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ORIGINAL PAPER

Does competition in the housing market cause transport poverty? Interrelations of residential location choice and mobility

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Abstract
Introduction This contribution examines the impact of the housing market on daily mobility and is based on the assumption that, in a supply-dominated housing market, as availability and affordability decline, many people must compromise, particularly on accessibility-related decision criteria when searching for a residential location. This applies even more to households with low financial flexibility, which can neither bear the high cost of housing in accessible inner-city neighborhoods nor afford the higher cost of mobility in less well-connected suburban areas.
Methods These interrelations are examined in a current study in more detail by means of problem-centered qualitative interviews highlighting the situation of low-income households, using the Munich Metropolitan Region as an example. This paper gives an overview of interrelations and presents selected results of the study.
Results Low-income households do not change their residential location unless it is really necessary. If they do move, they are nearly unable to optimize their location in order to have better access to destinations. Whereas they are able to change some destinations, there are also some immutable destinations, which lead to an increase in effort spent on transport.
Conclusions All in all the insights presented confirm the suggested assumptions. They show the very limited residential choices low-income households have, but leave room for further evaluations on possible implications.

Keywords Housing · Transport poverty · Residential location choice · Munich metropolitan region · Daily mobility · Low-income · Housing market

1 Introduction

Urban areas worldwide are becoming more popular. This is seen as a great opportunity for cities, particularly economically. However, despite widespread enthusiasm, this development is also creating challenges. There are groups of people who are not able to participate in the economic success. One consequence resulting from a higher demand is increasing prices for housing and living. Such increases do not necessarily come with increases in wages. Low-income groups in particular often do not benefit significantly from overall growth, yet they are the ones most affected by increases in the cost of living. As a consequence, relocating low-income households often have to compromise on the quality of their living conditions or on their residential location. Accessible inner-city locations are characterized by high competition and housing costs, meaning that less well-connected suburban areas are often the only alternative for these households. Since daily mobility is highly dependent on local conditions and the transport options provided near the residence, consequences for daily mobility, may result from the limited choice in residential location options. Those affected must inevitably come to terms with the new and unplanned circumstances in their new residential location and reorganize their daily mobility to ensure their access to key activities. The present paper aims to analyze the challenges low income households face after a relocation in a supply-dominated housing market concerning their daily mobility. It investigates these

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interrelations in an urban context, since existing research on mobility limitations often focuses on rural areas [1–4].

This contribution introduces selected results from a research project conducted in the Munich Metropolitan Region, with a special focus on low-income groups. First, this paper presents background information on the mentioned interrelations. The case-study area is introduced in section 3, before a description of the methodology of problem-centered interviews is provided. The goal of the interviews was to develop a deeper understanding of the challenges that low-income earners face in a supply-dominated housing market, which requires very detailed and intense work on the data. Such qualitative approaches are not very common in transportation research, but can complement existing knowledge, as this study shows. The results show that the residential choice of low-income households is very limited. As such, such households are greatly dependent on public transport; the location of the new residence has a strong impact on people's mobility. Unlike others that relocate, low-income households do not have the ability to optimize their access to certain destinations, which often results in an increase in effort expended on transport. In section 6, the limitations of the presented results and questions for further evaluations and research are presented.

2 Interdependencies of residential location and mobility in spatial context

In the field of residential location choice and mobility, there are many interdependencies. Most such connections belong separate fields of research, so that they can only be touched on here. The aim of the following paragraphs, however, is not to present an extensive analysis of each but an overview of the links between them with a special focus on barriers to mobility and constraints resulting from the housing market. Beforehand this paper provides a short introduction on our understanding of sustainably mobility and its importance for participation in society.

2.1 Sustainable mobility

The debate on sustainable mobility often focuses on the ecological dimension, whereas the social importance is hardly part of the debate, even though mobility is an essential prerequisite for participation in society [5, 6]. Within the context of this study, mobility is understood as the ability to move in physical space, whereas transport refers to realized mobility [7]. Mobility is about the possibilities available to an individual. Since most of our activities are spread across different locations, transport ensures that we can access them. Pickup and Guiliano call transport "a tool for living and working" [8]. Limitations in transport and mobility can, therefore, also limit the extent to what we can participate in society. In 1996, the OECD proposed the Vancouver Principles for Sustainable Transport, which can be considered as a milestone in the debate on sustainable transport. The second principle highlights the importance of equitable mobility:

Principle #2 Equity

> "Nation states and the transportation community must strive to ensure social, interregional and intergenerational equity, meeting the basic transportation-related needs of all people including women, the poor, the rural, and the disabled. Developed economies must work in partnership with developing economies in fostering practices of sustainable transportation." [9].

In recent years, the awareness of the importance of spatial mobility for participation in social activities has grown. Research has been done on transport poverty, especially in the UK [10, 11], as well as on other kinds of mobility-related discrimination [12]. There is a lack of a clear definition of transport poverty and similar terms, a good overview of different approaches is provided by Titheridge et al. [13]. For them it is about accessing key activities. Knowledge on these interrelations is becoming increasingly important, as society has rising demands with regard to mobility and there seems to be a need for everyone to be mobile at anytime and anywhere. This leads to the question of whether everyone can keep up with this development. One of the groups which is especially at risk of facing limited mobility options are low-income groups. People who have no income or a low income already have a high risk of facing multiple kinds of discrimination. Hence, for them, it is especially important not to be excluded from participation due to enforced immobility. At the same time low income groups are generally not well represented in most studies in the field of transport and mobility, even though their needs should play an important role when it comes to planning and policy decisions. This is why this study puts a special emphasis on the situation of low-income groups and aims to find out more about the challenges they face.

2.2 Mobility behavior and barriers to mobility

Mobility behavior and residential location are greatly interrelated [14]. We will give a short overview on these interrelations in order to provide some background information before moving on to the empirical results. Mobility behavior is not only dependent on individual preferences but also structural conditions such as accessibility and density [15]. The accessibility of a residence, which depends on the spatial availability of facilities, such as workplaces or schools and the respective transport supply [16], is the base on which people consider their mobility options and therefore influences their mobility patterns. As an example, residents of rural areas show a much higher share of automobile usage in their modal split than the residents of urban areas. On the other hand, an urban resident's share of walking, cycling, and use of public transport is usually higher.

Mixed-economy structures, shorter distances, and increased density in cities are the driving forces behind these differences. Furthermore, such spatial structures contribute to a higher demand for public transport, which enables the supply of public transit. Additionally, it is easier to combine trips when activities are located close to one another. This enables one to achieve more activities within a given time frame or financial budget. These are good preconditions for the self determination of mobility, meaning that people have different mobility options to choose from to organize their daily life according to their needs. This is why studies on mobility restrictions have often focused on rural areas. However, it can also be argued that people in urban areas can be restricted in their mobility and have other barriers, such as congestion, parking fees, inconvenient schedules, or competition among different modes that prevent people from accessing destinations.

Barriers to mobility may result from various factors. They can be categorized into spatial reasons, temporal restrictions, financial circumstances, and individual factors [17, 18]. Spatial reasons include the availability of transport supply and the accessibility of destinations. For example, many areas lack alternatives to the use of personal automobiles, due to no, inconvenient, or low-frequency public transport options. When distances are too far to be covered by walking or cycling, households without a car can be severely restricted in their mobility options [4]. This may lead to forced car-ownership [19], resulting in households to be forced to make cuts on other expenses. This leads to financial barriers. Many transport options can only be used by paying for them. Therefore, with a smaller household budget, the amount that can be spent on transport shrinks. Temporal restrictions mainly relate to travel times and operating hours of shops, offices, or childcare services. Individual factors include not only personal concerns of safety, but also access to information or physical restrictions. Furthermore, personal attitudes, values, and experiences influence mobility behavior considerably and can therefore account for individual mobility barriers [20, 21].

2.3 Residential location choice and role of the housing market

Individual preferences are reflected not only in mobility behavior but also in the choice of residential location [22]. In recent years, awareness has grown around the fact that, in addition to the influence of residential location [23–25] and attributes of the built environment on mobility patterns, individual mobility preferences also influence the choice of a residential location [26] - also known as residential self-selection [27–29]. Choosing a residential location is a multidimensional decision process, which is dependent not only on one's specific life circumstances and thus requirements concerning object properties, but also on spatial structures, such as neighborhood and accessibility. People usually choose a location enabling them to maintain their preferred lifestyle, including their preferred forms of mobility. This, however, implies minimum choice.

As with every other choice, the choice of residential location is determined by external constraints. In this case, it may be, for example, one's own finances or other personal requirements (such as wheelchair accessibility). The current situation in the local housing market can also be a constraint [30, 31]. In many growing metropolitan regions, we can observe a rather supply-dominated housing market, where real estate prices are rising. If the demand exceeds the supply, the supplier can set market standards and prices will go up. As the availability and affordability of residences decline, a growing number of people are excluded from market participation. In this way, they become very limited in their choice of residential location and trade-offs concerning quality or location become more likely. This of course applies particularly to households with low financial flexibility.

Beyond the situation in the local housing market, real estate prices are influenced by the specific location of the real estate. The presence of a great number of amenities nearby and access to public transport usually drive the increase in prices, which makes easily accessible inner-city areas often the most expensive locations in a city. Residential areas further out toward the fringes or the surroundings tend to be less expensive per square meter. At the same time residencies are often more spacious, which contributes to higher total costs. Moreover, these locations usually imply a higher cost for transportation and result in greater travel distances and limited options concerning transport modes. Related to this, the housing market has a considerable impact on residential location choice and thus, indirectly, on mobility options. However, the influence of the housing market on people's mobility has hardly been addressed in research.

Routines play a large role in mobility patterns [32]. Once someone has chosen a mode and route for commuting to work, he is not likely to question it again, unless there is a specific reason. There are some key events that can initiate a process of questioning or a reorganization of routines [33]. A major relevant event is a residential relocation. It makes a reorganization of daily routines necessary and initiates a process of comparing and weighing different alternatives, which may lead to a change in mobility behaviors. This is especially the case when relocation occurs across different spatial categories [34]. This is also why many studies on mobility behavior take advantage of the relocation process; routines are not as established and it might be easier for interviewees to explain their choices. This is also the approach of the present study.

3 Case study: The Munich Metropolitan Region

The present research focuses on the Munich Metropolitan Region as a reference for the growth of metropolitan regions worldwide, addressing key functions of metropolitan regions and their interrelations [35]. The Munich Metropolitan Region

is located within the state of Bavaria in the south of Germany (Fig. 1). The metropolitan region is clearly monocentric, oriented toward the City of Munich, which is the core of the region not only geographically but also in terms of political power, economy, culture, and education. There are other cities spread over the region, but large parts are mainly rural. The area of the metropolitan region is about 26,000 km^2. It has almost 6 million residents, almost half of them in the greater Munich region, and 1.5 million people live within the City of Munich itself. The Munich Metropolitan Region is characterized by a stable economy, low unemployment rates, and a large number of workplaces, particularly for highly skilled workers [36].

Whereas in many other German regions, population and workplace development are in decline, the Munich Metropolitan Region has been, and still is, one of the great growth areas of Germany. Population growth is occurring mainly due to migration from other parts of Germany and other European countries, but there are also positive birth rates. Immigration is characterized by people aged between 18 and 30 who are moving there because of education or work [37]. Nevertheless, the availability of skilled workers is thought to be a future challenge for the region.

3.1 Housing market

The housing market is, particularly in the City of Munich and its surroundings, highly competitive and expensive. Real estate prices in the area are among the highest in Germany. Population growth is putting even more pressure on the housing market; furthermore, real estate in the area is considered to be a particularly safe investment, which further stresses the housing market [38]. At the same time, new construction projects are limited as most space has been used. As demand has been exceeding supply for years, those seeking housing end up paying much more than they intend or compromising on location or quality of housing if they stay in the city [39]. The closer you come to the city center, which is also the area with the best transport supply, the higher the rents are.

The housing market in Munich, as described above, makes it increasingly hard, particularly for low- and medium-income households, to find affordable housing and sustain a livelihood. The lower a household's income, the higher the share of its income is spent on rent, so that shares of 40% or above have become increasingly common [38]. On an average, households leaving the City of Munich and moving to the surroundings double the size of their residence while at the

Fig. 1 Munich Metropolitan Region

same time saving up to one-fourth of their rent per square meter [37]. For many, the choice of a residential location is not a real choice anymore; they have to take what they can get and afford.

3.2 Transportation

The transport network in the metropolitan region is oriented around the City of Munich. Road infrastructure forms a radial system merging in the city. The public transport network is radially aligned around it as well. Within the city, there is a dense public-transport network, including trains, subways, tramways, and buses. In the City of Munich, 37% of the mode split is automobile use (including 10% passengers), 42% of trips are covered by walking or cycling, and 21% of trips are made using public transport [40]. This shows the importance of alternative modes to the private automobile, which especially applies to households with a lower income, since the share of automobile usage decreases with less income. Correspondingly, their average trip length is considerably smaller [18]. Public transport, however, is operating close to capacity, and the level of its supply declines with increasing distances to the region's core. High real estate prices and a low availability of housing have resulted in migration to the surroundings of the city. At the same time, many people are continuing to work in the City of Munich, which leads to increasing commuting distances and induces additional traffic.

4 Methodology

In a current research project, we are bridging the gap between classical transport research and the social sciences to complement existing knowledge and learn more about the issues mentioned above. The two approaches often seem to be far apart, but these fields of research can complement each other and thus contribute to broader knowledge in the area of transport and mobility. Both of these are subjects of research in various academic fields, but few bridges are being built to connect findings. To achieve a detailed knowledge of causalities, there is a need for a more integrated view. Therefore, interdisciplinary approaches should be reinforced. One way for this to occur is the combination of quantitative and qualitative research methods, as it is increasingly common [25, 34]. Quantitative methods are suitable for the quantification of data and the generalization of results, whereas qualitative research provides insights into underlying correlations. To gain better insights into the transport-related challenges that low-income groups face in competitive housing markets, we decided to conduct qualitative interviews with low-income earners. The aim is to learn more about their actual decision making, trade-offs and perceived possibilities. The present contribution focuses on these interviews and therefore represents an explorative research approach.

4.1 Research questions

As briefly shown in section 2 there is considerable knowledge about mobility behavior, the importance of mobility and possible barriers to mobility. The specific case of low-income groups in urban areas and especially the effects of the housing market on their mobility have not been addressed.

With reference to the correlations above, this study addresses the following question: What challenges concerning daily mobility do low-income earners face after relocation in a supply-dominated housing market? Thus, this concerns the impact of a supply-dominated housing market on the residential location of low-income households and the following consequences for their daily mobility. Therefore, we not only need to know what low-income households want but also to what extent can they influence their residential location in the first place.

The question raised above is based on the assumption that in a supply-dominated housing market, many have to compromise, particularly on accessibility-related decision criteria, such as access to public transport, when searching for a residential location as availability and affordability decline. This applies even more to households with low financial flexibility which can neither bear the high cost of housing in accessible inner-city neighborhoods nor afford the higher cost of mobility in less well-connected suburban areas. What follows for their daily mobility has been the subject of little research.

4.2 Case study: Low-income groups

A focus on low-income households was chosen because they are particularly affected by the rising real estate prices. Because of their very limited financial options, they cannot react as flexibly as households with a higher income can. Furthermore, they are also the ones most affected by the high cost of transportation, which means moving to the fringes of a city is not a valid alternative for saving money. Hence, these challenges can be observed amongst this group to a significant level.

The question remains how to operationalize low income, since the concepts of poverty and low income are a large research field. In very general terms, poverty is considered to be a condition in which people cannot reach the average standard of living of the society they live in. Even though many definitions go far beyond the economic criteria, financial resources are usually among the crucial factors. Relative poverty is defined relatively to the members of a society and, therefore, enables us to differentiate between countries or regions [41]. One measure commonly used to define poverty is the poverty–risk threshold, which is 60% of the median

income in a region for a single-person household. For bigger households a need–weighted equivalence income is applied, which is weighted by 0.5 for additional adults and by 0.3 for children (14 years or younger), in order to account for savings resulting from the presence of more people within one household (OECD-modified scale). For this study, we used a threshold of 80% of the median income in the City of Munich (Fig. 2), to widen the group of potential participants and to increase the chances in finding employed interviewees. People receiving public subsidies can be supported by the public authorities and are often eligible for public housing. People having less than 80% of the median income still have serious trouble finding affordable housing, but there is a higher chance of them being successful in their search without the support of public authorities. By this means, we obtained a sample of interviewees that received assistance from the public authorities and interviewees that did not, which was seen as a chance to take into account different situations.

A total of 17 interviews were conducted. Besides meeting the pre-defined income criteria, all interviewees had moved within the last three years. Most of them had some kind of regular occupation, to ensure that there will be at least one destination that is traveled to on a regular basis. Students and trainees were excluded from the interviews, since their status is only temporary, and they usually have a different perspective on planning.

One of the challenges during the research project was finding the interviewees. Low-income groups hardly organize themselves, at the same time they are very heterogeneous, so that there is not one contact point to address. Given that we know that low-income groups are not very well represented in many research projects, it can be assumed that many of them have so many things to struggle with in their daily life that answering a questionnaire is just not their top priority. Additionally, accessing potential participants for a research project within population groups that are similar to oneself is often easier than addressing other groups, which is why in many research projects students are represented at an above-average rate. Within this project several different ways were utilized to find potential interviewees. Six interviewees were found via an online survey of a related project, where they indicated that they would be interested in taking part in additional interviews. Helpful, also for background information, was contacting with different social organizations, debt counselling, and work projects for people living on public subsidies. Single participants were found via Facebook, by handing out flyers at food distribution centers, and hanging posters at public authorities and advisory centers. It can be concluded that there is not one way that is suitable to reach out to and identify low-income participants, but it is important to be creative and anticipate that it may take some time to find them.

Figure 3a and b show some details about the sociodemographic background of the interviewees. Most of them were single-households, another large group consisted of male and female single parents. It was taken care to an even age distribution to avoid a bias due to age. Thirteen of them lived within the City of Munich, whereas four of them lived in the surrounding areas.

4.3 Problem-centered qualitative interviews

For many current questions on transport and especially on mobility behavior, the methods of the social sciences are particularly suitable. Qualitative approaches such as interviews are particularly suitable for exploring a field of research. Moreover, these approaches focus on causal interdependencies in order to understand people's behavior and enable us to work very intensely on the data without having a large number of datasets or cases [42]. Since this project aims to analyze the situation of low-income households, it is beneficial to include their point of view in order to understand the challenges they face.

To address the research question raised above in detail, 17 problem-centered interviews [43] were conducted. Low-income earners that recently moved within the Munich region were asked about their choice of a residential location and their daily mobility before and after relocation. There was a particular focus on the role of accessibility-related attributes of their residential location and the importance of these attributes during the search. The interviewees were asked to draw a map showing their most frequently visited destinations in order to capture their activities, related locations, and preferred modes of transport.

The interviews were semi-structured and, in order to ensure important issues were covered in all the interviews, a guide was developed beforehand. The interview guide was built upon a literature review and the subsequent research questions

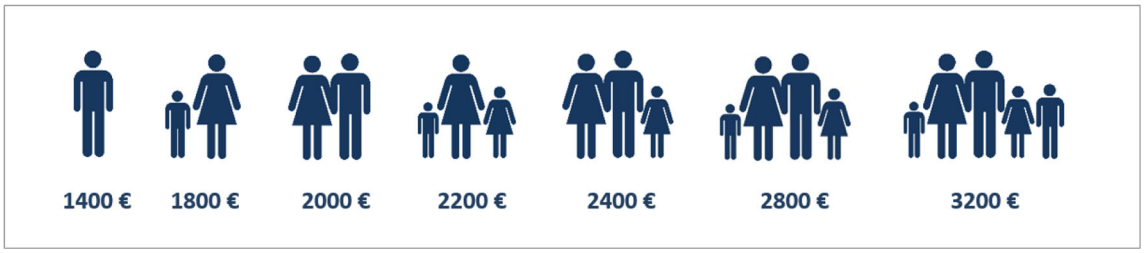
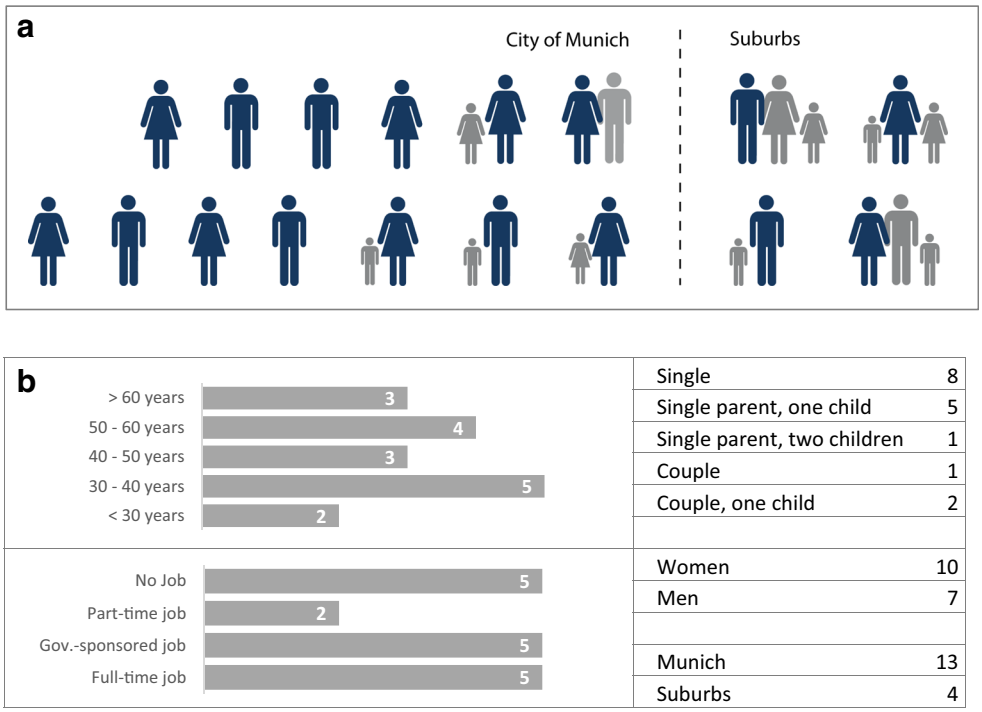


Fig. 2 Income thresholds for the interviewees (net household income per month)



Single	8
Single parent, one child	5
Single parent, two children	1
Couple	1
Couple, one child	2
Women	10
Men	7
Munich	13
Suburbs	4

Fig. 3 **a** Household structure, gender and residential location of the interviewees **b** Sociodemographic information on the interviewees

and it was revised based on a pretest. The guide consists of four sections: search process, current residential location, mobility behavior and activities, and the situation before the relocation. Most interviews took between 60 and 90 min, all of them were recorded and transcribed afterwards. In-depth evaluation was done by means of a qualitative content analysis [44], therefore the data was categorized by three content-related main categories, derived from the interview guide. Then different sub-categories were formed inductively within each main category, which means the categories were developed iteratively based on the data. The system of categories was designed and evolved with support of MaxQDA.

It is important to keep in mind that the objective of qualitative methods is not to discover numerical correlations or representative findings for a defined population. It is about understanding, rather than explaining, the underlying motives and views of the interviewees; these can possibly also be transferred to other individuals. The inductive approach complies with the explorative character of the research.

5 Selected results

The evaluations of the interviews reveal various challenges that all the interviewed low-income earners face. Mobility behavior is the result of complex considerations; however, compromises often have to be made in daily mobility as well as in the choice of residential location. It is apparent that people evaluate their residential location based on a number of influencing factors that are highly individual and greatly dependent on the specific situation of the household. Nevertheless, interdependencies within the decision-making processes are often characterized by economic constraints. Below, some of the key findings of the interviews will be introduced. They are divided into three sections, starting with the background of the relocation, then coming to the interviewees' mobility behavior, before focusing on the situation at the new residence. The findings will be presented through selected quotes from the interviews.

5.1 Relocation as a last resort

As explained above, it was quite difficult to find interviewees. It would have been easier to find individuals who met either the income criteria or who had moved within the last three years, but not both. This impression was confirmed by many organizations contacted to find interviewees: low-income earners only move if they have no other choice. It is generally difficult to find affordable housing and a relocation also involves expenses. Additionally, new rental contracts are usually more expensive than old ones, since the amount of rent charged is based on current local reference rent.

The interviewees move only in the instance when moving is their only option to sustain their living. All interviewees had left what was for them an unbearable housing situation: one woman dealing with health issues needed an elevator, which she did not have at her old place, and two others broke up with their partners and therefore had to look for places on their own. One interviewee wanted to have his son move in with him, but he had only a small one-room apartment; others

wanted to move in with a partner or were expecting a baby and needed more space. The interviewees all moved due to reasons that can be summarized as push factors. This means that their previous residences did not meet their present needs (anymore), forcing them to look for an alternative. Other common reasons for relocation, such as optimizing residential location or qualitative improvements such as a more attractive apartment or larger green spaces, are not among the crucial factors in this context.

The decision to move was not made easily by any of the households, accordingly relocation was not the preferred option. Half of the interviewees had at least some time for the search, whereas the other half had to move quite urgently. They had waited until the situation was unbearable for them, mostly because they had not been able to find a new residence at an earlier time. Five interviewees had not put much effort into the search, after experiencing too many rejections and as a result of the prices being too high, which led to them abandoning the search. Overall, the interviews show that the situation in the housing market causes great emotional stress for the interviewees, which sometimes ends in them giving up and not even trying to find a residence on their own. Two interviewees describe their perception of the housing market as follows:

> *„… the City of Munich as we see it here, is not for everyone and all the people that want to live here, you have to buy yourself into the city, which works for those who earn a whole lot of money, but for all the others it's extremely hard…*" *(*male, parent, 30 – 40 years, translated quote*)*

> "*I'd even say when you do have money it is hard to find a place. Even for people having a regular income in the primary labor market or an average income, it must be horror finding a place here. And […] that is what takes one's hope away…*" (male, single-parent, 30 – 40 years, translated quote)

This leads the households to accept almost any option, regardless of their initial preferences. The households' top priority is finding an affordable place to live, everything else comes second. One of the interviewees describes how she got her apartment after a search of seven months due to an eviction notice:

> "*… I took what I got. I called them and they said ‚we have an apartment'. I said ‚I'll take it'. That's as simple as it was, I had no other option…*" (female, single-parent, 40 – 50 years, translated quote)

Similarly, people waiting for public housing often do not dare to reject an offer, regardless of whether the apartment itself or its location is convenient or not. Households that are receiving public subsidies, such as those for whom the earned wage is too low to live on, are in some cases provided with public housing (Sozialwohnung) by the local housing authority. However, waiting lists for public housing are extremely long, and depending on the urgency, it can take several years to get an apartment, so that the possibility of getting a residence through public housing is not guaranteed. Among the interviewees, five were allocated public housing.

As we see from the examples, a relocation is a last resort for the households. They move due to push factors, not because of minor qualitative improvements. Their ability to be proactive in the housing market is very limited not only because of high rents, but also due to great emotional pressure. This leads the households to prioritize finding an affordable place and putting everything else second.

5.2 On the go with public transport

The need to compromise in order to find a residence, does not mean, that interviewees do not care where they live. Concerning spatial features close to their residence, all of them stress the importance of access to public transport. Figure 4 shows all interviewees except for two use public transport regularly. Five interviewees rely solely on public transport. Public transportation, therefore, plays an important role in the mobility of the interviewees, which has considerate influence on the efforts of organizing their daily lives. One interviewee describes the perfect public transport supply as follows:

> "*Ideally, of course, would be having the subway right at the front door, and it would go everywhere and you wouldn't always have to change three times…*" (male, single, 30–40 years, translated quote)

Even though interviewees are satisfied with the overall supply of public transport in the Munich region, which might be due to its comparatively dense and high-functioning public transport network, there seems to be an ambivalent attitude toward the frequent use of public transport, as the following quote shows:

> "*…it's annoying when I have to change umpteen times on the whole trip… because then I don't have any chance to sit down in the subway and relax, when I have to change to the next transport mode right away.*" (male, single-parent, 30 – 40 years, translated quote)

Most interviewees would prefer it if less or easier mobility was required to participate in their daily activities. In particular, the number of transfers on public transport required or the overall travel time are considered to be inconvenient. Two interviewees use the car on a regular basis for their daily mobility, three more households own a car, but two interviewees only use it as a passenger. Even though five additional

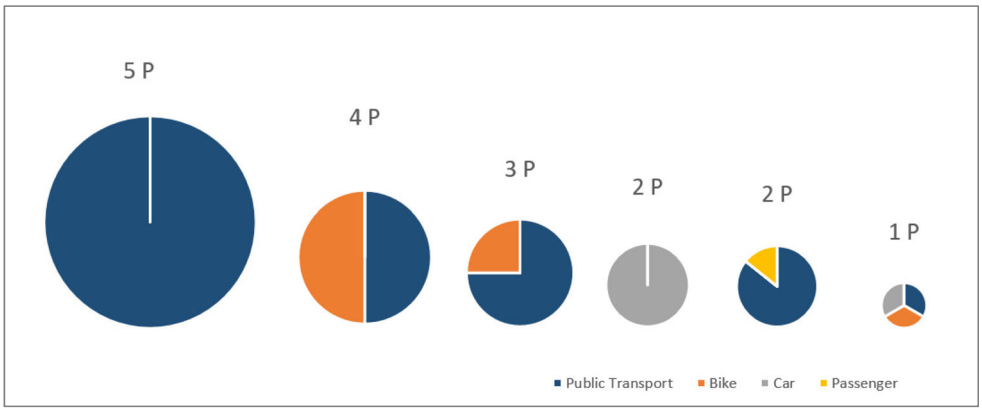


Fig. 4 Regularly used transport modes of the interviewees

interviewees indicate the wish to own a private automobile, they are also aware of the disadvantages, such as congestion or parking issues, and therefore, would not use an automobile for daily mobility. The desire to own a car is therefore not necessarily connected to the need for a car.

Only four interviewees use their bike frequently and five more mainly use public transport, but use their bike now and then in the neighborhood. The rest of the interviewees do not use a bike. Four indicate health issues as a reason, whereas four others state that even though cycling is a valid alternative for short-distance trips, it still does not play any role in their daily routines. An important precondition for bike use is of course the residential location and the location of the required urban amenities and destinations.

Nevertheless, mode choice is, as many studies have shown, a highly individual decision that depends on preferences and prior experiences. As a result, the transport infrastructure is perceived differently by different people living in the same area. Further knowledge may be gained from approaches such as lifestyle research or the analysis of social structures. This, however, cannot obscure the fact that income has a major impact on people's mobility, since preferences can only be acted out when options are available. As we have seen, the interviewees in this study mostly rely on public transport, therefore access to public transport and bearable travel distances are among the most crucial factors to ensure valid mobility options.

5.3 Consequences of limited location choices

As all interviewees moved because of the mentioned push factors, they had very little influence on the specific location of their new residence, few alternatives to choose from, and were therefore not able to optimize their residential location. This confirms the assumption that, as affordability and availability decline, other decision criteria take lower priority.

A residential relocation involves a reorganization of mobility patterns and destinations. The households adjusted their destinations gradually, starting with those of daily necessities, such as food stores; they choose new options closer by. The more time has past since the relocation date, the more destinations have usually been adjusted to the new location. This process is, of course, easier when the new residential location is either close by the old one or, due to other reasons, is already familiar or has been chosen deliberately because of spatial features. Most interviewees indicate facilities for daily necessities as a very important location factor for their residential location. Having a decent supply of these facilities citywide helps people not only to organize their life in new neighborhoods but also to avoid unnecessary trips. One interviewee describes the supply in his neighborhood as follows:

> "*Let's put it this way, there are not a whole lot of shopping facilities close by. I live on X-Street and there is a 'Norma' at A-Street and a bit closer there is a 'Penny.' And then there is a 'Real,' but that's already in B, which means I'd have to go by subway and then take a bus, not exactly around the corner, so that I could say 'I forgot something, I'll just go real quick and do some shopping'…*" (male, single-parent, 30 – 40 years, translated quote)

Another one adds:

> „*Well, there is a 'REWE,' but that's not where I buy my stuff, too expensive, I go by bus three stops until Y-Street…*" (male, single, 30 – 40 years, translated quote)

It clearly is not only about having stores close by, but also about having access to affordable stores, which can in some cases contribute to an increase in effort, as the example above shows. However, not all destinations can easily be relocated: the workplace, family, and friends are immutable destinations. We know that optimizing trips to such destinations is a classical reason for relocation, so households move to a preferred neighborhood, closer to friends or to their workplace in order to reduce commuting times. For the interviewees, however, it is a gamble, if they can reach their preferred destinations easily or not, so that for some interviewees the effort to reach these destinations increased after relocation, becoming more time-consuming, inconvenient, or costly than before. One of

the interviewees, who moved into to suburbs describes his daily commute as follows:

> "*I have the feeling in Munich I had more time and it was more relaxed, […] until I'm at the office it takes one hour and within one week that is just so much time, which is lost…*" (male, single-parent, 30 – 40 years, translated quote)

Accessibility and long commuting distances can have severe impacts on other aspects of life and can make the organization of the everyday life of interviewees more difficult. In the worst case, it can become a vicious circle, such that the affected individual cannot increase the working hours that would be necessary to increase earnings to afford a relocation closer to the workplace. This is described by one of the interviewees in the following quote:

> "*I'm still working in Munich which means I still have the trip to the city every day […] I'm working part time. Right now 20 hours, since there is no other way with travel time and kindergarten opening hours…*" (female, single-parent, 30 – 40 years, translated quote).

As mentioned before, rents are usually higher in inner-city neighborhoods, which leads to some of the interviewees moving towards the fringes of the city and in four cases even into the suburbs. As a consequence at least three of the interviewees mention they feel pushed out of the city:

> „*Well, that is… I have the feeling, that they somehow… that when you earn less, that you are pushed towards the fringes of the city…*" (female, single-parent, 40 – 50 years, translated quote).

This spatial exclusion has impacts not only on their social participation and their feeling of being part of urban community, but also on their actual mobility options. For their daily mobility, this results in longer trips and potentially more complicated public transport connections, which is the opposite to the interviewees' desire for easier mobility. This also impacts the mode choice, since further distances to destinations make the use of the bike less likely. The accessibility of destinations and also the ability to adjust destinations to the new residential location have major impact on the interviewees' satisfaction with their new residential location.

After the residential relocation, households need to reorganize their daily life including their mobility, which is more difficult when households cannot influence their residential location. Some destinations can be adjusted easily, whereas others cannot. This might lead to an increase in mobility efforts and can also affect the interviewees' contentment with their new residence.

6 Conclusions and outlook

The presented results of this study confirm, in many ways, the knowledge concerning residential location and mobility that has been introduced above. The findings support a strong relation between residential location and mobility. The time of relocation is a good opportunity to investigate these interrelations further. Moreover, the results show the great importance of mobility in people's everyday lives and how barriers to mobility can be diverse.

The interviewees did not change their residential location unless it was really necessary, since it is very hard to find a new residence that matches their needs and budget in the contemporary housing market in Munich. This leads to them often having no or very little influence on the location of their new residence, which makes it even harder to reorganize their life and their mobility at the new location. Whereas they are able to change some destinations, such as shopping facilities, there are some immutable destinations, such as those of the workplace, friends, and family. The effort to reach these destinations has increased for many interviewees, which is in clear contradiction to the wish for easier mobility. Low-income households interviewed as part of this study face many challenges after relocation that households with more money may also face. The main difference is that low-income households cannot change their behaviors as flexibly to compensate for the change and, hence, they are even more affected. This highlights the importance of investigating low-income households as a group that is often rather underrepresented and subject of little research.

This study does not provide representative evidence for a common phenomenon, but it does indicate some reasonable interrelations that would be worth further research. The interrelations described should be analyzed over the long-term. We do not know how increased effort spent on transport changes people's mobility or even their life in the long-term perspective. The more time they spend on transport, the less time they have for other activities. With increasing efforts being required, they may not continue to visit such destinations on a regular basis, which can result, at worst, in being less mobile and less socially involved.

Thus, the question of whether competition in the housing market can contribute to forms of transport poverty cannot yet be fully answered. However, we can conclude at this point that competition in the housing market may contribute to an increase in efforts spent on local transport. As has been shown, the housing market has a major impact on the residential location choice and there are also some strong indications that it indirectly has a considerable impact on mobility. This concerns low-income households in particular, a group which often struggles with limited mobility options anyway. The findings of this study illustrate that these influences have been neglected in research too long and that qualitative research methods can be an

enriching extension of classical research methods in transportation research. It is not only in the explorative phases of research that interdisciplinary approaches have a valuable contribution. They also give a chance to place more emphasis on people and their points of view. Hence, there is a need for a deeper understanding of the decision-making processes of households and their influence on spatial developments, which not only provides further arguments for a more integrated approach in land use and transport planning, but also supplies many links for future research and deeper evaluation.

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