thus be seen as the realization of actions and choices based upon individual priorities and values all within someone's scope of total potential, or capabilities (Vecchio and Martens, 2021). Because functionings are based upon individual values and priorities capabilities and functionings can differ greatly. Someone might not choose to use a more rational or more readily available option within their set of capabilities for a variety of reasons (Smith et al., 2012). Additionally, Luz and Portugal (2021), also express this sentiment stating that an aggregated analysis would not be enough when trying to analyze the impact of trends on an individual's accessibility. They state that the limitations someone might have on their conversion factors can only be made visible when a person-based approach is adopted.

This framework capabilities and functionings could give more insight into the opportunities and options that someone has because it not only considers the existing networks available to everyone but also someone's individual situation and what they choose to opt for (Smith et al., 2012). In the case of rising fuel prices both someone's set of capabilities and their resulting functionings might be impacted. As Vecchio and Martens (2021) state, the set of capabilities is influenced by available resources and conversion factors that might be impacted by the rise in costs of traveling by car. Functionings, in turn, could also be impacted either through a lower available set of capabilities or because of a change in value given to certain choices (Smit et al., 2012).

The actual choices that someone makes are influenced by their given value to each activity or action. These functionings might appear to be quite irrational when only looking at the choices made (Hickman et al., 2017). Therefore, it is import to include values given to each of these actions in the analysis. Someone may give sentimental value to some actions and therefore choose those over others while it may appear to be the less obvious choice when approaching the choice with solely an economic view. Therefore, in this analysis, the actual choices that someone makes and the resulting functionings are related to the value that an individual gives to them, forming a more complete picture of why the choices are made (Vecchio and Martens, 2021).

2.4 Conceptual model

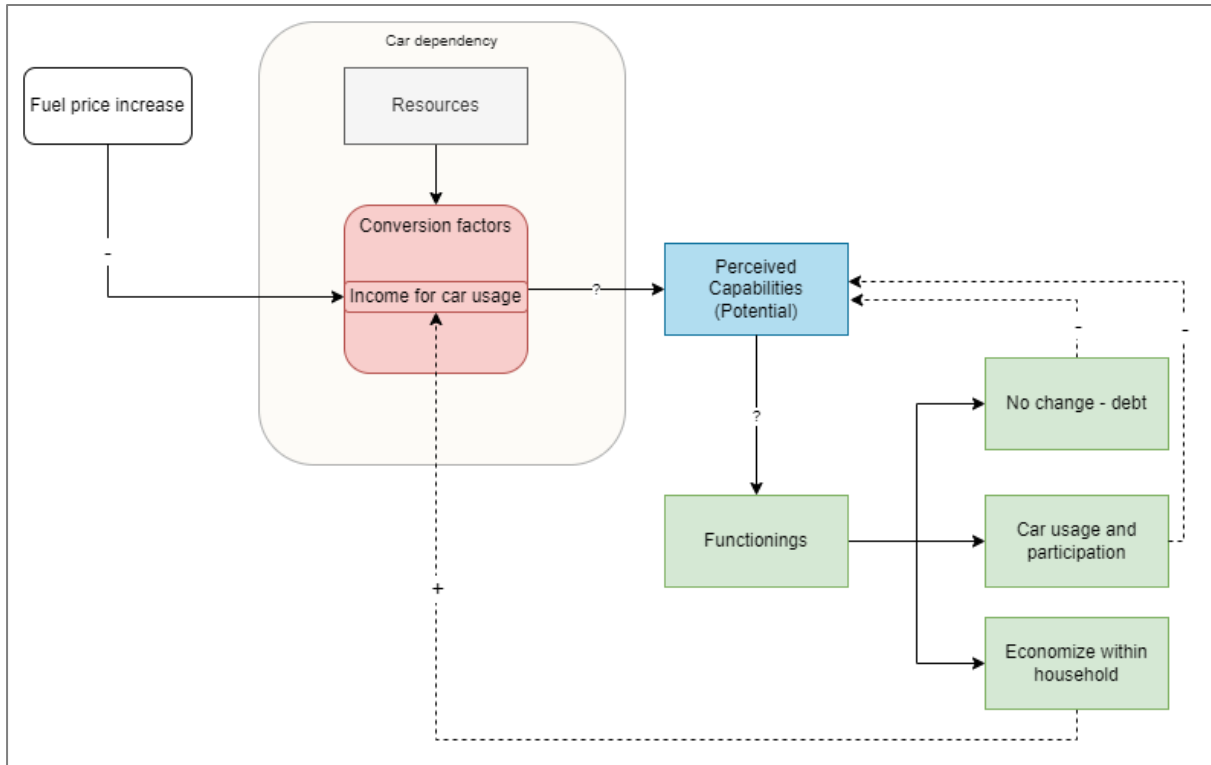


Figure 1, Conceptual model

The analysis of this paper was based upon the conceptual model depicted in figure 1, Conceptual model. The model is based upon the Capabilities Framework as discussed by Vecchio and Martens (2021). A fuel price increase would have a negative impact on income used for car usage. This can be seen as a component of the conversion factors that someone needs to convert resources into capabilities (Vecchio and Martens, 2021). Conversion factors can consist of a variety of concepts that are available to individuals such as confidence to use a mode of transport, knowledge of different transport systems and, as aforementioned and reflected in the conceptual model, income to afford to use different resources (Luz and Portugal, 2021). Between low- and middle- income households these conversion factors differ as the income that low-income families might have available for transportation is lower than that of middle-income families.

The resources in this instance are subjective to the car dependency that characterizes the environment. Resources can consist of a range of goods that include cars and other personal modes of transport, public transport systems and the availability of sufficient infrastructure networks (Vecchio and Martens, 2021). Resources, are fewer because the area is car dependent and the car is the most important mode of transport to develop the individual's set of capabilities. The resources in this instance are limited for every group because of their car dependency. All households living in the car dependent area have the same road- and public-transport network available and all distances to amenities are the same. The determinants of car dependency outlined in chapter 2 explain the lack of resources available to each household living in a car dependent area. The resources are not changed easily but can be used differently through conversion factors.

There can however, be a difference in resources between households when availability of a car is considered. When there is no car available the car as a resource is no longer usable to develop capabilities. Especially for people living in a car dependent area the availability of a car as a resource is important. When considering households this may present a difference in behaviour since one household may need to share one car when there are multiple people in need of car usage. Therefore, purpose of trips, such as employment or taking children to activities may also influence functionings, or behaviour when choices are made.

As a result, an individual that experiences a fuel price increase might experience an impact on capabilities depending on their income or obligations. These actual capabilities however can be very difficult to realistically measure (Hickman et al., 2017). Therefore, in this conceptual model and research analysis the perceived capabilities are used as an indication of how pressure on capabilities is perceived. Perceived capabilities can shed light on individuals experience of accessibility and the impact fuel price changes might have on their perceived potential to travel and participate in society (Hickman et al., 2017). They might for example feel that they are more constraint in what they are able to do.

Consequently, an individual chooses how they deal with the increase in prices, their coping mechanisms. Their functionings are impacted based on what activities and functions they value. In theory they could choose to travel less and participate in less activities or they could choose to try to reallocate household funds and increase funds that are used for car usage (Belton Chevallier et al., 2018). A third coping mechanism might be refraining from taking any action. This coping mechanism could in time result in a buildup of debt (Belton Chevallier et al., 2018).

The functionings are dependent on conversion factors and could thus be impacted by a change in fuel prices (Luz and Portugal, 2021). When prices go up households might have to adapt existing coping mechanisms or adopt new ones. A conversion factor can also include willingness to drive a car (Vecchio and Martens, 2018). Therefore, a different influence of fuel costs increase on conversion factors could also be a change in willingness to use a car as the costs of traveling with the car as mode of transportation might put off individuals to actually use it (Vecchio and Martens, 2021). Especially within middle-income families the choices that are made could vary as some might be willing to spend more on car usage and compensate elsewhere in household funds while others might be unable or unwilling to do so and consequently are forced or choose to travel and participate less in activities. These are choices that are dependent on an individual's values and purposes of travel and may thus be very different between household situations.

The capabilities framework as a guideline for the conceptual model helps to identify individual barriers and choices that could result in a change in perceived capabilities or potential, or a change in functionings (Vecchio and Martens, 2021).

3. Research methodology and data collection

The aim of this thesis is to gain insight into the coping mechanisms used by middle- and low- income families in car dependent areas to overcome a steep and sudden rise in costs for traveling by car. Rising costs of fuel may impact the perceived capabilities and functionings of low- and middle- income families as their options of traveling become more limited (Vecchio and Martens, 2021). This in turn might impact their well-being and result in an unequal access to opportunities and activities or a perceived lower ability to participate in society (Walks, 2018). Important to understand is how this rise in costs influences the perceived capabilities that different households have and how it influences the actual choices that they make. Households might have to compensate for the loss of income by adopting different coping mechanisms depending on the purpose of their daily trips (Chevallier et al., 2018). These choices result in a difference in functionings based upon individual values and priorities. Within income groups these mechanisms might differ because they have different means and priorities to compensate for a rise in costs (Mattioli et al., 2019). Middle- and low-income households could adopt a variation of coping mechanisms to compensate for the increased costs and understanding them could help in offering better options for compensation in the future (Chevallier et al., 2018).

Two data collection techniques were combined to answer these three questions (Table 2).

RQ	Method of data collection	Documentati on	Method of analysis
a) How can a person based perspective shed more light upon the effects of fuel price increases on middle- and low-income households in car dependent areas?	Textual and theoretical analysis	Textual	Document analysis
b) How does a rise in fuel prices impact perceived capabilities of middle- and low- income households in car dependent areas?	Semi-structured interview questions with middle-income families and expert interviews with social and financial help organizations about CRES within low- and middle-income families. Participants are found through CBS (2021), University of Groningen (2022) and OpenStreetMap (2007) data in combination with determinants from literature. Contacting local network organizations, street interviews and snowballing techniques are used to find participants in the identified areas.	Transcriptions	Atlas and inductive coding system
c) How does a rise in fuel prices impact decision-making of middle- and low-income households in car dependent areas?	Semi-structured interview questions with middle-income families and expert interviews with social and financial help organizations about CRES within low- and middle-income families. Participants are found through CBS (2021), University of Groningen (2022) and OpenStreetMap (2007) data in combination with determinants from literature. Contacting local network organizations, street interviews and snowballing techniques are used to find participants in the identified areas.	Transcriptions	Atlas and inductive coding system

Table 2, Framework for data collection techniques

3.1 Data collection methods

The research method was based upon the nature of the research questions. The first sub-question is a theoretical question. The second and third sub-questions are qualitative research questions. The first research question is answered through a theoretical literature analysis in order to explain how a qualitative approach can help form a more complete picture of how households cope with the risen costs of travel in car dependent areas. This question was answered through a literature analysis discussed in chapter 2 and explained in subsection 3.1.1.. It is included to provide a guideline throughout the research project that builds upon the capabilities approach as a framework. The second and third research questions are answered through qualitative research in the form of semi-structured in-depth interviews.

3.1.1 Literature analysis

A documentary and spatial analysis was carried out to compare determinants of car dependency in theory and in practice to identify areas that might experience car dependency. Throughout theory and documents several determinants for car dependency are discussed and used. These are outlined in chapter 2 and were compared to existing geographical features in the Netherlands using maps in Geographical Information Systems (GIS). The documentary analysis helped to gain insight into these determinants and attempt to apply them to the northern regions of the Netherlands. This analysis consisted of a collection of most recent mobility reports in the Netherlands and recent reports on car usage that had been published by private and (semi-) governmental analysis bureaus such as the Spatial Planning Bureau, the Netherlands Environmental Assessment Agency and the Central Bureau of Statistics. These are further defined in the following paragraph. The determinants derived from these reports, as presented in chapter 2, were largely consisted with the determinants derived from theory and, although not all precedents of car dependency are included, these factors, as described in chapter 2, seem to be the most important in defining the current car dependency in the Netherlands.

Car dependent areas analysed in this research paper were derived from the Dutch Accessibility reports by the KiM Netherlands Institute for Transport Policy Analysis (Zijlstra et al., 2021a; 2021b; 2021c), the accessibility report by the PBL, Netherlands Environmental Assessment Agency (Bastiaanssen and Breedijk, 2022) and the population decline report by the RPB, Spatial Planning Bureau (van Dam et al., 2006). These were analysed in combination with determinants of car dependency discussed in theory and GIS maps using data from the CBS, Central Bureau for Statistics (2021), the University of Groningen, Geodienst (2022) and Street Map (2022). The data used to form GIS maps consisted of data on distances to crucial amenities and data on income levels as well as data on the public transport system and a geographical base of the map. An example of this information in GIS is added in Appendix III.

The reports used in this research analysis describe the current Dutch public and private transport trends, emphasize difficulties in transport for different groups and focus on car usage within different contexts. Therefore, they are very useful in explaining the different determinants of car dependency in the Dutch context. The reports described public transportation, population density and distance to amenities as important indicators for car dependency. Several areas in the Netherlands were described as becoming increasingly car dependent. These areas mostly consisted of rural areas in the Northern and Southern parts of the country (Bastiaanssen and Breedijk, 2022). The provinces of Groningen, Leeuwarden and Zeeland are provinces where car dependency is high and accessibility is considerably lower than in other provinces (Bastiaanssen and Breedijk, 2022). Because of the emphasis in the aforementioned the reports on these regions and the limitation of travel budgets within this research project the Northern provinces were chosen to be used in the spatial analysis. These areas, as determined by van Dam et al. (2006), experience increasing car dependency due to population decline and moving businesses and were therefore a logical spatial boundary of this research. As mentioned in the section above, these factors were used in the identification of car dependent areas and in the qualitative research analysis of how respondents experience and respond to car dependency.

3.1.2 Qualitative research questions

The second research question is centered around perceived capabilities of households during increasing costs of traveling. Do these households feel that they are able to achieve less or feel that they are more constrained in their travels than before because of the rise in costs? Their perceived accessibility is at the centre of their capabilities in this part of the interviews. Capabilities encompass all different actions that someone is able to achieve with their particular resource set and within the constraints of their household (Vecchio and Martens, 2021). However, when analyzing these capabilities in a qualitative manner the results could be painted within the view of the household itself and the situation they are in (Vecchio and Martens, 2021). Therefore, this research analysis focusses on perceived capabilities and the influence that the increasing prices might have on the feeling of being free and able to travel. How do the households perceive the constraints that the rise in costs put on them and their capabilities? As Hickman et al. (2017) describe perceived capabilities in their research could be seen as the desired capabilities that could have been reached. A set of actions that they are able to do and results that they are able to reach that are based upon individual priorities and values (Hickman et al., 2017). Do these households feel that their capability is still sufficient enough or has it changed because of the rise in costs of traveling by car? These questions can be important in understanding how constrained people feel and if rises in fuel prices impact that feeling.

The third research question focusses on the actual choices that are made within the household because of the rise in costs. Are there changes made in daily activities compared to when costs were lower or do these families try to maintain their normal activities and continue their daily functionings? Hickman et al. (2017) also describe this distinction in desired capabilities and actual (realized) functionings. They focus on what choices are made and how they shape the daily life of individuals (Hickman et al., 2017). Functionings can offer an insight into the actual consequences of a sudden rise in fuel prices and what choices consequently are made to cope with the changes in costs (Hickman et al., 2017). Actual functionings can be determined as activities or actions that households do that because they are of a certain value to them (Hickman et al., 2017). Changed actual functionings might impact their activities further down the road. Less time spend with friend or less time spend on health activities might impact their functionings later on as well forming a cycle that reinforces itself (Luz and Portugal, 2021).

Findings of the analysis were transcribed and inductively analysed using an open coding system in Atlas. Expected is that the findings provide insight in the perceived capabilities of middle- and low-income households that experience increased car related economic stress because of the rise in costs for traveling by car and all costs associated with the rise in fuel prices. Findings also provide insight in the changed functionings and choices that are made in relation to these functionings within the low- and middle-income families. These choices can depend on priorities, obligations and values that an individual or household has and may impact the working of the household as a whole (Mattioli et al., 2019).

3.1.3 Data collection technique

For the purposes of this research seven interviews were held with middle-income individuals using an interview guide for semi-structured interviews. The respondents were contacted through communication with community associations, social services and online community networks. Moreover, thirty cooperations and associations were contacted within the identified car dependent areas to distribute the appeal for an interview. Few of the institutions replied to the appeal and of those seven of the conducted interviews were derived. All of the respondents were found through this networking technique. This method was also attempted for low-income households, however, these individuals seemed to be more reluctant to be interviewed as the response from lower income households was very limited. The expert interviews were included to shed more light upon the impacts in low-income families as well as an expansion of information on the impacts of high fuel prices on middle-income families.

The middle-income families could experience a newfound difficulty with the rising prices and the expert

interviews shed more light upon how and how much these families were impacted. Therefore, to include experts within the topic of CRES a secondary data collection strategy was added by contacting financial and social help organizations and from the first respondent snowballing was attempted. This resulted in two expert interviews with organizations that help households and individuals that struggle to make ends meet. Reasons for the limited response within the low-income group were identified through one of the interviews when the interviewee expressed that there were a lot of research projects that focused on their villages and that they (the villagers) were becoming more reluctant to answer appeals for interviews. Furthermore, the time constraint that some low-income families might have upon their daily activities was also expressed and could have influenced the response rate of the low-income households. However, in the context of this research the expert interviews in combination with the response from the in-depth interviews has resulted in a consistent line of reasoning that explains differences in decision-making and priorities between and within income groups.

The expert interviews were conducted with social and financial services on a municipal level and included the same topics as the interviews with individuals as well as a discussion of what households contact these services and how they cope with increasing financial pressure. These interviews served to explain which income groups experience increased stress and how these groups cope with increased prices. The groups consisted of the two different economic groups and within these groups, different occupations and purposes of trips were discussed.

In addition to this an important distinction to shortly discuss in this chapter is purpose of trips. These may also influence the impact of a fuel price increase (Mattioli et al., 2019). Depending on priorities different income groups might adopt a variation of coping mechanisms to either keep traveling to the prioritized activities (such as employment or obligations) or decide to travel less if they prioritize funds for other household activities (Belton Chevallier et al., 2018). Therefore, both employed and retired or unemployed individuals within households as well as households with and without children were included in the data collection. These characteristics define obligations that often require car usage and could thus influence behaviour in decision-making when it comes to transportation.

3.2 Research specifications

3.2.1 The respondents

Table 3 presents several general characteristics of the respondents that were interviewed for this research project. Seven individuals were interviewed on about car dependency, their capabilities and their functionings and coping mechanisms.

Respondent	Car Availability	Employment	Car Usage
1	2 cars	Employed	2 times a week
2	2 cars	Unemployed	4/5 times a week
3	1 car	Unemployed	3 /4 times per week
4	2 cars	Employed	Every day
5	No car	Unemployed	1 time per week
6	1 car	Unemployed	2/3 times a week
7	2 cars	Employed	Every day

Table 3, respondents and characteristics

Table 4 displays the geographical location of the respondents. The table defines the population density, number of interviews between brackets and the presence of a supermarket and public transport in the interview locations. These factors give an indication of car dependency.

Location	Population Density	Amenities	Bus stop frequency
Ezinge (3)	675	Community shop	1 stop, 1 p/h
Feerwerd (1)	520	No supermarket	No stop
Warfhuizen (3)	205	No supermarket	1 stop, 1 p/h

Table 4, Location and geographical characteristics

In addition to the in-depth interviews with these respondents two expert interviews were conducted as described in the section above. These organizations aided households that have difficulties in maintaining household funds and operated on a municipal level. The interviews, as with the other respondents' interviews, were centered around car usage, capabilities and coping mechanisms. In addition to these topics, households that experience increased CRES were discussed to gain insight into recent consequences of higher prices for low- and middle-income households. These social and financial help facilities organize several training and support sessions for families in their respective municipality. Therefore, they could offer an oversight of how different families are impacted.

3.2.2 Unit(s) of Analysis

This research analysis was carried out between July 2022 and July 2023 with data collection between January and April of 2023. The time focus within the interviews is between May and July of 2022 as in this period the fuel prices rose suddenly and steeply (Cohen, 2022). While prices fluctuated before and after this period this timeframe remains the most crucial since prices overall rose more steeply and quickly than people could manage to anticipate. The spatial boundaries of the research analysis were determined by the documentary analysis as presented in chapter 2 and are limited to the Northern regions of the Netherlands as this region was determined to be prominent in car dependency throughout the spatial and documentary analysis.

4. Findings

In this chapter the findings of this research thesis are presented. The findings are discussed according to the research question setup. The household interviews discuss findings of middle-income households. The expert interviews focus on low-income households, though they do take middle-income households into account as well. Firstly, the impact on capabilities in combination with car dependency is discussed among the different income groups, and differences within these groups are highlighted. Secondly, the functionings and coping mechanisms are discussed according to the household interviews and the expert's interviews. These too are then separated to discuss differences between income groups and within households. The findings are supported by quotes from the interviews.

4.1 Car dependency and perceived capabilities

4.1.1 Household interviews, Car dependency

Seven in depth-interviews were held with middle-income families. The first topic in each interview was car dependency. All of the respondents felt that they were dependent on a car to keep up their preferred level of accessibility. This is expressed in the following quote where the respondent was asked whether they would consider themselves to be car dependent;

“Yes, I think so. Well, there is public transport here, but because of my activities and interests, I am often away and I feel that’s why I need a car.” [13:17 ¶ 11 in interview 3](#)

Most of them felt that they had to adjust their lifestyle if they did not have access to a car. They felt that the local public transport system did not weigh up against the comfort and flexibility of a car as the bus connection was complicated or non-existent. Usage of the car, while important for all respondents, differs between respondents as some of them used local amenities that they felt were sufficient enough for small supply runs or were doable by bike. Nevertheless, the main consensus is that the car remains indispensable for the functioning of the household.

However, there is a difference in car usage between different groups. Employed individuals and people with children use the car daily to get to work, schools or supermarkets. There is a different use of transport for retirees and unemployed respondents, who used their car 1 to 5 times a week to get to supermarkets or social activities. The perception of car dependency did not differ between these two groups but their car usage depended on the purpose of trips and number of necessary trips. The purpose of trips for employed respondents centered around work and often children. These trips were seen as crucial and an inability to use a car would impact the functioning of the household. For unemployed and retired respondents the trips were mostly centered around social and recreational activities. Though these trips were seen as important with regards to their social life they were carried out less often and the costs of travel were thus often lower overall.

One of the most used alternatives for a car within the middle-income group was the electric bike. Several of the respondents mentioned that while the car has become more expensive, they would mostly use the car for short distances. Therefore, in several cases the electric bike was seen as a viable substitute for some trips that were otherwise made by car. The respondents used it for small grocery runs and for social and active trips as depicted by the following quote;

“I had a lease contract for an electric bike. It was comfortable and I went on some beautiful rides with it. But when the contract ended, I didn’t renew it. I might buy one in the future though. I can buy one from a bike shop just outside the village that sells used electric bikes, and I’ll go check it out soon. Then I’ll bike to Winsum. There’s a small electric ferry there. In the summer, I bike there and take the ferry with my bike, and then bike to Winsum. I do that a few times a week, and I consider it as alternative transportation, which means I’m driving less. I put a bag on the back and go grocery shopping there.” [13:18 ¶ 57 in interview 3](#)

However, the purpose of trips determines the dependency on a car. When the respondents have to travel with kids or have to get groceries that cannot fit on a bike the car remains crucial. Especially later during the day or when the weather was bad;

“There is nothing in the evening, so I can go all the way somewhere, but I can’t come back (without a car) [13:4 ¶ 17 in interview 3](#)”

In conclusion, the people living in the areas of investigation, as expected through spatial analysis, are very car dependent and define the car as crucial to keep living in these areas.

4.1.2 Household interviews, Perceived Capabilities

The capabilities of the respondents were found to be impacted differently throughout this research depending on purpose of trips and income level. While not all of the respondents felt that rising fuel prices had an influence on their accessibility level some of the respondents felt that the high fuel prices had an impact on their ability to have a social life. The social activities were often the first to be excluded when prices of fuel went up as these were often further away than a trip to for example a nearby supermarket. This development was seen both in trips made to social activities and in social visits that would have been made. This is also what is expressed in the quotation below;

“Apparently, it’s shorter from Warfhuizen to Groningen than from Groningen to Warfhuizen. I had someone who said they were not coming because it was getting too expensive and the public transportation was too long, so yeah” [16:6 ¶ 40 in Interview 6](#)”

As also indicated by the quotation above, some of the respondents also felt that their inaccessibility by public transport and the rise in costs of traveling by car could impact their friendships because they were hard to reach with any mode of transport other than a car. However, the impact was only seen when distances to cover were considerable and therefore the costs of travel were also high. Most distances to social activities remained within affordable ranges. Only long-distance trips to other parts of the Netherlands or abroad were sometimes seen as too expensive.

A more pronounced fear lies within the general accessibility of the region. Most of the retired respondents worried about their accessibility if they would ever lose the ability to drive. They mentioned that they would have to rely heavily on their local social network and some of them mentioned that they were afraid to become lonely whenever their car would cease to be a viable mode of transport. This sentiment is clearly defined in the following quotation;

“If you don’t have any transportation yourself. Your life is really restricted. Your world becomes so small. I can’t imagine not having a car, then I’m really tied to the village and I’ll leave for the city” [13:9 ¶ 33 in interview 3](#)”

Most of the respondents felt that if public transportation were improved their level of accessibility would be a lot better and would provide a safety network for when the car was either broken or undrivable due to other issues. The bus network that is in place in the respondent’s living areas at the moment does not provide this level of safety as the connection is scattered and the driving times are very low or unreliable. The following quotations represent the respondent’s sentiment on this issue;

“But if there is a direct connection, then you don’t have to worry about that (waiting and scattered arrival times), so it would work. Then it depends on the regularity of the direct line.” [16:12 ¶ 59 in Interview 6](#)”

“Yes, I think it’s nice in Germany that if you travel a short distance, it’s free or only 9 euros a month. My sister lives in Ireland and all people over 65 have free public transportation. That’s also good for loneliness. It’s not just transportation, it’s also social. It also affects your health, just getting some fresh air.” [17:17 ¶ 125 in Interview 7](#)”

“Yes, we had a situation where both cars were broken. Then you’re like, “Oh, what am I going to do now?” Then you’re stuck in your village for a week, especially if the weather is bad. Because it’s windy and biking is not possible.” [11:7 ¶ 30 in Interview 1](#)

While five of the respondents felt that their level of accessibility was sufficient because of the availability of a car, the same number of individuals felt that if their car were to fail as a mode of transport that they would be greatly impacted and their lifestyle would suffer because of the change in accessibility. Furthermore, most of the respondents were more worried about their accessibility in combination with old age and ability to drive a car than they were with the rising fuel prices. For most respondents the rise in fuel prices was not truly impactful as distances that were traveled were often short as explained by the following quotation;

“The city is about 20 km to drive and that's the furthest I will go then. That's 20 there and 20 back, and it costs 1 liter of gasoline because my car runs on 1 in 20. So at the peak it was 5 euros and now it's 4 euros, so I didn't really notice that one euro. And if you're thinking of taking public transport instead, no, it costs at least as much. So honestly, I don't go to Groningen very often and nowadays you can work from home quite a bit, so I work from home and my girlfriend also works from home a lot. [11:22 ¶ 40 in Interview 1](#)

However, becoming unable to drive a car due to other developments, such as diminishing health, did create a fear of becoming immobile regardless of fuel prices;

(If you cannot drive) “your world becomes very small. And it’s still uncertain whether the local store will survive here. There’s a bakery and a small supermarket. The hairdresser and doctor are only there two days a week, and otherwise there’s nothing. Yes, you’ll stay alive, but that’s it. And then the question is whether I can still go to that store when I get older. So it’s a big deal for older people.” [13:10 ¶ 37 in interview 3](#)

“ I am aware that as long as I am healthy, it’s fine like this, but if I become a little unwell, then living in this remote area might become challenging” [15:11 ¶ 48 in Interview 5](#)

4.1.3 Expert interviews; Car dependency

Two social work organizations were interviewed to gain insight into the trends with relation to car related economic stress within car dependent areas. These interviews gave more insight into the variety of households that experience CRES. They focused on low-income families as these families contacted the facilities more often and the expertise of the social work organizations could offer an insight that was not obtained through the household interviews. However, the expert interviews also included the middle-income families as these too contacted these facilities and the experts could offer insight into their behaviour and coping mechanisms. Both organizations help individuals that struggle to participate in society and offer them help and guidance. The organizations operate on a municipal level and function to help household manage household funds and cope with rising prices such as the fuel price increases. They do so by offering information and training on financial strategies, by helping contact governmental agencies to help finance through subsidies and by helping households find their way to debt counseling. As stated above, these interviews focused mostly on low-income families, however, they also helped form a clearer image of the situation that middle-income families find themselves in. During the interviews the topics of car dependency, car related economic stress and coping mechanisms were discussed.

Firstly, car dependency was discussed as a topic within the expert interviews. Car dependency is a common geographical characteristic in the area of operation of this social and financial assistance service. Throughout the interviews it became apparent that, according to the respondents, several factors contribute to car dependency in the area of operation of the social work organizations for both middle- and low-income groups. The respondents of both organizations noted that this is mostly seen through

the disappearance of amenities and the insufficiency of the public transport network. These developments have caused car dependency for everyone living in these areas, throughout all income groups. The most important factors that contribute to the car dependency in the area were described as the lack of local amenities, increasing travel times to basic necessities, and the disappearance of public transportation networks. These contributors to car dependency were described by the following quotation;

"In the (...) region, there are limited bus services and many villages do not have a supermarket. As a result, people with and without jobs are dependent on cars or experience a lot of inconvenience without their own transportation." [Respondent 1, expert interview](#)

"When they do have one (a car), it is often because it is absolutely necessary. This can be due to work schedules and/or locations where public transportation is not an option" [Respondent 2, expert interview](#)

The limited access to local amenities includes crucial services such as education, employment, medical care and grocery shops. The distance to these amenities primarily, cause local residents to become dependent on a car as their primary mode of travel. When traveling by car is not an option the distances can be too long to overcome and can lead to exclusion problems such as loneliness and inaccessibility of crucial care as illustrated by the following quotation;

"Many villages lack facilities such as schools, supermarkets, other shops, pharmacies, libraries, etc. When people can no longer afford to make these trips, it can lead to loneliness and no access to the necessary care." [Respondent 1, expert interview](#)

"Not only do individuals feel the impact, but it also affects their children, friends, and family. Often, people in the immediate vicinity (of the households) also have low incomes, which leads to a significant decrease in visits and contributes to increased loneliness." [Respondent 2, expert interview](#)

The influence of fuel prices, specifically for low-income households, can thus mean that households have to choose between activities. Furthermore, it can mean that their potential or capabilities are impacted. These findings are further presented in the section below.

4.1.4 Expert interviews; Perceived Capabilities

The inaccessible services and social activities can sometimes impact people's ability to participate in society or develop their own abilities on an educational or employment level. People who have difficulties with costs related to car usage could, according to the respondents, opt to call in sick to work or skip other important activities because traveling to these locations is too costly and budgets would not allow for such expenses. As recalled by both of the respondents, both working and unemployed individuals can suffer severe consequences of increased costs of travel by car in the car dependent areas. Middle-income families have been contacting both these facilities more in the period of this research thesis than before due to the increase in prices. They too can experience increased financial stress when the prices of fuel and for example heating get too high. However, the low-income families are the group who suffer the most crucial impacts on capabilities because they cannot find anything within their household to economize further on.

"There are now middle-income families that are struggling. They can still make choices" [Respondent 2, expert interview](#)

"The working poor who have to travel long distances to get to work, now have even less money left over" [Respondent 2, expert interview](#)

For both low- and middle-income families, the travel reimbursements that working individuals receive are sometimes not up to date with current prices of travel. This can impact incentive to show up to work.

Both organizations recalled that there are individuals in households who maintain that they sometimes call in sick to work because travelling there is too expensive. When the reimbursements do not rise with the rises in costs of fuel and energy, an individual may choose to stay at home when they feel that the costs of travel take up too large of a portion of their earnings. There are no financial regulations that help these individuals in such an occasion. One of the respondents commented about this problem as follows;

"Employer travel expense reimbursements are often not increased or not proportionally increased with the fuel price, which means that it costs some people too much money to get to work. This can result in them either calling in sick or sacrificing other expenses or bills."
[Respondent 1, expert interview 1](#)

The impact on capabilities differs between low- and middle-income groups. As found within the household interview data, middle income groups appear to manage by cutting costs within the household and they thus experience little to no impact on travel behaviour. This has little impact on capabilities as they are still largely able to function as they would have before the price changes. Low-income groups, on the other hand, commonly seem to think that there is no alternative than to skip activities or go into debt. When they resort to skipping these activities this can then, according to the organizations, lead to further trouble because crucial social or healthcare related appointments are missed;

"This means that people choose to use the car less frequently. Family visits become less frequent, and appointments at hospitals may be canceled." [Respondent 2, expert interview](#)

The capabilities of the low-income families are impacted by these choices as they often feel that they influence participation, ability to take up opportunities and influence further ability to manage household funds.

"Since public transportation is more expensive than using a car, people continue to rely on cars. However, in the end, there is not enough left in the budget. We (the social and financial help organization) have spoken to people who had to call in sick because they had no money to get to work. There is no provision in this community to provide bicycles to those with insufficient budgets. This means that their living environment often remains limited to walking distances from home. Not only do individuals feel the impact, but it also affects their children, friends, and family." [Respondent 2, expert interview](#)

As emphasized by the expert respondent in this quotation, the difference between impact on capabilities is that for low-income families the rise in fuel prices can mean that their ability to participate in society is impacted. While for middle-income families this is most often not the case as they are still able to plan and adapt in order to keep going to activities. For low-income families the impact of having to skip activities due to an inability to fund them can also impact the lives of the people around them and can influence connections between friends and family.

The coping mechanisms adopted by both low- and middle-income households are further discussed in the following paragraph.

4.2 Functionings and Coping mechanisms

4.2.1 Household interviews, Functionings and Coping mechanisms

Most of the respondents of the household interviews did not feel the need to change their travel habits in reaction to the change in fuel prices. However, in combination with the higher energy and heating prices almost all of the respondents made changes within their household to mitigate the expenses made within these price rises. The middle-income households were able to do so because they have some budget to spare. The rise of fuel prices did not impact them very much because distances are not too long. However, in combination with the price rises in other sectors, the middle-income families became more aware of their spending. Some of these respondents stated to be more considerate when it came to heating the house as stated in the quotation below;

"Yes, yes, I mean, I bought a lot of woolen sweaters, slippers, and the heater is set to 17 degrees. Just trying to cut back, you know. So it's quite drastic." [17:8 ¶ 44 in Interview 7](#)

Furthermore some acknowledged that they had invested in energy saving products such as an electric bike, car or other heating systems, both to deal with rising costs of energy and to be mindful of the climate changes.

While most changes for middle-income families changes were made within household spending some of the respondents also made changes to their travel schedules and activities. These changes were because no other option was available. As stated in the quotation below, some of the respondents relied more on combination of trips or on family members to get them supplies to save trips made by car.

"Yes, that's all I do. My son works in a supermarket, so I tell him to bring things home. My husband works in a place about 25 kilometers away, so if he passes by a store, I always ask him to bring things home. I'm very much into combining activities and getting everyone to do things for me." [17:10 ¶ 58 in Interview 7](#)

Most of the changes in functionings made by middle-income households relate to economizing within the household. Middle-income families, as found within this research thesis, often do not adopt functionings related to a change in transport or doing nothing (going into debt) (Conceptual model, figure 1).

4.2.2 Expert interviews; Functionings and Coping mechanisms

During the interviews with social and financial help facilities coping mechanisms adopted by low-income families and middle-income families were also discussed. One of them, briefly mentioned in the section above, is resorting to calling in sick to work when travel reimbursements are too low. This change in functionings caused by adopting this coping mechanism severely impact one's capabilities. This coping mechanism was mostly adopted by low-income families as their travel reimbursements did not weigh up to the costs of fuel at the distances that they had to travel to work. This coping mechanism is a change of travel behaviour that greatly impacts capabilities and could affect someone's ability to take up opportunities and develop their skills (conceptual model, figure 1).

Another coping mechanism mentioned by the respondents is leaving the car for other social or recreative activities or combining trips to economize costs of travel. As mentioned by both of the respondents, leaving the car behind is in many cases the most used. This coping mechanism too is mostly used by low-income individuals as they have no option to compensate within the household. As represented by the quotation below, these households already economize on every aspect and can often find no other way than reducing travel to economize any further. Where middle-income families are often able to plan and adapt their schedule, low-income families do not have any spare time and funds causing them to have to skip trips or built up debt;

"For many families, I hear about the fixed amount that goes into the tank. They refuel on

Sundays, with a fixed amount, and plan for the expected trips. These are often middle-income families. (They have the flexibility for this; lower-income families are too busy with groceries and utilities.)" [Respondent 2, expert interview](#)

"Most low-income families have exceptional budgeting skills. The problem is that fixed expenses and the cost of living are higher than their income. No matter how well they budget, it will never be enough. These families are accustomed to denying themselves basic necessities because there is simply "no money for it." " [Respondent 2, expert interview](#)

Individuals that experience car related economic stress also choose to make more use of compensation regulations instigated by the municipality or try to find help with organizations such as the ones that the respondents represent. However, for low-income families, there is also a serious risk of going into debt. This is because they have other fixed expenses as mentioned in the quotation above. These expenses in combination with the rise in fuel costs can cause people to have to go into debt or rely on programs that keep them functioning at a minimal level;

"For those with minimum income, there is often no room for further budget cuts, and people turn to food assistance programs and experience payment delays, especially considering that food prices also have a significant impact on the budget." [Respondent 2, expert interview](#)

These are all coping mechanisms adopted by households that experience high car related economic stress. For these low-income families there is already a limited budget for car usage. This means that however short the distances, any rise in fuel prices means that there are less funds available for trips.

However, other coping mechanisms are available when considering the help that social work organizations offer. One of the respondents recalled that individuals can receive assistance with their financial problems and that this help can also offer some mitigation of the problems by increasing financial insight or helping with communication with government services. The following response was given when this respondent was asked how the organization itself helps individuals in coping with increased prices of fuel;

"(the social and financial help facility) offers individual assistance in making choices in situations of scarcity and dealing with such issues. Prioritizing, trying to anticipate consequences, and seeking alternative solutions" [Respondent 1, expert interview](#)

Nonetheless, the coping mechanisms adopted by low-income families are often more related to changing transport behaviour or doing nothing (going into debt) than to economizing within the household (conceptual model, figure 1).

4.3 Interviews synopsis

All of the respondents felt that they were car dependent. In their view living without a car in these areas greatly impacts their accessibility. The prices of fuel specifically were almost never a serious problem for middle-income families as distances to travel, while necessary by car, were not too long and the costs of these trips, at least for middle-income households, had no discernable impact on their households' finances. However, the costs of fuel in combination with the rise in costs of heating and energy were mentioned a lot. These did have an impact on how the households were run. Most middle-income respondents mentioned that they adopted new energy saving measures within the households and were mindful of their energy usage. Their behavioural changes mostly pertained to changes within the household and they managed to cope by economizing without changing travel behaviour or going into debt.

Nevertheless, there are some issues that were discussed by middle income households in the interviews. Half of the respondents actively tried to combine trips or asked their family or local network to help get them supplies. However, these differ between households that are employed, retired or unemployed. While retired or unemployed or retired individuals did feel the necessity for usage of a car, they mentioned using public transport or a local social network more than those who were employed or had children. Retired and unemployed respondents used a car considerably less than those who were employed or had children. This difference can be attributed to the purpose of trips and the necessity of time management for households that are employed or had children.

The perceived capabilities for middle income families are impacted through car dependency but not through high fuel prices. Due to the limited impact of high fuel prices on short distances compensation for higher fuel costs takes place within the household and thus has no discernable impact on the perception of accessibility. The only coping mechanism that takes influences transport behaviour within the middle-income households is combining trips and sporadically fewer social activities (if they are at long distances). The former has no direct impact on capabilities and the latter is used only when fuel prices are considerably high thus increasing costs of travel so much that a long trip is not worth it at that time and cost.

However, a discernable notation is that failing to drive a car is a considerable fear for accessibility and capabilities as there is no alternative regardless of economic status. Several of the respondents would move if they became less mobile. This finding is one that emphasizes the car dependence that these households find themselves in.

Most of these findings are very different than the ones for low-income families. Capabilities for low-income families are impacted greatly as they often feel the need to skip crucial trips such as work and health activities. These families often find that they have no other option than to adapt their travel patterns and thus they have to skip activities or go into debt. Their coping mechanisms consist of changing their travel behaviour or doing nothing; or going into debt. Because there is no room within the household budget to adopt other functionings such as economizing on food they have to resort to coping mechanisms that impact the functioning of their household and their ability to travel. Both of these coping mechanisms impact capabilities and can have significant consequences on development of potential and quality of life (Conceptual model, figure 1).

These findings are further discussed and linked to theory in the following chapter.

5. Discussion

In this discussion chapter the findings are related to theory. The findings are discussed in order of the research questions. Firstly, the use of the capabilities approach and its effectiveness for a person-based research thesis is discussed. Secondly, car dependency and its consequences on decision-making is discussed. Thirdly, the impact on capabilities and functionings are discussed. The findings are compared to those in theory and the distinction between income groups and within income groups is further explained.

5.1 The capabilities approach and a person-based perspective

Within this research thesis a person-based perspective was adopted as compared to the aggregate perspective that is used in most transport studies. This perspective helped form an image of reasonings behind movements and travel behaviour. The capabilities approach offered a framework in which the decision-making of the households was linked to their impact on capabilities. In this paragraph the use of the capabilities approach and its effectiveness on a person-based perspective is highlighted as presented in the first sub-research question.

The capabilities approach used in this research thesis has helped identify differences in perception and reasoning as well as potential in accessibility between groups and different occupations. The approach has helped to explain the reasoning behind the variety of choices that are made within households to cope with a change in transport costs. As stated by Vecchio and Martens, (2021) the capabilities approach offers a framework in which the construction of one's potential is explained. Someone's ability to move financially, socially and physically can be impacted by outside trends or developments (Vecchio and Martens, 2021). The approach helps in identifying why certain choices are made within households and how they shape the situations that these groups find themselves in.

Within this research thesis the capabilities approach has been a helpful tool in explaining movements and choices on a disaggregate level. While resources used as a concept in the capabilities approach are somewhat the same for the groups living in car dependent areas, the management of these resources or ability to turn these resources into capabilities can vary greatly. The conversion factors, ability to turn the resources into capabilities, is highly dependent on several factors such as economic status or occupation. This was also found by Vecchio and Martens, (2021), explaining that conversion factors identify constraints in people's lives and can help form a clearer image of both power structures and equality within the support systems. The conversion factors affect what choices people are able to make, in other words, what capabilities they are able to achieve. In the conceptual model (Figure 1) the choices, functionings, have been separated into three main choices; doing nothing, economizing within the household and adapting transport behaviour. These different coping mechanisms result in varying impacts on capabilities in turn and were found to be different between income groups as discussed in subsection 5.3.

Several factors can explain the difference in coping mechanisms. In this research project the difference in purpose of travel and the difference in economic power has been identified to explain differences in coping mechanisms. The car is indispensable for everyone because of the limited resources in road networks, public transportation and amenities, in other words, because of car dependency. However, how different groups deal with the limitation on resources differs between groups depending on how they are able to turn these resources into capabilities. This then comes down to conversion factors and someone's ability to make use of the resources available to them.

The approach has helped form a clearer picture of differences between economic groups and has highlighted differences within the economic groups based upon occupation. The differences between different economic groups in impact on capabilities and functionings in combination with theory is discussed in paragraph 5.3.1. Differences within groups and their impact on capabilities are discussed after that.

5.2 Car dependency; findings and theory

The influence of car dependency on decision-making within transport behaviour has been discussed by Smith et al. (2012) stating that in rural areas the dependency on a car can influence decision-making as some activities always require car usage. The priorities of families in rural, car dependent, areas can then differ between income groups and within income groups depending on what activities are necessary (Smith et al., 2012). For example, as stated by Smith et al. (2012), a family with children has less room to manage travel expenditures than a family without children because the car is often more necessary to function as a household. This was also seen within this research and the purpose of trips within car dependent areas is further explained in paragraph 5.3.2.

The car dependency that households experience can influence decision-making related to transport and finances. Middle-income groups rarely changed travel behaviour and never changed travel behaviour that resulted in less participation. These families were able to cope with their car dependency, even with higher fuel prices. Low-income groups, on the other hand, often had no other option than to adapt travel behaviour and participation in activities as their budgets simply would not allow for any increase in spending on car usage. However, the car dependency that both these groups find themselves in did dictate their reasoning as some trips were crucial and were only given up as a last resort. For middle-income families this meant that long social trips might be skipped when prices got too high and for low-income families this could mean that even crucial trips such as health-care or going to work were sometimes skipped.

The car dependency is a result of limited resources available to these families and does have an influence on what the household prioritizes, as also mentioned by Smith et al. (2012), explaining that a lack of resources can result in a lower range of opportunities available and could thus impact capabilities for families living in car dependent areas.

5.3 Impact on capabilities and functionings; data and theory

As noted before, the main finding that this research thesis is that people living in car dependent areas adopt various coping mechanisms in order to deal with rising fuel costs before they adapt their transportation habits. This is because, like discussed by Smith et al. (2012), the dependency on a car dictates how and what choices can be made. When resources are limited, the car is necessary to maintain a certain lifestyle. This was also found throughout the interviews and is in line with used theories. For the impact on capabilities and use of coping mechanisms there is a different storyline. Both of these are impacted and used differently by different groups.

5.3.1 Differences between income groups

Differences within the adopting of coping mechanisms are found to be profound between income groups. Both middle- and low-income groups as suggested by Cohen (2022) were found to experience some consequences of the rise in prices. Middle-income groups, where they might have had no trouble with fuel costs before, now may find difficulties in dealing with the higher costs. This finding was mentioned multiple times in the interviews and was also mentioned by the experts when discussing the difference in impact between middle- and low- income households. Though middle-income families are more aware of the costs of travel by car since they have risen, they rarely have to adapt their travel behaviour in order to cope and almost never felt that their level of accessibility, or their capabilities were impacted. Most of the middle-income families, as discussed within the expert interviews, are able to cope by adapting planning and budgeting and thus do not have to change their travel behaviour very often. The short distances that they often travel in combination with the risen fuel prices can often be compensated elsewhere. They often adopt the functioning, or coping mechanism, of economizing within the household as illustrated in the conceptual model (figure 1). In theory the impact on capabilities and functionings of middle-income households is lesser known. However, the coping mechanisms adopted by middle-income families discussed in this research project do not seem to impact capabilities in the same way that the coping mechanisms of lower income families do. As discussed by Smith et al. (2012) the strategies that are often adopted by low-income families, such as limiting transportation and going into debt, do greatly impact capabilities. However, being able to cope by economizing within the household is seen as a way of coping that does not have a significant influence on capabilities or perceived accessibility levels. This coping mechanism does not influence travel behaviour and does not have an impact on their level of participation. However, it can have an impact on capabilities such as being well-nourished when decisions have more impact on economizing within the household supplies and access to healthy food (Vecchio and Martens, 2021). In this research thesis, it was illustrated within the expert interviews that middle-income families too apply more for food support programs since prices went up. Therefore, it can be stated that middle-income families have become vulnerable and may more often experience an impact on capabilities because their priorities and behaviour are impacted by fuel price increases.

However, within this research thesis it has become clear that middle income families are mostly able to adapt to the rise in prices without suffering severe consequences. With the resources and car dependency that they have been experiencing for a long time they are still able to use their conversion factors (in this case capital) to reallocate funds and they manage to adopt coping mechanisms that mostly take hold within the household. In doing so they do not or rarely have to adjust their transport behaviour. Most important is that even with their car dependent lifestyle they often adopt coping mechanisms that do not impact their ability to travel. These coping mechanisms, such as economizing on food and other expenses, are the first ones to be used in order to remain mobile. Whenever this is not enough there are some minor changes, such as combination of trips or reliance on local social networks, that help these households to still manage.

By adopting these coping mechanisms there is nearly no effect on capabilities. As stated by Smith et al. (2012) capabilities can be impacted when necessary trips or important activities have to be skipped. As found within this research thesis, this is rarely the case for middle income families. For middle-income households this is because the costs of traveling by car are manageable, if they have to economize they will do this elsewhere. Functionings for middle-income families, as mentioned above, do not or rarely

impact capabilities, compared to the conceptual model (figure 1) they will almost always be able to economize within the household.

There is a crucially different path that low-income families often take. Low-income families as represented by the data in this research, do not have an overflow of funds or goods that can be economized on. The low-income families have a limited capability to turn resources into capabilities (Smith et al., 2012). This means that for them, coping mechanisms become more limited. Reallocation of funds is almost never seen as a viable option and choices have to be made that either consist of doing nothing and building up debt or adapting their travel behaviour. As becomes clear from the expert interviews almost all low-income families that are connected to these organizations find that they have no other option than to skip social, employment related or other important activities. Because economizing is no longer an option as the budget is already too tight, they cope by doing nothing (going into debt) or adapting travel behaviour. While for middle-income families the rise in fuel prices manageable over short distances, for low-income families even these trips become unaffordable and result in a significant change in capabilities. The main difference between the two economic groups is then that the choices that low-income families make, do impact capabilities where for middle income families they often do not.

So while both income classes sometimes find that they have to change their functionings, the degree in which these changes have an impact on capabilities is different. While car dependency and the average increase in costs of travel remain the same between the two groups (resources remain the same) the conversion factors, or ability to turn resources into capabilities is different between the two groups.

5.3.2 Differences within income groups; purpose of trips

Within income groups a difference in impact of capabilities and use of coping mechanisms can be seen with regards to purpose of trips. As stated by Mattioli et al. (2018) purpose of trips can dictate behaviour and choices. The importance or value allocated to these trips can have an influence on why different choices are made. Having children or a regular employment position can mandate that transport is even more important and can cause families and households to prioritize spending on car usage even more. This aspect was also found within this research project. While car usage was important for all respondents within and between different groups, the respondents that had children or were employed felt that they were even more dependent on a car to maintain their lifestyle. Because of this both middle- and low-income groups that had these obligations prioritized economizing elsewhere more than adapting their transportation habits.

Like stated by Mattioli et al. (2019) for lower income households this means that if they have these sorts of obligations that they might go into debt, do nothing, because they feel that there is no other option. This was also found within the answers of respondents for this research project when the expert interviews indicated that low-income households often had increasing difficulties in budgeting because there simply was no room left. The choices they made then depended on priorities and often resulted in increasing car related debt or increasing troubles in being able to feed their families. These families could then have an increased debt while also applying to food support programs to support their households. The car in these cases is only used when absolutely necessary, and because of the car dependency that these households experience, the rise in fuel prices influences immediately impacts household fundings, even on short trips. In short, both going into debt and adapting transport behaviour are coping mechanisms that are simultaneously adopted by low-income families when they have obligations that require transport by car. These coping mechanisms both influence capabilities. As discussed by Smith et al. (2012), they limit opportunities for these families. They can impact their ability to reach certain activities and function in a way that improves their overall status (Smith et al., 2012).

A notable addition to this finding is when someone's travel reimbursements are too low, something that has happened over the course of this research data collection time period. In that case, the benefits of physically going to work do not way up to the costs of travel. The household might then resort to calling in sick in order to still be able to maximize income. Inability to come to work was also mentioned by Froud et al. (2002) stating that skipping these activities is one of the coping mechanisms used by low-

income families when there seems to be no other option. However, an important statement to keep in mind is the statement of the respondents that these price change rose so quickly that travel reimbursements in both income groups often did not rise equally as quickly. This means that employed people within both low- and middle-income groups calling in sick to cope with high travel costs is used as a coping mechanism because the benefits weigh up to the costs. This coping mechanism is only used by employed people and can affect capabilities as important activities are skipped. However, this coping mechanism is the result of slowly rising travel reimbursements compared to high fuel prices and is not a direct impact of high fuel costs.

Belton Chevallier (2018) also discussed the importance of purpose in trips stating that time management and priorities differ between groups that prioritize different purposes of travel. For groups that are employed or have other obligations that require (almost) daily travel by car, an inability to use a car would affect almost every aspect of their life. Finding a job is near impossible and taking care of kids is also incredibly difficult. These households value car usage because they feel that they are unable to function as a household without access to a car. The difference in impact relating to purpose of travel was also seen in this research as it further increased car dependency and vulnerability to fuel prices in both middle- and low-income groups.

6. Conclusion

In this conclusion the main findings of the research thesis are summarized and additional recommendations for future research are given. Furthermore, limitations of the research are discussed. This research thesis was aimed at answering the research question;

“What coping mechanisms are used by middle- and low-income households in car dependent regions when the costs of traveling by car increase?”.

The research analysis consisted of both theoretical analysis and qualitative research to answer the aforementioned research question using the capabilities approach. The capabilities approach in this research project functioned as a framework to identify differences in reasoning and differences in choices that impact potential or capabilities. The framework helped form a clear image of how different groups of people, both between and within different income groups reacted to a rise in fuel prices.

The main finding that became apparent throughout this research project is that coping mechanisms as presented in the conceptual model (figure 1) are adopted by both low- and middle-income groups and that these coping mechanisms differ depending on income and purpose of travel. For middle-income families the coping mechanism that is adopted most often is economizing within the household. This is because they are able to manage the rise in fuel prices over short distances and can plan according to their budgets. They almost never felt that the rise in fuel prices greatly impacted their capabilities. For low-income families the coping mechanisms that are adopted most often are adapting travel behaviour and doing nothing or going into debt. The low-income families adopt these mechanisms because there is no room for economizing elsewhere in the household and they often felt that even a slight rise in costs of travel impacted their ability to participate greatly.

Priorities depend on purpose of trips for both income groups. Middle-income families almost never adjust travel behaviour and certainly do not do so when they have obligations such as work or children that require travel by car. The only exception to this is when middle-income individuals resort to calling in sick to work when travel reimbursements are too low to compensate.

For low-income families the priority of work or children often results in a change in travel behaviour elsewhere, for example health care, or an increased car related debt. These choices affect capabilities differently and while middle-income families coping mechanisms almost never impact their capabilities, the coping mechanisms adopted by low-income families do, since they further limit opportunities and potential to participate in society .

It is important to understand these differences in choices and behaviour and were they come from to gain more insight into how these households get into financial difficulties. When economizing is not a viable option any longer, important and necessary activities are skipped resulting in an even worse impact for families that feel that they have no other option. These groups, while experiencing the same rises in prices, do make different choices and have different priorities.

Though this research sheds light upon the several factors mentioned above it is also limited by some factors. The first limiting factor is that within data collection low-income families were hard to reach. The expert interviews functioned as a way to still include this important group in the research and explained their movements and behaviour. However, future research including interviews with low-income families themselves could help gain more insight into how their situations dictate the choices that they make. Especially the time management that dictates choices within low-income families can be interesting for further research. Future research could, for example, look into how time management differs between the two economic groups and how this time management dictates how choices are made when funds related to car usage are limited. Time management, especially for low-income families, was found to dictate decision making both in travel and in participation in activities. Research into how much time is spend on each activity in combination with how much travel time each activity is allowed could help in forming a clearer image of how travel behaviour is explained and why certain activities are skipped more often than others.

A further limitation of this research is the perception of the situations that these families find themselves in. This research focussed on these perceptions as they give an indication of how these households feel and operate within their respective situation. However, while conditions might be the same, they are not experienced similarly for everyone. The respondents answered within their own point of view and therefore their answers are shaped by the personal conditions that they find themselves in. For further research, a comparison of this research with factual findings of transport movements of the same groups could offer insight into the differences between perception and statistics.

To help mitigate the CRES that these households experience, as explained through the expert interviews, policy changes that help employers keep up with travel reimbursements could influence the presence of especially low-income families at work. The ability to go into work could help these families take up more opportunities and in turn might positively impact their capabilities. Furthermore, while low-income families receive help with their financial status through counselling and budgeting training, there are still families within car dependent regions that simply cannot manage and therefore refrain from going to activities. To help specifically these families remain mobile, future policies should help offer affordable and reliable public transport in car dependent regions.

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Appendix I: Interview guide

General	<p>Hallo en dankuwel dat u de tijd heeft om dit interview te doen met mij. Het interview zal ongeveer een half uur duren met uitloop tot 1 uur . Ik zal de informatie die u mij vandaag geeft gebruiken in mijn onderzoek om erachter te komen of en hoe de prijsstijgingen van mei tot juli 2022 in relatie tot autogebruik het dagelijks leven van verschillende huishoudens heeft beïnvloed.</p> <p>(Het consentformulier is eerder al gemaïld)</p>	
General questions	<p>Waar woont u? Werkt u op dit moment? Bij ja... Hoe ver is dat van uw woonlocatie af? Heeft u een auto? Bij nee.. Heeft u regelmatig toegang tot een auto? Met hoeveel mensen deelt u de auto?</p>	
Car dependency	<ul style="list-style-type: none"> - Zou u zeggen dat u autoafhankelijk bent? - Hoe vaak reist u per week met de auto? - Hoeveel tijd per week zit u ongeveer in de auto? - Hoever moet u reizen om bij de volgende voorzieningen te komen? <ul style="list-style-type: none"> o Boodschappen o Medische zorg o Sociale activiteiten o Groenvoorzieningen als een park - Heeft u andere activiteiten die u wekelijks bezoekt? <ul style="list-style-type: none"> o Hoe ver moet u dan ongeveer reizen? - Voor welke van de activiteiten die net genoemd zijn heeft u de auto nodig? - Vindt u dat toegang tot een auto noodzakelijk is voor u? <ul style="list-style-type: none"> o Waarom vindt u dat? - Zijn er andere vervoersopties beschikbaar? <ul style="list-style-type: none"> o Welke zijn dit? - Maakt u gebruik van deze opties? <ul style="list-style-type: none"> o Hoe reist u meestal als de auto niet beschikbaar is? o Waarheen reist u dan? 	
Functionings and choices	<ul style="list-style-type: none"> - Hebben de benzineprijzen in 2022 uw reispatroon beïnvloed? <ul style="list-style-type: none"> o Op welke manier? - Bent u veranderd van vervoersmiddel sinds de benzinestijgingen? <ul style="list-style-type: none"> o Waarvoor heeft u toen gekozen en waarom? - Heeft u bewuste veranderingen gemaakt in uw huishouden toen het rijden duurder werd? - Zijn er aanpassingen geweest in uw uitgave patroon toen de kosten van benzine omhoog gingen? - Bent u activiteiten gaan combineren sinds de kosten hoger zijn geworden? - Hoe hebben de benzine prijsstijgingen uw keuze in dagelijkse activiteiten beïnvloed? - Welke activiteiten, als die er zijn, heeft u minder vaak ondernomen sinds de stijging van de benzineprijzen? - Heeft u keuzes moeten maken tussen activiteiten buiten huis? <ul style="list-style-type: none"> o Welke prioriteiten heeft u dan? 	
Perceived capabilities	<ul style="list-style-type: none"> - Hoe denkt u op dit moment over uw bereikbaarheid? <ul style="list-style-type: none"> o Is dit hetzelfde beeld als toen de benzineprijzen hoog waren afgelopen jaar? - Denkt u dat de benzineprijzen uw vrijheid om te reizen beïnvloeden? <ul style="list-style-type: none"> o Op welke manier is dat? - Denkt u dat de benzineprijs invloed heeft op uw bereikbaarheid? - Denkt u dat de benzineprijzen invloed hebben op uw sociale leven? - Denkt u dat u tijdens de hoge prijzen van benzine evenveel kon ondernemen als op andere momenten? - Denkt u dat de benzineprijzen op een andere manier uw dagelijks leven beïnvloeden? <ul style="list-style-type: none"> o Wat voor veranderingen heeft u opgemerkt? 	
	Additions	- Heeft u nog toevoegingen die belangrijk zijn voor dit onderwerp?
Closing	Thanks, and closing information	- Hartelijk bedankt voor uw tijd. Zoals besproken in het consentformulier zal ik een bewijs van vernietiging toesturen. Als u in de toekomst nog vragen heeft over het onderzoek of over uw deelname aan het onderzoek kunt u mij altijd bereiken op En via ...



Appendix II: Consent form

Deelname consent formulier - Research Ethics Committee (REC)

in Master thesis research project:

De impact van autoafhankelijkheid en stijgende benzineprijzen op het dagelijks leven in Noord-Nederland

Het onderzoek;

De afgelopen tijd hebben veel huishoudens gevolgen ondervonden van de stijgende benzineprijzen. Deze gevolgen zijn niet voor iedereen hetzelfde en er zijn grote verschillen te vinden als men kijkt naar individuele situaties. Een deel van de huishoudens in Noord-Nederland is vaker genoodzaakt een auto te gebruiken omdat de bereikbaarheid in de landelijke omgevingen verslechtert. Verschillende belangrijke voorzieningen verplaatsen steeds meer naar centrale gebieden en het ov-netwerk is niet altijd voldoende dekkend. Landelijke gebieden worden hierdoor steeds autoafhankelijker. Dit onderzoek is erop gericht om meer informatie te verzamelen over hoe huishoudens die afhankelijk zijn van de auto om gaan met de prijsstijgingen en welke keuzes er gemaakt worden op het gebied van reizen en activiteiten. Dit interview legt de focus op de autoafhankelijkheid en de gevolgen van de stijgende benzineprijzen voor het dagelijks leven.

- Ik heb de informatie gelezen en begrijp waar dit masteronderzoek over gaat
- Ik heb de kans gehad om dit onderzoek te bespreken. Ik ben tevreden met de antwoorden die ik kreeg
- Ik begrijp dat deelname vrijwillig is en dat ik het recht heb op mij terug te trekken uit het onderzoek vanaf drie weken na het interview, en om elke individuele vraag te weigeren te beantwoorden
- Ik begrijp dat mijn deelname vertrouwelijk is. Zonder mijn toestemming wordt er geen materiaal gebruikt waaraan je mij kan identificeren in dit en alle verslagen die uit dit onderzoek zullen voortkomen.
- Ik begrijp dat alle informatie die ik geef vertrouwelijk bewaard wordt in een beveiligde ruimte of op een met wachtwoord beveiligde computer.

Omcirkel alstublieft JA of Nee in de volgende stellingen:

Ik geef toestemming voor audio-opname van mijn interview JA / NEE

Ik wil graag anoniem blijven JA / NEE

Bij JA

Mijn voornaam kan gebruikt worden in het onderzoek JA / NEE

Of

Een pseudoniem die ik gekozen heb kan gebruikt worden in het onderzoek JA / NEE

“ Ik ben het er mee eens dat ik deelneem aan dit individuele interview en begrijp dat ik een kopie van dit participatie consentformulier ontvang”

Handtekening van de deelnemer: _____ Datum: _____

“ Ik ben het er mee eens de condities van dit formulier na te leven en ervoor te zorgen dat geen van de deelnemers schade ondervindt aan de hand van dit onderzoek”

Handtekening onderzoeker: _____ Datum: _____

Vul alstublieft de onderstaande gegevens in. Deze gegevens worden alleen gebruikt om consentformulieren en eventuele notities op te sturen als u die wilt ontvangen.

Email:



Vertrouwelijkheid en rechten van de deelnemer:

- De interviews worden opgenomen en notities kunnen tijdens het interview gemaakt worden
- U heeft het recht op elk moment te vragen de opname te stoppen en ook om het interview op elk moment te beëindigen
- U heeft het recht een kopie van de notities te ontvangen en correcties te maken of te vragen materiaal uit het onderzoek te laten.
- De informatie die u geeft wordt vertrouwelijk bewaard op een computer met een wachtwoordbeveiliging. U ontvangt een notificatie als de ruwe data verwijderd wordt.
- De informatie die u geeft wordt gebruikt voor de Master Thesis die, als die af is, online gepubliceerd zal worden.
- Tenzij u het expliciet anders aangeeft zal uw informatie, naam of andere persoonlijke informatie, waarmee u geïdentificeerd kan worden, niet in dit onderzoek of toekomstige onderzoeken vermeld staan.

Als deelnemer heeft u het recht om:

- Te weigeren deel te nemen
- Te weigeren een specifieke vraag te beantwoorden
- Te vragen of de audio-opname uit kan
- Het interview te beëindigen
- Niet mee te doen aan het onderzoek tot de publicatie
- Vragen te stellen op elk moment gedurende de deelname
- Te vragen of materiaal verwijderd kan worden als u niet wil dat het gebruikt wordt in het onderzoek

Nogmaals bedankt ik u dat u de tijd neemt om deel te nemen aan dit onderzoek. Ik ben bereikbaar voor vragen of opmerkingen; mijn contactinformatie staat onderaan deze brief. Mijn begeleiders informatie kan op verzoek gegeven worden.

Met vriendelijke groet,
Ayleen Labee

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Appendix III: Example GIS map

