

Promoting the bus use under elderly to keep facilities in reach



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Abstract

The declining amount of inhabitants in rural villages in Noord-Brabant, the Netherlands, causes local facilities to disappear. This is a large problem for the less mobile elderly. Those elderly cannot easily move to another villages for their basic needs and are depended on alternative transport methods. This research will focus on the use of the bus by elderly. It will explore the factors that influence the decision of elderly to take the bus. Hereby it aims to improve the bus network so it can become a valid transportation method for elderly, mainly the less mobile elderly. This is done by answering the following research question: how do different factors influence the decision of elderly people to take regional bus lines to visit facilities that no longer exist in their own village? The research is focused on problems that are related to the following parts of a bus network: the approach to and from a bus stop, the comfort of a bus and the frequency, demand coverage and network coverage of a bus network.

This question will be answered using semi-structured interviews as research method. Those interviews are conducted with board members of elderly organizations in rural villages. The interviews are analyzed using a thematic analysis. Hereby, interesting answers were coded. Those codes were themed and those themes were used to answer the corresponding sub-questions.

This research was limited by the amount of respondents. Because of the low amount of respondents, some important issues might not have been mentioned or were only mentioned once. Because of this, there can be other factors that also play a role in the decision to take the bus that were not covered in this research. While the respondents were trustworthy based on their position in the elderly organization, three of the five respondents came from the same area. This caused the results to be a bit more bias about the specific situation in that region.

The results of this study show that the main issues for elderly are the complicated use of a bus, the long wait times and inconvenient transfers that are caused by the low frequencies, the limited network coverage of the bus and the limited times the bus drives. The approach to the bus stop was less of an issue because of the general smaller size of a village. This made the distance to a nearby bus stop small and overall safer. The complicated bus use creates an less comfortable situation for elderly when they enter the bus and need to check in. This process takes a long time and during this process the elderly feel unsafe. For many elderly, the long wait times, the inconvenient transfers and the limited times the bus drives are factors that makes the bus less attractive to use for elderly. Besides this, the network coverage is not great since they are limited by the bus route, and therefore elderly do need to make more transfers to reach villages or cities that are further away. This only increases the wait times and makes it less convenient for the elderly to use the bus.

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1 Introduction

The Association of small villages in Noord-Brabant (Vereniging Kleine Kernen Noord-Brabant, VKKNB) has the ambition to keep or improve the vitality of rural villages in Noord-Brabant. They want to achieve this by researching relevant themes that play a role in the decreasing vitality of rural villages. This gives the association a better understanding of the situation in the rural villages. This research will explore a specific problem that combines the themes of public transport and local facilities and demography. It will explore how public transport can be used to keep the disappearing local facilities accessible for the ageing population.

1.1 Problem

Ageing in the rural municipalities is mainly caused by the increasing amount of youth that is moving to larger cities (Brabant Kennis, 2019). Besides this, many elderly prefer to stay at home instead of moving to nursing homes, this is often referred as ageing in place (Fatima & Moridpour, 2019; Engels & Liu, 2012). The improved healthcare, the attachment to the local areas and the larger costs of moving to a nursing homes are examples of reasons why elderly prefer to stay at home (Fatima & Moridpour, 2019). Ageing in place creates some benefits by releases some of the pressure on the already to full nursing homes (Brabant Kennis, 2019). However, local facilities in rural villages tend to close down or move to larger cities. According to Christiaanse & Haartsen (2017), the closure of a local facility is mainly perceived as negative by elderly because of the larger distance they now have to travel to another facility. This makes it important for elderly to be mobile. For many elderly, the use of the car is increasing as a preferred transportation mode (Banister & Bowling, 2003; Engels & Liu, 2012). Nonetheless, some elderly aren't able because of certain reasons and according to Szeto et al. (2017), the older elderly get, the less likely they are willing to and are able to drive. This makes those elderly depended on alternative transport modes. Public transport can be one of those alternatives.

The need for a good public transport network for the less mobile elderly is important. Many elderly travel weekly for their basic needs and monthly for their healthcare needs (Engels & Liu, 2012). Most of those elderly prefer to take their trips between the peak hours at midday (Fatima & Moridpour, 2019; Engels & Liu, 2012; Szeto et al., 2017). However, traveling with the bus at those hours is not always an option because of the lower frequencies. In most rural areas in Noord-Brabant, the frequency of most lines is only one bus per hour and this is not likely to increase. Running those bus lines through rural areas is unprofitable because of the low demand. Only the policy of the province Noord-Brabant makes sure that those lines still exist. This policy is that the profitable lines cover the losses of the rural lines (Jacobs, 2020). This makes it harder for the bus lines to survive in those areas. This is an issue for the less mobile elderly since they depend on a good public transport system or alternative transport methods if the facilities are disappearing from their own village. Besides this, having access to a good public transport network also increases the freedom, independency and quality of life of elderly (Shrestha et al., 2017). In this respect, improving the public transport in those rural villages can be the solution to keep facilities accessible and improve the living situation for elderly. There are multiple factors that can improve the bus for elderly. However, not all of those factors are known for elderly in specifically rural areas.

1.2 Societal relevance

The need for a transport method for less mobile elderly is high because of the disappearing facilities in their own rural villages. Public transport can be a solution for this. However, the public transport networks in those rural villages are not optimal. The low demand for busses negatively impacts the presence of public transport. This research will explore the factors that influence the decision of elderly to take the bus. Hereby it will help to improve the knowledge about what factors are important to improve to make the bus a good transportation option for the elderly.

1.3 Scientific relevance

There can be multiple obstacles or negative experiences when using a bus as an elderly person, those can negatively influence the decision of an elderly person to take the bus. Studies already investigated the obstacles of public transport for elderly people. However as Cheng and Chen (2015) noted, there is a difference between mobile and less mobile elderly. This difference has not been taken in to account in most of those studies. Besides this, the issues of transitioning to public transport as elderly and the consequences of the transition are also unknown (Shrestha et al., 2017). Those obstacles or negative experiences that elderly people have of using public transport can play a role in the issues of transitioning. Alsnih and Hensher (2003) also noted that there needs to be a better understanding of the mobility and accessibility needs of elderly. This research will explore how those obstacles can influence the decision of an elderly to take the bus in rural areas. Hereby, it will improve the knowledge on the issues by transitioning to the bus and the perception of elderly on the bus in specifically rural areas. By researching this, it will also give more insights in the mobility and accessibility needs of elderly in rural areas.

1.4 Research questions

The research question is: how do different factors influence the decision of elderly people to take regional bus lines to visit facilities that no longer exist in their own village? This question will be answered using the following sub-questions: how does the walking to and from a bus stop influence the decision?; how does the comfort of the bus influence this decision?; and how does the frequency and coverage of the bus influence this decision? The factors that are stated in the sub-questions are explained in chapter 2, the theoretical framework. This chapter will give an understanding of the theoretical perception of public transport of the elderly. Chapter 3 will explain the method that is going to be used to answer the research question. Chapter 4 will describe the results of that method per sub-question. Chapter 5 will discuss the results and limitations of the method and chapter 6 will finalize this research with a conclusion.

2 Theoretical Framework

2.1 Theory

Shrestha et al. (2017) describes the public transport use of elderly with the four 'A's': accessibility, availability, affordability and acceptability. Those terms come with different factors and requirements that can influence the travel behavior of elderly. The most relevant factors will be used throughout this research. For this research, the concepts accessibility and availability will be used. Those two concepts are further explained in the next paragraphs.

Accessibility can be seen as how well an elderly is capable of comfortably travel by bus. Shrestha et al. (2017) divided the accessibility in three different factors: the bus, the bus stop and the approach to the bus. Hereby the accessibility of the bus is about the features the bus has to help elderly to comfortably travel with the bus and access the bus from the bus stop. The accessibility of the bus stop is about the seating facility, the amount of information about the departure times and how the stop is maintained. The last factor is the approach to the bus stop. This has to do with the distance to the bus stop, the state of the walkways and if the traffic safety is well managed with for example crosswalks or lower car traffic speeds. Cheng and Chen (2015) noted that a safe approach to the bus stop is one of the main issues for elderly. This is mostly about the stressful traffic situation that can occur at some busy locations. According to Fatima and Moridpour (2017), a maintained and well-lit walkway is also an important factor to make the approach easier for elderly. The comfort of the bus is becoming important for longer bus trips (Hansson et al., 2019). So, the approach to and from a bus stop and the comfort of a bus are going to be important subjects for the accessibility of the bus based on the literature.

Availability is how a certain area is facilitated with a public transport network and if the need for public transport is met by the elderly (Shrestha et al., 2017). Hereby, factors like frequency, demand coverage and network coverage are important factors. Those factors cover the need and possibilities of elderly to travel at any time to any destination. Frequency and reliability are both important factors for the use of a bus (Hansson et al., 2019; Cheng & Chen, 2015). More delays can cause people to chose to use public transport less often, especially if there are multiple transfers involved in the trip (Hansson et al., 2019). According to Hansson et al. (2019), a good network coverage is also an important factor. A good network coverage makes it easier for elderly to travel to their preferred destination, hereby factors like the travel time (Hansson et al., 2019) and inconvenient transfers because of the extra walking and costs (Cheng & Chen, 2015) can have negative effect on the network coverage and can cause problems for elderly. Shrestha et al. (2017) also noted the demand coverage as an important factor for availability. This factor can be an issue in rural areas since the busses do not drive as often. The factors frequency, demand coverage and network coverage will be used to cover the availability concept of the bus in this research.

2.2 Conceptual framework

Both the concepts accessibility and availability can be split up in to different factors. For accessibility this will be the bus and the bus stop approach and for availability this is the frequency and demand and network coverage. Table 2.2.1 shows the factors and sub-factors for both concepts that are going to be used for this research. This section will explain this table and define the factors.

The two factors used for the accessibility concept are the bus itself and the bus stop approach. The bus covers the comfort of the elderly when using the bus. For this research, the bus is divided in to two sub-factors, comfort and the access to a bus. Hereby comfort will mean the experience when and elderly is inside the bus. Hansson et al. described this comfort as: 'service elements that make journeys relaxing, enjoyable, or productive, e.g. through station facilities, seating and personal space, ride comfort, vehicle condition, atmosphere, and complementary services such as on-board Wi-Fi.'

(Hansson et al., 2019, p. 3). The access of the bus is about the features that help an elderly to enter and travel easily in the bus. Examples of those features are listed by Shrestha et al. (2017): ‘low floor buses, kneeling facility, handrail, priority seating, wheelchair space’ (Shrestha et al., 2017, p. 351, table 1). The other factor is the bus stop approach. This factor is split up in traffic safety and the distance to a bus stop. Hereby, a unsafe route to the bus stop can make it an stressful situation for an elderly to walk that distance, especially if they are less mobile. This makes the distance also an important factor since a shorter distance will be easier for elderly to walk. The bus stop approach will also cover the walking route to the final destination from the last bus stop.

Frequency and coverage will cover the concept availability. Hansson et al. (2019) also gave an definition of availability that is in line with how Shrestha et al. (2017) defined the concept, this definition is: ‘extent of the service offered in terms of geography, transport modes, operating hours, and frequency.’ (Hansson et al., 2019, p. 3). For this research, the frequency of a bus network will be defined as busses per hour. Another sub-factor of frequency is the reliability, this is about how often the bus has delays and how this effects the opinion of elderly about public transport. The second factor is the coverage. This combines the demand and network coverage and is about how well an elderly can travel at their preferred time to any destination. The sub-factor demand coverage is about if the time frame of the bus schedule meets the times when elderly want to travel. Network coverage is about how well different villages are connected and if they are easy to access with the bus. Hereby factors like travel time and the amount of transfers are important. This is an important factor since elderly need to travel to other villages if the local facilities are starting to disappear.

Table 2.2.1: Conceptual framework

Concepts	Factors	Sub-factors
Accessibility	Bus	Comfort
		Access to a bus
	Bus stop approach	Traffic safety
		Distance to a bus stop
Availability	Frequency	Busses per hour
		Reliability
	Coverage	Demand coverage
		Network coverage

3 Method

This research will explore factors that influence the use of the public transport by elderly in rural areas to answer the research questions. This section will explain how the data is collected and how it will be analyzed. The study areas will be rural villages spread over Noord-Brabant. Noord-Brabant is a province in the Netherlands that has a lot of rural areas with rural villages. Most of those villages are facing the problem of ageing and a decreasing amount of local facilities. In this study, a rural village is a village with less than 7.500 inhabitants. Those are the villages where ageing and the disappearing of facilities are problems. This research will focus elderly over 65 years who live in those rural villages. This section will go in on how this population is reached and what method will be used to gather and analyze the data.

3.1 Method and population

The method that will be used are semi-structured interviews. Researching the decision of elderly to take the bus based on certain factors by using semi-structured interviews is an effective method since this decision is mostly formed by opinions and experiences of the public transport. As Rabionet (2011) mentioned: “There is no doubt that qualitative interviewing is a flexible and powerful tool to capture the voices and the ways people make meaning of their experiences.” (Rabionet, S.E., 2011, page 563). The interviews will be conducted with board members of elderly organizations. Besides sharing their own experiences and opinions, they also have a good idea about the experiences of other elderly because of their prominent role in the elderly organization. The elderly organization is the ‘Katholieke Bond voor Ouderen’ (KBO, Catholic Union for Elderly). This is a large organization with locations spread over the whole of Noord-Brabant. There is not going to be a preference by selecting a location. The only condition is that the location covers a rural area not too close to main city. There will be five interviews conducted with different board members of the KBO at different locations.

3.2 The interview

The interview will be structured in five phases. The first phase will be a general phase to get to know the transport mode of the respondent and the reasons for using or not using the bus. The last phase will be about any other points that were not mentioned but could be important for the respondent. The other three phases will be based on the sub-questions. Those questions will be asked to answer those questions based (but not limited to) the factors and sub-factors described in table 2.2.1. Table 3.2.1 shows the structure of the interview. This structure will help dividing the results between the three sub-questions. This will make it easier to answer the different sub-questions. The interview itself can be found in appendix 1.

Table 3.2.1: Interview structure

Phase	Subject
Phase 1	General questions
Phase 2	Walking to and from a bus stop
Phase 3	Comfort of the bus
Phase 4	Frequency and coverage
Phase 5	Closure questions

3.3 Strategies

During the interviews, different strategies described by Kvale (2007) will be applied to get the most out of the interview. Every phase will start with an introductory question and will have some more specific questions after that. All questions can be followed up by follow-up questions. Those questions will mostly depend on the answers. Another strategy to get more out of an answer is to apply a short pause after an answer. According to Kvale (2007) this can lead to more information if

the interviewed person breaks the silence. It also can happen that different phases of the interview will get mixed up. This will not be a problem, but it is important to keep note of the questions that still needs to be asked about a phase. To get back at a unfinished or partly answered phase, structured questions can be asked. Those questions will indicate the beginning of a new or unfinished phase. Those strategies will help to keep the interview on track. If the interviewed person gives permission to record the interview, it will be recorded and transcribed afterwards, otherwise notes will be made of all the answers. The language of the interview will be Dutch to make it more comfortable for the interviewed persons.

3.3 Analyses

The transcribed results will be thematically analyzed based on the method described by Nowell et al. (2017). This method analyses the data based on code. This is done in six phases: familiarize data, creating codes, searching for themes, defining themes, reviewing themes and producing the results. The codes will not be predefined based on the literature. However, the codes are made using the sub-factors of table 2.2.1 in mind. In this way, most sub-factors will be part of the results if the sub-factors are mentioned in the interviews. Since the interview is designed to answer the sub-questions, who each cover described factors of table 2.2.1, it is likely that most sub-factors will be covered. Information that also relates to the use of the bus by elderly will also be coded. The codes then will be themed. Corresponding codes will be grouped and named based on the corresponding subject of the codes. After this, the themes will be distributed over the three sub-questions. The themes that do not cover a sub-question will also be discussed in the section: other results. The next chapter will present the results per sub-question.

4 Results

This chapter will present the outcomes of the thematic analyses of the interviews. The outcomes are themes that correspond to the subjects that were covered in the interviews. Therefore most themes can be linked to a corresponding sub question. Themes that are not a part of any sub question are also presented here and will be further discussed in the discussion. Every sub question will have a table with the corresponding themes and codes and the amount of respondents that mentioned the code to show the results. As last, the most important results will be mentioned. The data used in this study consists of five interviews of around a half hour. To keep the respondents anonyme, the respondents are referred as respondent 1 to 5. Table 4 shows more information about the collected data. It has to be noted that the respondents are board members of the KBO and mostly talked about the experiences and opinions of the elderly members of their own KBO.

Table 4.1: Interviews

Interviews	Village	Gender	Additional notes
<i>Respondent 1</i>	Ossendrecht	Male	Bus driver (different questions)
<i>Respondent 2</i>	Raamsdonk	Female	
<i>Respondent 3</i>	Sint-Hubert	Female	
<i>Respondent 4</i>	Mill	Male	
<i>Respondent 5</i>	Mill	Female	

4.1 Walking to and from the bus stop

The question ‘How does the walking to and from a bus stop influence the decision?’ corresponds to two themes. Hereby, the theme bus stop coverage is about the locations of the bus stops and if they are close by the starting and final destinations and can be tied to the sub-factor distance to a bus stop. The theme safe walk to the bus stop about the safety of an elderly during the walk to a bus stop and covers to the sub-factor traffic safety.

Table 4.1.1: Walking to and from the bus stop

Walking to and from the bus stop		Respondents				
Theme	Code	1	2	3	4	5
Bus stop coverage	Bus stop coverage is good	X	X		X	
	Good connection to destination	X		X		
Safe walk to the bus stop	Walking to the bus stop is harder for less mobile elderly		X			
	Safe walk to the bus stop			X		
	Elderly need to watch out when walking to the bus stop					X

According to the interviews, the bus stop coverage in the starting village and the destination village is good. Three of the five respondents mentioned that there are enough bus stops in their own village. Respondent 2 mentioned that ‘we got enough bus stops here, you can easily enter the bus’. Respondent 4 said that ‘the village is not that big, so walking to a bus stop is not a problem’. However, respondent 3 mentioned that she still had to walk 10 to 15 minutes to reach a bus stop, so a good bus stop coverage is not the case for some elderly. Besides the general good coverage of bus stops, the bus also has a good connection to the final destination. ‘Elderly just have to wave, and then the bus will stop at that location’ (Respondent 1). If the safety of the route is a concern of elderly is not really applicable from the interviews. However, according to respondent 5, there can be some areas that are busy with traffic where elderly need to watch out. Besides this, respondent 2 mentioned that less mobile elderly might have a hard time walking to a bus stop. Overall, the walking to and from a bus stop are not a large problem for elderly. The overall bus stop coverage is good because of the smaller size of the village, so the distance is not big for most elderly. While less mobile elderly can have a harder time with walking to the bus stop, only 2 of the 5 respondents had a negative response about the walk route.

4.2 Comfort

This section will present the results of the sub-question: ‘how does the comfort influence the decision’. The theme comfortable bus covers both sub-factors, comfort and access to a bus, that are discussed in chapter 2. This theme is about how well elderly can travel with a bus. The second theme is complicated bus use, while this theme does not directly correspond to a sub-factor, it can be covered by the sub-factor comfort. Complicated bus use is mainly about the lack of knowledge of the bus under elderly and how they struggle to keep track of the actions they have to take to enter and pay for the bus. Knowing how the bus works makes the trip more comfortable for elderly since they do not have to deal with this struggle in that case.

Table 4.2.1: Comfort

Comfort		Respondents				
Theme	Code	1	2	3	4	5
Comfortable bus	Elderly can easily enter the bus	X	X	X	X	
	Being mobile is important for elderly	X	X	X		X
	Busses are comfortable			X		
	Driving in the bus is safe			X		
Complicated bus use	Elderly do not know how the bus works		X	X		X
	Checking in the bus is not pleasant for elderly			X		

Four of the five respondents mentioned that the elderly easily can enter the bus. ‘The bus stops are made in a way that entering the bus is made easy’ (respondent 5). And besides this, there is also an small elevator in some busses that can help elderly enter the bus according to respondent 1. Respondent 3 mentioned that driving in a bus is comfortable and safe. However, four of the five respondents mentioned that it is necessary for elderly to be mobile. As respondent 2 mentioned ‘if you are very old and you are walking with a walker, you are not capable to use the public transport. That is just not possible. Everybody may think that it is possible, but it is just a step to far.’. It has to be noted that respondent 5 mentioned that entering the bus was hard for elderly with a walker or wheelchair. However, all the other four respondents mentioned the opposite. Because of that, the opinion of respondent 5 is not taken in to account in the results.

The second theme is complicated bus use. Three of the five respondents mentioned that elderly have trouble with using the bus because they do not know how it works. Respondent 2, 3 and 5 mentioned that they tried to encourage elderly to use public transport by giving them workshops about how public transport works and made some trips with the elderly to a given destination. All three respondents said that the elderly enjoyed those trips, however it still was too complicated to do on their own. Both respondent 1 and 5 mentioned that not many elderly started using public transport more after the workshops. Respondent 3 gave as reason: ‘elderly are the slow ones in this story, while using public transport is a habit for other people, it takes too long for elderly to get used to the public transport systems’. This is mainly the case for elderly who do not use public transport on a regular bases according to respondent 2 and 3. ‘Elderly do not always feel safe in this fast world with entering the bus and with checking in and out (respondent 3). While traveling in the bus is safe, the complicated use of the bus makes using the bus less comfortable.

Based on the results, comfort seems to be a quite important factor for elderly that influences the decision to take the bus. Being less mobile and inexperienced with the use of a bus are factors that negatively impact the decision. Both of those factors make the elderly want to travel less with the bus besides the effort to make it more comfortable for elderly by creating a easy to access bus and organizing workshops to teach elderly about public transport.

4.3 Frequency and coverage

The last sub-question is: ‘how does frequency and coverage influence the decision’. Hereby there are three corresponding themes: elderly prefer to travel at midday, non-optimal bus schedule and connection to other villages. Elderly prefer to travel at midday is about how elderly do not travel at the rush hours. The non-optimal bus schedule is about the sub-factors frequency and demand coverage but it also is about the overall planning of the bus. It describes how those factor are limiting elderly to travel. The connection to other villages is about the sub-factor network coverage and shows the results of how the bus is connected to nearby villages or larger cities.

Table 4.3.1: Frequency and coverage

Frequency and coverage		Respondents				
Theme	Code	1	2	3	4	5
Elderly prefer to travel at midday	Busy during rush hours	X				X
	Elderly are likely to travel at midday		X			
Non-optimal bus schedule	A higher frequency does not improve the bus	X	X	X		X
	The bus takes too long		X	X		
	Inconvenient transfers		X	X		
	Long wait times for busses		X			
	The bus does not drive in the evening		X	X	X	
	The bus schedule is not pleasant			X		
	The bus schedule is not always reliable			X		
	The bus does not drive in the weekend					X
	The busses mostly drive on schedule					X
Connection to other villages	Nearby villages can be reached with the bus		X		X	
	The connection to cities is not optimal		X	X	X	

The fact that elderly are likely to travel at midday is already mentioned by the literature (Fatima & Moridpour, 2019; Engels & Liu, 2012; Szeto et al., 2017). According to respondent 2, elderly are less likely to travel in the morning since they do not have the need to travel early. ‘Few elderly have need to travel before 9:00. Most of the elderly travel for shopping and the shops only open at 10:00.’ (respondent 2). Another reason for elderly to travel at midday is because during the rush hours, the busses are mostly filled with people who go to school. As respondent 1 mentioned: ‘no, the bus is too small at occasions, then you arrive at a bus stop with a lot of people and some of those cannot enter the bus. This is mainly an issue during the rush hours.’ And respondent mentioned that elderly prefer to travel at midday because of the larger amount of people that are going to school during the rush hours.

Four of the five respondents mentioned that the frequency is good enough currently. According to respondent 5, elderly are used to the fact that the bus does only drive once per hour and change their plans around it. Besides the fact that elderly preferably travel at midday, the elderly are limited by the demand coverage of the busses. Three of the five respondents mentioned that the busses do not drive in the evening. This causes problems for elderly, as respondent 2 said: ‘the bus did not drive in the evening, so the elderly could not return home’. Respondent 2 also mentioned that elderly do not take the final bus time in to account. Respondent 5 mentioned that the busses do not drive in the weekend and that this limits some elderly to take the bus. The inconvenient transfers and the long wait times also are problems for elderly according to respondent 2 and 3. ‘It is a lot to investigate with all those transfers’ (respondent 3) and according to respondent 2, some of those transfers also have a long wait time for the next bus. All of those factors make the schedule less pleasant. The reliability of the busses seem to be less of an issue, there are some cases where a bus does not show up or is late, but according to respondent 3 and 4, it does not happen a lot. According to respondent 2 and 3, the bus route is also too long. ‘The bus makes a route for tourists before it arrives in Nijmegen’ (respondent 3).

Two of the five respondents mentioned that the connection to nearby larger villages is good. In both cases this is because the village was less than 4 to 10 kilometers away. However, as respondent 2 said, 'you are tied to certain routes when using the bus'. As an elderly you cannot travel to all villages with the bus, only the ones that share the same route. The connection with some larger cities are not great according to three of the five respondents. Reasons for this were mainly the extra transfers and the amount of time it takes to drive to the city with a bus.

According to the results, the consequences of a low frequency and the coverage do have impact on the decision of elderly to take the bus. The long wait times, inconvenient transfers and limited drive times of the bus are the factors that make the use of a bus less attractive for elderly.

4.2 Other results

Some themes are not covered by a sub-question but are still important to consider. Those themes are: elderly do not prefer the bus and inaccessible information. The theme elderly do not prefer the bus is about the use of alternative transport modes and the general use of the bus. The theme inaccessible information is about how elderly have a hard time accessing the bus schedule from their homes. The other theme contains codes that do not fit any theme, but can be relevant for this research.

Table 4.4.1: Other results

Other results		Respondents				
Theme	Code	#1	#2	#3	#4	#5
Elderly do not prefer the bus	Preference to use a car because of its ease of use		X	X	X	X
	Preference to take alternative modes instead of the bus		X	X	X	X
	Promoting the use of the a more attractive bus can help			X		
	There are few elderly that need public transport				X	
	Few elderly travel with the bus					X
	Elderly cannot be depended on public transport					X
Inaccessible information	Elderly cannot access the bus schedule easily			X		
	Elderly only can find the schedule by the bus stop					X
Other	The bus does not make elderly more mobile		X			
	Driving more smaller busses can help					X
	Not all facilities are available			X	X	

The theme elderly do not prefer the bus is mentioned by four of the five respondents. This is mainly because the elderly who still can drive have the opinion that the car is easier to use. 'Public transport is a step to far if an elderly can drive a car. It takes too long. If you enter car, you can immediately go somewhere and exit by your destination.' (respondent 2) and 'if I want to travel to Nijmegen or to Uden them I am faster with the car and I can go at the time I want' (respondent 3). The elderly who do not own a car have access to other transport modes or solutions. Those elderly use a taxi, travel service or are getting help from their children. The bus is too much of a struggle for those elderly as respondent 3 mentioned: 'I cannot think about traveling to a hospital in a larger city, that is an enormous undertaking and that is not doable by elderly. Elderly use the taxi for that.'. Besides this, respondent 5 mentioned that the elderly do not have to assume that they can rely on public transport if they are going to live in the village. Overall, this theme supports the fact that the use of the bus is not optimal in rural areas.

The inaccessible information about the bus schedule is also shortly mentioned in the interviews and can also impact the decision of elderly to take the bus. Hereby it mainly is about how elderly are not able to easily access the bus schedule and according to respondent 3 makes the use of the bus harder for elderly.

5 Discussion

5.1 Validity

This research explored the factors that influence the decision of elderly to take the bus. This was done by interviewing board members of an elderly organization. Semi-structured interviews were used for this research since this is a good method for capturing the voices and experiences of the respondents (Rabionet, 2011). When repeating this method, it probably will give the same results if a certain point was mentioned multiple times. However, there were some results that only were mentioned once in the interviews. Due to the low amount of interviews, it is uncertain if those results were representative for all the elderly. However, since most of the respondents had a good knowledge about the elderly society based on their position in the elderly organization, some of the results that were only mentioned once are valuable to take into account, but cannot be used for a strong conclusion. Another issue was that three of the five respondents came from the same region, and two of those three from the same city. This was due to the referencing of contacts by respondents. This could have led to more biased results based on that region. Repeating this research in other countries will give other results since most results of this research are based on the Dutch public transport system. Other countries might have different systems and rules.

5.2 Expectations and explanations

Based on the literature, all factors of the sub-questions should have had a negative influence on the decision of elderly to take the bus. While this is the case for comfort, frequency and coverage, the approach to and from the bus stop does not seem to influence the decision of elderly. According to the literature, traffic safety and distance were the main problems for elderly with the approach to the bus stop (Cheng & Chen, 2015). However, the results show that traffic safety was less of an issue for elderly and that the distance to a bus stop was in most cases short because of the good bus stop coverage. The main reason for this is that this research focused on rural areas in Noord-Brabant while the literature did not focus exclusively on the rural areas. The villages in the rural areas that were included in this research are on the small side. This made the traffic situation safer since it is not as busy as for example in urban areas. Besides this, the amount of bus stops does not need to be high to cover a large part of the village, so the distance is small in most cases.

The literature also suggested that comfort is an important factor for elderly (Hansson et al., 2019). The results indicate that comfort has indeed an influence on the decision of elderly to take the bus. However, this because of another factor that was not described in the literature. The main issue here was that elderly do not know how the bus works and that this creates an unpleasant situation when they want to enter and check into the bus. The sub-factors comfort and bus access were less of a problem for elderly. This problem is also explained by Shrestha et al. (2017), the use of the bus creates a complicated and inconvenient situation for less experienced elderly. The results do show that less mobile elderly have a harder time to comfortably travel than mobile elderly, so in this case those factors do influence the decision. This can be because of the fact that entering and leaving the bus just takes too long for the less mobile elderly, besides the features that help them to enter the bus. The longer time it takes to enter the bus can be the factor that makes the less mobile elderly prefer other alternatives over the bus.

The last factor is the frequency and coverage. The literature shows that frequency, network coverage and demand coverage are important factors for a public transport network (Hansson et al., 2019; Shrestha et al., 2017). While the low frequency is not a problem according to the results, it does create longer wait times and inconvenient transfers and those are problems for elderly according to the results and the literature (Cheng & Chen, 2015). The results also show that the demand coverage and network coverage are important factors that influence the bus use of elderly. According to the literature, both factors are important for a good public transport network (Hansson et al., 2019;

Shrestha et al., 2017). Four of the five respondents mentioned that it is not optimal for a bus company to drive more frequently because it is just not profitable for bus companies to let more busses drive in rural areas because of the low demand. The minimum of busses makes the described problems larger in those rural areas.

5.4 Contribution

The knowledge gap that this study tried to fill was about the issues of elderly when transition to the bus and give a better understanding of the mobility and accessibility needs of elderly. This was done by researching different factors that can influence the decision of elderly to take the bus. There are a couple reasons that les willing to transition to the bus. One reason is that elderly do now know how the bus works. This makes them uncomfortable with using the bus and because of that they prefer to use other transport modes. A second reason is the possibility of using alternative transport methods. Taxis and other travel services do not have the same problems the bus has in the rural areas and are therefore a preferred mode for elderly. Those alternatives do not have inconvenient transfers and long wait times. The low frequency, demand coverage and network coverage makes elderly less likely to travel with the bus since this causes long wait times and possible inconvenient transfers. Improving the bus schedule and making the bus more easy to makes the bus more accessible for elderly and can motivate elderly to travel more often with the bus.

5.5 Limitations and further research

The results are possibly influenced by the low amount of conducted interviews. This is mainly because of the fact that not all questions were the same between the interviews because of the semi-structured interview method. This could have led to a under representation of certain results and as already mentioned, while those results can be valuable, those results cannot be used for as a strong conclusion. The five respondents were trustworthy because of their position in the elderly organization. They mostly talked about problems that are occurring by more elderly and therefore shared less of their own opinions about public transport. However there is a chance that they were bias in favor of the elderly. This might have lead some over emphasized problems, but this is less of a problem since this research mostly focused on the factors that influence this decision. The focus of this research could have been a bit broader. It only focused on three factors, but the results implied that there were more factors that influenced the use of the bus by elderly, this was mainly the use of alternative transport methods. Further research can interview more elderly and also include elderly that are not involved in a community to validate possible bias of board members of elderly organizations. Another issue of this research was that one villages was over represented, a better spread of villages through the study area will help to get better results for further research.

6 Conclusion

6.1 Conclusions

This section will answer the main research question: how do different factors influence the decision of elderly people to take regional bus lines to visit facilities that no longer exist in their own village? This question will be answered using three sub-questions based on the concepts availability and accessibility and the factors that correspond to those concepts (see table 2.2.1). The next paragraphs will answer the following sub-questions: how does the walking to and from a bus stop influence the decision?; how does the comfort of the bus influence this decision?; and how does the frequency and demand coverage of the bus influence this decision. The last paragraph will give a final conclusion and compare the results with the literature described in chapter 2.

6.1.1 Walking to and from a bus stop

Walking to a bus stop is less of a problem for elderly according to the results. The overall distance is for most elderly short because of the good coverage of bus stops in the villages. Besides this, there are also no significant safety issues when walking to the bus stop. However, it is still important for elderly to watch out for themselves at busy areas and less mobile elderly can have harder time walking to the bus stop. Both of those points were only mentioned once during the interviews, so it is not a significant factor in the approach to or from a bus stop. Based on those results, the approach to or from the bus stop is not an issue for elderly and therefore will have less of an influence on the decision to take the bus.

6.1.2 Comfort of the bus

The comfort is more of an issue for elderly, especially less mobile elderly. While accessing the bus is made easy for elderly, it is still important to be mobile to comfortably travel with the bus. Another issue is that elderly do not know how to travel with the bus. They struggle with the process to enter or exiting the bus. Hereby they have to take their time to check in or out. During this process they feel unsafe and this makes traveling less comfortable for elderly. Not knowing how the bus works is a large factor that negatively influences the decision of elderly to take the bus and this has even more impact on less mobile elderly.

6.1.3 Frequency and coverage

Frequency and coverage are also factors that influence the decision to take the bus. Factors that mainly have an impact on this are the long wait times, inconvenient transfers and the long drive times of the bus. This makes it less attractive for elderly to use the bus. Besides this, the elderly are limited by the time the bus drives, and the bus does not drive in the evening and in some cases also not in the weekend. Those are also factors that play a role in the decision to take the bus. The network coverage is good if an elderly want to travel to a nearby village or city to reach other facilities, however not all villages and cities are well connected with a bus line. So the lower frequency makes the use of the bus less attractive and elderly are limited by the low demand and network coverage.

6.1.4 Conclusion

In conclusion, the bus use is not an preferred travel option to visit facilities in other villages for elderly in rural areas. According to the literature, a good bus network needs to have a good demand coverage and a network coverage, factors like wait times, transfers, frequency and reliability are important for a good functioning bus network. Other factors that are important for elderly are a safe and short walk to and from a bus stop and a comfortable bus that they easily can access and travel in. The results of this study show that not all of those factors are optimal in a rural bus network in Noord-Brabant. The frequency, demand coverage and network coverage are not great. Elderly cannot travel at any time in the day and are limited to a certain bus route. To reach larger cities,

elderly do need to transfer a couple times. Those transfers are not always convenient for elderly and have some times a long wait time because of the lower frequencies. However, a bad network coverage does not mean that the facilities are out of reach since the needed facilities can also be located in a village that reachable without having to transfer to another bus. The elderly are also limited by the demand coverage because of the fact that the busses do not drive in the evening and sometimes in the weekends. All of those factors negatively influences the decision of elderly to use the bus. While elderly can comfortably travel in the bus, the process of checking in and entering the bus can be unpleasant for most elderly, especially less mobile elderly. This is because the use of a bus can be complicated for this group. The only factor that is not a problem according to the results is the approach to and from a bus stop. Due to the smaller size of the rural villages, the distance to the nearest bus stop is in most cases small and there is less traffic then in urban situations. The low traffic and the short distance makes it a safe approach for elderly. In conclusion, the long wait times, inconvenient transfers, the limited times the bus drives and the complicated bus use are the factors that influence the decision of elderly the most.

6.2 Recommendations

Based on the conclusions of the previous section, the most room for improvement is with the factors comfort, frequency and coverage. The main issue with comfort is that the bus use is too complicated for elderly. This issue can be solved by making the check in or out process for elderly an easy process so the elderly do not have to reach for their travel card or ticket. Promoting the overall use of the public transport by elderly is also an option. However based on the interviews, this method was already applied a couple times with the use of workshops and this did not seem very effective. Further research can focus on how to simplify the check in or out process for elderly or on how to find an effective method to make elderly more accustomed to the use of a bus.

A second suggestion is to increase the bus frequency at times when elderly travel the most. This is in line with a suggestion that was given by respondent 5. This suggestion was about driving more busses per hour, but making the busses smaller. By making the busses smaller, the costs of running a bus more often is decreased. A higher frequency can also create a better connection with other bus lines, so the wait times are not as long and the transfers will be more pleasant. To make this effective, further research is needed to analyze the travel patterns of elderly in rural areas.

Further research can also look at the effectiveness of alternative transport methods, like the taxi or travel services, to reach facilities in other villages. According to the interviews, elderly do prefer those travel methods over the bus if they cannot drive the car anymore. This is mainly because of the fact that it is easy to reach and use and always available. Focusing on this is also an solution to cope with the decreasing amount of facilities and ageing in rural villages.

7 References

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8 Appendix

8.1 Appendix 1 Interview

Introduction;

- Introduce myself & university
- Anonymous, recording permission
- Topic: Using the bus to access facilities in other villages.

Phase 1: General;

- Is every facility available in your town, or do you have to travel to another town to visit those?
 - o Is this causing problems for you?
- What are the reasons for most of your travels?
 - o By what mode?
 - o And how far do you travel?
- Do you travel with the bus for those reasons?
 - o Why do/don't you travel a lot with the bus?
 - o Are you willing to travel more regularly with the bus?
 - Why/Why not?
 - And if it is one of the few available transport modes?

Phase 2: Approach to the bus stop;

- How do you feel about the walk the bus stop?
 - o How long does it take to travel to the bus stop?
 - o What about the traffic situation?
- Does this influence your decision to take the bus?
- What about the walk from the final bus stop to your destination?
 - o Do you know the situation beforehand?
 - o If you don't know the situation, does that keep you from traveling with the bus?

Phase 3: Comfort;

- How do you feel about traveling in the bus itself?
 - o And if you want to take longer trips?
- What are the important features a bus needs to have to make your travel comfortable?
 - o And does the lack of those features impact your decision to take the bus?

Phase 4: Frequency;

- Is the bus always available at the hours you want to travel?
 - o Are you well informed about this?
 - o How does this impact your travel options?
- What do you do if the bus did not arrive, or is delayed?
 - o Does this happen more often?
 - o Does this have impact on your decision to take a bus in the future?
- What do you think about the amount of busses per hour?
 - o Does this influence your decision to take the bus?
 - What is the main reason for this?

Phase 5: Final questions;

- Are there other factors that play a role in taking the bus that weren't mentioned in this interview?
- What are for you the main factors that keeps you from taking the bus?
- How do you think the bus can be improved?
 - o With those improvements, do you think that you are more willing to take the bus?
 - And if it is the only available transport mode?

