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Understanding Mobility in Sparsely Populated Areas: Between Vulnerability and Asserted Choice?

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Abstract. This paper aims to provide an in-depth knowledge of mobility in sparsely populated areas based on a quantitative and statistical approach. First, it analyses mobility practices in sparsely populated areas and compares them with those in urban areas. It then proposes an assessment of car dependency of population living in rural areas. It points out that this dependency results from either a constraint or an asserted choice, depending on existing alternatives of car use. It also analyses the degree of dependency by having a focus on multimodal practices of people living in these areas. It then concludes with the challenge of shifting populations living in sparsely populated areas from constraint mobility to chosen mobility, by offering mobility services adapted to their needs and, above all, by encouraging them to consider new practices that go beyond their routines.

Keywords: Mobility, sparsely populated areas, car dependency.

1 Background and challenges

Mobility in sparsely populated areas is at the heart of public policy concerns. It represents a major societal issue that is part of climate emergency and ecological challenges. France has been particularly involved since the social movement of the “Yellow Vests” at the end of 2018, a social protest linked to the refusal of an increase in fuel taxation [1, 2]. This challenge has been amplified by the current economic and energy crisis. Public stakeholders have acted the specificities of mobility policies of these territories, given both their mobility vulnerability due to a higher car dependency of population [1] and their environmental and energy vulnerability because of the lack of credible mobility alternatives to solo-driving. Considering the challenge of decarbonized mobility policies, there is an urgent need for an ecological transition in these territories [3]. However, this will be difficult because the economic and social cost of this transition is particularly high and mainly borne by households [4].

In France as in other European countries, public policy stakeholders are mobilized to propose more sustainable mobility services adapted to these areas [5, 6, 7]. The scientific community is also working on the evaluation of local initiatives to set up mobility services in sparsely populated areas [1, 8]. To achieve this, stakeholders need to rely on a better understanding of mobility needs and current mobility practices. However, this knowledge remains partial. The key question is then how to characterize the car

dependency of people living in sparsely populated areas? This is the main issue that this paper attempts to answer.

2 Literature review

Even if residents of sparsely populated areas have the same day-to-day activities program (work, shopping, leisure) as those living in densely areas, there are some specificities in their mobility: longer travel distances due to both the dispersion of housing and the distance from services and employment, poor public transport services due to low density, and predominance of car use [3]. There is a consensus to speak about a population that is captive to the car for its daily journeys, about an involuntary or constrained mobility [3] and, more broadly, about a car dependency [3, 8, 9, 10, 11]. The car then appears to be the easiest mode to travel in these territories, and sometimes the only one that exists or is practicable [12]. This feeling is widely expressed by people living in rural areas [2, 3]. As a result, the car ownership rate is among the highest [8, 13], and car use is more akin to solo-driving use [1].

The French scientific literature therefore mainly highlights car practices in rural areas [11]. However, this finding is primarily based on national statistical data from the population census, which tends to limit the assessment to motorization rates and car use for only home-work journeys. This is due to the real difficulty of setting up statistical databases in rural areas, leading research work to rely on qualitative surveys [8, 14]. Although these latter enable researchers to identify major trends, the lack of quantified data and the challenges of these areas encourage research work that will provide a better understanding of mobility needs in rural areas [15].

3 Methodology

3.1 Definition of sparsely populated areas

The term of sparsely populated or rural areas covers a range of geographical realities, from peripheral areas of metropolises or main conurbations, to isolated rural areas or villages [3]. There is no precise definition [7], which means that different methods are used to define them [3, 10, 11, 16, 17]. We have opted for the objective definition of the French statistics institute (INSEE), which characterizes the different degrees of urbanization of the French territory based on the result of European studies [18]. It identifies two classes of sparsely populated territories, the sparsely populated municipalities and the very sparsely ones, which differ from the proportion of half of the population living in communes with a density of less than 300 inhabitants or 25 inhabitants per km². Considering this definition, 90% of all French municipalities are rural ones. They gather 35% of the French population, above the European average rate (24%).

3.2 Specific use of two databases

Our work is based on some analyses of two databases on daily mobility. The first database corresponds to the gathering of different household travel surveys lead in France. These surveys, called “EMC2 surveys” and based on a national methodology, collect weekday journeys made by people the day before the survey. The database brings together 69 surveys carried out in large and medium-sized conurbations between 2011 and 2022. It covers 24% of French sparsely populated communes and correspond to a sample of 211,234 people surveyed. The database totals about 1765,000 gross trips, of which 26% are made by people living in sparsely populated areas. The second database is the national personal mobility survey, called the “EMP survey”, conducted by the French government in 2019. It records both the daily journeys made by people and longer-distance ones. Its sample is composed of 13,825 individuals surveyed, including 4,842 people living in low-density areas. This represents a total of 36,088 gross weekday trips, including 12,687 made in low-density areas. The results of these two databases are not directly comparable, given the size of the sample of sparsely populated communes and the different modalities of some of the data collected. As a consequence, we invite any reader to consider the results as orders of magnitude.

4 Main results

4.1 Differences in mobility practices in sparsely populated areas?

There is a same level of mobility on a weekday. Whether living in a sparsely or densely populated area, an individual makes the same number of average daily trips, more than 3 trips per day. Overall, he almost spends the same time travel budget (between 83 and 87 min). However, trips by residents of sparsely populated areas are longer, averaging 11.8 km per trip versus 7 km in densely populated areas.

However, the rate of immobility is higher in sparsely populated areas. It reaches between 11% and 16%, depending on the day and the survey compared with 10% to 11.1% in very densely populated areas.

Moreover, there is no difference in the hierarchy of transport modes use. We can say that density of areas doesn’t alter the hierarchy. Whatever the type of area, the car remains the primary mode of transport, walking the second and public transport the third. However, it is the intensity of use that differs. The modal share of the car is much higher in sparsely populated areas than in densely ones (see Table 1). This greater car use in rural areas leads to less use of walking and public transport.

Table 1. Main modal shares according to the two databases (EMC2 base/EMP base).

Mode	Dense area	Intermediate-density area	Low-density area
Car	44.9 / 43.2	66.0 / 69.4	71.4 / 77.2
Walking	35.2 / 33.2	24.1 / 21.5	19.2 / 14.2
Public transport	15.2 / 17.5	6.1 / 5.9	5.3 / 4.1
Cycling	2.3 / 3.4	1.6 / 2.2	1.3 / 2.5

Nota: the first number relates to the result of EMC2 base / the second one of the EMP base.

4.2 An asserted or chosen car dependency?

The scientific literature points out a car dependency of people living in rural areas. Does this notion of dependence indirectly conceal the behavior of individuals who systematically take the car without thinking about using other transport modes such as cycling and walking for short trips? This refers to a reflex or non-reflexive use [8], especially in a context where it's easy to travel by car due to the fluidity of traffic (10). Is this dependency chosen or constrained?

We consider here the average trip, which is around 12km in sparsely populated areas. This distance rules out the alternative of walking. Bicycles, especially electric ones, could be a possible alternative, subject to safe development of country roads. We therefore focus on the public transport alternative, in order to measure the type of dependence in relation to an average journey. The literature highlights the fact that low-density areas are less well covered and served by public transport. Only 25% of low-density communes are part of an urban transport perimeter of large or medium-sized agglomerations with some public transport services. Nearly 40% of sparsely populated communes are part of small intermunicipal structures that are still thinking about setting up mobility services adapted to their territory. If we consider regional transport, it is not possible to measure the geographical coverage of rural areas by regional coach services due to the lack of national data. We can just say that these types of service are intended to serve these territories in a fine-tuned way. On the contrary, we can assess their coverage by the rail network on the basis of a radius of 3km around the railway stations. This leads to a proportion of 30% of rural communes and 45% of the population living in rural areas under the influence of a rail service. These results confirm the diversity of sparsely populated areas seen here from the angle of their accessibility to public transport.

4.3 A multimodal resident of sparsely populated areas?

Car dependency is here characterized from another angle, linked to the evaluation of the degree of dependency. In terms of their mobility practices, are people living in rural areas exclusive car users, or, on the contrary, are they multi-modal, using the car for some of their journeys and more virtuous modes for others? The approach of multimodality in travel practices is analyzed from the self-reported frequency of mode use, a question asked in EMC2 surveys. In sparsely populated areas, 89% of people are not exclusively dependent on car use, and use other transport modes (see Table 2). Nearly one in four of them never use the car as a driver. The preferred mode of transport is then walking and car as a passenger, followed by public transport. Finally, less than 1% of multimodal people never use the car, either as a driver or a passenger. In this case, they walk or take public transport to a lesser degree.

Table 2. Proportion of people according to the frequency of modes use by multimodal people

Mode	Regular use	Occasional use	No use
Car passenger	38.0	37.1	24.9
Car driver	76.8	2.9	20.3
Walking	68.1	25.2	6.7
Public Transport	9.0	17.5	73.5
Cycling	12.5	32.4	55.1

Two multimodal patterns stand out among multimodal individuals (see Table 3). Four out of ten people travel by car or on foot and three out of ten people travel by car or on foot or by bicycle. As a result, almost 70% of multimodal people living in rural areas use car and active modes. Public transport ranks third, always associated with car and active modes. There are differences with multimodal people living in densely populated areas. Indeed, the first two multimodal models combine the car with public transport (65% of people). The use of active modes and car represents the third and fourth practices of these people (28%).

Table 3. Being a multimodal people in sparsely and densely populated areas means using...

Modes	% of people living in sparsely populated areas	% of people living in densely populated areas
Car, walking	40.7	18.8
Car, walking and cycling	28.7	9.3
Car, walking, cycling, public transport	11.9	25.0
Car, walking, public transport	11.6	39.8

5 Conclusion

This paper aims to qualify the notion of car dependency among the population living in sparsely populated areas. Despite the limits of data used, it quantifies the phenomenon of car dependency. The aspirations of these populations to have alternatives to the car have been affirmed through the national debate led by the French government in 2019 following the “yellow vest” movements. Some households begin to reconsider their solo-driving use because of their travel budget and/or because of pro-environmental values [11]. This shows that there is local demand for alternative mobility solutions to car use in these areas. In France, local stakeholders are already working to implement mobility solutions adapted to sparsely populated areas (shared mobility, rural mobility as a service, self-service bicycles,), and to revitalize small railroad lines.

But will this lead to a lessening of car dependency in sparsely populated areas? Won't habits and social norms be stronger, leading to the continued predominant use of

solo-driving car? Even if reducing car use could be perceived as a higher difficulty in rural areas [2], the transformation of mobility aims to move from subjugated mobility to chosen mobility. Beyond technology, we need to bring about sociological change. And it is in this direction that work on mobility in sparsely populated areas deserves to be pursued, considering the changes taking place in lifestyles and purchasing practices (widespread telecommuting and residential mobility to sparsely populated areas, development of e-commerce, etc.).

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