Transport poverty:

definitions, indicators, determinants, and mitigation strategies

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Transport poverty: definitions, indicators, determinants, and mitigation strategies

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List of abbreviations

AROP	At risk of poverty
EQLS	European Quality of Life Survey
ETS	Emissions Trading System
EU	European Union
EU-SILC	EU Survey on Income and Living Conditions
GTFS	General Transit Feed Specification
HBS	Household Budget Survey
LIHC	Low Income-High Cost
LFS	Labour Force Survey
MS	Member State
MSD	Materially and socially deprived
NAP	National access point
NeTEx	Network Timetable Exchange
NUTS	Nomenclature des unités territoriales statistiques
OEM	Original equipment manufacturer
SCF	Social Climate Fund
SCP	Social Climate Plan
SMSD	Severely materially and socially deprived
WLTP	Worldwide harmonized Light vehicles Test Procedure

Summary

This final report summarises the outcomes of the study "*Transport poverty: Definitions, indicators, determinants, and mitigation strategies*" commissioned by DG EMPL. Proceeding based on three tasks, the project (i) investigates the concepts and definitions related to transport poverty, (ii) researches and estimates possible indicators for measuring transport poverty and (iii) collects effective mitigation strategies addressing specific manifestations of transport poverty, exploring the interplay of the relevant stakeholders and how these processes are grounded in national policy making. The report also reflects key results from four national case studies carried out for Germany, Poland, Romania and Spain.

The literature review shows that transport poverty is a multi-dimensional phenomenon that is strongly influenced by a range of related concepts such as mobility justice, mobility poverty, transport disadvantage, transport justice, accessibility poverty, and transport-related social exclusion. The three main aspects of transport poverty that are essential to defining the phenomenon are availability, accessibility, and affordability, as well as a cross-cutting dimension of adequacy.

Based on the conceptual framework, the report identifies a comprehensive set of possible indicators that span the availability, accessibility, and affordability dimensions of transport poverty. Different limited EU-level microdata sets are available to depict these dimensions and help measure transport poverty for the EU-27, including the EU Survey on Income and Living Conditions (EU-SILC) and the Household Budget Survey (HBS).

There are important caveats and limitations in the existing EU-level data collection and therefore its quality. The data limitations make it difficult to perform an appropriate assessment of the different dimensions of transport poverty in the EU. Firstly, the survey datasets employed in this study stem from different years, the oldest being from 2014. The only indicators for which data are collected on a yearly basis are related to (non) car ownership and based on the EU-SILC. The HBS that is used for assessing the affordability of public and private transport has an implausibly high number of zeros in important transport expenditure categories for several countries ([1]), hence distorting the overall assessment. Furthermore, comprehensive spatial data is missing to properly investigate the accessibility dimension at the EU level now. Some initiatives are underway to improve this situation. At the same time, the case studies demonstrate that several data gaps that exist at EU level can be filled with national and local data.

This study therefore serves as a basis and a first attempt to foster analysis and debates around measuring and monitoring transport poverty in the EU while recognising that based on the currently available data, much more monitoring is needed to have a full picture of transport poverty. In this context, further methodologies and monitoring frameworks are necessary.

([1]) Eurostat recommends the use of dots to indicate missing data, but the high number of zeros for transport expenditure suggests that some of the reported zeros are in fact missing data that have not been correctly labelled. As Member States are responsible for the compilation and transmission of the data, Eurostat is not able to trace back the original entries and identify implausible data points.

The report shows results for preliminary indicative nine individual transport poverty indicators covering the availability, accessibility, and affordability dimensions.([2]) It analyses potential indicators for all individuals and households, as well as for different target groups, related to the degree of urbanisation and standard social indicators, such as at risk of poverty or social exclusion.

Based on the available data, the report highlights that transport poverty is not necessarily a rural phenomenon. The analysis presented in this report shows that aggregate results for availability and affordability challenges are more pronounced in rural areas, with poorer households in those areas particularly affected. At the same time, there are significant challenges observed in urban peripheral areas, as well as in some denser urban centres. Transport poverty rates in rural areas vs. urban areas within a country depend on both geographical and demographic factors, such as the share of vulnerable populations living in rural areas and the available transport infrastructure and transport policies.

As expected, affordability challenges are a much larger issue for vulnerable populations than for the general population. 21% of households at risk of poverty are confronted with unaffordable transport. This result is as expected since households at risk of poverty have lower incomes and lower overall expenditures and are more likely to spend a larger part of their overall budget on necessary travel.

Based on the currently available data some trends emerge. However, due to limited data availability and the multidimensional character of transport poverty, no unique trend across all dimensions of transport poverty can be identified.

In a final step, the report analyses the policy landscape, focusing on the various instances of transport poverty across several Member States. National contexts are extremely relevant in both identifying which households and individuals are vulnerable and in developing tailored solutions. Moreover, within the national landscapes, local and regional authorities play a crucial role in both the policy design and the implementation and evaluation process. The analysis is based on six thematic policy areas: price type measures, financial, social and legislative measures, infrastructure programmes and national and regional strategies. Each category includes policy examples, addressing aspects related to availability, affordability, accessibility, as well as cross-cutting elements related to adequacy. Equally important, while acknowledging the importance of the EU strategies and legislation on mobility, the scope of the policy chapter is not to present and assess the EU legal framework on transport, but to offer policy examples adopted across Member States that tackle transport poverty.

1. Introduction

Promoting social inclusion and combatting poverty are at the forefront of the European Union's (EU) agenda. This is also enshrined in the European Pillar of Social Rights and

([2]) Those nine indicators are: 1) Materially and socially deprived individuals owning a car, 2) Public transport stop is 'too far away', 3) 'Very difficult' access to public transport, 4) Access to public transport too difficult for persons with reduced mobility, 5) One-way commute to work of more than 30 min, 6) Enforced lack of a car, 7) Public transport is 'too expensive', 8) Household spends more than 6% of total expenditures on transport, 9) Household spends more than twice the national median on transport

its Action Plan, which has put forward the EU target of reducing the number of people at risk of poverty or social exclusion by at least 15 million by 2030.

According to the Eurobarometer of 2022, 32% of the respondents see rising prices and the cost of living as the most important issue at that time. In addition, with the green, digital and demographic transitions underway, support is needed to ensure no-one is left behind.

Supporting people's access to essential services, such as energy and transport, directly contributes to the objectives of promoting social inclusion and combatting poverty, as people at risk of poverty or social exclusion and the most marginalised face the greatest barriers in accessing such services. Furthermore, access to essential services is key to a full participation in society and crucial to access a wider set of other enabling goods and services, such as employment, education, and healthcare. Promoting the availability, accessibility and affordability of public transport, can also limit the use of private transport and therefore positively contribute to the EU goal of reducing transport related emissions and reaching climate neutrality by 2050, as established in the European Climate Law ([3]).

The European Pillar of Social Rights principle 20 relates to access to essential services ([4]). Inadequate or lack of access to affordable transport can exacerbate inequalities, income poverty as well as labour market and social exclusion and could thus hinder social, economic, and territorial upward convergence. It could also compromise the necessary acceleration of the green transition, including its social acceptance. Ensuring wide access to transport is crucial for ensuring social rights and guaranteeing a fair green transition for all.

In the EU policy domain, the issue of transport poverty has been brought up prominently in the Council Recommendation on ensuring a fair transition towards climate neutrality ([5]), adopted on 22 June 2022, and in the Regulation establishing the Social Climate Fund (SCF) ([6]), adopted on 12 May 2023, which introduces the first EU-wide definition for transport poverty in the European Union (EU) ([7]). It is also a key element of the Commission Report on Access to essential services in the EU *([8])*, which highlights the need to regularly collect data on transport poverty and provide adequate funding and policy measures to tackle the issue.

This final report details the outcomes of the DG EMPL project "Transport poverty: Definitions, indicators, determinants, and mitigation strategies". The project pursues three tasks: it (i) investigates the concepts and definitions related to transport poverty, (ii) researches and estimates possible indicators for measuring transport poverty and (iii) collects effective mitigation strategies addressing specific manifestations of transport poverty, exploring the interplay of the relevant stakeholders and how these processes are grounded in national policy making. It also reflects key results from four national case studies carried out for Germany, Poland, Romania and Spain.

(3) Regulation (EU) 2021/1119 of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law')

([4]) The European Pillar of Social Rights, in its principle 20, establishes that "everyone has the right to access essential services of good quality, including water, sanitation, energy, transport, financial services and digital communications. Support for access to such services shall be available for those in need".

([5]) OJ C 243/35 of 27 June 2022 - https://www.consilium.europa.eu/en/press/press-releases/2022/06/16/council-takes action-to-ensure-green-transition-is-fair-and-inclusive.

([6]) Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1060 (OJ L 130, May 2023, p. 1–51).

([7]) Article 2(2) of Regulation (EU) 2023/955 .

([8]) https://ec.europa.eu/social/main.jsp?langId=en&catId=1592&furtherNews=yes&newsId=10595.

The remainder of the report is structured as follows. Section 2 provides an overview of the literature on transport poverty, working definitions for this report, and a comprehensive conceptualisation of transport poverty. Section 3 provides an overview of the different possible indicators that have been used to measure transport poverty in the relevant literature. Extensive information on individual possible indicators accompanies this section in the Annex. Section 4 presents the main insights on the state of play of transport poverty in the EU-27. Section 5 looks at the policy landscape and good-practice measures related to tackling transport poverty and derives seven policy insights. Section 6 offers a conclusion.

2. Conceptualising transport poverty

To develop a working conceptualisation and definition of transport poverty, this study considered the existing relevant literature on the subject. To extract this relevant literature, a system search and review was conducted on Scopus. A Boolean ([9]) search was carried out using the terms 'transport' AND 'poverty' to harvest all the related articles that contain these terms in their titles, keywords, and abstracts. ([10]) The search outputs for this study went beyond the EU geographical focus in order to attain a broad overview of how transport poverty is understood, conceptualised, measured. ([11]) Articles in English were the focus of the search; as of March 2023, the process yielded 1,947 articles from Scopus. Irrelevant articles were omitted from further detailed screenings. ([12]) 271 articles were deemed relevant for further analysis.

2.1. Results from the literature review

From this literature review, it became clear that transport poverty is closely related to a number of other concepts such as 'accessibility poverty' or 'poverty of access' (Farrington and Farrington 2005; Martens and Bastiaanssen 2019), 'transport disadvantage' (Currie et al. 2009), 'transport-related' or 'transport-based social exclusion' (Preston and Rajé 2007; Schwanen et al. 2015), 'social equity,' 'fairness' and 'justice in transport' (Jones and Lucas 2012; Sheller 2015) and 'transport wealth' (Stokes and Lucas 2011). Although these terms have different meanings, there is significant overlap and at times they involve similar approaches and assumptions (Kuttler and Moraglio 2021). In this understanding, other terms that are commonly used in studies related to transport include 'transport affordability' (Litman 2021; Lucas et al. 2016), 'forced car ownership' (Curl et al. 2018) and 'car-related economic stress' (Mattioli and Colleoni 2016).

([9]) Boolean searches allow users to combine words and phrases using the words AND, OR, NOT (known as Boolean operators) to limit, broaden, or define their search.

([10]) The search was limited to the combination of 'transport' and 'poverty' as this already yielded many search results. An initial review of the search results indicated that key contributions in the field had been captured by this search, including results related to adjacent concepts such as mobility justice and transport disadvantage, for example. We determined that the relevant articles and adjacent concepts offered a suitable level of coverage based on long-term, in-depth research experience in the field gathered by the research team. It should also be noted that adjacent concepts were not the focus of this literature search.

([11]) A similar literature review was conducted by Mejía Dorantes and Murauskaite-Bull (2022).

([12]) This refers to articles that were clearly not related to issues of transport and transport poverty based on the title and abstract. They were related to, for example, the fields of biology or geology, or were too broad, focusing on country-wide infrastructure plans including transport and so on.

In the EU, mainstreaming of transport poverty research is still at an initial phase. In France, the 'Observatoire National de la Précarité Energetique' established that households that spend more than 10% of their expenditure to mobility costs is considered to be in energy poverty ([13]). In the UK, where transport poverty is a well-known and accepted issue, 'transport poverty' as a term in its own right emerged from the discourse on transport-related social exclusion (Social Exclusion Unit 2003) and became significant after being employed as a tool to highlight and integrate issues around the affordability of car ownership, the costs of public transport, and the lack of access to it (Sustrans 2012). Research from the UK is therefore advanced and of particular relevance for the EU as well. The term has since been used widely beyond the UK context, both in academic and policy contexts.

Box 1: The concept of transport-related social exclusion in Poland

In Poland, another concept is relevant, namely transport exclusion. This is understood as transport-related social exclusion in the international literature. ([14]) Transport exclusion is more commonly present in areas that are most often rural, have negative natural growth, and are inhabited by an ageing population. ([15]) These are the areas in which, following the dissolution of state-owned regional transport companies and the subsequent liberalisation of the market and privatisation of these companies, the companies withdrew from the least profitable routes. It is in this area that the state does not organise public transport, and the only publicly available forms of transport are either buses that transport children to school (but only elementary schools) or private carrier offerings, which are mainly available from Monday to Friday. A significant area is de facto devoid of public transport, which has led to the phenomenon of people owning a car although they may have to cut back on other expenses to do so.

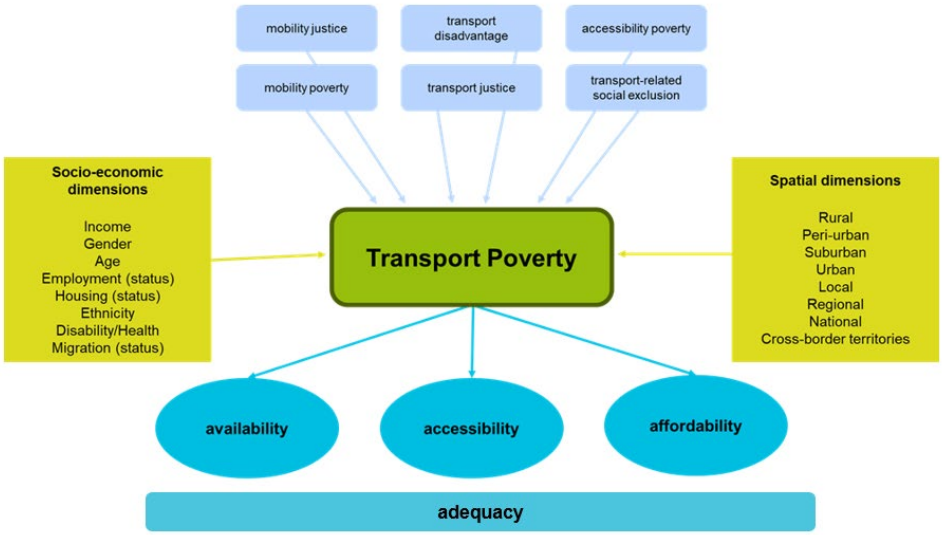
The results of this literature review are summarised in Figure 1, which offers a multi-dimensional conceptualisation of transport poverty.

([13]) https://onpe.org/geolocalisation/mobilite

([14]) https://bip.brpo.gov.pl/pl/content/rpo-wykluczenie-komunikacyjne-zapewnic-transport-publiczny-choc-do-siedziby-gminy

([15]) https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/rolnictwo/obszary-wiejskie-w-polsce-w-2022-roku,2,6.html

Figure 1: Conceptualisation of transport poverty



Source: Oeko-Institut and University of Manchester (UofM)

This conceptualisation brings together several different aspects. Firstly, the report conceptualises similar and adjacent concepts such as transport justice and mobility poverty as a part of transport poverty. The literature on these concepts played an important part in understanding transport poverty. Secondly, the conceptualisation includes several adjacent dimensions. According to the relevant literature, different socio-economic dimensions are thought to influence how individuals are affected by transport poverty. Additionally, the spatial dimension plays an important role in how transport poverty is experienced.

At the heart of the conceptualisation are three central aspects: availability, accessibility, and affordability. In addition, it considers relevant cross-cutting elements related to adequacy, as well socio-economic and spatial dimensions. These are described in detail below.

2.1.1. The three core dimensions

The three "A"s are defined and addressed in a number of different ways in the current academic literature and EU official texts (Lucas et al. 2016; Steer 2022; Mejía Dorantes and Murauskaite-Bull 2022). For the purpose of this report and based on this literature, the three aspects are defined as follows. ([16])

Availability

Availability refers to the presence of transport (options). A household or individual faces availability issues when they **do not have transport (options), public and/or private, available to them**. This may present itself in the form of:

([16]) The order in which these aspects are presented in this report is based on the literature examined and the following logic: availability is considered first because it is the prerequisite of mobility (Rozynek et al. 2022, p. 7); accessibility is considered second, because the access to other essential services that transport provides is a prerequisite for social inclusion, the central concern (Lucas 2012); once availability and accessibility have been established, the cost and affordability of transport services is considered. Depending on the context in which the definition is used and the purpose for which the definition is developed, other (political) priorities may change this logic.

- limited or no public transport options available.
- limited or no private transport options available.

The availability of public transport is linked to the proximity to stations/stops and to the reliability and frequency of the services. This can be referred to as the level of transport provision (Sun and Thakuriah 2021) and means that transport availability is closely related to transport infrastructure. This includes the built environment that makes it possible to use certain transport modes, such as cycling, walking, public transport, or a car.

In research, availability in terms of private transport often refers to car ownership but can also include access to parking or charging infrastructure in the case of EVs, for example.

Proxies for availability can be linked to physical proximity of public transport stops, the frequency of public transport services, but also linked to car ownership and road and charging infrastructure. The adequacy of this access (i.e. to its use by persons with disabilities) is based on different needs across socio-economic groups; it is considered as a separate issue and relates to the adequacy of transport system.

Accessibility

Accessibility refers to the access to essential goods and services (other than transport itself). ([17]) A household or individual is affected by this dimension of transport poverty when the transport provision that is available to them does not allow them to reach essential activities, goods, and services other than transport itself (referred to as "(other) essential goods and services" from here on). This may present itself in the form of:

- inability or extreme difficulty to reach key destinations
- excessive time needed to reach these destinations

The availability of transport (options) alone does not indicate whether these transport options allow access to (other) essential goods and services covering daily needs, such as employment opportunities and related services, childcare, education, or health services. In the European Pillar of Social Rights essential services are defined as "water, sanitation, energy, transport, financial services and digital communications – that are essential to meet basic human needs to live and to participate in society" (European Commission 2023b). Accessibility is essentially about the connectivity of the transport system and the extent to which this fosters social inclusion. A situation of low accessibility can severely restrict an individual's ability to take part in society (Martens and Bastiaanssen 2019).

Being able to reach (other) essential goods and services is therefore a prerequisite for social inclusion. This also includes focusing on the needs of those individuals and households and how these needs may vary greatly. Moving towards an operationalisation of the concept of transport poverty, Pot et al. (2020) designed a framework which suggests that it is important to consider not only the physical

([17]) This deviates from the definition of accessibility in other EU legislation. For example, in the European Accessibility Act defines accessibility in terms of accessibility for people with disabilities and reduced mobility. See: https://ec.europa.eu/social/main.jsp?catId=1202.

characteristics of the transport system but also people's perceptions of its adequacy to meet their accessibility needs. This suggests that both objective and subjective measures that include perceptions of adequacy should be considered.

Finally, even when the transport system offers accessibility to (other) essential goods and services, transport users can still face transport-related "time poverty" if it takes an excessive amount of time to reach these destinations. That means that even with high levels of accessibility, individuals can still "experience reduced participation to social activities, for reasons that are transport-related" (Mattioli 2021, p. 108).

Affordability

Affordability refers to the ability to cover the costs of transport in relation to income. A household or individual is affected by this dimension of transport poverty when they have difficulty in covering, or are unable to cover, the costs of transport in relation to their income. This may present itself in the form of:

- high expenditures (in relation to income); and
- trade-offs within individual/household budgets and associated debts.

When focusing on affordability in defining transport poverty, Gleeson and Randolph (2002, p. 102) posit that transport poverty occurs "when a household is forced to consume more travel costs than it can reasonably afford, especially costs relating to motor car ownership and usage" (see also Awaworyi Churchill 2020; Litman 2021; Lucas et al. 2016). Affordability is essentially about the cost of the transport system.

The issue of affordability is also relevant when it comes to car ownership and usage. Often households in fringe urban and rural areas need to purchase and use cars in order to meet their basic needs due to no or limited public transport options or poor pedestrian accessibility (Mattioli 2017). Consequently, this also results in additional financial stress for a household: due to this 'forced' car ownership, the household has additional car-related expenses that may put strain on other elements of the household budget.

Individuals and households often have to make trade-offs between expenses on travel and other essential expenditures. Transport affordability is therefore not just about costs and income, but "the ability to undertake transport movements (make necessary journeys to work, school, health and other social services, and make visits to other family members or urgent other journeys) without significantly constraining the ability to undertake other activities of importance" (Carruthers et al. 2005, p. 2). However, the definition of 'necessary journeys' is subjective and depends on trade-offs with other necessary household finances, such as housing. The unaffordability of transport cannot, therefore, always be observed solely in actual expenditures. When households have unusually low transport expenditures, this can be related to the concept of "hidden transport poverty," meaning that individuals constrain their mobility beyond their actual needs due to costs (see, for example, Eisfeld and Seebauer 2022 on hidden energy poverty).

The transport affordability dimension is particularly important in the current context of multiple crises and the increase in the cost of living for many households and individuals in the EU. It is also intrinsically linked to the green transition and its price impacts on vulnerable groups, such as the introduction of the Emissions Trading

System for road transport (and buildings) ([18]), which will impact energy and transport expenditure and can pose challenges to low-income and low-middle income groups, and especially to vulnerable groups. ([19])

2.1.2. Cross-cutting issues in transport poverty

Although the three "A"s cover the main dimensions of transport poverty, issues surrounding the usability of the transport system have not yet been explicitly addressed here. This report therefore discusses a cross-cutting dimension – adequacy - that contains important conditional elements that should be considered.

Adequacy

Adequacy refers to the usability of the transport system. A household or individual is affected by this dimension of transport poverty when the transport system is not readily usable for them. This may present itself in the form of:

- a lack of barrier-free travel opportunities.
- low levels of safety and/or security.
- unavailability of information about travel possibilities.

This essentially refers to situations in which transport may be readily available, it can provide high levels of access to (other) essential services and goods, and is affordable, but does not provide a necessary level of usability to the transport user. This is related to whether the transport options that are being used can be done so safely, with the appropriate level of comfort and health (Awaworyi Churchill 2020; Lucas et al. 2018). This relates, for example, to the lack of barrier-free access making it difficult or impossible for persons with disabilities to use the transport system. Indeed, persons with disabilities are often at risk of social exclusion due to lack of access to transport (also in comparison to other members of the same household) (Carew et al. 2019).

It is also related to the safety and security of transport (options), both in terms of road and pedestrian safety, related to the transport mode, as well as transport security, which is related to acts of crime, harassment, and discrimination that may occur while using transport modes. In terms of the suitability of transport options, for older people and women, security in transport is a key requirement for them to be willing to use public transport; negative experiences can lead to the avoidance of using it (Titheridge and Solomon 2007). A lack of adequacy for certain groups can produce discrimination in the transport system based on a variety of socio-cultural aspects, such as race, age, gender, ethnicity, disability, or nationality.

([18]) Proposal for a directive amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757

([19]) To support households which can be negatively affected by the new Emissions Trading System to buildings and road transport, the European Commission put forward the Social Climate Fund Regulation to finance measures, investments and income support to those in energy and transport poverty.

This dimension also includes the consideration of exposure to externalities such as air pollution. This is a relevant dimension that can considerably affect accessibility of people with respiratory conditions, for instance.

Finally, adequacy also relates to how easy it is to access information about travel opportunities. This dictates whether transport users can take advantage of transport options that are available, that provide high levels of accessibility and that are affordable to them.

Spatial and socio-economic dimensions

The three defined dimensions – availability, accessibility, and affordability – are considered to be horizontal issues in this report. That means they are examined across the entire population. Within each of these dimensions, vertical analyses differentiate between population groups. This means that within each dimension, a differential analysis can examine how these aspects are felt by different groups, socio-economic characteristics, or spatial variants. For example, by exploring how affordability of transport varies between men and women.

By taking **socio-economic** characteristics into consideration, the conceptualisation of transport poverty acknowledges that the phenomenon is experienced differently by different groups, who may therefore have different needs, which need to be incorporated in both measurement and policy design and implementation.

Researchers have argued that transport users can be marginalised based on their income, gender, race, class, caste, colour, nationality, age, sexuality, disability, and other characteristics (Awaworyi Churchill 2020; Farber et al. 2018; Kuttler and Moraglio 2021; Steer 2022). These characteristics can change how transport poverty is experienced and deepen transport inequities. For example, in their study of personal transport expenditure of EU households, Koukoufikis and Uihlein (2022) show that the burden this expenditure poses for households is driven by gender, income, household type and employment status.

For this study and the conceptualisation of transport poverty introduced at the EU level consider relevant cross-cutting socio-economic dimensions to be ([20]): **income, gender, age ([21]), employment (status), housing (status), ethnicity, disability/health, and migration (status).**

([20]) These are aligned with the grounds of discrimination referred to in the EU Charter of Fundamental Rights, Article 21.

([21]) This aligns with the European Commission's' "Green Paper on Ageing" (2021b).

Box 2: Insights on the gender dimension from the Spanish case study

Existing data is often not disaggregated by gender dimensions. In the Spanish case study, there was a particular focus on exploring how transport poverty is experienced differently by men and women. By ignoring these gendered dimensions, the predominant focus becomes the experience of men — capturing their behaviours, physical attributes, and biological characteristics. This implicitly designates men as the default individuals, perpetuating a system whereby decisions, spatial designs, and mobility patterns are considered without due focus on the specific needs and experiences of women. By omitting women from datasets, we inadvertently endorse a norm whereby the male perspectives prevail, leaving females to navigate a world that is not tailored to their needs. This underscores the urgent need for a more inclusive approach in researching and measuring mobility across EU. This approach should acknowledge and address the differences between men and women in shaping transport systems and urban environments, by incorporating gender-disaggregated data. It is already clear that gendered dimensions as well as other cross-cutting issues need to be taken into consideration, both when conceptualising transport poverty and in developing possible indicators.

Transport poverty is also a highly **spatial concept**. Where one lives can be just as relevant to experiencing transport poverty as other socio-economic factors. These spatial dimensions are particularly related to the availability and accessibility aspects of transport poverty, but affordability issues may also present itself in a spatialised way.

The clearest example of locational disadvantage in this context is related to the urban-rural divide. Several studies have shown that rural, peri-urban, and suburban areas are more strongly affected by transport poverty particularly due to lower availability and accessibility levels (Chiffi et al. 2021; Ahern et al. 2016; DeJohn et al. 2023). Access to cars is often more crucial for mobility and social participation in rural areas, leading to higher car dependency (van Dülmen et al. 2022). This may also result in higher levels of transport poverty within the affordability dimension as more capital and everyday finances are needed to cover the private car-related costs.

On the other hand, locational disadvantage and car-related economic stress are not purely rural phenomena. Locational transport-related disadvantages, in relation to low levels of availability and accessibility, is often especially dominant in racially or ethnically segregated areas, in which many members of the community do not have jobs, quality education, access to healthy food, playgrounds, and medical care (D'Agostino et al. 2021). Similarly, Eide et al. (2015) find that barriers to accessing health services (via transport) can be higher in urban than in rural areas due to larger socio-economic divides in larger cities that prevent certain groups from accessing health care.

The issue of transport poverty can also be exacerbated when coupled with energy poverty, referred to as “double energy vulnerability” (Simcock et al. 2021; Mejía Dorantes and Murauskaite-Bull 2022). The overlap of energy and transport vulnerability is often the highest in rural areas (Simcock et al. 2021), but also among some of the socio-economic groups mentioned above, further highlighting the role of both spatial and socio-economic dimensions as drivers, exacerbators, and/or causes of transport (and energy) poverty. Often housing and transport costs are interconnected, meaning households with lower income move to suburban areas to reduce their housing costs,

forcing them in many cases to spend more time and money to carry out activities or to become reliant on private transport.

For this study and the conceptualisation of transport poverty on the EU level, relevant cross-cutting spatial dimensions are considered to be: **rural, peri-urban, suburban, urban, local, regional, national and cross-border.**

2.2. Defining transport poverty

Following from this conceptualisation, and based on the academic literature, this report proposes a "working definition" of transport poverty that guides the approach taken in this report to measure the phenomenon ([22]):

An individual or household is in transport poverty when they do not have (suitable) public or private transport (options) available to them and/or when the transport system limits access to (other) essential goods and services and/or when they have difficulty or are unable to meet the costs of transport.

Most recently at the EU level, transport poverty emerged as a key term in the discussions surrounding the implementation of the Emissions Trading System for buildings, road transport and additional industry sectors (ETS 2) and the Social Climate Fund (SCF). The Social Climate Fund Regulation (2023) provides a definition of transport poverty for this specific context for the first time at EU level. Article 2(2) of that Regulation defines that:

"'transport poverty' means individuals' and households' inability or difficulty to meet the costs of private or public transport, or their lack of or limited access to transport needed for their access to essential socioeconomic services and activities, considering the national and spatial context."

This definition encompasses the three dimensions of the phenomenon, following the same approach proposed in this report.

At the same time, the Social Climate Fund Regulation also includes the related concept of '**vulnerable transport users'**, which means "individuals and households in transport poverty, but also individuals and households, including low income and lower middle-income ones, that are significantly affected by the price impacts of the inclusion of greenhouse gas emissions from road transport within the scope of Directive 2003/87/EC and lack the means to purchase zero- and low-emission vehicles or to switch to alternative sustainable modes of transport, including public transport".

The Social Climate Fund Regulation requires Member States to present national Social Climate Plans, ensuring that transport poverty considerations are integrated into those plans. The Commission will support this work through dedicated guidance document to Member States. This emphasis on transport poverty also aligns with the priorities outlined in the new mandate, as stipulated in the mission letter ([23]), making it a

([22]) It should be noted that within the academic literature there are several varying definitions of transport poverty and that in the EU context, a definition has been developed in the context of the Social Climate Fund. The definition elaborated here does not relate to a specific policy context but is a holistic definition of the phenomenon and serves the purpose of this report, especially in relation to estimating indicators of transport poverty.

([23]) https://commission.europa.eu/document/download/de676935-f28c-41c1-bbd2-e54646c82941_en?filename=Mission%20letter%20-%20TZITZIKOSTAS.pdf

significant focus area for future transport policy and action. The announced EU-anti Poverty Strategy ([24]) will also play a crucial role in addressing the access to essential protections and services.

3. Measuring transport poverty

To be able to measure and monitor levels of transport poverty and track progress towards reducing it, an analysis of possible indicators is elaborated in this section.

It is important to highlight that the list of possible indicative indicators provided in this report is based on the currently available, comparable, and more regularly collected data across the 27 Member States of the European Union. However, relevant data is often scarce, making this the first attempt to reflect on such indicators. These indicators represent a first attempt to measure transport poverty in the EU but further work is needed to provide a more comprehensive monitoring approach. Future efforts, if pursued, could build on this foundation, with improved data collection and refining the indicators for more comprehensive monitoring.

Possible indicators found in the literature can broadly be grouped into (i) individual or household indicators and (ii) spatial indicators. Individual or household indicators are based on individual/household survey data. The unit of analysis are individuals or households. Spatial indicators often have an availability and accessibility focus and are based on a range of data sources, such as network and timetable information, information on the location of essential services and census data. These data sets are combined based on the smallest geographical area that they have in common. The unit of analysis is, therefore, a geographical area, for example a postcode, and results are displayed in the form of a map.

The choice of potential indicators depends on the research question at hand and is closely linked to data availability. In some countries, such as the UK, the US, and Canada, detailed spatial information on the access to essential services is publicly available. ([25]) Also for EU countries, ongoing efforts have led to a recent body of work that estimates indicators based on spatial data (Almeida et al. 2024; Kelly et al. 2023; Giordano et al. 2024). Before this, studies conducted in the EU or for individual EU Member States mostly relied on survey data. More information from the literature can be found in Section 8 in the Annex, in which they are categorised along the different dimensions of transport poverty including detailed bibliographical information.

Considering the conceptual framework presented in Section 2, different indicators can be proposed and used for the purposes of measuring and monitoring transport availability, accessibility, and affordability in the EU. In Sections 3 and 4, the report focuses on the three dimensions of availability, accessibility, and affordability. It does not propose indicators for measuring adequacy, as finding suitable data has proven

([24]) https://commission.europa.eu/document/download/27ac73de-6b5c-430d-8504-a76b634d5f2d_en?filename=Mission%20letter%20-%20MINZATU.pdf

([25]) In the UK context, for example, researchers can rely on the UK government's journey time statistics / Model of Connectivity, which make journey times to key services, such as employment, health care, town centres, education, and food stores publicly available by postcode: https://www.gov.uk/government/collections/journey-time-statistics.

difficult at EU level, while insights on how the adequacy dimension could be measured are provided based on the Spanish case study (Section 4.1.3).

During the project, a total of 25 potential indicators were explored. After a series of robustness checks and sensitivity analyses, the nine indicators presented in Sections 3.2 to 3.4 were considered the best options to measure the availability, accessibility, and affordability dimensions of transport poverty in the EU-27 based on the survey data that is currently available. Before delving into these nine possible indicators, the report presents the EU-level datasets that are used to estimate the indicators presented in this report (Section 3.1). In the Annex, the report presents the individual possible indicators that could be used in a transport poverty scoreboard for the EU-27. More details on the estimation strategy, construction choices, data gaps and results by target groups for the nine indicators can be found in the Annex.

3.1. EU-level datasets used in this report

At EU level, different household and individual survey data sets are available and can be used to estimate possible transport poverty indicators for all EU Member States. Spatial data is also available and recent efforts have led to a number of studies investigating the accessibility of a selection of essential services in several Member States (Almeida et al. 2024; Giordano et al. 2024).

As shown in the four case studies, additional data is available at the national and local levels, which allows a more in-depth analysis to be carried out. This includes additional data on certain aspects of transport poverty (Spanish case study), dedicated mobility surveys and spatial data (German case study), data from public transport providers and administrative data (Romanian case study), as well as local data on public transport coverage (Polish case study).

For the EU-level analysis, data from the EU Statistics on Income and Living Conditions (EU-SILC), the Household Budget Survey (HBS), the EU Labour Force Survey (LFS) and the European Quality of Life Survey by Eurofound (EQLS) are used. The project used microdata for all datasets except for the LFS, for which aggregate data published by Eurostat was used. Please refer to the Annex for detailed information on the datasets and survey years used in this report. The datasets operate on different underlying populations. The EU-SILC data present the population aged 16 and over ([26]), the LFS the active working-age (15-74) population in employment and the HBS the household population. It is assumed that the distribution observed within these populations is relevant in estimating transport poverty and that it can be considered representative.

There are data limitations, including regarding the years for which data is available. Frequent monitoring requires timely and regular data collection. Furthermore, several potential indicators presented in this study rely on self-reported variables. These elements must be taken into account when interpreting this report's results.

([26]) The EU-SILC survey contains four datasets (household register D-file, household data H-file, personal register R-file and personal data P-file), all of which are merged into a single file at the personal level before the estimation of the EU-SILC indicators. Individual weights are then applied appropriately so that the results are representative for each Member State and for the whole EU. The personal data covers persons aged 16 and over. The results therefore refer to people aged 16 and over.

Table 1 presents an overview of the datasets used in this study, along with information on their timeliness and reliability. The latter is measured in terms of who runs the survey (e.g., national statistics offices vs. any other entity), established and/or standardised survey methodology (e.g., Eurostat), how well established the survey is (how many years it has run for), and its usefulness for policy monitoring. For example, the Eurostat LFS survey has an established methodology and sample size, is being used for labour market outcomes monitoring (e.g., employment, unemployment and activity rates) and has run for many years with rolling samples. The rolling sampling method allows for a more reliable answer than a one-off interview as the interviewee answers the questions for five quarters in a row, for example.

Table 1 – Data source characteristics

	Timeliness (yearly/ tri-annual update of the indicators)	Reliability/ Survey used for policy monitoring	Self-reported
Yearly EU-SILC	√	√	√
EU-SILC 2013, 2014 ad-hoc modules		√	√
Eurofound EQLS 2016			√
HBS 2015		(√)	
Eurostat LFS 2019 ad-hoc module		√	√

Source: Own elaboration

While survey data, such as that used to estimate the potential indicators presented in this report, is important to monitor needs and vulnerabilities, design policies and decide how to best use funding opportunities, good administrative and spatial data are essential to allocate benefits and funds on the ground in a timely manner and contribute to their effective take-up. Therefore, to adequately assess transport poverty at the EU level, it would be very important to have comprehensive spatial data available with information on the location of essential services, the transport network (both public and private), timetables (ideally dynamic information) and journey times. To date, this information has been collected for certain locations, services and transport options (e.g. Ferrer-Ortiz et al. 2022 for Barcelona), but is not available for the whole EU-27. The UK government's journey time statistics / Model of Connectivity ([27]) can be considered good practice in terms of making accessibility data publicly available, as they include journey times to key services, such as employment, health care, town centres, education, and food stores by postcode.

Transport poverty is a multidimensional issue and must be analysed within different perspectives. In the context of this study, we consider transport poverty within the scope of mobility needs for obtaining access to key social inclusion enablers, such as education and job opportunities, access to essential services, such as health care, and involvement in social activities (Mattioli et al., 2017). It should be also noted that transport use is also influenced by preferences and aspirations of its users. Therefore,

([27]) https://www.gov.uk/government/collections/journey-time-statistics

it is important to consider the diversity of individual experiences when analysing each of the indicators in the subsequent sections.

3.2. EU-level indicators related to the availability dimension of transport poverty

Related to the availability dimension of transport poverty, the report presents the following four potential indicators:

- materially and socially deprived (MSD) individuals who own a car,
- public transport stop 'too far away,'
- 'very difficult' access to public transport; and
- access to public transport too difficult for persons with reduced mobility.

The following sections provide details on each indicator, namely data sources and construction choices, advantages and drawbacks as well as results and trends for the EU-27 Member States.

3.2.1. Materially and socially deprived (MSD) individuals who own a car

Based on a method developed by Mattioli (2017), this report presents an indicator that targets materially and socially deprived (MSD) individuals who own a car (which the author labelled "forced car ownership"). The term 'forced car ownership' first appears in literature in Jones (1987) and Banister (1994) and refers to people on the lowest income levels in the United Kingdom who own a car due to the lack of available alternatives.

While car ownership can create financial strain for some households, it is essential to recognize that owning a car (or nor owning a car) does not automatically equate to transport poverty. For many, a car is an aspirational good, and making this assumption overlooks the complexity of individual circumstances. Rather than suggesting that all materially deprived individuals who own cars are necessarily transport poor, a more nuanced analysis is required. It's important to consider the diversity of experiences and motivations behind car ownership.

Material and social deprivation refers to a situation where a person lacks the material resources and social opportunities to afford goods and services which are considered desirable by most or even necessary to have an adequate standard of living. This indicator is constructed based on the yearly EU-SILC survey question: "Do you own a car?". The answer modalities are: 'Yes', 'No, cannot afford' and 'No, other reason' ([28]) The first modality is used to estimate the indicator.

([28]) The indicators based on the EU-SILC are related to the population aged 16 or more.

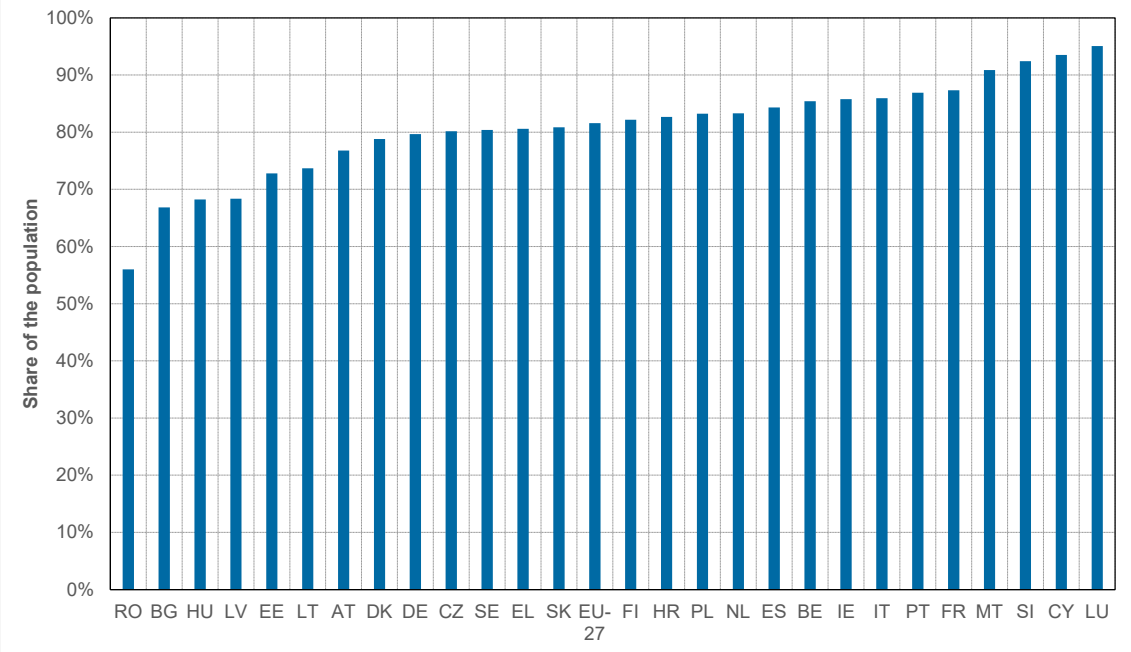
This indicator was originally developed on the basis of a previous material deprivation indicator ([29]), but can be adapted to the newer social and material deprivation indicator. ([30]) In the EU-27, 82% of the population live in a household that owns at least one car (Figure 2). The share varies between 56% and 94%, with Romania having the lowest and Luxembourg the highest share. Most countries show shares between 70% and 90%, underlining the strong presence of private vehicles as a means of transport for daily mobility needs.

The EU-27 average of materially and socially deprived individuals owning a car amounted to 14.5% in 2022 (Figure 3). In general, the share of the population that faces material and social deprivation and owns a car has reduced between 2016 and 2022. The share ranges from 4.6% in Sweden to 37.9% in Greece in 2022. Overall, in 2022, the indicator was above the EU average in Greece, Cyprus, Spain, Portugal, as well as in Bulgaria, France, Romania and Ireland.

([29]) The old material deprivation indicator is available up to 2020. After 2020 some of the items included in it are no longer collected at EU level. Until 2020, material deprivation was defined as the percentage of the population that cannot afford at least three of the following nine items: 1) to pay their rent, 2) mortgage or utility bills; 3) to keep their home adequately warm; 4) to face unexpected expenses; 5) to eat meat or proteins regularly; 6) to go on holiday; 7) a television set; 8) a washing machine; 9) a car. “Severe material deprivation rate” was defined as the enforced inability to pay for at least four of the above-mentioned items.

([30]) The new material and social deprivation indicator provides a measure related to the (in)ability of individuals to be able to afford a set of thirteen predefined material items that are considered by most people to be desirable or even necessary to experience an adequate quality of life. The list of thirteen items includes the following (seven related to the household and six related to the individual). At household level: 1) capacity to face unexpected expenses; 2) capacity to afford paying for one week annual holiday away from home; 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments); 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) ability to keep home adequately warm; 6) have access to a car/van for personal use; 7) replacing worn-out furniture. At an individual level: 1) having an internet connection; 2) replacing worn-out clothes by some new ones; 3) having two pairs of properly fitting shoes (including a pair of all-weather shoes); 4) spending a small amount of money each week on oneself; 5) having regular leisure activities; 6) getting together with friends/family for a drink/meal at least once a month. The material and social deprivation rate is defined as the proportion of the population that is unable to afford five or more of this list of thirteen items. The severe material and social deprivation rate are defined as the proportion of the population that is unable to afford seven or more of the above-mentioned items.

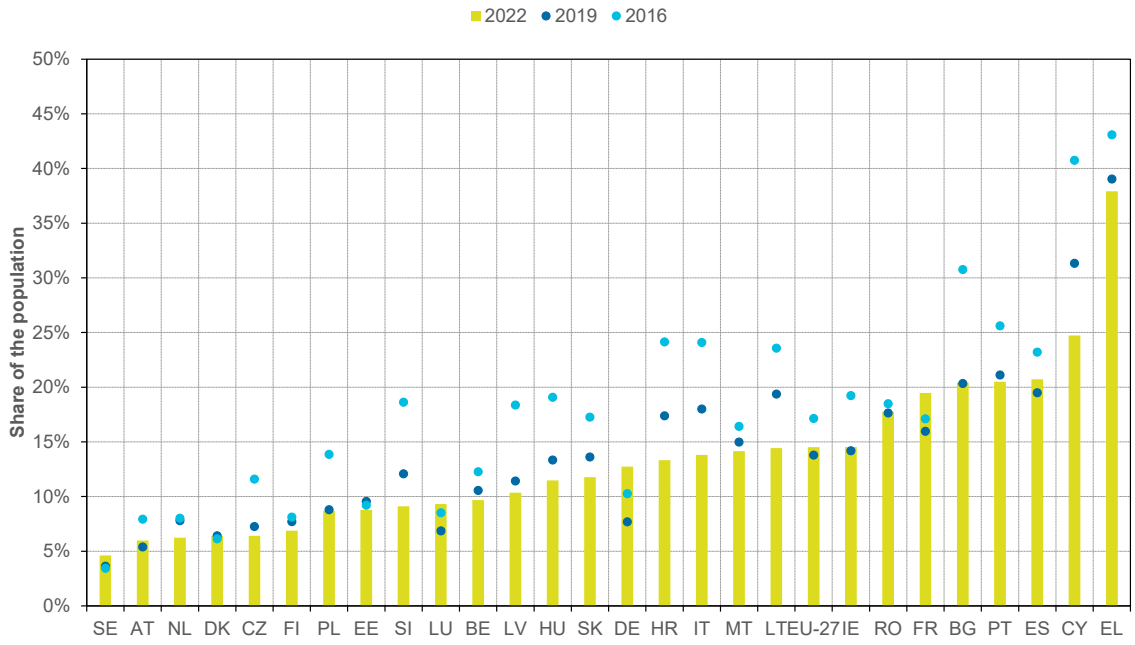
Figure 2: Share of the population living in a household with at least one car



Source: Oeko-Institut own calculations based on 2022 EU-SILC microdata

Notes: The EU average is weighted. Calculation based on personal data matched with household information, which includes persons aged 16 and older. Results represent the share within population aged 16 and over.

Figure 3: Share of the population that is materially and socially deprived and owns a car



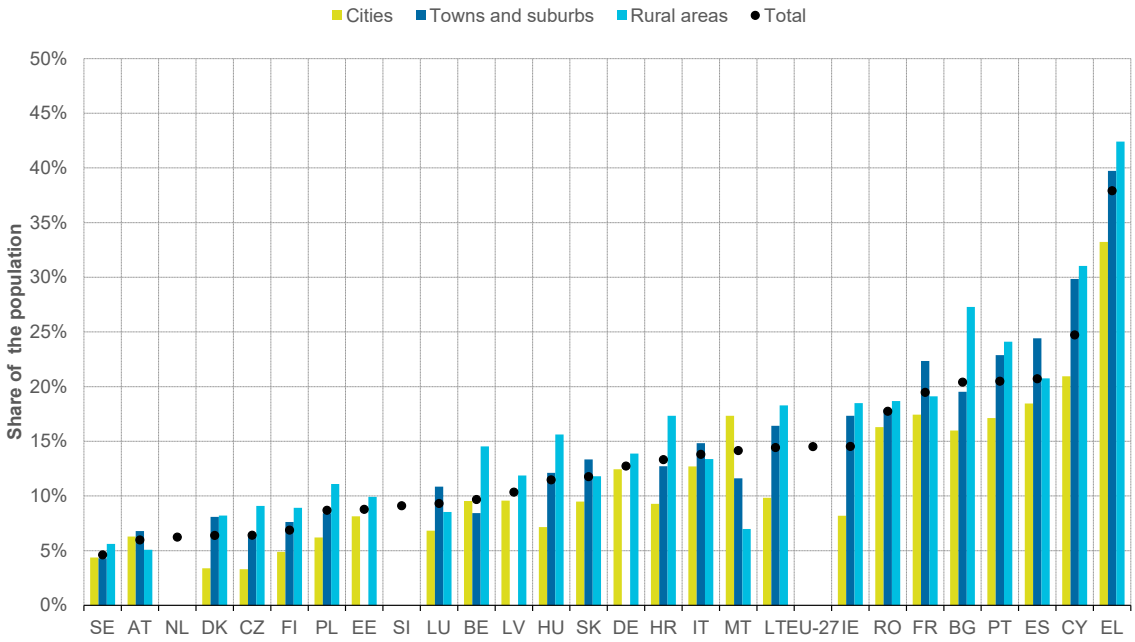
Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata

Notes: EU average is weighted. The chart shows share of people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) and are materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator). See footnote 30 for the exact definition of this deprivation. The calculations are

based on personal data matched with household information, which includes persons aged 16 and older. Results constitute the share within the population aged 16 and over.

According to this report's interpretation for a possible indicator for the availability of transport, countries that have a high share of individuals who are materially and socially deprived and own a car, are often those where transport options are limited, i.e., countries or regions with a less dense public transport network or active mobility options. This is reinforced by the fact that the indicator is generally higher in rural areas, which are often less served by public transport options. As Figure 4 shows, the share of people who are materially and socially deprived and own a car is higher among those living in rural areas in all Member States, except Malta.

Figure 4: Share of the population that is materially and socially deprived and owns a car by degree of urbanisation, 2022



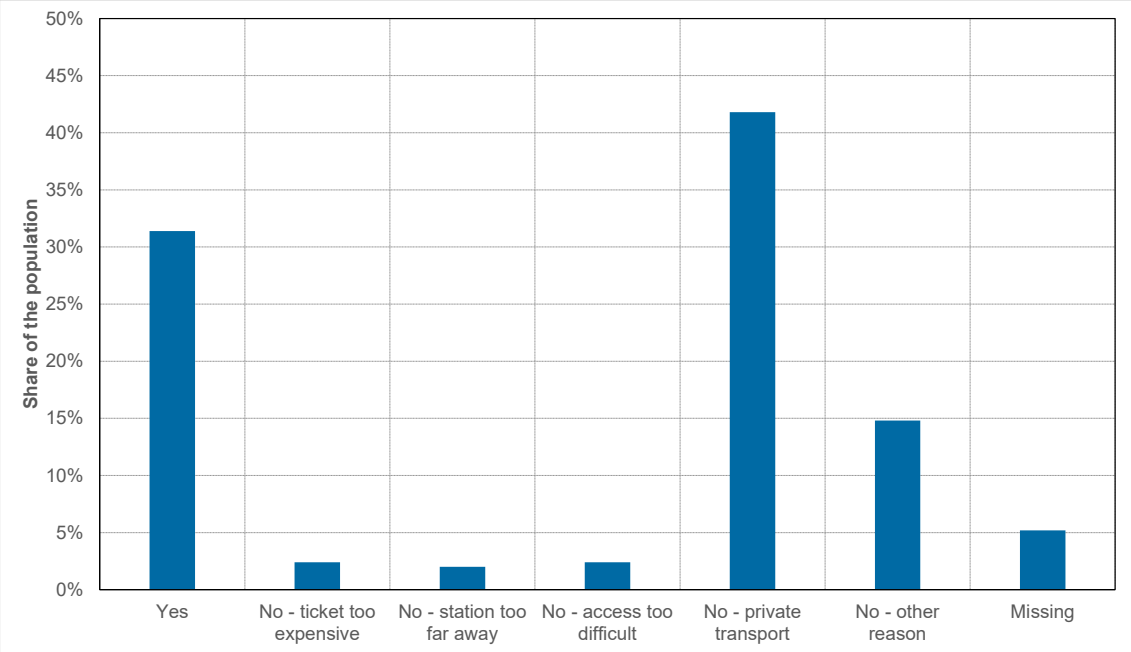
Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

Notes: EU average is not available by degree of urbanisation. The chart shows the share of people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) and are materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator according to footnote 30 by degree of urbanisation. To be noted that the variable "degree of urbanisation" is missing for NL and SI. For DE, EE, LV the category 'towns and suburbs' is missing for DEG in 2022. Calculation based on personal data matched with household information, which includes persons aged 16 and older. Results represent share within population aged 16 and over.

3.2.2. Public transport stop is 'too far away'

This potential indicator is based on the question in the 2014 (2013) EU-SILC ad-hoc module 'Material deprivation': "Do you regularly use public transport?" (PD090). The answer modalities are: Yes, No – ticket too expensive, No – station too far away, No – access too difficult, No – private transport, No – other reason. Figure 5 shows the share of responses (weighted) given to the 2014 question. It is important to note that each interviewee could only choose one answer and that, therefore, a large proportion of the people for whom the stop is too far away, or the ticket may be too expensive, may simply have answered 'No – private transport'.

Figure 5: Share of the population that uses / does not use public transport regularly (Question: 'Do you regularly use public transport?') (EU-SILC 2014)

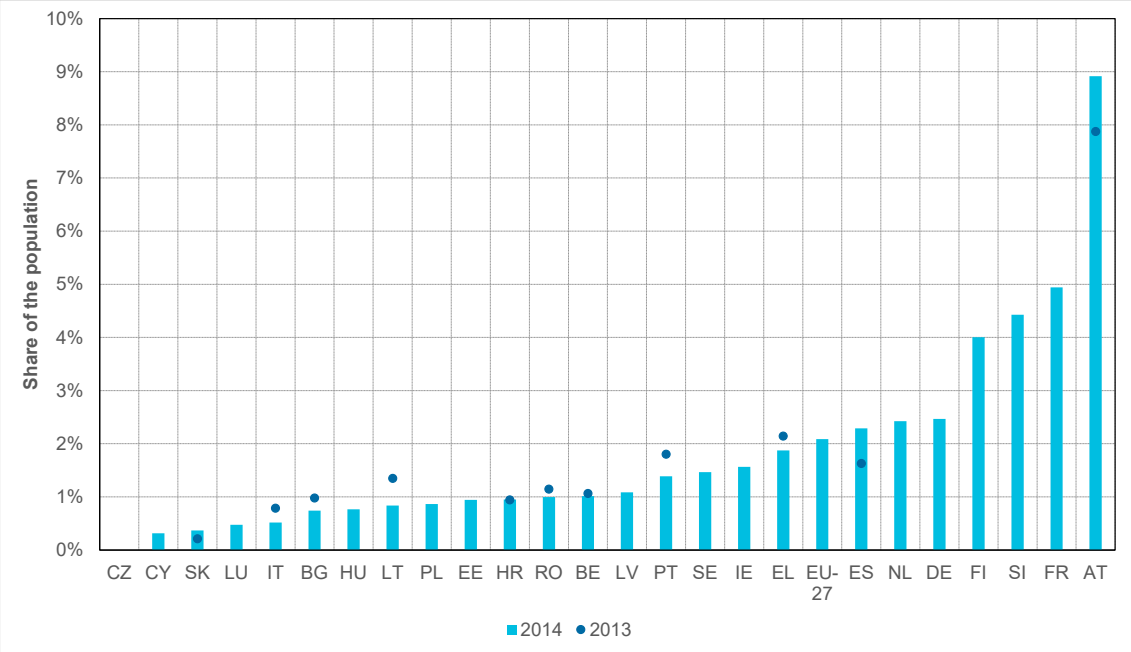


Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the EU population answering "Yes", "No – ticket too expensive", "No – station too far away", "No – access too difficult", "No – private transport", "No – other reason".to the question "Do you regularly use public transport?" [PD090]. The calculations are based on personal data from EU-SILC, which includes persons aged 16 and over. The results reflect the share within the population aged 16 or over.

In order to build this potential indicator around the answer modality 'No - station too far away' this report assumes that this answer indicates the unavailability of public transport is the most important reason for individuals for not using public transport. This question is repeated in a slightly different format in the EU-SILC 2024 rolling module on 'Access to services' (see Section 5 in the Annex for more information). The share of the population who indicate the stop being too far away as the main reason for not regularly using public transport is rather small (Figure 6). The share is high in Austria, France, Slovenia and Finland.

Figure 6: Share of the population for which the nearest public transport stop is 'too far away'

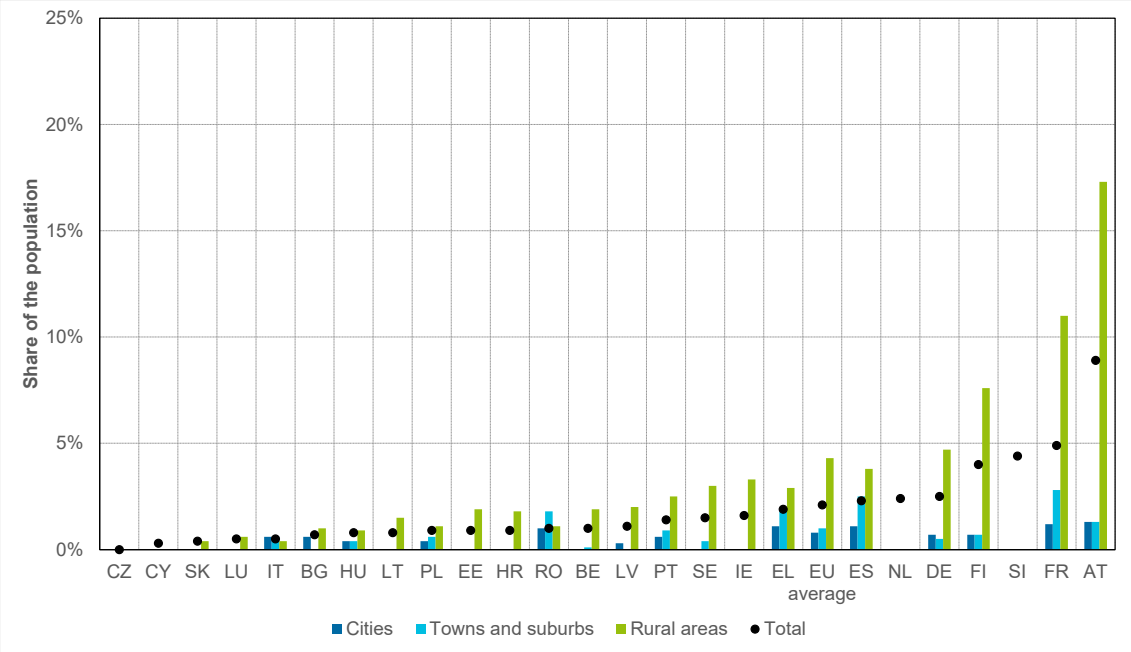


Source: Own calculations based on the EU-SILC 2013 microdata ad-hoc module 'Wellbeing' and the EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, station too far away" to the question "Do you regularly use public transport?" [PD090]. The EU-27 average is weighted. The variable PD090 is missing for CY, CZ, DE, DK, EE, FI, FR, HU, IE, LU, LV, MT, NL, PL, SE, SI in the EU-SILC 2013 data. According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): MT in the EU-SILC 2014 data. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SK in the EU-SILC 2013 data. CY, LU, SK in the EU-SILC 2014 data. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). The calculations are based on personal data from EU-SILC, which includes persons aged 16 or over. The results reflect the share within the population aged 16 or over.

Reinforcing this point, Figure 7 shows that the result for Austria, France and Finland could be driven by the unavailability of public transport in rural areas. At least for Austria, the 'public transport atlas' shows that the number of public transport trips is a lot smaller in rural compared to urban areas (Agora Vekehrswende 2022). Therefore, how countries score on this indicator may be related to the public transport network per se, to the network in rural areas, and to the share of the overall population living in rural areas and the geographical characteristics of those areas. For policy making, it is important to consider where exactly in the country these issues exist.

Figure 7: Share of the population for which the nearest public transport stop is 'too far away' by degree of urbanisation, 2014



Source: Own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

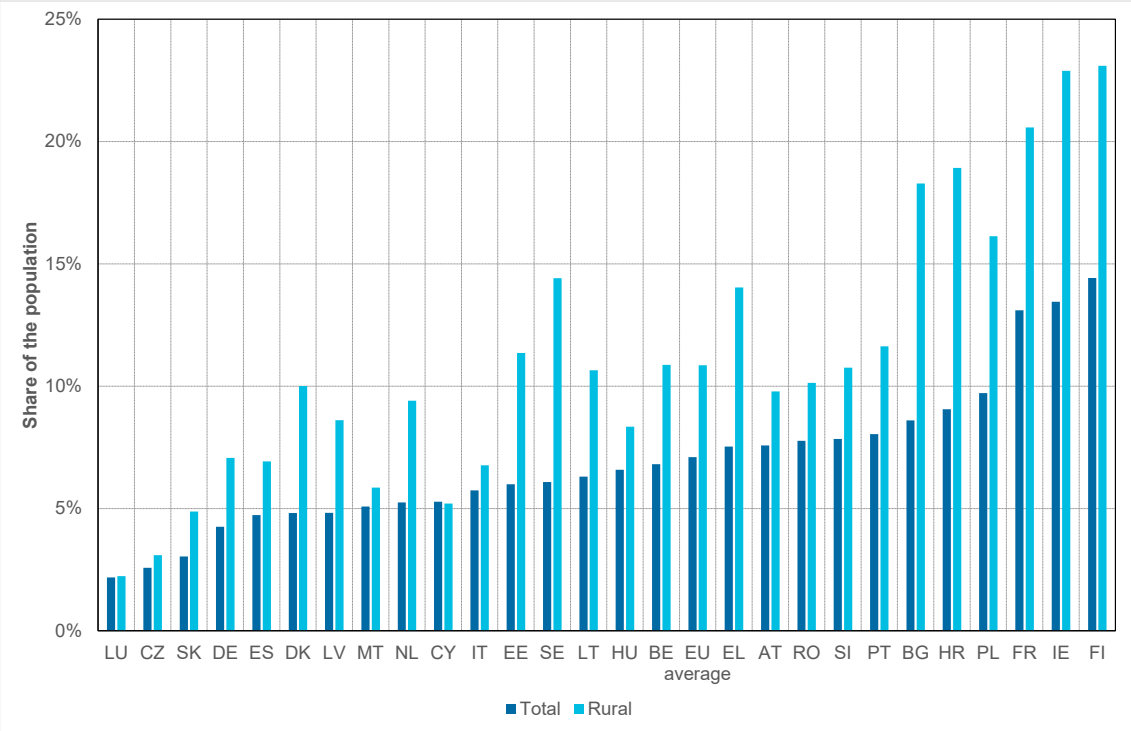
Notes: The chart shows the share of the population responding "No, station too far away" to the question "Do you regularly use public transport?" [PD090] by degree of urbanisation [DB100]. Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. For NL and SI there is no information on the degree of urbanisation available. LV and EE have no observations in the category 'towns and suburbs', because the observations in the category "towns and suburbs" were merged to "cities" for anonymisation. MT has no observations in the category "rural areas", because the observations in the category "rural areas" 'ere merged to "towns and suburbs" for anonymisation. Therefore, NL and SI have not been included in the calculation for the EU-Average and LV, EE and MT were included accordingly to the categories available. The EU-Average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): MT for the shares in all degrees of urbanisation and in the total population. CY, SK, LU, LT, EE, HR, BE, SE for the shares in the category "Cities". CY, SK, LU, BG, LT, HR, IE for the shares in the category "Towns and suburbs". CY for the shares in the category "Rural areas". According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): BG, HU, PL, RO, LV, PT, FI, AT for the shares in the category "Cities". RO, SE for the shares in the category "Towns and suburbs". SK, LU, BE for the shares in the category "Rural areas". CY, SK, LU, IT for the shares in total population. The calculations are based on personal data matched with household information, which includes persons aged 16 or older. The results reflect the share within the population aged 16 or over.

3.2.3. 'Very difficult' access to public transport

Using data from the EQLS 2016 by Eurofound, this indicator is based on the responses of 'very difficult' to the survey question "Rate the accessibility of public transport". This indicator could be considered as a possible supporting indicator to the EU-SILC indicator presented in 3.2.2., as the survey has a relatively small sample size (around 1,000 respondents per Member State).

Figure 8 shows the share of the population (total and rural) by Member State which considers access to public transport to be 'very difficult'. Similarly, to Figure 7, both Finland and France also score highly in this potential supporting indicator. However, Bulgaria and Croatia have much higher values in this indicator compared to the one presented in the previous section. In most Member States, individuals living in rural areas are disproportionately more affected by very difficult access to public transport according to the EQLS. The largest differences are seen in Bulgaria, Croatia, Finland and Ireland, for which the indicator is around 10 percentage points higher in rural areas compared to the overall population. In smaller Member States, such as Cyprus, Luxembourg or Malta, the difference between overall and rural populations is less pronounced.

Figure 8: Share of the population with 'very difficult' access to public transport for the total and rural population, 2016



Source: Own calculations based on Eurofound 2016 European Quality of Life Survey microdata.

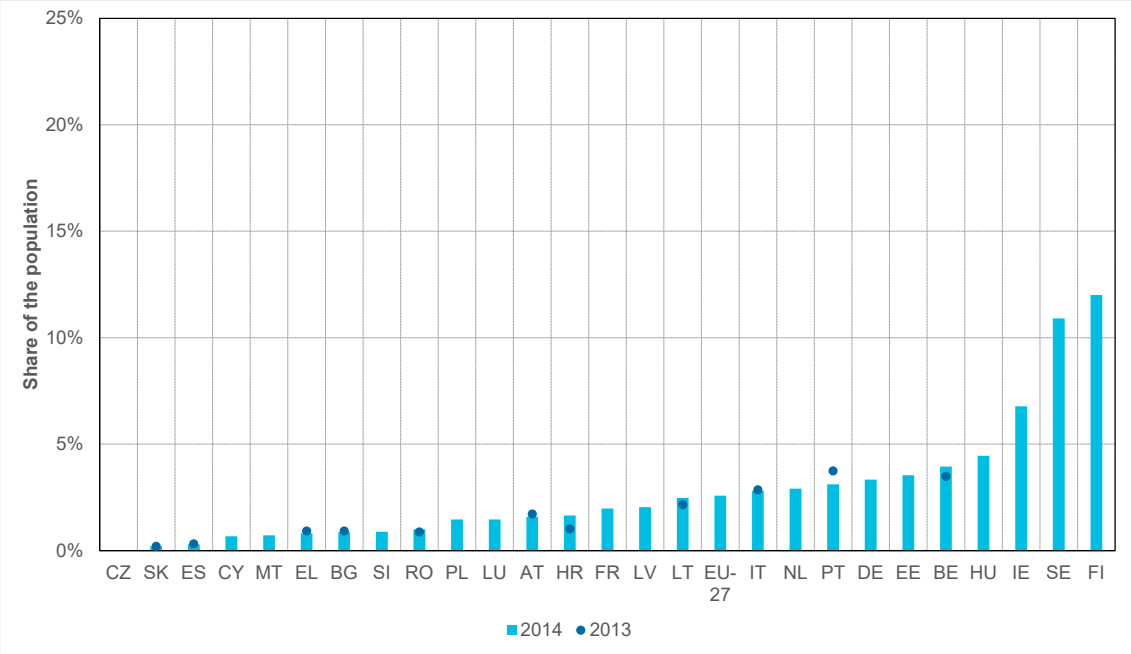
Notes: The chart shows the share of the population responding to the question "Q56 (Q51) Thinking of physical access, distance, opening hours and the like, how easy or difficult is your access to the following services? – b. Public transport facilities (bus, metro, tram, train etc.)" [Y16_Q56b] with "Very difficult" among different population groups: Total (overall) population; Rural population [urb_subjective]. MS are ordered by the shares in the total population (smallest to largest). Individuals who responded to the question [Y16_Q56b] with the following answers were excluded from the calculation: Refusal; Not applicable (service not used); Don't know. The following answers were included: Very easy; Rather easy; Rather difficult; Very difficult. The EU-27 values are calculated across the entire sample of the 27 Member States.

The difference in results between the potential indicators presented in Sections 3.2.2 and 3.2.3 is related to the fact that the EQLS question is very different from the EU-SILC one. Respondents have to rate the access to public transport on a scale, whereas for the EU-SILC question they have to choose one answer category from several possible ones to explain why they do not use public transport.

3.2.4. Access to public transport is too difficult for persons with reduced mobility

In this report, this potential indicator is considered as highlighting an availability issue for a target group (persons with disabilities), although it is also related to the adequacy dimension of transport poverty. It is based on the EU-SILC ad-hoc module 'Material deprivation' 2014 (cf. Section 3.2.2) and captures respondents who answered 'No – access too difficult' to the question of whether they regularly use public transport (PD090).

Figure 9: Share of the population with too difficult access to public transport for persons with reduced mobility



Source: Own calculations based on the EU-SILC 2013 microdata ad-hoc module 'Wellbeing' and the EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, access too difficult" to the question "Do you regularly use public transport?" [PD090]. The description of the variable defines the answer "No – access too difficult" as "Difficulties in getting to the station, especially for disabled people". The EU-27 average is weighted. The variable PD090 is missing for CY, CZ, DE, DK, EE, FI, FR, HU, IE, LU, LV, MT, NL, PL, SE, SI in the EU-SILC 2013 data. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SK in the EU-SILC 2013 data. SK in the EU-SILC 2014 data. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). Calculation based on personal data from EU-SILC, which includes persons aged 16 or over. The results reflect the share of the population aged 16 or over.

Figure 9 shows the share of the population for whom difficult access to public transport is the main reason for not using it. The guidance of the EU-SILC questionnaire refers

specifically to persons with disabilities in this regard. Shares are particularly high in Finland, Sweden and Ireland. Shares are particularly low in Czechia, Slovakia and Spain. This indicator can indicate which countries have taken effective measures to make public transport more accessible to everyone. At the same time, further data is needed to better understand the self-reported data in certain Member States, such as Finland and Sweden, countries that generally rank highly in terms of transport infrastructure and accessibility. This could raise questions about whether the data is reflecting a lack of accessible transport or whether other factors, such as harsh winter conditions, are being conflated with structural accessibility problems. Additionally, the low shares reported in countries like Czechia, Slovakia, and Spain might not necessarily indicate superior accessibility measures. Preferences and attitudes towards public transport usage, or discrepancies in reporting practices may influence the data, suggesting that direct comparisons between countries should be approached with caution.

In conclusion, while this indicator sheds light on some aspects of public transport accessibility, the limitations present in a survey data collection requires further analysis. Future surveys should allow for multiple responses to capture the multifaceted reasons behind public transport use and accessibility issues. Moreover, more granular data—particularly seasonal and regional—would help clarify whether reported accessibility challenges are structural or temporary.

Again, the same caveat applies to all potential indicators based on the 2014 EU-SILC question “Do you regularly use public transport?”. Respondents can only pick one answer and may answer that they do not use public transport, because they have private transport options available (Figure 5). For all these people, one does not know whether public transport is available to them or not.

3.3. EU-level indicator related to the accessibility dimension of transport poverty: One-way commute to work of more than 30 minutes

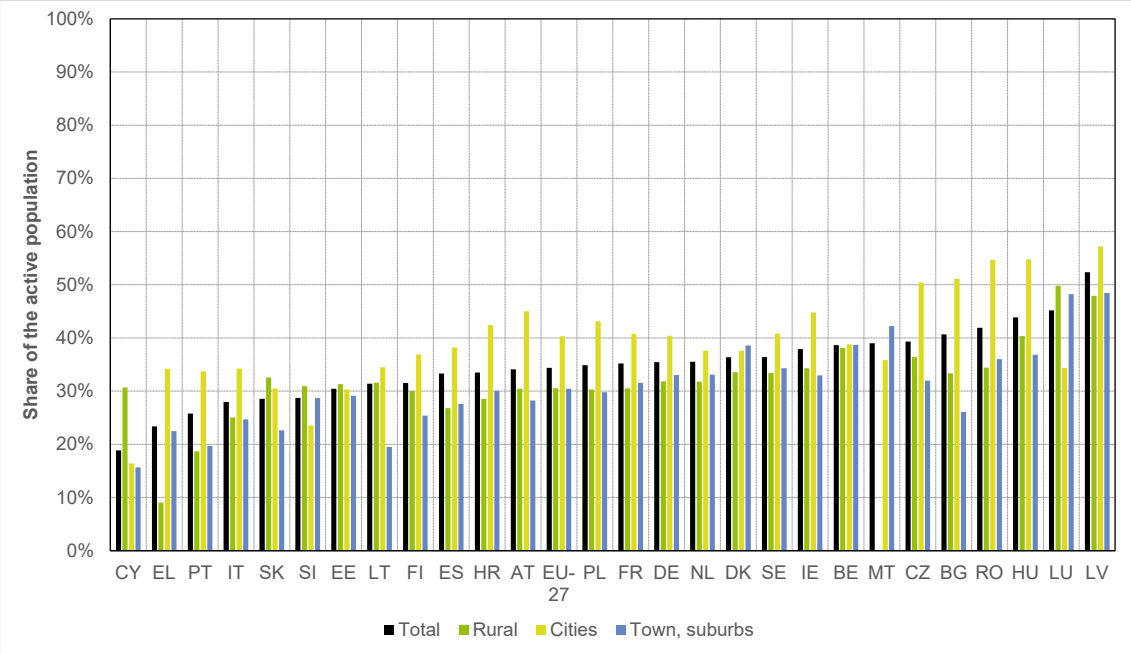
Regarding the accessibility dimension, this study proposed a possible indicator based on the LFS 2019 ad-hoc module on work organisation and working time arrangements. It indicator estimates the share of individuals who commute for more than 30 minutes to their workplace (one way). The selection of the threshold of 30 minutes was informed by the estimated average commute time within the LFS ad-hoc module (25 minutes) across the EU population and the disaggregation available in the published data. There is an important discussion about sufficient levels of accessibility in the literature. Ryan and Martens (2023) demonstrate how to define sufficient levels of accessibility, and why adoption of specific accessibility standards is difficult.

While extended commute times, caused by multiple factors, including congestion, can suggest accessibility issues for some, it could also indicate greater labour mobility, reflecting dynamic labour markets and positively contributing regional development.

Figure 10 shows the share of the active working-age (15-74) population in employment that spends more or less than 30 minutes to commute to work (one-way). In the EU-27, 34% of the active population spend more than 30 minutes commuting to work, but the variation across Member States is large, ranging from 19% in Cyprus to 52% in Latvia. The high share of people with a long commute in Luxembourg is likely due to a high

incidence of cross-border commuting. When the shares of people with a long commute in rural areas are compared to the overall population, only five Member States have a higher share in rural areas (Cyprus, Estonia, Luxembourg, Slovenia, Slovakia), while in other Member States, people living in rural areas tend to be less affected by long commute times. This may be due to a higher use of private transport and lower levels of congestion of the transport infrastructure. In fact, the share of people with long commute times is often the highest within cities.

Figure 10: Share of the active population spending more than 30 minutes commuting to work (one-way) by degree of urbanisation, 2019



Source: Own calculations based on Eurostat [lfso_19plwk28] 'Persons in employment by commuting time, educational attainment level and degree of urbanisation'.

Notes: The chart shows the share of the active working-age (15-74) population in employment who spend more than 30 minutes commuting to work (on-way). MS are ordered by the shares in the total population (smallest to largest). The data is obtained from the statistics published by Eurostat based on the European Union Labour Force Survey (EU-LFS) 2019 module on work organisation and working time arrangements. For the calculation of the shares, the number of people with a commute time of '30 minutes or over' was divided by the sum of people with the following commute times: 'Zero minutes'; 'From 1 to 14 minutes'; From 15 to 29 minutes'; '30 minutes or over'. For MT, the values for 'Rural' was missing (flagged as 'confidential'). For HR and LU, the values for 'Zero minutes' in 'Cities' were flagged as 'unreliable', as was the value for HR for 'Zero minutes' in 'Towns and suburbs'.

Based on EU-wide available survey data, one can only consider the commute to work as a proxy for accessibility. While commute to work is considered as one of the most important services related to accessibility (Allen and Farber 2019; Lunke 2022; Pritchard et al. 2022), a more thorough assessment of accessibility must also take into account other essential, such as education, health care or shopping for daily needs. Using spatial indicators, Almeida et al. (2024) estimate the driving and walking time to early childhood education and public employment services for several EU Member States. The Commission's Urban Data Platform Plus ([31]) shows the average road

([31]) https://urban.jrc.ec.europa.eu/map-view?lng=en&ctx=udp&ts=EU&pil=indicator-level&is=Default&tl=7&cl=default&i=300&clc=infrastructure-20-26-20accessibility&db=1011&it=metadata&cwt=line-chart&date=2018

distance per person to the nearest primary and secondary school, to the nearest cinema and train station.

3.4. EU-level indicators related to the affordability dimension of transport poverty

Related to the affordability dimension of transport poverty the report presents the following four possible indicators:

- Enforced lack of a car
- Public transport is 'too expensive'
- Expenditure on transport exceeds 6% of total expenditures of a household
- Share of total expenditures spent on transport by a household exceeds twice the national median (2M)

In the following sections each indicator is presented, detailing data sources and construction choices, advantages and drawbacks, as well as results and trends for the EU-27 Member States.

3.4.1. Enforced lack of a car

This indicator is based on the yearly EU-SILC and the response 'No – cannot afford' to the question of whether individuals own a car (cf. Section 3.2.1). This indicator can – to some extent – be considered the reverse of the indicator presented in Section 3.2.1 and is also related to the research of Mattioli (2017). The indicator is defined as the share of people who do not have a car because they cannot afford it, hence implying that the car is something that the respondents would like to have. In the EU, the share of the population that cannot afford a car was equal to 6% in 2022 (Figure 11). The share ranges from 1.3% in Luxembourg to 19.3% in Romania. Generally, the share of the population facing enforced lack of a car has reduced between 2016 and 2019 and further between 2019 and 2022. For Austria, 2016 and 2019 values are much lower than the 2022 value. The 2023 value is again much lower in Austria at 4.9%. ([32])

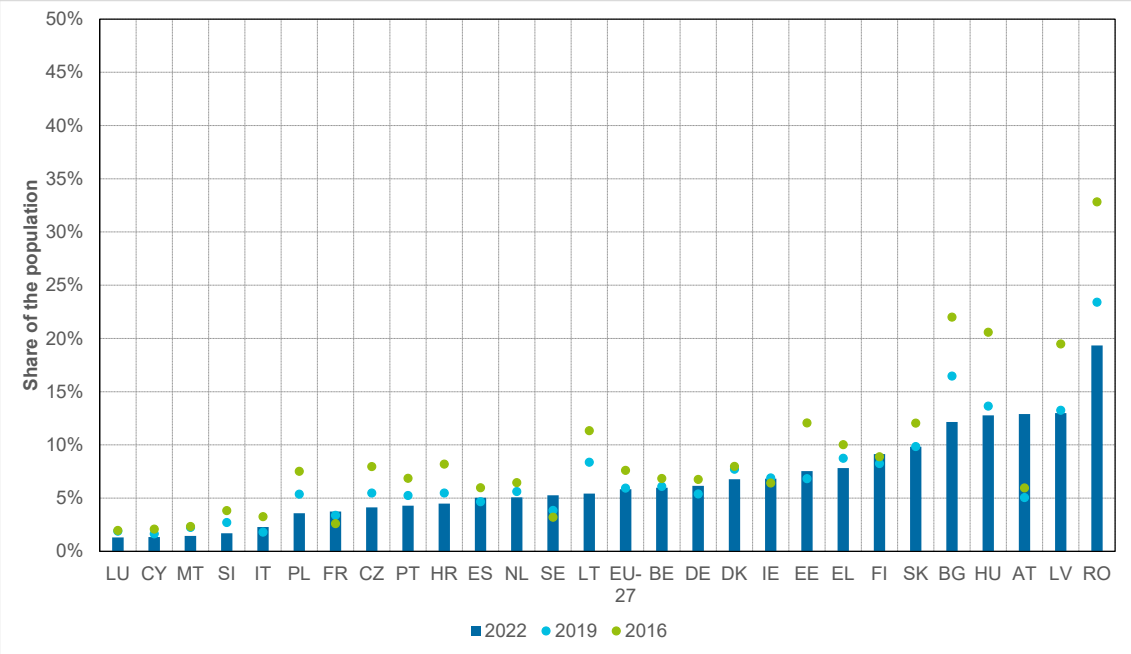
Figure 12 shows this possible indicator by degree of urbanisation, which shows that the enforced lack of a car is more prevalent in cities than in rural areas in most countries. Exceptions are Romania, Hungary and Bulgaria, where the issue is more pronounced in rural areas. The higher prevalence of enforced lack of a car in urban areas raises questions about differing perceptions of affordability, pointing to the need to measure and monitor transport poverty from a multidimensional perspective, as well as possible caveats in relying exclusively on survey data.

In urban environments, where public transport and alternative mobility options are often more readily available, car ownership may not be deemed as necessary. Additionally, the framing of enforced lack of a car as inherently negative overlooks important

([32]) https://ec.europa.eu/eurostat/databrowser/bookmark/98085885-e79b-4b14-afa1-22ecf81a915f?lang=en

contextual factors, such as the environmental and economic benefits of reduced car dependency, especially in cities where sustainable transport policies may actively discourage car ownership.

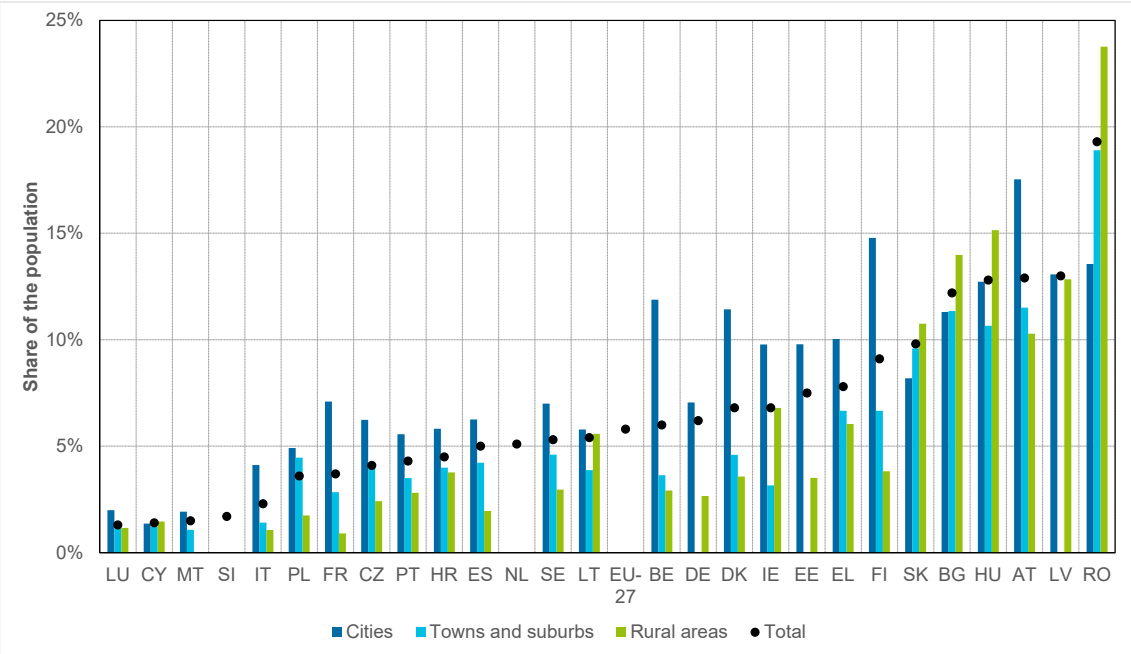
Figure 11: Share of the population that faces enforced lack of a car



Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

Notes: EU average is weighted. The chart shows people who cannot afford a car (answered 'no, cannot afford to the question of whether they have a car [variable HS110]). Calculation based on personal data matched with household information, which includes persons aged 16 and older. Results represent share within population aged 16 and over.

Figure 12: Share of the population that faces enforced lack of a car by degree of urbanisation, 2022



Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

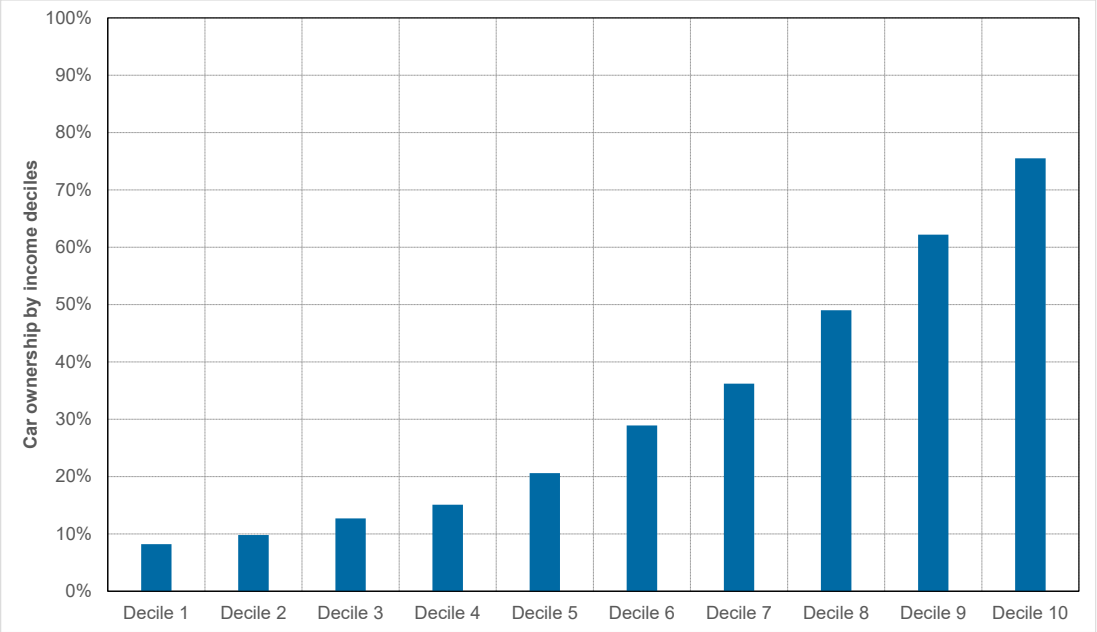
Notes: EU average is not available by degree of urbanisation. The chart shows people who cannot afford a car (answered 'no, cannot afford to the question of whether they have a car [variable HS110]) by degree of urbanisation. To be noted that the variable "degree of urbanisation" is missing for NL and SI. In MT, too few observations in the 'rural' category. For DE, EE, LV the category 'towns and suburbs' is missing for DEG in 2022. Calculation based on personal data matched with household information, which includes persons aged 16 and older. Results represent share within population aged 16 and over.

The fact that the results on urban vs. rural is the inverse as for the indicator on materially and socially deprived individuals owning a car shows that both indicators are also related to the availability of alternative transport options. In cities, where there is a higher likelihood of good public transport networks, individuals may not own a car and are therefore more likely to reply that they cannot afford one, as there are likely other affordable options available to them. In rural areas, on the other hand, even individuals that cannot really afford a car may own one as there is no alternative (see Figure 4).

Countries from the central eastern Europe region had already scored relatively high in the indicator on materially and socially deprived individuals owning a car and are also scoring particularly high in the enforced lack of car indicator. This may indicate that availability issues, particularly in rural areas, are reinforced by affordability issues in those countries. This in turn may be driven by higher levels of poverty and deprivation in those countries.

Box 3: Car ownership in Romania and Poland – insights from the national case studies

According to Romanian HBS data (2022), only 31.8% of households own at least a car. The percentages are slightly increasing, as in 2020 only 30.3% of the households declared having at least one car. This slight growth of the car ownership percentage correlates with wage increases at the national level. The rate of car ownership is low for the low-income households (less than 10% for the households situated in the first income decile own at least one car) and increases to 20% for the medium income households. Regarding the wealthiest households, 75.5% of them own at least one car. While HBS data may have limitations and there is no specific question related to the usage of a car without owning it (the cars in the property of companies represent more than 13% of the total car fleet in Romania) other data sets confirm the HBS trend indicating that Romania is below the European average in terms of car ownership and the national car fleet is very old ([33]) and polluting, with more than 70% of the car fleet falling under the non-Euro to Euro 4 emissions standards category ([34]). Moreover, among households owning at least one car, 58% live in the urban areas and 42% live in the rural one. The urban / rural divide is even higher when considering the general distribution of households: 52% are located in urban areas and 48% in the rural one. In addition, the possible indicator "enforced lack of a car by degree of urbanisation" encapsulates a national reality where households generally located in rural and small urban areas would need a car for mobility, since public transport services offer is often limited, but they do not have it.



Source: CSD own calculations based on Romanian HBS 2022 microdata.

According to Statistics Poland, the highest percentage of households with access to a private vehicle is found in sparsely populated areas (72%), and the lowest in densely populated areas (59%). In sparsely populated regions, there is a confluence of factors that contribute to the lack of available and affordable public transport. The

(33) https://www.economica.net/parcul-auto-din-romania-creste-dar-indicele-de-motorizare-ramane-cel-mai-mic-din-europa_641129.html

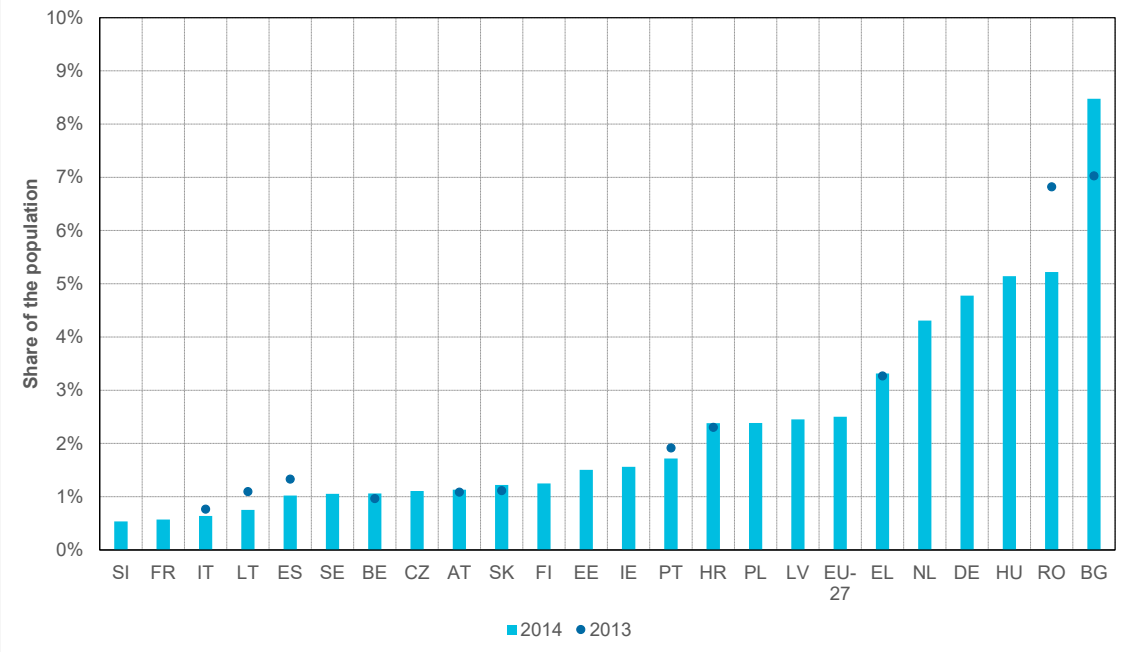
([34]) Computation based on the National Statistical Institute data on the vehicles registered in Romania.

distances travelled by car are considerable, and the costs of public transport fares are higher with carriers. This scenario can indicate the reasons for the high percentage of households with access to a private vehicles in rural areas (Fijalkowska et al. 2024).

3.4.2. Public transport is 'too expensive':

Based on the EU-SILC ad-hoc module 'Material deprivation' 2014, this indicator captures respondents who answered 'No – ticket too expensive' to the question of whether they regularly use public transport (cf. Section 3.2.2). The share of the population stating that they are not using public transport, because the ticket is too expensive ranges from 0.5% in Slovenia to 8.5% in Bulgaria (Figure 13). The EU-27 average amounts to 2.1%. Generally, the share of the population who states that the main reason for not using public transport is that tickets are too expensive is relatively small (also note the methodological discussion above). Bulgaria, Romania and Hungary have the highest values, followed by Germany, the Netherlands and Denmark. While in countries with lower overall income levels, such as Bulgaria, Romania and Hungary, the household budget available to pay for the tickets may be the biggest reason for unaffordability, in countries with higher overall income levels, such as Germany, the Netherlands and Denmark, high ticket prices, and/or perceptions thereof, may cause individuals to choose this answer.

Figure 13: Share of the population for which public transport tickets are 'too expensive'



Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, ticket too expensive" to the question "Do you regularly use public transport?" [PD090]. The EU-27 average is weighted. The variable PD090 is missing for CY, CZ, DE, DK, EE, FI, FR, HU, IE, LU, LV, MT, NL, PL, SE, SI in the EU-SILC 2013 data. According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): CY, LU, MT in the EU-SILC 2014 data. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). The calculations are based on personal data from EU-SILC, which includes persons aged 16 and over. The results reflect the share within population aged 16 and over.

3.4.3. HBS affordability indicators: 6% and 2M

This section presents two possible affordability indicators based on the 2015 HBS data. Both indicators are related to the share of transport expenditure within total expenditure of a household. These indicators differ based on the threshold level used to define transport poverty, and they are estimated at the household level, unlike other indicators.

- **Expenditure on transport exceeds 6% of total expenditures:** Households are identified as transport poor if the share of transport expenditures in total expenditures exceeds 6%. A similar indicator (to the expenditure exceeds 6% of total expenditures) was used as part of the European Semester 2023 (European Commission 2023a). Some differences exist between the indicators that are discussed in Section 3 in the Annex.

- **Share of total expenditures spent on transport exceeds twice the national median (2M):** Households are identified as transport poor if the share of transport expenditures in total expenditures is higher than twice the national median of transport expenditures in total expenditures. The 2M indicator is adapted from the energy poverty literature (cf. European Commission 2023c).

The HBS provides aggregate categories of transport expenditure as well as several subcategories, such as vehicle purchases, fuel, and transport services. This report focuses on the recurrent costs like fuel are included in calculations, as well as the recurrent costs of road and railway transport services ([35]), as irregular transport costs such as the purchase of vehicles or the repair of personal transport equipment need to be analysed over a long period of time and cannot be properly estimated with the available data. The costs of road and railway transport services are used as a proxy for public transport costs. The costs of passenger transport by air and sea are excluded from the analyses, as most households do not use these transport modes for their daily transport needs. ([36])

Both indicators are restricted to the bottom half of the equivalised expenditure distribution in each Member States ([37]). Otherwise, a relatively large share of households identified as transport-poor would be amongst the richer households. This is because transport expenditures in the EU-27 tend to rise as total expenditures rise (Figure 14). The share of total expenditures spent on transport rises from 3.4% in the first decile to 5.0% in the fourth decile, staying relatively stable until the eight decile and

([35]) The following variables are included in transport expenditure for the calculation: Diesel [EUR_HE07221], Petrol [EUR_HE07222], Passenger transport by train [EUR_HE07311], Passenger transport by underground and tram [EUR_HE07312], Passenger transport by bus and coach [EUR_HE07321], Passenger transport by taxi and hired car with driver [EUR_HE07322]. We include expenditure on passenger transport by taxi and hired car with driver to cover the more informal transport options that are more common in rural areas.

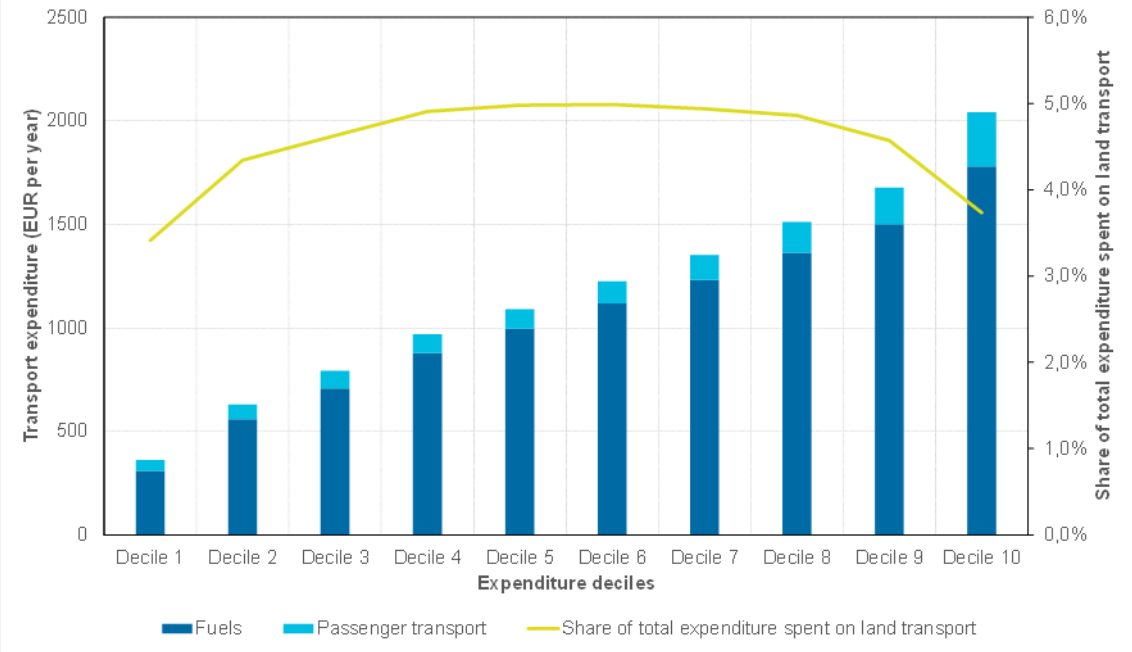
([36]) Of course, there are regions in the EU, in which households rely on passenger transport by air and sea for their daily transport needs. Unfortunately, we cannot identify the households living in these regions from the HBS data due to the low geographical granularity of the data (NUTS 1).

([37]) For the equivalisation, the modified OECD scale was applied that assigns a weight of 1 to the first person in the household, a weight of 0.5 to the second person, as well as each subsequent person at least 14 years of age and a weight of 0.3 to each child under 14.

then declining to 3.7% in the tenth decile, while total expenditures increase from about EUR 360 per year in the first decile to EUR 2,040 per year in the tenth decile according to the HBS 2015. Furthermore, expenditures on fuels for private transport are much larger than expenditures for passenger transport in all deciles, indicating that expenditures on transport using a private vehicle are dominating the transport budget of the average EU household.

Both indicators require further analysis and combination with other relevant datasets, as transport differs from other essential services, like energy. Transport is closely tied to urban planning and more prone to subjective factors such as preferences and aspirations. It confirms the report's premise that transport poverty must be analysed by a multidimensional set of indicators, including spatial data, to capture the full complexity of the issue."

Figure 14: Transport expenditure in the EU-27 per expenditure decile, 2015



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. AT is missing from the data. The EU average is weighted. Expenditure deciles are constructed based on equivalised expenditure data applying the modified OECD scale.

Results for the expenditure-based affordability indicators are very sensitive to the choice of the threshold above which a household is identified as transport poor. The 2M indicator sets twice the national median share of transport in total expenditure as the threshold, while the 6% indicator uses a fixed share of transport in total expenditures for all Member States as a threshold.

There is a wide variation in the national medians for transport as a share of total expenditures (Table 2). Some countries, such as Estonia, Lithuania and Romania,

have very low values, which can be explained by the high number of zeros in the transport expenditure categories. The lower the median values, the higher the probability of being classified as transport poor despite spending very little on transport, e.g., in Estonia everyone with any transport expenditure is classified as transport poor using the 2M indicator, because the median is zero.

Table 2 – National medians of relative and absolute transport expenditure

Country	Median share of transport in total expenditure	Median equivalised transport expenditure in Euros	Country	Median share of transport in total expenditure	Median equivalised transport expenditure in Euros
BE	2.78%	617	**IE**	4.27%	965
BG	1.73%	55	**IT**	4.20%	721
CY	6.03%	1013	**LT**	0.34%	16
CZ	5.00%	294	**LU**	1.88%	651
DE	3.36%	676	**LV**	1.57%	72
DK	1.16%	321	**MT**	4.96%	599
EE	0.00%	0	**NL**	3.13%	683
EL	4.32%	457	**PL**	3.09%	160
ES	3.28%	497	**PT**	5.83%	640
FI	3.11%	728	**RO**	0.73%	18
FR	1.62%	287	**SE**	5.15%	1136
HR	4.95%	317	**SI**	6.40%	734
HU	1.78%	85	**SK**	3.65%	240

Source: Weighted HBS 2015 data. AT is missing from the data.

Note: The transport expenditure is equivalised using the modified OECD scale.

If the zeros observed in the HBS 2015 are not really zero expenditures but potentially missing values, this data quality issue distorts the results of the expenditure-based transport indicators ([38]). For some Member States, the number of zeros is in fact

([38]) Eurostat recommends the use of dots to indicate missing data, but the high number of zeros for transport expenditure suggests that some of the reported zeros are in fact missing data that have not been correctly labelled. As Member States are responsible for the compilation and transmission of the data, Eurostat is not able to trace back the original entries and identify implausible data points.

implausibly high (see Section 4.1.1 and Section 3 in the Annex). Compared to using the average as a threshold, the median it is more robust to outliers.

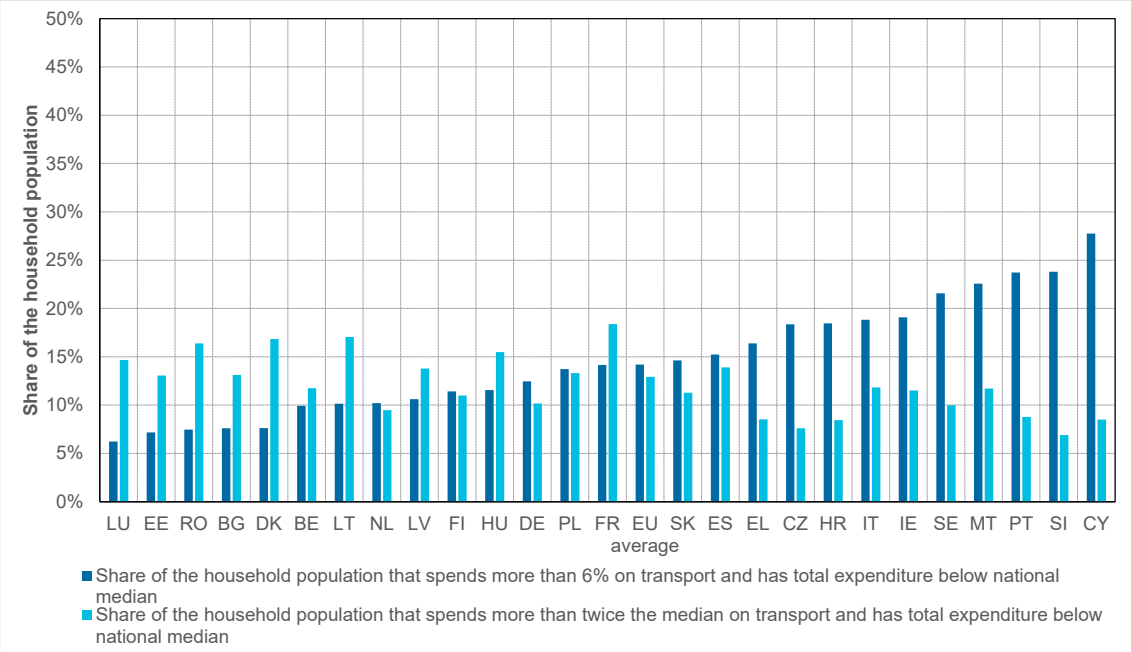
The choice of the threshold for the 6% indicator is based on the following calculations using the HBS 2015 related to the share of transport in total expenditures:

- The average of all national median values for the share of transport in total expenditure: 3.25%
- The median of all national median values for the share of transport in total expenditure: 3.21%
- The median share of transport in total expenditure over all EU-households: 3.34% (2015)

If the threshold for transport poverty is set at twice the median/average (similar to the 2M indicator), this would be 6.4 - 6.7% with the figures based on the 2015 HBS above. Therefore, it has been decided to use 6% as the threshold value. A higher threshold would identify less households and a lower threshold more households as transport poor. During the project, estimations with the HBS 2015 inflated to 2022/23 values using the relevant price indices (Section 3 in the Annex for more information) were performed. After inflation, the above values are higher at 3.55% for the average of all national median values and 3.63% for the median of all national median values, as well as 4% for the median over all EU-households.

In Member States with a relatively lower national median (Table 2), the share of households spending more than twice the median is relatively high (Figure 15). This applies to France, Lithuania, Denmark, Romania, Hungary and Luxembourg. In countries with relatively high national medians (Table 2), such as Cyprus, Slovenia, Portugal, Malta and Sweden, the share of households spending more than 6% of total expenditure on transport is high. Besides the value of the national median, the distribution of the share of transport expenditure in total expenditure is the other determinant in these indicators. A particularly uneven distribution whereby many households spend a very large share of total expenditure on transport, leads to high values in both possible indicators.

Figure 15: Share of the household population identified by the 6% and 2M indicators of transport affordability, 2015



Source: Own calculations based on HBS 2015 microdata.

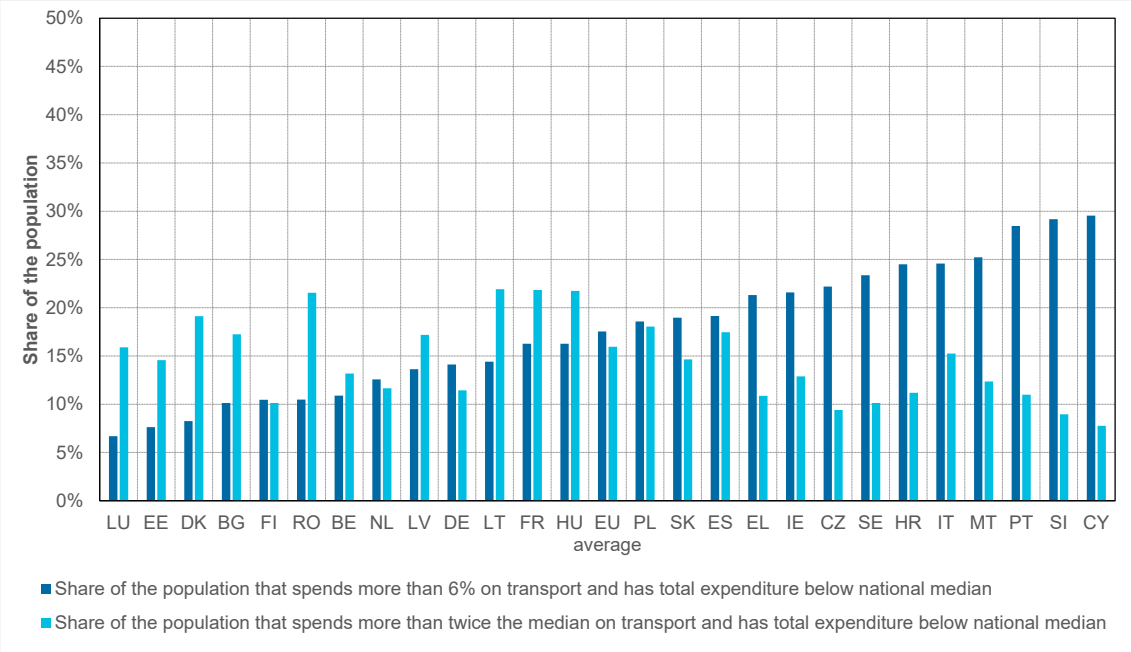
Notes: The chart shows the share of households that spends more than 6% or more than twice the national median on transport and has total expenditure below national median. The EU average is weighted. AT is missing from the data and is therefore not included in the EU average. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for the countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeros in transport expenditure (> 30% of total observations have zero transport expenditure).

Therefore, the difference between the 2M and 6% indicators can be explained by the distribution of the transport expenditure across the households of a Member State, which in some cases might be caused by poor data quality of the HBS 2015. There are advantages and limitations to both options. A national threshold, such as twice the median or 2M, is better suited to capture country-specific effects. A fixed EU-wide threshold may be easier for Member States to apply and makes it easier to compare values over time, since thresholds using median values change over time. Furthermore, the 2M indicator is less sensitive to rises in the price of fuels or transport services. In order to capture the impact of changing prices, a fixed threshold such as 6% is better suited. Researchers have also suggested to calculate the 2M indicator for a specific year and then fixing the threshold at this value going forward (Alonso-Epelde et al. 2023; Heindl and Schuessler 2015).

Figure 15 shows possible indicators in terms of the percentage of all households that are identified as transport poor by the 2M and 6% indicators, since the HBS data is based on household-level information. However, the number of persons living in each household is considered and one assumes that each person in the household is affected by transport poverty if the household-based indicator says so, the identified shares (this time of the whole population) rise by 1-6 percentage points (Figure 16). The exceptions are Cyprus for the 2M indicator and Finland for the 2M and 6% indicators, where the share of the population is 0.7 percentage points and respectively 0.9 and 1.0 percentage points lower than the share of the household population.

Apart from Cyprus and Finland, the difference between the results presented as the share of the population and the share of the household population ranges from 0.1 percentage points in Sweden to 6.3 percentage points in Hungary for the 2M indicator. For the 6% indicator, the difference between the results presented as the share of the population and those presented as the share of the household population ranges from 0.4 percentage points in Luxembourg to 5.7 percentage points in Italy. This suggests that households that are categorized as transport poor have more household members – on average – than those that are not transport poor.

Figure 16: Share of the population identified by the 6% and 2M indicators of transport affordability, 2015



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of population that spends more than 6% or more than twice the national median on transport and has total expenditure below national median. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. The results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeros in transport expenditure (> 30% of total obs. have zero transport expenditure).

It should also be kept in mind that identifying households as transport poor on the basis of high transport expenditure may underestimate the number of vulnerable households. Some households may not meet their daily transport needs due to a lack of financial resources ('hidden transport poverty'). The debate on energy poverty has led to the development of the M/2 indicator, which identifies households as energy poor if their (equivalised) energy expenditure is less than half the national median (European Commission 2023c). This indicator is intended to capture hidden energy poverty in households with unusually low energy expenditure (see for example Eisfeld and Seebauer 2022 on hidden energy poverty).

In the context of transport poverty, the M/2 indicator was excluded from the framework, because it is highly likely that it identifies households as transport poor that have a high proportion of active mobility (walking, cycling) or benefit from more affordable public transport, e.g., tickets for the elderly or subsidised work tickets. Comparative assessments supported by other objectives, on absolute and relative costs of travel,

and subjective data, on the perceptions of affordability, can provide insights into hidden transport poverty (Venter 2011, p. 6). An example of measuring personal perceptions of affordability is the indicator presented in Section 3.4.2. Under the assumption that public transport is the cheapest transport option apart from active mobility, ([39]) this indicator should capture those in hidden transport poverty. Spatial data on the public and private transport network, the location of essential services, the capacity, attractiveness and affordability of these services, as well as and (real-time) timetable and journey time data could further facilitate the monitoring of transport needs which in turn could help detecting hidden transport poverty (see Section 4.1.2 on spatial data).

4. Insights on the state of play of transport poverty in the EU-27

Based on our analysis of the nine potential transport poverty indicators both individually and as part of the scoreboard in the annex of this report, this section presents four cross-cutting insights related to the measurement and state-of-play of transport poverty in the EU-27.

4.1. Data availability and quality

While data is available to estimate indicators related to the three dimensions of transport poverty (availability, accessibility and affordability), important data availability and quality issues exist. Resolving those issues will further improve the measurement and monitoring of transport poverty across the EU. Addressing these issues would enhance the measurement and monitoring of transport poverty across the EU and contribute to a more efficient policy-making in the area.

While some initiatives are in progress to address these gaps, the current lack of harmonized and up-to-date data significantly undermines the overall assessment. The data limitations complicate a comprehensive evaluation of the different dimensions of transport poverty within the EU, as well as its development throughout the years, as data has also a time limitation.

The case studies in this report demonstrate that many of these data gaps at the EU level can be mitigated by using national and local data, which are often more granular and context specific. However, relying on disparate national datasets introduces its own challenges, particularly regarding consistency and comparability across Member States.

([39]) The cost per person-kilometre for public transport can differ significantly across various modes. In fact, when considering factors like occupancy rate in private vehicles, public transport may not always be the cheapest transport option. To gain a comprehensive understanding of public transport expenses, it would be ideal to combine regional data on detailed modal shares, which reflect passenger preferences and demand, with survey data on expenses and with information on the available public transport services illustrating the supply side.

A concerted effort to harmonize and improve the quality of EU-level data—especially in the areas of affordability and accessibility—would be required to ensure a more accurate and actionable understanding of transport poverty across the Union.

4.1.1. Limitations of currently available survey datasets

Due to the limited availability of data, the nine potential indicators presented stem from different survey years, the oldest being the 2014 EU-SILC ad-hoc module on 'Material deprivation'. What is more, the underlying population differs by indicator. The HBS indicators are expressed as shares of the household population of a Member State, the EU-SILC indicators as shares of the population that is older than 16 years, the LFS indicator as a share of the active working-age (15-74) population in employment. Comparisons between the indicators have to be carried out with caution.

The only variable used for indicator building that is collected regularly is the yearly EU-SILC question: 'Do you own a car?' Two indicators were built based on this variable: i) materially and socially deprived individuals owning a car and (ii) enforced lack of a car. These indicators are of high interest, since they rely on repeated, regularly collected, and recent data and since car ownership is a very important determinant of people's travel behaviours.

On a positive note, upcoming EU-SILC rolling modules will repeat some of the questions used to build indicators related to public transport availability and affordability (see Section 5 in the Annex for further information). However, as in the 2014 ad-hoc module, only one answer possibility can be chosen although answer modalities are non-exclusive. This poses a challenge for estimating indicators (cf. Section 3.2.2). There are several possibilities to improve the situation from the point of view of transport poverty; Respondents could be asked to rank main challenges, could be given more than one answer possibility or asked a follow-up question.

The results of the potential affordability indicators based on the HBS 2015 are highly dependent on the data quality of the survey. An important issue is the presence of implausible zeros in transport expenditure categories. Eurostat recommends the use of dots to indicate missing data, but the high number of zeros for transport expenditure suggests that some of the reported zeros are in fact missing data that have not been correctly labelled.

Table 3 presents the results of different analyses of the distribution of zeros in transport expenditure categories. For each country, the share of observations with zero fuel expenditure is shown. In several countries shares of more than 50% and in Romania a share of almost 78% can be observed, which is not consistent with national vehicle registration data (Eden et al. 2023). As high shares of zero fuel expenditure may reflect a society with a high use of public transport of active mobility, the analysis allows up to 30% of observations with zero expenditure in all transport expenditure categories and flag countries with more than 30% as unplausible in our calculations. This applies to Denmark, Estonia, France, Hungary, Lithuania, Latvia, Romania.

Table 3 – Distribution of zeros in transport expenditure categories of the HBS 2015

Country	Share of obs. with zero fuel expenditure	More than 30% of total obs. have zero transport	Zero expenditure on transport services for all

		expenditure	obs.
BE	23.4		
BG	50.1		
CY	16.3		
CZ	20.3		
DE	17.4		x
DK	39.8	X	x
EE	59.9	X	
EL	35.7		
ES	37		
FI	43		
FR	56.6	X	
HR	34.2		
HU	52.6	X	
IE	26.8		
IT	26		
LT	56.5	X	
LU	35.3		
LV	62.8	X	
MT	24.7		
NL	11.5		
PL	41		
PT	25		
RO	77.7	X	
SE	22.3		
SI	12.2		
SK	51.2		

Source: Unweighted HBS 2015 data. AT is missing from the data. DK has zero expenditure on transport services for all observations in three out of four categories of transport services.

Further, Germany has zero expenditure on passenger transport services for all observations. Denmark has zero expenditure on passenger transport services for all observations in three out of four categories in the 2015 HBS data (see also Table 3).

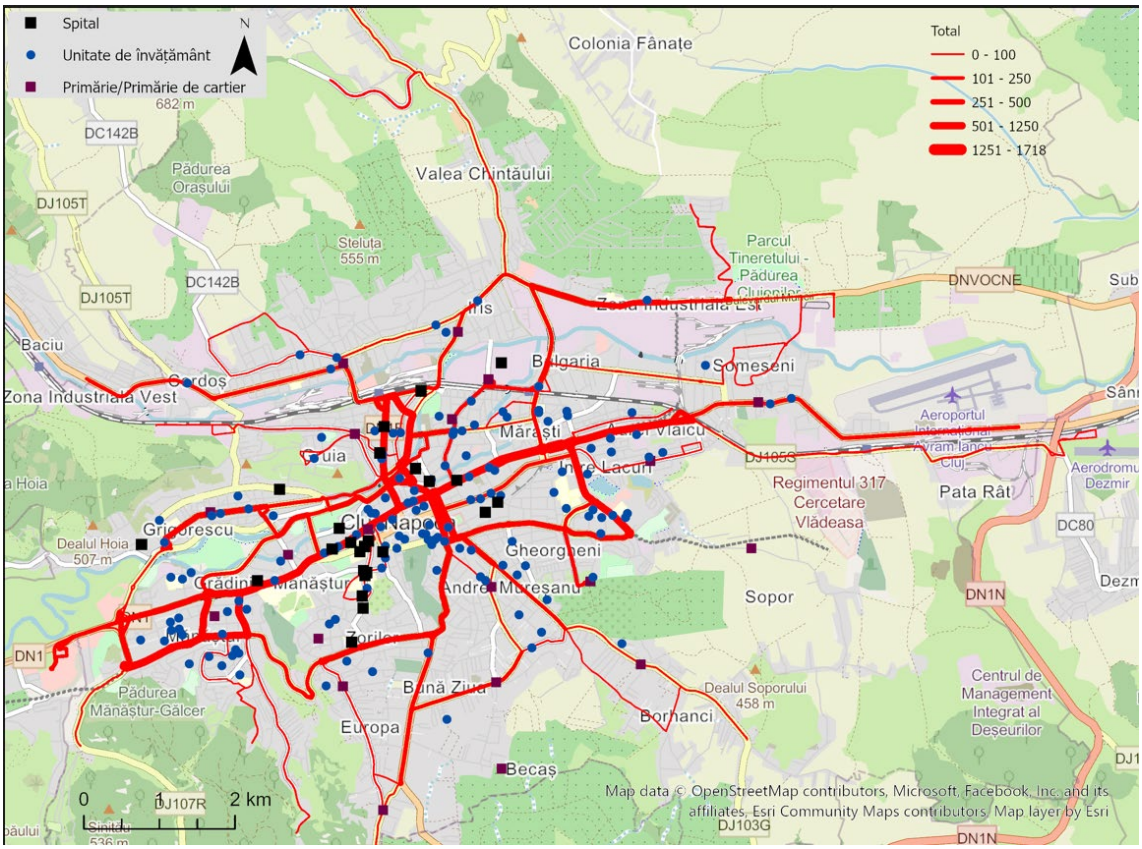
4.1.2. Spatial data is missing to comprehensively investigate the accessibility dimension at the EU level

In this report, one potential indicator related to the accessibility dimension is estimated. Based on the published LFS 2019 ad-hoc module on work organisation and working time arrangements, this indicator captures the share of individuals who commute for more than 30 minutes to their workplace (see Figure 10). While this indicator gives some insight into the accessibility of one essential service, ideally, accessibility issues would be measured using spatial indicators, as is the case in the state-of-the-art literature (Allen and Farber 2019; Lunke 2022; Peipins et al. 2013; Pritchard et al. 2022; Giordano et al. 2024; Kelly et al. 2023; Barajas 2021). ([40]) The representation of results at an appropriate aggregated geographical level or in the form of a map would also have advantages for policy targeting.

As part of the case study analyses, spatial data was employed to estimate accessibility for Romania (Box 5). This shows that at the national level, spatial data may be available that is lacking at the EU-level.

([40]) See also https://www.gov.uk/government/collections/journey-time-statistics

Box 4: Using spatial data to assess accessibility in the Romanian local case study of Cluj-Napoca



Based on a local survey conducted in 2023, the residents of Cluj-Napoca are generally satisfied with the public transport services. 87.5% of the respondents consider the lines are well connected and 83% of them find the waiting times as being reduced. Equally important are the geospatial information that map the geographical distribution of lines across the city, the passenger load per line and the reach to important public services, such as hospitals, public schools and public institutions. The GIS map indicates that traditional lines, connecting the older neighbourhoods constructed during communism and the city center, are well connected and have one of the highest load of passengers. On the map, the thicker the red line, the higher the load of passengers, the legend *"Total"* indicating the number of tickets and passes validated per day. ([41]) The more recent bus lines, connecting new neighbourhoods are very important for the mobility even though not all of them are used intensively by the residents and in the map are represented mainly by the thinner lines. Moreover, related to accessibility aspects, the public transport lines allow the access to education facilities, be it daycares, kindergartens, schools and universities (*on the map, the education facilities are marked with a blue dot*), most of them being concentrated in the city center and the older neighbourhoods. Similarly, access to hospitals, *marked with the black square*, is facilitated through the public transport infrastructure, as the map indicates. Only access to the town halls, *marked with a purple square,* including the offices open in the neighborhoods, is problematic in some areas, especially the ones that now are under construction. Some of the reasons reside in the fact that the frequency of some lines may be

([41]) In estimating the passenger load, there were used data from the public transport company. The values indicating the passenger load, calculated based on the number of passes and tickets validated, are based on daily averages.

reduced and they do not connect well with other lines. Overall, the network of lines inside the Cluj-Napoca municipality and the quality of the services are satisfactory, a fact confirmed in the GIS map and through the survey data.

In its Delegated Regulation (EU) 2017/1926 (European Union (EU) 2017), the EU requires Member States to make available static travel and traffic data and – optionally – dynamic travel and traffic data via national access points (NAPs). According to the regulation, data in the national access points should be provided in line with the NeTEx (Network Timetable Exchange). Static data include information on both scheduled and demand-responsive public transport, as well as personal transport. Static information includes a whole range of different data types including location of stops, layout of network, detailed trip plan / timetable information, as well as on the road and cycle network and information services. Dynamic data includes information on estimated departure and arrival times, disruptions and real-time status information. To date, data collection via the NeTEx or GTFS standard are incomplete. Comprehensive analysis of transport poverty is not possible without having complete data on public transport networks and therefore data availability in some EU Member States (e.g., Poland) is an issue.

In their report on Employment and Social Developments in Europe, the European Commission (2023) explores, at the NUTS3 level, the accessibility by car or foot for a number of essential services and a selection of EU Member States: (i) Access to early childhood education and care services and primary schools by foot and car in Finland, France, Greece and Spain and (ii) access to public employment services by car in Austria, Czechia, Denmark, Estonia, Finland, France, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Slovenia, Spain and Sweden. Access is measured by looking at the reachable area within a 15-minute walk or a 15- or 30-minute drive to each essential service. Data on essential services was collected from various sources, such as direct contact to the authorities in the relevant Member States and using information provided on relevant websites. The road network was taken from OpenStreetMap. More detailed analysis and some data updates for the estimation of these accessibility indicators can be found in Almeida et al. (2024).

The Commission's Urban Data Platform Plus ([42]) shows the average road distance per person to the nearest primary and secondary school, to the nearest cinema and train station. The JRC is engaged in an ongoing activity of mapping public and private transport networks and perform accessibility analyses to measure access to services and opportunities. In relation to public transport, several tools have been developed to solve time-dependent-shortest-path problems over public transport networks. In relation to private transport, both commercial and open-source road networks that have EU coverage are used and fed into routing tools to solve shortest-path problems (taking congestion considerations into account). Use of this mapping to measure access to essential services is foreseen. The project involves a significant data collection effort covering all EU Member States.

The upcoming 2025 EU-SILC ad-hoc module on energy and environment includes a question on whether a selection of essential services can be reached within the hour (Section 5 in the Annex).

([42]) https://urban.jrc.ec.europa.eu/map-view?lng=en&ctx=udp&ts=EU&pil=indicator-level&is=Default&tl=7&cl=default&i=300&clc=infrastructure-20-26-20accessibility&db=1011&it=metadata&cwt=line-chart&date=2018

4.1.3. Additional and better data is needed on cross-cutting issues

While the analysis enabled the estimation of a wide range of potential indicators for a number of target groups, several data gaps and blind spots exist. The Spanish case study highlights the importance of collecting gender-related data as results for the indicators estimated in the case study differ substantially between women and men. It would be very interesting to collect and investigate data on many other target groups at the EU level, such as unemployed, migrants, minorities. One potential indicator included in our analysis focused specifically on individuals with reduced mobility (Figure 9).

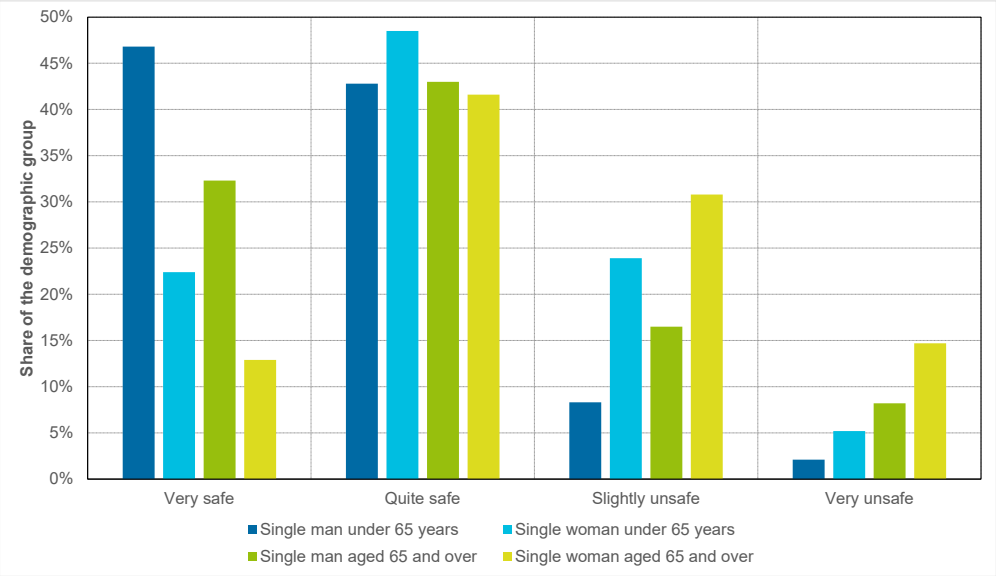
Box 5: Insights on gender-related data from the Spanish case study

Women often face unique challenges due to diverse mobility demands and patterns, often related to unpaid care work, and to having lower levels of disposable income, being disproportionally represented in single-parent households, and other related factors (Murauskaite-Bull et al. 2024). These challenges based on education and socio-economic attributes underline the need to consider gender-related factors when addressing transport poverty. The concepts of safety and mobility have taken a central focus in social and policy debate as essential components of human well-being and societal progress especially in urban settings. Perceived, experienced and "actual physical" sense of security encompasses emotional, and psychological factors. For women and social excluded collectives, the perception of security is often conditioned by a range of factors, including the fear of harassment, violence, and discrimination (González Moreno et al. 2022; Solomon und Titheridge 2007).

Gender-disaggregated data allows gender-specific mobility patterns to be identified and understood and trends and differences to be uncovered, not only in access and usage but also in safety perceptions. In the Spanish case study, an in-depth analysis of data and indicators collected at various levels within Spain was conducted. The foundation of the Spanish case study was grounded on three key elements. Firstly, the significance of gathering gender-disaggregated data to understand how transport poverty disproportionately impacts women, helping in recognising gender-specific trends and differences in safety perceptions and mobility behaviours. Secondly, the importance of analysing the public transport usage patterns considering the gender dimension to uncover variations in access and usage, offering valuable insights to enhance accessibility and mitigating transport poverty. Finally, the significance of examining crime data to gain an understanding of the safety challenges encountered by different genders with the aim of leading targeted interventions to bolster safety measures and alleviate transport poverty.

The findings highlight relevant insights regarding gender disparities in mobility preferences, safety perceptions, and travel behaviours: Women are more likely to use public transport or tend to favour more active mobility, such as walking and/or cycling especially for short trips. On the other hand, men, often viewed as the main household providers, retain the use of the owned car. This aspect is important to acknowledge as it sheds light on gender-specific mobility patterns (Mejía Dorantes and Murauskaite-Bull 2022). In addition, women tend to avoid travelling alone more frequently than men due to security concerns, especially at night or in poorly illuminated places. In this sense, the analysis of crime data, particularly incidents of harassment, assault, and violence, showed that women believe that public transport is less safe than men and they report higher safety concerns while travelling alone at night. Figure 18 provides an example of the statistics collected at the Spanish national level disaggregated per gender and age.

Figure 17: Spanish case study: perception of safety walking alone at night per gender and age



Source: Indicators of quality of life, physical and personal security. Module on wellbeing, 2013. INE

It is also interesting to note that gender and age intersect in the 'very unsafe' category, while gender is more strongly expressed in the 'slightly unsafe' (feminised) and 'safe' (masculinised) categories. This data supports more qualitative research findings, which consistently showed that traveling during nighttime hours is associated with increased concerns about crime and feelings of vulnerability. Hence individuals' travel choices are often influenced by the fear of potential dangers (Cozens et al. 2004; Currie et al. 2013). This phenomenon is especially significant for women, as noted by Col-lectiu Punt 6 (2017) and Yavuz and Welch (2010).

4.2. Transport poverty is not an exclusively rural phenomenon, but analysis points to greater issues in rural areas

The Annex to this document introduces an analysis of the nine transport poverty indicators by degree of urbanisation, where the data permits. This analysis shows that transport poverty is not an exclusively rural phenomenon. In fact, some potential indicators, such as the one focusing on enforced lack of a car are generally higher in urban than rural areas (Figure 12).

However, a range of potential indicators, especially those related to availability, as well as the expenditure-based affordability indicators, are higher in rural than in urban areas. This applies, for example, to the availability indicator on materially and socially deprived individuals owning a car (Figure 4). This indicator is higher overall in rural areas than in cities and also in all EU Member States individually, except Malta and Austria. It is particularly high in rural areas in Bulgaria, Ireland, Cyprus, Greece, Hungary, Lithuania and Croatia. Similarly, the share of the rural population stating that the nearest public transport stop is too far away is higher than amongst the urban population in all EU Member States except Romania where it is highest in towns and suburbs compared to cities and rural areas (Figure 7). On average, 4% of individuals

living in rural areas state that the nearest public transport stop is too far away, while only 1% in cities do so. ([43]) These results indicate that as expected, public transport availability is a greater issue in rural areas or towns and suburbs than urban areas. This holds for the EU overall and for all Member States individually. In some Member States, the difference between urban and rural areas is especially stark. These are Finland, France and Austria.

The results on the urban-rural divide are driven by a number of factors: (i) the state of the public transport network, (ii) the way in which the population is spread out across the country, (iii) the percentage of the population living in rural vs. urban areas and also (iv) poverty and social deprivation rates in urban vs. rural areas. These drivers pick up the different parts of the transport poverty issue related to infrastructural and policy aspects, to geographical and demographic aspects, as well as to poverty and vulnerability.

Box 6: Public transport in smaller towns - Experience from the Polish case study

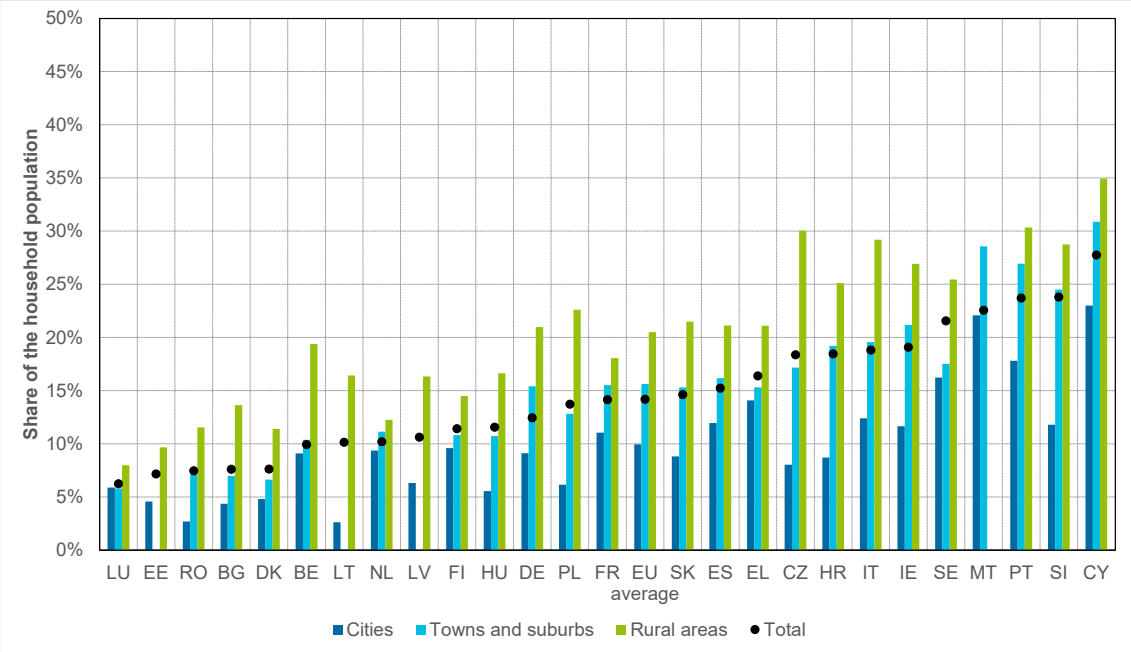
In Poland, there is a significant discrepancy between the fulfilment of the availability, accessibility and affordability dimensions in large cities and the lack thereof in smaller cities. This discrepancy is particularly evident in medium-sized cities, in which the situation is dynamic and dependent on the region and, in many cases, on local authorities. This issue is relevant nationwide, but it is illustrated using the case of the region Lower Silesia in the Polish case study in which, within the same region there are different approaches to organising transport in their area by local authorities. This results in significant differences between similar centres in the same region, despite the same legislation and similar geographical location. The relative importance of a given town in the context of this discussion depends on a number of factors, including its size and its connectivity to the regional transport network. In addition, the approach of local authorities to transport organisation is a crucial consideration. It is noteworthy that there are three different approaches to transport organization in these areas. There are those that organise public transport independently, those that belong to a transport association or those that do not participate in the organisation. The availability of railroads and the number of connections to other major centres also play a role. It is interesting to note, in particular, the case of the smaller towns in Lower Silesia (less than 50,000 inhabitants), which have access to regional rail transport and are developing free public transport systems (free travel does not, however, include commercial carriers). Free transport systems are not present in the larger cities of the region. This shows the extent of the complexity and unevenness of the issue in medium-sized cities and towns in Poland, which was illustrated by the case of Lower Silesia.

Similarly, both potential affordability indicators that rely on expenditure data from the HBS show a much higher share of affected households in rural areas as compared to cities. Figure 19 explores the 6% indicator by degree of urbanisation. At 20% of the household population, the indicator is twice as high in rural areas compared to cities in

([43]) It is important to stress again, that the way in which the underlying EU-SILC variable is structured, respondents can only choose one of several answer modalities. Most respondents answer that they do not use public transport, because they have private transport available (Figure 5).

the EU on average. The highest value in rural areas is recorded with 35% in Cyprus. On the one hand, this indicator shows the areas in which households have a particularly large expenditure for transport. On the other hand, since the indicator is related to total expenditures, it also takes into account the economic situation of a household in terms of total expenditure. Again, those countries for which the indicator is particularly large in rural areas are likely countries in which both expenditure on transport is large in rural areas and in which the rural areas are poorer.

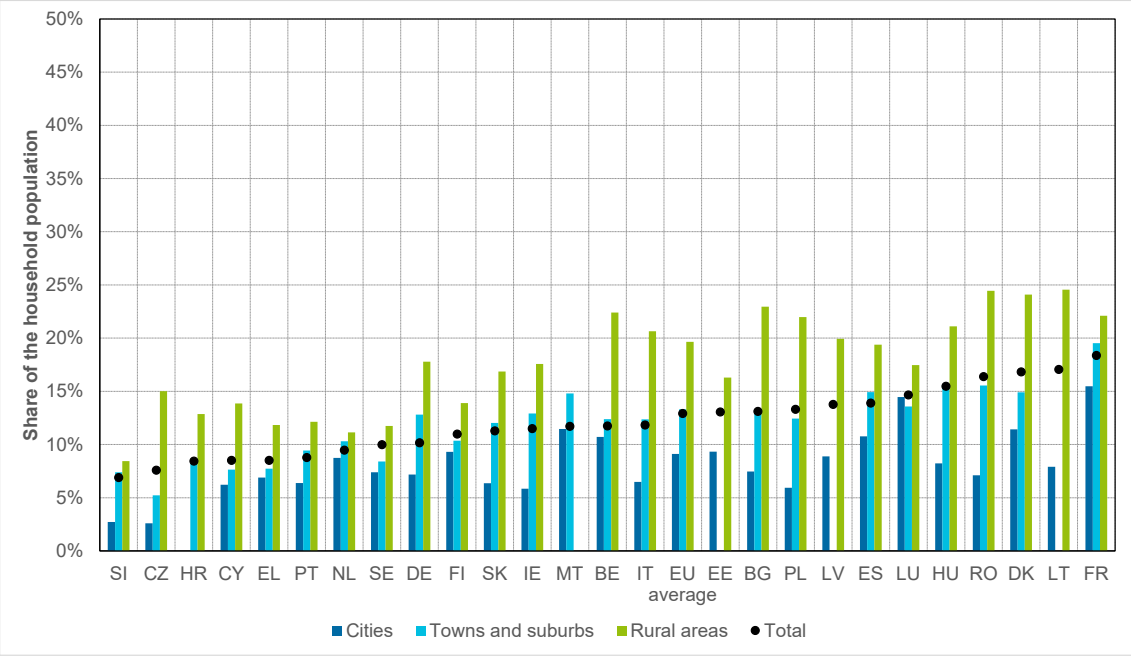
Figure 18: Share of the household population identified by the 6% indicator of transport affordability by degree of urbanisation, 2015



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households that spends more than 6% on transport and has total expenditure below national median by degree of urbanisation. The EU average is weighted. AT is missing from the data and is therefore not included in the EU average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeros in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): EE; LT, LV for the category 'Towns and suburbs'. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): DK for the category 'Cities'. BG for the category 'Towns and suburbs'.

Figure 19: Share of the household population identified by the 2M indicator of transport affordability by degree of urbanisation, 2015



Source: Own calculations based on HBS 2015 microdata.

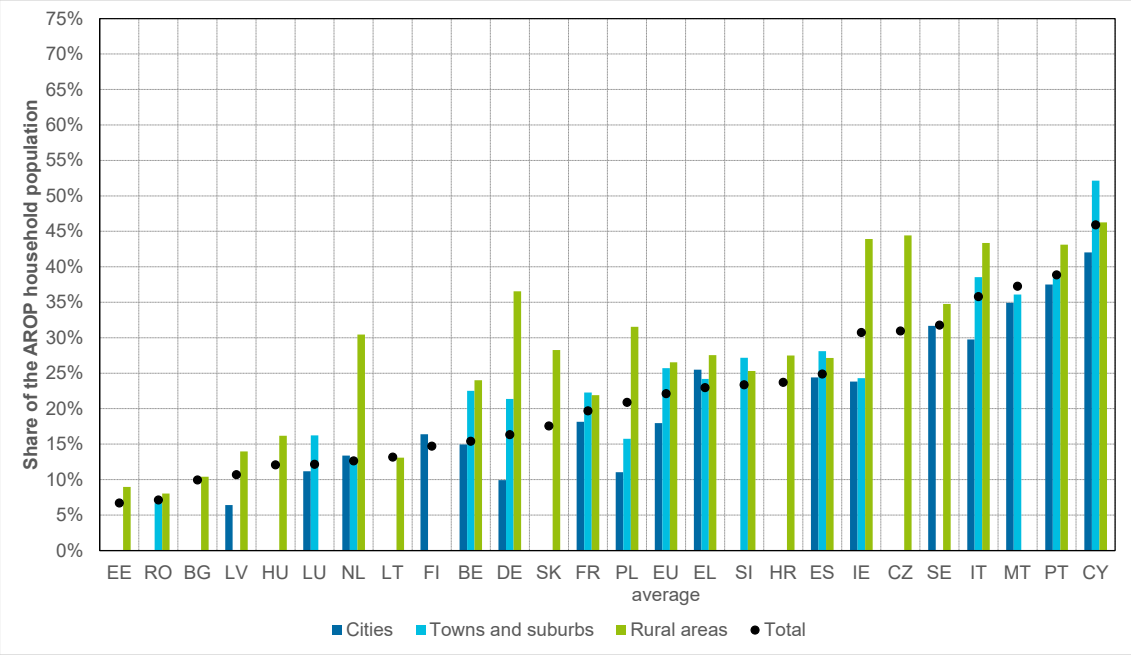
Notes: The chart shows the share of households that spends more than twice the national median on transport and has total expenditure below national median by degree of urbanisation. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeros in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): HR for the category 'Cities'. EE, LV, LT for the category 'Towns and suburbs'. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SI, CZ for the category 'Cities'. CY, SE, MT for the category 'Towns and suburbs.

This finding also holds for the 2M indicator, which is particularly large in rural areas in Lithuania, Romania and Denmark (Figure 20). In their study for Spain, Alonso-Epelde, E., García-Muros, X., González-Eguino, M. (2023) also find that expenditures on transport are larger in rural areas.

The fact that poorer rural areas are particularly affected is illustrated by the result that nearly half of the households at risk of poverty (AROP) ([44]) in rural areas are identified as transport poor by the 6% indicator in several Member States (Figure 21) including Cyprus, Czechia, Ireland, Italy and Portugal.. The 2M indicator also points to similar findings (see Section 3 in the Annex).

([44]) Individuals and households are at risk of poverty if they have an equivalised disposable income below 60% of the national median income.

Figure 20: Share of the AROP household population identified by the 6% indicator of transport affordability by degree of urbanisation, 2015



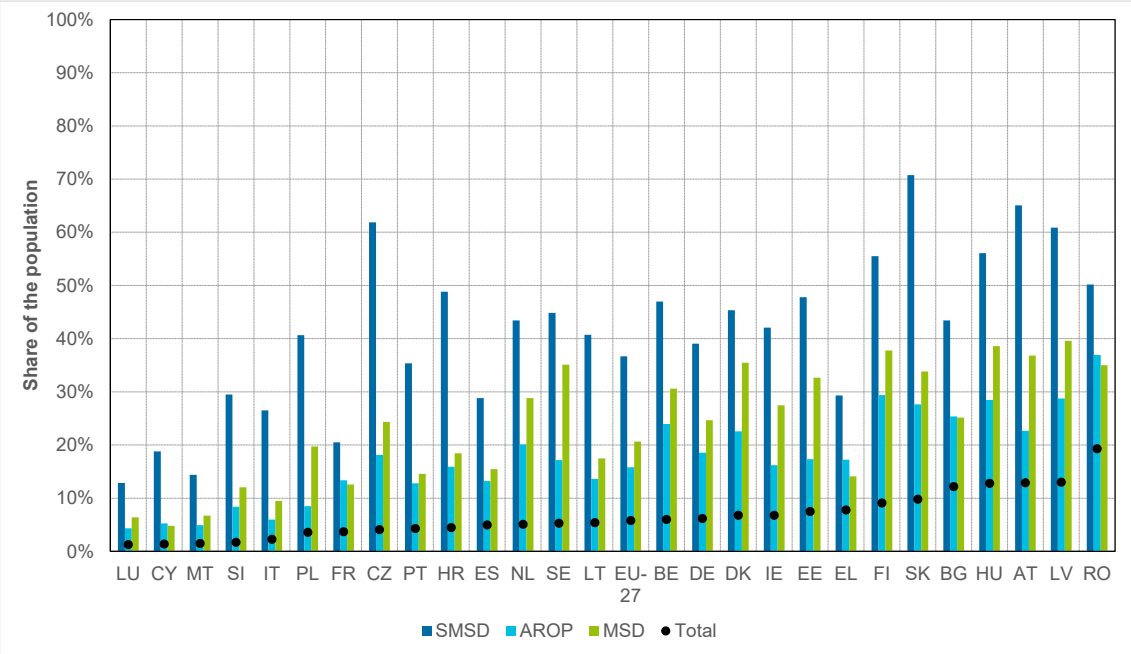
Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households amongst the AROP population that spend more than 6% on transport by degree of urbanisation. A household is AROP (at-risk-of-poverty) if it has total expenditure below 60% of the national median total expenditure. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU-Average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): EE, RO, BG, LT, HU, SK, HR, CZ, SI for the category 'Cities'. EE, FI, BG, LV, HU, LT, SK, HR, CZ, SE for the category 'Towns and suburbs'. LU, FI for the category 'Rural areas'. DK for all categories. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): LU, LV, FI, SE for the category 'Cities'. RU, LU, NL, SI, MT for the category 'Towns and suburbs'. EE, BG, NL, BE, SK, SI, CZ for the category 'Rural areas'. BG for the category 'Total'.

4.3. Unaffordability of transport is a much greater issue for vulnerable populations

Figure 22 shows the share of the population that cannot afford a car and faces enforced lack of a car for the different population groups: at risk of poverty (AROP), materially and socially deprived (MSD) and severely materially and socially deprived (SMSD). ([45]) The share amongst these vulnerable groups is much higher than in the total population and it is particularly high for the SMSD population.

Figure 21: Share of the population that faces enforced lack of a car among vulnerable groups, 2022



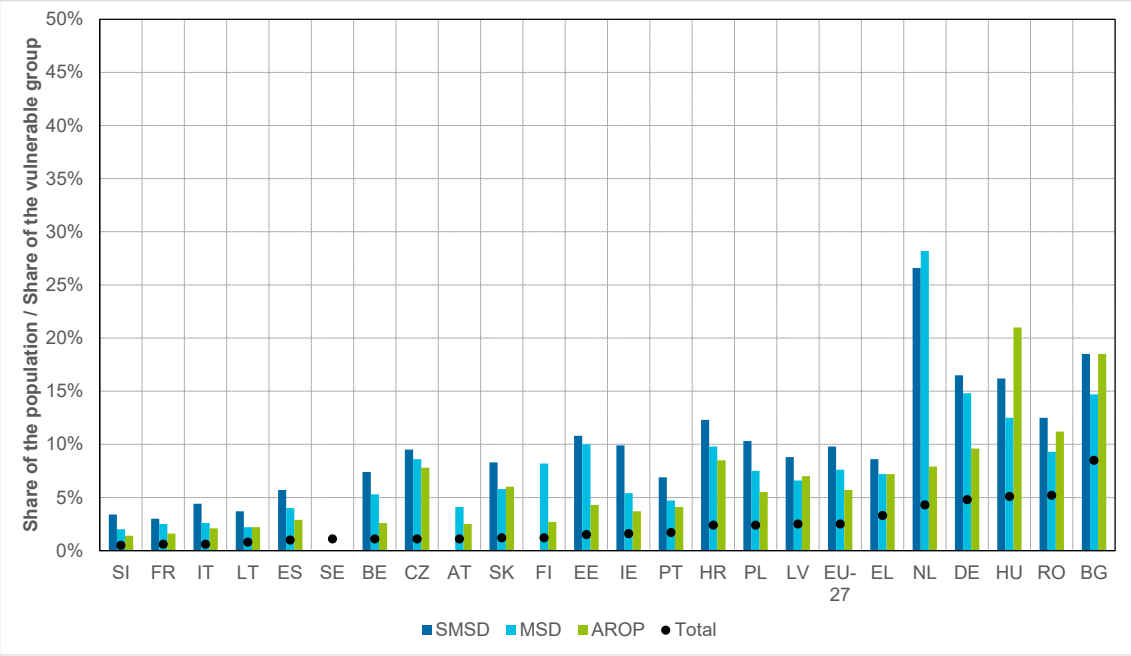
Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

Notes: EU average is weighted. The chart shows people who face enforced lack of car (answered 'no, cannot afford to the question of whether they have a car [variable HS110]) among those who are: 1) severely materially and socially deprived (meaning that they lack at least seven items out of thirteen items included in the new material and social deprivation indicator, 2) materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator, 3) at-risk-of-poverty (having an equivalised disposable income below 60% of the national median income) and 4) among the total population. See footnote 30 for the exact definition of MSD and SMSD.

Similarly, the share of the AROP, MSD and SMSD population indicating that public transport tickets are too expensive and that they face unaffordability of public transport is much higher than the share in the overall population (Figure 23). The difference is particularly high in Czechia, Slovakia and Italy. The difference is particularly low in Bulgaria, Romania and Greece, for which the overall population shares are large. It could be expected that subsidised public transport for vulnerable groups should reduce the share of these groups facing affordability issues. Therefore, countries for which the difference between the general population and the vulnerable population is low could be those that have effective subsidy schemes for those groups.

([45]) For more information on the MSD and SMSD see footnote 30.

Figure 22: Share of the population for which public transport tickets are 'too expensive' by vulnerable group, 2014



Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, ticket too expensive" to the question "Do you regularly use public transport?" [PD090] amongst different population groups: At risk of poverty (AROP) [HX080], severely materially and socially deprived (SMSD) [RX060], materially and socially deprived (MSD). Individuals are AROP if their income is less than 60 % of the national median. The SMSD indicator provides a measure related to the (in)ability of individuals to be able to afford seven of thirteen predefined material items. The list of thirteen items includes the following: 1) capacity to face unexpected expenses; 2) capacity to afford paying for one week annual holiday away from home; 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments); 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) ability to keep home adequately warm; 6) have access to a car/van for personal use; 7) replacing worn-out furniture; 8) having an internet connection; 9) replacing worn-out clothes by some new ones; 10) having two pairs of properly fitting shoes (including a pair of all-weather shoes); 11) spending a small amount of money each week on him/herself; 12) having regular leisure activities; 13) getting together with friends/family for a drink/meal at least once a month. Individuals are MSD if they are not able to afford five of the thirteen predefined material items. Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. The EU-27 average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): CY, LU, MT for the shares in all amongst all population groups and total population. SE, AT, FI for the shares in the SMSD population. SE for the shares in the MSD population. SE for the shares in the AROP population. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SI, FR, BE for the shares in the SMSD population. AT, FI for the shares in the MSD population. FR, LT, BE, AT, FI, NL for the shares in the AROP population.

Box 7: Romanian experience on the affordability of transport services in towns, suburbs and rural areas

In Romania, there are 320 urban settings, out of which 103 are municipalities (bigger administrative relevance). Moreover, Romania is administratively organised in 42 counties, including the capital of Bucharest. Each county has a municipality of socio-economic and political relevance, called "capital county". Each capital county has a public transport service network. In addition to these places, there are public transport services in other 38 cities, totalling 80 cities ([46]) across Romania with public transport services. These public transport services are administered by local authorities and usually offer services at affordable prices or have a system of discounts for different categories identified as vulnerable by the city councils and supported by subsidies offered from the local budget.

Since, small towns and rural areas rarely have public transport services, alternatives are provided through a system of public licences for private transport operators. While there are some principles and legal provisions to be followed related to affordability and accessibility, private operators usually have higher prices than the public transport companies. Moreover, across and even within counties, the prices per kilometre may vary from one transport operator to another. Therefore, households that do not live in cities with public transport may be faced with higher prices for transport and a transport schedule that is rather scarce in frequency. In these circumstances, the cost of mobility is even higher, putting an extra burden on the most vulnerable. Households located in rural areas depend heavily on those private transport operators. Moreover, private operators do not mirror the system of discounts existent in the public transport systems, thereby generating higher costs for households. These aspects explain why there are still households that find public transport expensive and cannot afford to pay for their mobility, as expert interviews conducted in the context of the Romanian national case study indicate. However, this analysis reflects mainly the situation of households and individuals who depend on public transport due to certain constraints (geography, area of residence, income or other personal features) or due to individual choices.

Pilot studies conducted for two rural regions situated in the metropolitan area of Brasov and the vicinity of other urban settlements (Alba-Iulia) indicate that the poor public transport infrastructure (reduced frequency, reduced connectivity, higher prices) encourages people to use private cars or find other commuting solutions (Consorțiul SMARTA 2021). Moreover, when local authorities from both urban and rural areas have been involved in consultation processes and the public transport offer was developed based on households' needs (frequency, affordable passes, clear communication of the schedule), the number of passengers increased. However, being a pilot study, the data from the experiment cannot be generalized. Moreover, the lack of geospatial data prevents a thorough accessibility analysis. Also, the scarcity of data related to the existence of the bike lanes at national level, leave this means of transport poorly examined and explored as a viable alternative for mobility. As a large share of the population at risk of poverty or social exclusion lives in rural areas, towns or suburbs in Romania (HBS, 2022), there is an overlap between the most economically deprived groups and those facing difficulties in meeting transport costs. Note that more recent EU-SILC data indicators an improvement since local public transport services are improving and are becoming

([46]) Estimation based on findings by CSD.

present even in smaller cities in Romania.

Finally, the share of the AROP population identified as affected by the 6% and 2M indicators is significanctly higher than the one identified for the bottom half of the expenditure distribution (cf. Figure 15). It is particularly high amongst the AROP population in Cyprus, Portugal, Malta, Italy and Sweden for the 6% indicator and in France, Luxembourg, Italy, Luthuania, Spain and Malta for the 2M indicator (Figure 24). This result is as expected, as households at risk of povety have lower incomes and lower overall expenditure and are more likely to be forced to spend a larger part of their overall budget on necessary travel. Please note, that the MSD and SMSD indicators cannot be calculated based on the HBS, which is why only the AROP indicator is shown in this case.

Figure 23: Share of the AROP household population identified by the 6% and 2M indicators of transport affordability, 2015

Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households amongst the AROP population of households that spends more than 6% or more than twice the national median on transport. A household is AROP (at-risk-of-poverty) if it has total expenditure below 60% of the national median total expenditure. Total expenditure is used as a proxy for income, because income is not available for all countries. The EU average is weighted. AT is missing from the data and is therefore not included in the EU average. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeros in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, CZ, DK, HR should be flagged for the 2M indicator due to a low number of observations (20-49 observations). According to Eurostat rules, BG should be flagged for the 6% indicator due to a low number of observations (20-49 observations). According to Eurostat rules, SI is excluded for the 2M indicator due to a low number of observations (<20 observations). According to Eurostat rules, DK is excluded for the 6% indicator due to a low number of observations (<20 observations).

For Spain, Alonso-Epelde, E., García-Muros, X., González-Eguino, M. (2023) report that expenditure-based indicators (in their case 10% and 2M) are highest amongst the middle class. They compare low-, middle- and high-income households.

4.4. The incidence of transport poverty aspects across EU regions

The results in Section 3 show that the availability of transport options as measured by the indicator capturing materially and socially deprived individuals with car ownership is a particular issue in several southern European Member States. The indicator was above the EU average in Greece, Cyprus, Spain, and Portugal, as well as in Bulgaria, France, Romania and Ireland. This points to a particular availability problem in the southern European region. Greece, Cyprus, Spain and Portugal also perform relatively poorly in one or both of the HBS affordability indicators, indicating affordability issues alongside availability ones. According to the HBS affordability indicators, further southern European Member States perform relatively poorly related to affordability in general (Malta) and affordability for vulnerable groups (Italy).

According to our definition, the 'enforced lack of a car' indicator measures affordability issues. This indicator was particularly high in Romania, Latvia and Austria, as well as Hungary, Bulgaria and Slovakia (Figure 11). In general, Member States from central eastern Europe score high in this indicator (with the exception of Poland). This result points to the fact that also in the central eastern European region several countries face both availability and affordability issues.

Austria, Finland and France seem to face a particular challenge in relation to both private and public transport availability, especially in rural areas (Section 3). For Finland, this also holds with regard to the accessibility of public transport for persons with reduced mobility (Section 3.2.4).

Finally, Bulgaria, Romania, Hungary, Germany and the Netherlands show the lowest performance specifically related to the affordability of public transport, as they have the highest share of the population stating that tickets for public transport are too expensive.

In general, however, as noted in the scoreboard analysis (Annex) no straightforward pattern emerges related to the incidence of transport poverty across the EU. As presented in this section, some trends can be described but overall, no clear worst or top performing region or country emerges. Important data caveats also present challenges in providing a concrete picture of transport poverty in the EU.

In relation to all of these regional and country trends, further analysis is needed on the extent to which these results are related to the geography, demography and policy landscape of these countries, keeping in mind the data limitations described above.

5. Tackling transport poverty: policies and measures

This chapter classifies existing policies and measures that can address the dimensions of transport poverty according to a proposed set of categories. It provides an overview of the existing practices and challenges in designing and implementing strategies and policies that address some dimension of transport poverty. The measures identified are

not exhaustive and offer an insight of the existing approaches on tackling manifestations of transport poverty across the Member States surveyed.

The policy analysis is grouped in six main thematic areas, as presented in Table 4. This covers the following topics: price, financial, social and legislative measures, infrastructure and national strategies. Each thematic area is explored in different sub-chapters, which consider an array of policy measures and the set of criteria included in the evaluation process. The findings address aspects related to policy making, stakeholder involvement in the process, and the need for data driven policies.

The chapter is organized in six sections. The first one offers an overview of the status on tackling transport poverty across EU countries, explains the methodology of data collection and the process of analysis, and starts a discussion on the meaning of "vulnerable groups" in relation to transport poverty. More nuances on the "vulnerable group" concept are added within the following subchapters when presenting the identified policy measures. Subchapters 5.2 to 5.6 offer an insight on thematic policy measures (price, financial, social and legislative, infrastructure and national and regional policies) adopted by the surveyed MS, merging theoretical discussions with concrete policy examples.

5.1. Status-quo on tackling transport poverty in EU countries

In the EU, there is a common definition of transport poverty, provided in the Social Climate Fund Regulation. At national level, most policies and legislative measures either do not refer to transport poverty per se or are at an early phase of development and implementation. In addition, most Member States have adopted various measures that address specific aspects of transport poverty. Moreover, some countries have adopted national, regional and local strategies and long-term action plans for responding not only to people's mobility needs, but also to their socio-economic wellbeing. Therefore, across Member States there is a consistent variety of policy measures and strategies that seek to address the various dimensions of transport poverty.

Transport is an essential service that has the potential to enhance socio-economic mobility, reduce inequality among groups, and overall increase social inclusion. Therefore, transport is a strategic policy area for national and local governments. In a context of multiple layers of decision-making, governments are responsible for setting the strategic vision, the regulatory framework, and the means to achieve these goals. However, without proper implementation and coordination among various stakeholders from different levels of governance, significant challenges persist to implement strategic policies.

This section presents an overview of measures that can address one or multiple dimensions of transport poverty, but mostly do not address the full multidimensionality of the issue.

To obtain an overview of these measures, a three-step-methodology was developed. Firstly, two in-depth expert surveys focused on the countries represented in the project consortium were conducted with experts who are part of the consortium (Belgium, Germany, Poland, Spain, and the UK). One of these surveys was geared to the broader national context and is referred to as "Survey 1." The other is geared to

national policy practices and is referred to as “Survey 2”. Secondly, an expert survey was conducted with experts outside the consortium with reference to EU Member States not included in the consortium (Austria, France, Hungary, Ireland, Malta, the Netherlands, Portugal and Slovenia). This expert survey is referred to as “Survey 3”. Thirdly, a desk review was carried out on additional cases (Greece and Sweden in particular, given the consortium decision on the relevance of these cases) and on policies and literature indicated in expert interviews for policy clarification.

The surveys aimed at identifying existing policy practices related to transport poverty. The survey templates communicated to experts can be found in the Annex 9. The surveys focused on the following:

- Survey 1 targeted the role of transport poverty in government agendas, related challenges and integration with other policies, climate policy in particular.
- Survey 2 targeted existing policies assessed for their adequacy to tackle transport poverty by looking at the type of measures, assessment of transport poverty dimensions covered (the 3 As), the geographical coverage, the policy area, the types and numbers of actors involved in policy-making and implementation, the status of its implementation, beneficiaries, measure details, evaluation (evaluation studies if available, or expert desk evaluation).
- Survey 3, geared to third project parties, enquired into the same aspects, in a more simplified manner.

Six sets of surveys were collected for surveys 1 and 2 with reference to Belgium, Germany, Poland, Romania, Spain and the UK. 15 further experts replied to the survey invitations sent outside the consortium using mainly the complete email list of the ENGAGER ([47]) network and targeted experts identified within Energy Poverty Advisory Hub networks. Additional experts were individually approached from the professional networks of the consortium members. From the final 15 completed surveys, those referring to non-EU Member States were eliminated, while duplications were merged with existing information for complexity.

In the data analysis process, one step included a mapping of the relevant stakeholders, their interplay in the policymaking process and how the different layers of governance across nation states and the EU have an impact on transport policies. In addition, the analysis explores how policies address specific challenges across different layers and models of governance.

Table 4 – Thematic areas of policy interventions

	Short overview	Countries that implement
Price	Social tariffs, discounts and reduced or free tickets and passes.	All MS surveyed ([48]) (Austria, Belgium, France, Germany, Hungary, Ireland, Malta, Netherlands, Poland,

([47]) The “Energy Poverty Action: Agenda Co-Creation and Knowledge Innovation (ENGAGER 2017-2021)” project.

([48]) All MS surveyed refers to the countries included in expert survey (members of the consortium and from the extended network of European experts): Austria, Belgium, France, Germany, Hungary, Ireland, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, and Spain.

		Portugal, Romania, Slovenia, Spain) have adopted national or local policies of social tariffs or other price subsidies.
Financial	Subsidies, vouchers, tax exemption that encourage electric mobility. Not all of them tackle transport poverty.	All MS surveyed implement a form of electric mobility subsidy programme. These measures do not address transport poverty as the vulnerable groups are not directly targeted France is an outlier, having designed a social leasing programme (Mascaro and Hermine 2024).
Social	Categories directly identified as vulnerable (low-incomes, people with disabilities or health conditions, pensioners, students, pupils or parents with infants) with measures designed to facilitate access to mobility. The measures are usually price-based, but also involve aspects related to availability (dedicated public transport services) and accessibility (access ramps, devices used for easing the mobility, frequent stops, etc).	All MS surveyed recognize certain, which are targeted either through financial, awareness campaigns, dedicated infrastructure for different categories of individuals with special needs (e.g. people with disabilities, low mobility or health conditions) etc., implemented nationally or at the local level.
Legislative	Legal documents that define vulnerable categories, establish procedures, funds for investments, tax schemes or deductions, etc. Usually, the targeting process and the schemes are part of complex systems of social protection measures that aim to facilitate socio-economic mobility and ensure the access to basic services.	All MS surveyed have legal provisions that address at least indirectly one aspect related to transport poverty or there is a national system/fund put in place.
Infrastructure	Extension of the public transport, cycling or walking infrastructure; More accessible public infrastructure for people with disabilities or reduced mobility (e.g., parents with infants)	All MS surveyed, including local authorities from these countries invest in more accessible infrastructure.
National and Regional strategies	National Master Plans with clear stated objectives and actions plans for addressing transport poverty manifestations. These strategies define transport poverty, target the vulnerable groups, at least partially, and propose solutions.	Portugal, Ireland, the UK (partially, at regional level), Belgium, the Netherlands, Spain.

Source: Own compilation

Beside the policy intervention categories, the evaluation process included a set of criteria that structured the assessment process, indicating details about the policy design, stages and actors involved in the implementation, the targeting phase and how/if the 3As are addressed:

- **well-designed policy intervention**: The policy addresses a wide range of mobility issues, includes working definitions and is well-structured. It sets clear objectives and actions.

- **smooth implementation:** The policy involves multiple stakeholders who work collaboratively in its implementation.
- **identified beneficiaries:** The policy clearly identifies its beneficiaries and targets the vulnerable groups.
- **availability:** The policy aims to make transport options more available, thereby reducing transport poverty.
- **accessibility**: The policy includes measures to improve access to mobility overall, and access to essential services and goods more specifically, across the country or within a specific territory. Elements related to environmentally sustainable mobility are equally important in addressing transport accessibility.
- **affordability**: The policy aims to make the transport options affordable for all the people, including the ones with low incomes or belonging to other vulnerable groups.

Throughout this chapter, there is an ongoing discussion on how to identify vulnerable groups most impacted by the various dimensions of transport poverty. Starting with the criteria listed in the working definition (see pages 13-16 of this report), vulnerability can be linked to the three core dimensions of transport poverty: availability, accessibility and affordability.

Relative to availability, vulnerable groups have no or limited access to public and private transport. This dimension is related closely to the infrastructure availability and it is addressed through several policy examples in the following chapters.

In terms of accessibility, vulnerable groups face extreme difficulty or are unable to reach (other) essential activities, services, and goods. While infrastructure may be available, there are other criteria that may lack (limited connectivity to essential services like hospitals, schools, markets, workplace, etc) or the time needed to reach these essential services and goods is excessive. The safety and security of individuals is another component that can be included in this discussion. In this study, these aspects are considered under the adequacy dimension, which is cross-cutting to all the dimensions of transport poverty. The examples presented in the analysis address the vulnerability-accessibility nexus.

Lastly, in relation to affordability, vulnerability can be assessed through the high share of transport costs in relation to the household or individual income. Therefore, vulnerable categories are often low-income individuals and households. However, throughout the policy analysis, there are examples of identified vulnerable groups in relation to affordability, that are not linked directly to low incomes, but are included through other socio-economic characteristics (age, status, health condition).

5.2. Price-related policy measures

Policy measures related to prices, including social tariffs for various vulnerable groups, discounts, and reduced or free tickets and passes are measures with an impact on the affordability dimension of transport poverty given the cost reduction of transport fares. Additionally, throughout this section the concept of vulnerable groups is explored

looking at how various Member States choose to define these and include afterwards in policy measures.

Aiming to reduce the costs of transport in relation to the households' income, these measures reduce the financial burden of (public) transport. Especially in times of crisis, but also related to the introduction of an emission trading scheme for the road transport sector (ETS2, which will also cover the building sector and additional sectors), price-related measures are important for mitigating the negative impacts that will affect mostly low-income groups and other vulnerable categories. Moreover, addressing the affordability of public transport is crucial for ensuring that disadvantaged individuals have access to (other) essential services.

Since these types of measures involve large budgetary interventions, there are a set of aspects that need further inquiry. One major concern is that reducing ticket prices, while beneficial for low-income users, could result in decreased revenue for transport companies or public transport associations. This potential loss of revenue might hinder their ability to invest in expanding and maintaining infrastructure, which is critical for providing reliable and high-quality services. Therefore, it is essential that such affordability measures are combines with measures and investments to promote the access to transport, further developing the necessary infrastructure.

Three main findings can be drawn from the pricing measures identified. Firstly, in terms of governance, both national *and* local authorities across EU Member States have adopted price-related interventions. This was often carried out with the support of other relevant stakeholders, including public transport companies, private operators, various ministries involved in the targeting process and civil society organizations. Secondly, the clearer the design of the measures, the easier it is to implement, be it nationally or locally. Thirdly, targeting vulnerable groups is a complex issue and requires the involvement of a large group of stakeholders, cooperation among actors, and proper budgetary planning. For example, price interventions addressed through national legislation can cover large groups of the population, given broad inclusion criteria that refer to age, health conditions, profession, social status, etc, but it may raise questions related to over targeting. This means that on the one hand, various potentially vulnerable groups are covered by such measures, while on the other hand they do not specifically target the most vulnerable, which could result in inefficient policy design.

5.2.1. Social tariffs for large categories of beneficiaries

The policy review identified national measures addressing large categories of vulnerable beneficiaries (e.g., Hungary, Poland, Romania). These measures are generally implemented at the national level. Some selected categories receive additional support at the regional or local level (e.g., additional local measures for pupils in Romania). Such policies are more typical of the post-communist regions, but not only. Across national landscapes relatively similar categories of individuals are targeted, despite some slight differences between countries. These are mostly associated with low income or the absence of it, certain health conditions or merits related to public duties: pupils and youth up to the age of 18 or older, associated with access to mandatory education or national legal work permit limitations; university students given their lower degree of employment; pensioners; people with disabilities and related documented health conditions; beneficiaries of one or several social benefits (low-income groups, social assistants, etc.); categories credited with certain symbolic statuses (e.g. war veterans).

In **Hungary**, the government adopted a new tariff policy in March 2024 that applies across the country for all railway passengers (the MAV company) and public road transport users (Volánbusz 2024). As a result, all passengers under the age of 14 and over 65 can travel free of charge, and all passengers between the ages of 14 and 25 can travel with a half-price ticket. The measure also targets people with disabilities, long-term illnesses, and their companions, who may travel for free when using the railway infrastructure. Around one million civil servants, teachers, health workers and firefighters, etc. have a 50% discount based on a subscription, but these categories are not necessarily vulnerable per se, raising questions related to the targeting process and the reasons behind this extensive inclusion process apart from the general objectives of reducing CO2 emissions due to private transport. As a result, public transport in Hungary became more affordable for a large number of people, including specific vulnerable groups. To date, there is no available data that could assess the success of the policy, but these new tariff measures are adding to an existing system of discounts and benefits for specific groups (students and pupils, pensioneers and people over 65 and people with specific health conditions) (Hungary Today 2024). Also, these types of interventions require coordination and cooperation among the large number of stakeholders involved, not only for the design stage, but also for the targeting and implementation processes.

5.2.2. Social tariffs for local and national public transport

This section provides examples of social tariffs for local and national public transport. The list is not exhaustive and other good practices are implemented or under trial. While affordable public transport is a key measure in addressing transport poverty since it makes transport more accessible to those facing financial hardship, it also benefits a broader segment of the population, not just those directly affected by poverty.

In **Poland**, the public transport systems across the large municipalities are generally affordable for the population. For example, cities like Warsaw, Gdansk, Wrocław, and Krakow subsidise transport costs by nearly 70%. Discounts are available for a wide range of beneficiaries, including pupils, students, and the elderly, though these discounts vary between rail and urban transport and differ from city to city. Some cities offer free public transport until the age of 16 and from the age of 70, while others provide discounts. Smaller cities with limited financial resources struggle to offer similar subsidies. Therefore, these kinds of interventions could be extended outside the large- or medium-sized cities that can financially sustain extended subsidies, with support from the central government or other financing mechanisms.

In **Romania**, most large- and medium-sized cities have a satisfactory public transport system. Public transport services that operate under the principles of affordability and access facilitation for isolated groups are widespread. While the principles are not explicitly mentioned in any legal document, the manner of organising and operating the system indicates these aspects. For example, each municipality subsidises the transport services and establishes the prices for tickets. These prices follow the principles of affordability for all the potential passengers, regardless of their income. Moreover, especially in the wealthy municipalities, there is a system of discounts in place for the categories considered vulnerable. For example, in the Cluj-Napoca municipality, retired people have free passes on the public transport network all across the city and the system of discounts covers other categories of the population (CTP Cluj-Napoca 2024). However, not all municipalities can afford large benefits for their

residents and without proper interventions from central governments, there is a risk of unequal response to transport vulnerabilities across urban areas.

Programs designed under the format of targeted discounts for the regular users of public transport (buses and trains) for urban and interurban passengers have also been adopted in other EU Member States, including Spain, Germany or Belgium. In Luxembourg, free public transport is provided in the entire country and to the entire population.

In **Spain**, under the coordination of the government and with the active participation of the Ministry of Transport and RENFE (the national railway operator), bus and rail users received discounts (a range from 50 to 100% discounts) for 16 or more trips every four months, easing the price burden and increasing the chances of using public transport means for daily mobility (Ministerio de Transportes y Movilidad Sostenible 2024). At the local level, Sevilla offers free urban buses to some unemployed categories and discounts to large families (Tussam 2024; Consorcio de Transporte Metropolitano del Area de Sevilla 2024). The Barcelona Metropolitan Area grants full free public transport for a period of three years to anyone retiring their old car not complying with most recent emissions standards.

A “close-to-free” policy initiated in **Wallonia (Belgium)** is a price measure aimed at young people under 25 and elderly over 65 regardless of their socio-economic conditions. Priced at 1 Euro/fare, the measure makes public transport affordable to selected categories, while also motivating citizens to use public transport over personal vehicles. The measure has not been implemented yet but is in the negotiation phase. In addition, countries like Belgium and Spain do not record a very high pressure of the costs of public transport on individuals (cf. Figure 13), as it is indicated in the composite indicators. This can also be explained through the measures that address affordability of public transport.

With high media coverage, the **German Federal Government** introduced the ‘9 Euro’ ticket in June 2022, at the peak of the energy crisis, for a duration of 3 months. This ticket covered almost all regional public transport in Germany, which was a novelty among the monthly tickets available in the country. Targeting affordability, the measure aimed to ease the burden of the spiking energy prices on individuals. The ‘9 Euro’ ticket was considered to be cheap enough to attract new users to public transport. In addition, it provided financial relief for everyone, but most importantly for low-income households. From May 2023, the government adopted the ‘49 Euro’ ticket with the aim to simplify the use of municipal tariff systems when travelling through different municipalities and to make the use of public transport more attractive in the long term (DB Fernverkehr AG 2024). Like the ‘9 Euro’ ticket, this special ticket covers almost all the regional public transport in Germany, and it is cheaper than other monthly passes. The main beneficiaries are the regular users of public transport and the holders of monthly public transport passes. The reduced-price tickets increase affordability. The ‘9 Euro’ ticket has been replaced by the ‘49 Euro’ ticket (per month). It has been purchased by fewer people compared to the ‘9 Euro’ ticket. In addition to the price, the fact that the ticket can only be purchased as a subscription with payment by a current account may also be a reason for lower uptake. For low-income groups, the ‘49 Euro’ ticket may still be too expensive, especially if it is only available as a monthly subscription. Therefore, most regional transport networks offer social tickets for public transport at a reduced price, which are only available to people on low incomes (e.g., social welfare recipients). Unfortunately, these tickets are often only valid on the regional transport network. In the EU-SILC surveys, around 5% of German respondents find that public transport is expensive, and they cannot afford it (Figure

23). However, the data were collected prior to the adoption of the '49 Euro' ticket and more recent data may indicate a higher satisfaction rate.

Additional measures in **Italy** are noteworthy: the national Government provides some cash-back on public expenses to groups with an income under EUR 20.000 (Ministero del Lavoro e delle Politiche Sociali 2024). The Lombardy region in Italy offers social tariffs to some social groups on their regional all-public-transport seasonal ticket (Regione Lombardia tutti i diritti riservati 2024).

5.3. Financial policy measures

Financial policy measures include a diversity of instruments, from subsidies to various tax exemption systems and voucher policies that facilitate access to clean and accessible transport for citizens. Some stand out for their positive impact on vulnerable populations. Moreover, the display of financial policy measures can include the creation of specific funds destined to finance availability or accessibility projects or even the design of local programmes aimed to promote public transport mobility by offering free passes or discounts.

5.3.1. Financial policy measures for private transport

France has implemented a programme that tackles both transport poverty (the affordability, accessibility and availability dimensions) and promotes electric mobility. A social leasing programme that addresses car dependent low income families facilitates the access of citizens to personal electric mobility through a subsidised car leasing plan (Ministère de la Transition écologique et de la Cohésion des territoires 2024). This initiative involves an agreement between the French government, leasing companies, and original equipment manufacturers (OEMs), offering 17 vehicle options ranging from the A-segment to small vans. Provided beneficiaries are car-dependent, they can access a rental policy offering prices ranging from EUR 49 to 150 per month, excluding insurance. The program is based on three-year leasing contracts, with the option to purchase the leased vehicle at the end. The subsidy, consisting of both a bonus and social leasing subsidy, is capped at EUR 13.000/beneficiary and is conditional on meeting certain environmental criteria. The program was perceived as highly attractive, receiving over 90,000 applications within a short period, with 50,000 being accepted, demonstrating a keen public interest in electric mobility. However, its success also highlights areas for improvement, such as reducing subsidy levels to broaden accessibility without straining the state budget, and enhancing transparency, particularly among leasing companies. Additionally, concerns are raised about the relatively short duration of the leasing period, prompting a need for reassessment in future iterations of the program. The total cost of the programme for 2024 was 650 million Euro. In comparison to the usual schemes aimed at renewing national car fleets, this programme is designed to better target vulnerable households. This is also a good example of cooperation between public and private entities.

Portugal, on the contrary, implemented the Incentiva + programme as an extensive financial measure to contain carbon emission coming from transport (Babo 2023). Tax revenues (i.e., EUR 360 million in 2024) would be dedicated to transport poverty mitigation measures, such as electric mobility new transport facilities and improved access to public transport in rural and isolated areas, increasing the chances for vulnerable consumers to access better quality and sustainable transport. This policy

stands out as a good example in terms of emission containment and public transport facilitation.

5.3.2. National funds for public transport facilitation

The **Polish** Government established a Public utility Bus Service Development Fund, through the FRPA, a national fund to co-finance interurban public transport operators to develop new bus services and operate regional intercity bus transport (Ministerstwo Infrastruktury 2024). The programme does not apply to urban and metropolitan public transport. Co-financing is provided in the form of a subsidy per vehicle kilometre of the supported bus lines, a surcharge on the price of service. The surcharge is set at an amount of no more than PLN 3.00 (EUR 0.75) per vehicle kilometre of public utility transport. The condition for obtaining the surcharge is that the organiser finances a part of the price of the service to an amount that is at least 10% and the conclusion of a contract for the provision of public mass transit services. From 2020, the Fund's trustee distributed PLN 800 million (approx. EUR 180 million) annually. This is a well-designed policy intervention because the policy addresses a wide range of mobility issues, includes working definitions and is well-structured. It sets clear objectives and actions. The policy involves the cooperation of multiple stakeholders with national coordination, to facilitate regional-level transport.

5.3.3. Local subsidies for public transport

The Green Friday initiative of the **Romanian** Environment Ministry involved a recommendation for local public administrations to offer free public transport on Fridays in order to increase public attractiveness for the usage of buses as opposed to private cars and reduce the environmental impact of urban transport. The initiative was taken up and sustained by some city halls, such as Cluj-Napoca, Romania, where it was considered good practice given the constant increase of commuters between 2020-2023, as a study shows (Kirchler et al. 2023). More insights are needed to establish the climate and budgetary impact of the policy. Local autonomy in project implementation and funding resulted in many administrations giving up implementation due to high costs. Where implemented, the policy provided high transport affordability, however, given that the policy was primarily implemented by wealthier communities, it did not necessarily target the most vulnerable overall. Policy programmes that are designed as multimodal transport option for frequent commuters require both complex planning (consultations among stakeholders, needs assessment, and targeting the groups who would benefit the most) and budgetary interventions for all the policy implementation stages.

For example, the park-and-ride programmes implemented in **Germany** and in Barcelona, **Spain**, offer low fares on integrated transport systems. Frequent public transport users from all metropolitan municipalities in Barcelona can park their vehicles at a reduced or free rate in designated parking areas around strategic transport nodes, integrating various transport means (train, tram, bus, bikes, etc.), for 24 consecutive hours, while moving around through public transport. Service registration is performed through a free app, website or call centre (Àrea Metropolitana de Barcelona 2024). The policy stands out for increasing access to public mobility, accessibility and reducing fare costs for commuters.

5.4. Social and legislative policy measures

One important step in addressing the various aspects of transport poverty is to identify and target through measures the categories of people most affected. This process is rather complex and involves both data gathering and analysis proceeding, and also cooperation among stakeholders. Throughout the MS practices, the targeting step can be carried out by means of legislative instruments, at national level, or decisions made at local level by various authorities. In other words, through national legal frameworks various identified vulnerable categories (e.g. pupils, students, pensioners, people with disabilities or reduced mobility and other health conditions, low-income households and individuals, etc) benefit from low fares or various mobility packages usually across the borders of a state, while the measures taken by local authorities only apply to a specific region or municipality. Based on the vulnerabilities identified, the measures can involve various interventions, from price-based ones to accessibility and availability.

5.4.1. How to target the vulnerable groups and their needs?

The process of targeting the vulnerable groups is conducted in various manners across EU Member states, involving different processes and procedures.

In **Romania**, through legislative measures a set of vulnerable categories are identified at national level and hence, a set of actions are recommended and implemented. Firstly, university students, pensioners, people with disabilities or specific health conditions, survivors and heroes from World War II and the 1989 Revolution, children institutionalised, and children with at least one deceased parent receive various discounts for the train travels across the country or, in some cases, lump sums for fuel. Secondly, similar categories benefit from free or discounted fares for the local public transport mobility – a decision that is subject to political debates in each city council with a public transport service. The greatest challenge for these categories in terms of availability, accessibility and affordability remains the transport in small towns and rural areas in which public transport infrastructure is underdeveloped. Finally, in the process of making these provisions actionable, a large number of both governmental and private actors are involved, from various ministries (transport, education, social affairs) to transport operators (bus operators, train companies) and civil society groups. While this generous targeting tackles many aspects related to transport poverty (availability and affordability mainly, but also accessibility), the bureaucracy around the process is still heavy and discouraging in accessing the benefits.

Equally importantly, some targeting processes and measures may not directly address transport poverty, but some of its manifestations. With the explicit objective of reducing the school dropout rate and integrating vulnerable pupils in the educational system, **Romania** adopted measures addressing some aspects of transport poverty under the new education law in September 2023 (Stănescu 2023). These new measures providing free fares on public transport or school buses, including special transport to soliciting pupils enrolled in public education, increased the accessibility and availability of transport means for pupils who reside outside the administrative units of their school. This highly bureaucratic procedure was facilitated through a cooperation between the Ministry of Education, the county councils, who coordinate public transport operators, and the county school inspectorates. The process involves an official solicitation from parents or caregivers, the approval of the school of enrolment, data centralisation by school inspectorates and city council organisation of transport facilities. The companies offer these services based on the lists received from the school inspectorate. The Ministry of Education operates the financial transfers based on these situations.

Additionally, all pupils have free railway transport for 2nd class tickets and are entitled to free local public mobility (on buses, tram, metro or boats or similar) on the basis of a free monthly travel card. Municipalities and public transport companies play an important role in implementing this measure nationally. While the process is not necessarily smooth, and further adjustments are required as the bureaucracy represents a burden for the stakeholders involved (especially for the private transport operators and the county school inspectorates), the measure per se indicates a large process of cooperation between different layers of governance.

Similarly, in **Poland** there is a national system of subsidised public transport for children enrolled in public and private kindergartens or primary schools and students with disabilities to facilitate access to education. As a main actor in the implementation process, each municipality is responsible for providing transport and care during transportation for these categories. The municipality can either offer the transport services or reimburse the costs if the parents or caregivers are providing the transport. However, transport for secondary school students is not guaranteed through national programmes, hence not subsidised, even though the need for support exists for this category as well. Specific measures that require coordination across layers of governance are important for both testing the cooperation mechanisms, but also for highlighting the need of local authorities in implementing national strategies (Król 2023).

In the **Netherlands**, the process of targeting and proposing tailored policies has taken a different route. Through the Environmental Assessment Agency (PBL in Dutch), an autonomous research institute, data are analysed, existing policies evaluated, vulnerable households and individuals targeted, and new transport measures proposed (Bastianseen and Breedijk 2022). Additionally, a Dutch National Accessibility Metrics was developed for generating better insights at neighbourhood level into access to jobs and amenities with different modes of transport and at different times of the day and week. For example, the metrics rely of a specific set of data: open access “travel time” data, administrative data sets and survey data. Moreover, the accessibility indicators were finetuned using the following data: a. data for the destination locations (facilities and jobs), the origin locations (neighbourhoods or residential areas) and the transport network between locations (travel times per mode of transport). The data sources are a mix of geo spatial data, aggregated with residential locations identified based on postal codes and addresses of the facilities (educational facilities, healthcare facilities, jobs, markets and green areas). Moreover, diverse national datasets have been used for this extensive mapping process, including data about the residential areas and specific classification. For the travel times, another set of computations have been performed based on the existing travel time data and some assumptions (walking time based on specific distances) (Bastianseen and Breedijk 2022). As the process was very complex, the report offers more insights int the methodology.

The goal was to gain insights into the access to jobs, healthcare, education, shopping with different modes of transport and at different moments of the day. The data analysis found substantial differences in accessibility: people that use a car have by far the highest accessibility to amenities and jobs, even during peak hours, while those who (have to) rely on public transport have considerably less accessibility, especially if they live in rural areas, urban fringes and suburban areas. Although bicycle use contributes to increasing accessibility, this is often limited in rural areas or at the outskirts or urban areas. These types of accessibility metrics allow policymakers to assess how different transport and land use policies and investments could improve the accessibility to other key essential services by different population groups and areas. The indicated measures need to be personalised based on these accessibility metrics and other urban data and adapted to specific urban or rural settings. For

example, for new urban planning, these metrics may help avoiding further accessibility challenges, avoiding therefore some key aspects related to transport poverty. However, it falls under the governmental (national and local) responsibility as to how these data and insights are ultimately translated into concrete policies.

Similarly, in **Slovenia**, there is an initiative that brings together both governmental bodies including several ministries, research institutes and non-governmental organizations that aims to define, measure and assess the transport poverty phenomenon across the country (ZRC SAZU 2024). Starting from a rather academic initiative, with the endorsement of several ministries (Ministry of Environment, Climate and Energy, the Ministry of Natural Resources and Spatial Planning and the Ministry of Infrastructure) and other research institutes, the initiative has a bottom-up approach. Firstly, it aims to collect and analyse data, and then explore solution. The last stage involved the implementation and the active participation of governmental bodies. This is an innovative approach both on the mapping process and the solution design stage. First results indicate that households in rural or isolated areas seem to be highly deprived of mobility options. Moreover, the initiative aims to assess how accessibility challenges can be alleviated, especially in rural areas, based on geo-spatial indicators. A second stage of the programme aims to work on the management of public transport, involving the Public Passenger Transport Management Company in the consultation loop. On-demand public transport is a widely recognised solution, especially as a solution for sparsely populated areas. Its benefits and effectiveness remain a point of discussion and should be evaluated in a case-by-case situation upon implementation (Ryan and Martens 2023).Tackling adequacy in transport poverty

Transport welfare is promoted by adequacy features of public mobility. These include general conditional elements, such as the absence of mobility access barriers, sufficient and easily accessible information on travel opportunities and elevated safety and security travel conditions of the travel service and infrastructure. Specific positive measures have also been identified for targeted vulnerable groups, such as measures that take into consideration gender-specific mobility patterns, target disabled citizens, or increase the access to education of targeted marginalised groups.

The **Metropolitan area of Barcelona** stands out for an initiative aimed at increasing travel security for women and minors through the implementation of a more frequent and on-demand stopping system during night-time, weekends, and holidays. ([49]) The measure also involved the reorganisation of bus-lines around main bus nodes in order to increase oversight. Based on this new system the access of the population residing in low density areas of the metropolitan area was increased. Access to transport was facilitated for these areas based on an easy to use on-demand mobile application or a call-based system whereby citizens from more isolated areas could request a mobility service. As the adequacy aspect of a service is more difficult to measure, intervention results have yet to be entirely compiled and the need for additional safety measures and impact measurements have been pointed out.

Financial and non-financial practices targeting disabilities can be identified in **Belgium, the Flanders region**. Authorities are focusing on fighting exclusion and raising awareness to the barriers that people with disabilities face when it comes to public transport. For example, the DIGNITY project supports public and private mobility providers in designing digital products and services that are accessible to as many

([49]) This measure is contained in the PMU – PLA DE MOBILITAT URBANA 2024 from the Barcelona City Council and in the PMMU 2019-2024 - PLA METROPOLITÀ DE MOBILITAT URBANA 2019-2024.

people as possible and helps policymakers formulate strategies that promote innovation in digital transport provision while responding to global, social, demographic, and economic changes (DIGNITY 2024). The special focus is on the disabled commuters, aiming to increase information availability for the public, and overall service efficiency, but also on the needs of various categories of disabled commuters. Moreover, the product will be piloted in four cities and regions from the EU (Barcelona, Ancona, Tilburg and the Flanders), and based on the input collected, the final application will be refined for responding to multiple needs.

5.5. Infrastructure policy measures

The availability of public infrastructure is an important factor of integration, both from a social point of view and from the perspective of consolidating local links between urban centres and the peri-urban, rural or small-urban communities. A number of initiatives in the EU stand out for their ability to produce better integrated regional/metropolitan contexts and high potential for spill-over of benefits commonly confined to urban centres.

5.5.1. Non-motorised infrastructure for sustainable mobility

Cycling and walking are affordable forms of mobility. Depending on circumstances they can be quick and reliable ways of getting around especially in urban contexts, but also overall for more local mobility needs. They can be an important source of transport poverty alleviation for individuals with a more short-spanned daily mobility, as is the case for more vulnerable categories. The availability of good quality and secure infrastructure, well-linked to other modes of transport is therefore important.

Between 2020 and 2023, the **German Federal Government** allocated EUR 900 million to the development of bicycle infrastructure throughout the country. The main impact of the programme was expected to be in the area of climate, given its integration in the climate strategy. Additional availability and affordability benefits were also expected. The measure was evaluated as highly acceptable and with a broad social impact, given that a large fraction share of the population that uses bicycle mobility.

Similarly, AMBici - the shared e-bike service in the metropolitan area of **Barcelona, Spain** - is an infrastructure-based measure implemented since in January 2023 to connect the Barcelona bike lanes of 15 surrounding municipalities populated with 2600 high-end e-bikes and 236 parking/charging stations (AMBici 2024). The system is fully integrated with the public transport system (train, subway, tram, bus, the shared bicycle, (i.e., Bicing) inside Barcelona, offering lower fares to those who use the integrated system. Additionally, users have access to Bicibox, a public network of free and secure parking spaces for private bicycles and scooters. The service is available to official residents and tourists over 18 years of age. This measure stands out for facilitating intermodal transport, securing accessible fares for all users, adaptability to diverse travel preferences, and high climate impact through street decluttering. The policy is positively evaluated for broad social adequacy, but also in terms of cross-administrative cooperation.

5.5.2. Transport hubs, designed as integrated public transport infrastructure

Public transport hubs are designed as integrated solutions that respond to the multiple needs of peoples' mobility. One interesting example is the **Groningen – Drenthe** hub which aims to offer a multimodal travel option (including train, park and ride options, bus stations and smaller hubs from the rural areas from these two regions) that would respond to the various needs of the residents. Operational since 2018, the hub has not started with an evidence-based approach, responding to some predetermined policy goals, but has taken an experimental approach, collecting data constantly and adapting to the peoples' needs of mobility. However, the hub was designed on an existing infrastructure that was adapted constantly (including a change of public transport stops, adopt new lines, following a bottom up policy approach) (Kask et al. 2021). The Groningen – Drente hub has been already assessed by an external team and changed accordingly. Moreover, the transport hubs are getting more and more attention, being a policy option considered in other European countries, as well (Germany – Bremen, Belgium – Flanders).

5.6. National and regional strategies

Political commitment and cooperation are important in the pursuit of such complex policies as transport. National strategies and action plans are cornerstones for further programmes as they theoretically propose a vision, actionable objectives and clear pathways for implementation. Also, based on data driven processes of identifying the vulnerable groups and with the support of large groups of stakeholders, national and regional (depending on the variety of governance models) strategies have the potential to tackle transport poverty from various angles. Equally important is the governance model within each country that has an influence on designing and implementing policies. If countries with centralised decision making at national authorities' level (Ireland, the Netherlands, Hungary etc.) have different leverage and capacity to design and implement top-down policies, for countries like Germany, or even Spain, with multiple regional governance structures, the process may be very different, both in terms of the stakeholders involved and the time needed to negotiation and implementation. Moreover, during the implementation phase, there is a need for local administrations to adapt national plans to local specificities, needs and budgets.

In this sense, there is evidence in **Belgium** in support of the effectiveness of regional and local intervention. The House of Representatives, for instance, has called on the cabinet specifically to work with provinces, municipalities, and transport services on measures to improve accessibility at all levels and to prevent the current level of public transport from deteriorating further. In Belgium, regions are able to adopt their own strategies for climate infrastructure. For example, the Flanders Climate Policy Plan supports climate-favourable narratives to generate adherence of individual commuters and private shippers to multi-modality (including cycling, public transport and shared mobility) and demand-driven transport in their routines for a climate-friendly mobility.

Moreover, the **Flanders Accessibility Master Plan** foresees strategies for making the public transport stops more accessible for people with visual and motor impairments (De Lijn n/a). By 2030 the Plan projected the installation of ride-on curbs, bus stops and tactile guidance to make stops autonomously accessible to persons with motor and visual impairment. Under the plan Flanders offers support to 30 municipalities yearly between 2021 and 2025 to draw up individualised action plans on bus stop

accessibility. The Biennial "More Mobile Municipality" awards EUR 50.000 to the most mobile municipality. Broadly, the Plan aims to impact on the general population by increasing the quality of transport overall based on conditional elements. On the other hand, the Walloon Infrastructures Plan 2020-2026 pushes financial resources towards transport infrastructure to increase convenience for commuters. Actions proposed for financing are the maintenance and modernisation of the existing road network, the creation of exclusive bus lanes, the development of transfer stations and stops in the proximity of activity centres, intermodal solutions, integration of technologies in transport, cycling and pedestrian infrastructure.

Taking a different approach, the National Sustainable Mobility Policy in **Ireland** outlines a strategic plan for the period 2022-2030 (Department of Transport 2022). The first phase aimed to solve the challenges of rural mobility by enabling at least 500,000 additional daily active travel and public transport journeys by 2030 and to achieve a 10% reduction in kilometres driven by fossil-fuelled cars. To achieve these goals, the main actions include a comprehensive process of identifying the vulnerable (based on road safety criteria, households' income, disability, or other health conditions), improving and expanding sustainable mobility options nationwide, and offering safe, green, accessible, and efficient alternatives to car travel. Additionally, it incorporates demand management to optimize daily travel requests and reduce reliance on private cars. To date, the policy has led to nearly a 15% increase in bus passenger numbers and almost an 8% rise in train passenger numbers since 2019. The policy is well-designed, with clear objectives and a strategic framework extending to 2030. Its smooth implementation involves collaboration among multiple stakeholders, including the Department of Transport, National Transport Authority, Transport Infrastructure Ireland, and local authorities. The policy identifies its beneficiaries, including the public, the environment, urban and rural communities, the health sector, the economy, and transport and mobility companies. It aims to make sustainable transport options more available and affordable, thereby reducing transport poverty, and seeks to change public attitudes towards transport, making sustainable options more acceptable and accessible nationwide.

All in all, master plans and national or regional strategies play an important role in setting the political agenda, giving priority to measures that tackle transport poverty and prioritizing measures and budgets. Moreover, it involves a process of cooperation among stakeholder ex-ante the process of implementation, preparing them for the further stages of policy implementation.

6. Conclusions

Transport poverty is a complex phenomenon that cannot be measured with a single indicator. Different indicators are needed to measure whether an individual or household is affected by the different dimensions of transport poverty (availability, accessibility, affordability, as well as the cross-cutting issues of adequacy).

This study shows that transport poverty is not a phenomenon limited to rural populations. The analysis of nine potential transport poverty indicators related to the availabilty, accessibility and affordability dimensions in this report shows, however, that those issues are more pronounced in rural areas and most pronounced in poorer rural areas. How exactly the rural population is affected in each Member State depends on geographical, demographic and economic factors, as well as on infrastructure and political decisions.

Considering income levels, as well as standard social indicators, such as at-risk-of-poverty (AROP) or material and social deprivation (MSD), when designing and interpreting potential transport poverty indicators are of particular importance. On the one hand, levels of unaffordability of transport are much higher among vulnerable groups. On the other hand, expenditure-based indicators may detect 'transport poverty' even amongst high-income households. This could be the case since households with higher income levels are more prone to own a car and regularly use it. Since these indicators consider fuel costs, it can capture those households, which are not necessarily poor, but present high transport expenditure. While this study stresses that transport poverty goes beyond material deprivation, it is important to note that certain indicators applied to the whole population may wrongly identify high-income households and individuals as being transport-poor.

The issues related to transport poverty across the EU-27 that emerge from the study are heterogeneous, though some horizontal trends can be observed. The quantitative analysis points to a particular availability problem in southern Europe, as well as in central and eastern Europe. According to the potential indicators estimated in this report, in several southern (Greece, Cyprus, Spain and Portugal) and central and eastern EU Member States (Bulgaria, Romania), the availability issue is compounded by affordability issues. Austria, Finland and France seem to face a particular challenge in relation to both private and public transport availability, especially in rural areas. The affordability of public transport appears to be more prominent issue in Bulgaria, Romania, Hungary, Germany and the Netherlands, although further analysis to understand this aspect is required.

There are important data caveats relating to the data sources that can be used for measuring transport poverty in the EU at the moment. First of all, several of the surveys used in this report are relatively old and have never been repeated. In order to effectively monitor transport poverty in the EU, timely, repeated and reliable data sources are necessary. Ideally, better survey data and spatial data covering all EU Member States would be needed to monitor all aspects of transport poverty. This is especially true in terms of geospatial data on the location of essential services and transport networks and in relation to data on important target groups (e.g. women). The results derived from the case studies show that additional data is often available at the national and local levels, which can enrich the EU-level findings. In fact, in order to design, implement and monitor policies at the national and local levels, this kind of data is indispensable.

There are some important key findings that can be drawn from this policy analysis process. Firstly, all MS surveyed have adopted and are implementing various strategies that tackle transport poverty. While not all Member States have national or regional strategies adopted or working transport poverty definitions, there is an understanding that mobility is a core component of peoples' life. Secondly, there are countries representing leading examples and have already a working structure for data analysis and targeting the vulnerable groups (Slovenia, the Netherlands, Ireland) and political coordination (Belgium) for adopting strategic master plans and policy measures. Thirdly, stakeholders' engagement in consultation processes, including various layers of governance, transport companies, be it public or private, citizens associations and experts, are a necessary condition for closing the policy loop. This is supported by examples from various countries.

Moreover, for measures related to the availability of transport, public infrastructure plays a crucial role in both social integration and economic development and cohesion, linking urban centres with peri-urban, rural, or small-urban communities that are often more vulnerable. Various EU initiatives exemplify effective regional/metropolitan

integration and the potential for widespread benefits, from bike lanes to on- demand public transport. Social tariffs for specific vulnerable groups are measures related to the affordability of transport that are implemented across all Member States surveyed. While they are adopted across various levels of governance, these social instruments are effective and necessary short-term solutions.

In the process of policy making, in targeting the vulnerable, tailoring solutions and responding to citizens' needs, local authorities play a prominent role. Since public authorities are unequal in terms administrative capacity, knowledge or embedded cooperation processes, national and EU-level support can play an important role in assisting them in developing better policies, also from a cohesion perspective. For this purpose, continuous and improved monitoring and adaptation of policies is also crucial to ensure they remain effective and inclusive. Technical assistance as well as various financial instruments and funds are important for both planning and implementing transport policies both at the EU and national levels. Equally important, transport poverty may be also addressed subsidiarily in measures that primarily tackle other challenges (air pollution, increasing the adequacy of public transport, etc). Being a multidimentional and complex issue, addressing transport poverty may require a coordinated set of policy interventions, adapted to each context. Finally, when addressing transport poverty is not the main objective, but the targeting process considers vulnerable groups, the outcomes recorded in the surveyed Member States are largely positive. Addressing transport poverty positively contributes to addressing social exclusion overall, as it can promote better access to employment opportunities, education and healthcare. In addition, promoting sustainable solutions positively contributes to tackling climate change and improving health of our citizens.

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Annex

This Annex describes the nine potential transport poverty indicators in detail, as well as the data sources, the methods used, and the assumptions made. It is structured per data source, starting with the yearly EU-SILC in Section 1, followed by the 2014 EU-SILC ad-hoc module in Section 2, the 2015 (and 2020) HBS in Section 3 and the LFS in Section 4. Sections 5 to 9 present information on upcoming EU-SILC modules, provide descriptive statistics on transport expenditures, describe the datasets used to estimate the indicators, show an overview of the indicators estimated in the literature and show the data collection template used for the section on policies and measures.

1. Indicators based on the yearly EU-SILC question “Do you have a car?” (HS110)

The two indicators in this section are based on the yearly EU-SILC question “Do you have a car?” (HS110), for which answer modalities are: 1. Yes; 2. No, cannot afford; 3. No, other reason. The variable records whether the household has a car or whether the household does not have a car because it cannot afford it (enforced lack) or for other reasons. ([50]) ‘Enforced lack’ implies that the item is something that the household would like to have but cannot afford.

According to the methodological guidance of EU-SILC, possessing a car does not necessarily imply its ownership: the car may be rented, leased, provided on loan, or shared with other households. If the car is shared between households, it is accounted as possessing it if there is adequate/easy access (i.e., the household can use the car whenever it wants). In the case of owning a car, the household is considered to possess it if any one of its members possesses it. A company car or van which is available to the household for private use counts as possessing the item. A car or van that is provided only for professional purposes should not be considered as possessing the car.

1.1. Materially and socially deprived individuals who own a car

This is an indicator developed by Mattioli (2017). It identifies households that *own at least a car and are materially deprived*. It is assumed that these individuals own a car although it may be beyond their means due to lack of alternatives, especially with regard to public transport alternatives. Therefore, this indicator reflects the (lack of) availability of (alternative, public) transport options. There is also an important affordability dimension to this indicator as it is thought to result in households cutting

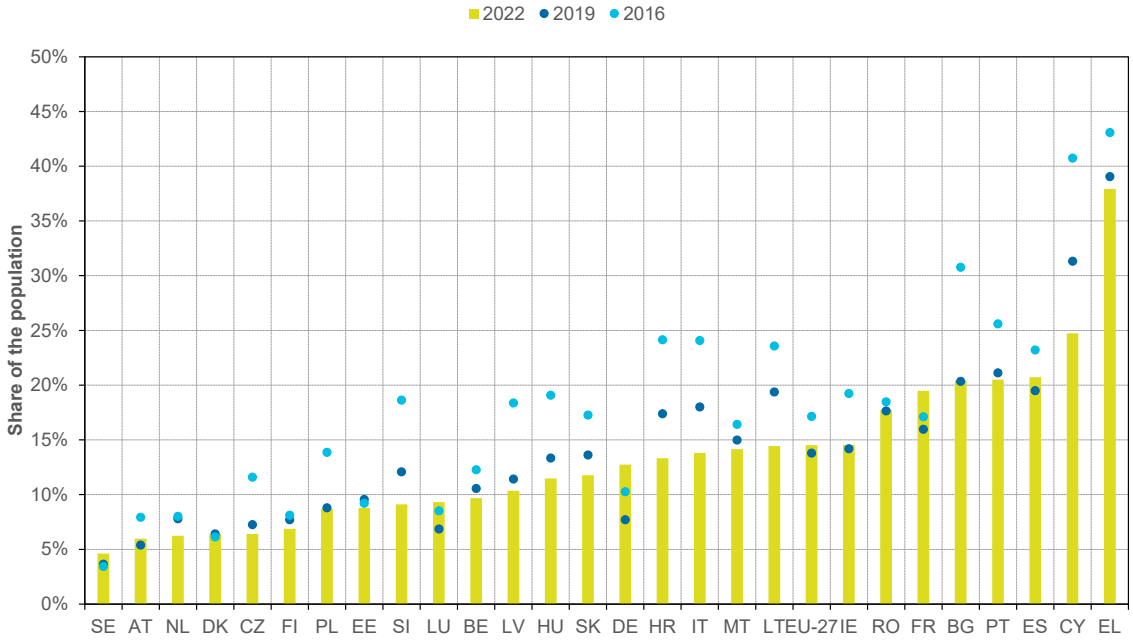
([50]) Car ownership refers to all types of cars and does not distinguish between combustion engine and electric vehicles.

expenditure on other necessities and/or reducing travel activity to the bare minimum, both of which may result in social exclusion and may further exacerbate already existing vulnerabilities.

The indicator was originally built based on a previous material deprivation indicator, ([51]) but can be adapted to the newer social and material deprivation indicator. ([52])

The EU-27 average of the share of materially and socially deprived individuals owning a car was equal to 14.5% in 2022 (Figure 3/Figure 25). The share ranges from 4.6% in Sweden to 37. % in Greece in 2022. Overall, in 2022, the indicator was above the EU average in southern Member States (Greece, Cyprus, Spain, and Portugal) except for Italy and Malta, and in Bulgaria, France, Romania and Ireland. In general, the share of the population that faces material and social deprivation and owns a car has reduced between 2016 and 2022.

Figure 24: Share of the population that is materially and socially deprived and owns a car



Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

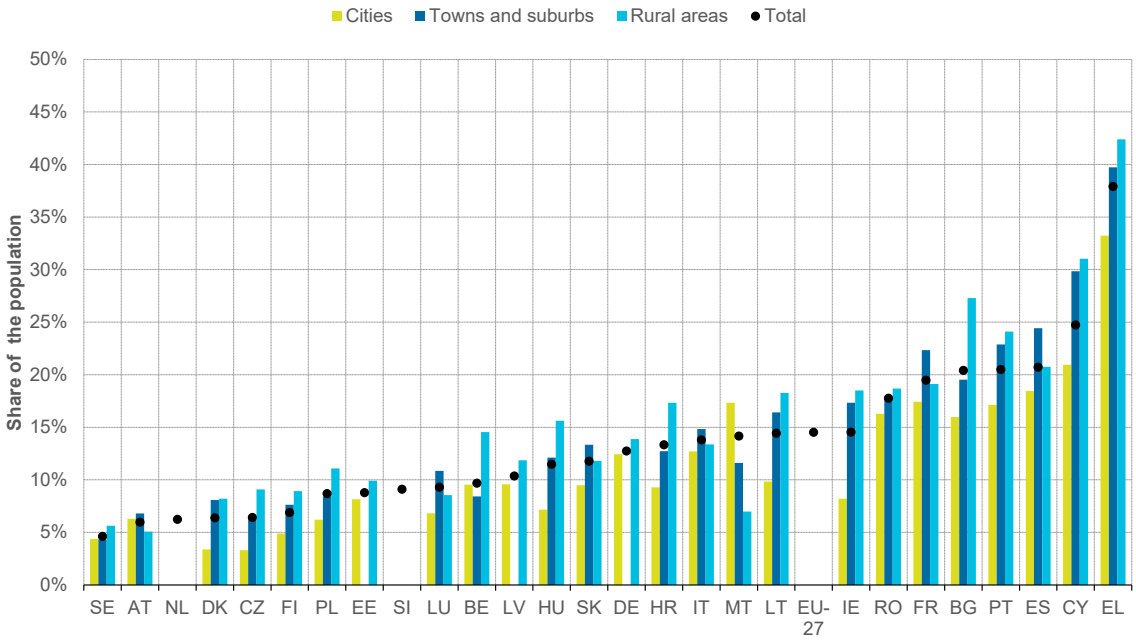
([51]) The old material deprivation indicator is available until 2020. After 2020 some of the items included in it are no longer collected at EU level. Until 2020 material deprivation was defined as the percentage of the population that cannot afford at least three of the following nine items: 1) to pay their rent, 2) mortgage or utility bills; 3) to keep their home adequately warm; 4) to face unexpected expenses; 5) to eat meat or proteins regularly; 6) to go on holiday; 7) a television set; 8) a washing machine; 9) a car. Severe material deprivation rate was defined as the enforced inability to pay for at least four of the above-mentioned items.

([52]) The new material and social deprivation indicator provides a measure related to the (in)ability of individuals to be able to afford a set of thirteen predefined material items that are considered by most people to be desirable or even necessary to experience an adequate quality of life. The list of thirteen items includes the following (seven related to the household and six related to the individual). At household level: 1) capacity to face unexpected expenses; 2) capacity to afford paying for one week annual holiday away from home; 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments); 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) ability to keep home adequately; 6) have access to a car/van for personal use; 7) replacing worn-out furniture. At individual level: 1) Having internet connection; 2) Replacing worn-out clothes by some new ones; 3) Having two pairs of properly fitting shoes (including a pair of all-weather shoes); 4) Spending a small amount of money each week on him/herself; 5) Having regular leisure activities; 6) Getting together with friends/family for a drink/meal at least once a month. The material and social deprivation rate is defined as the proportion of the population that is unable to afford five or more out of this list of thirteen items. The severe material and social deprivation rate is defined as the proportion of the population that is unable to afford seven or more of the above-mentioned items.

Notes: EU average is weighted. The chart shows people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) and are materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator. See footnote 52 for the exact definition of MSD.

Figure 4/Figure 26 shows that the share of people who are materially and socially deprived and possess a car is higher among those living in rural areas in all Member States, except Malta.

Figure 25: Share of the population that is materially and socially deprived and owns a car by degree of urbanisation, 2022



Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

Notes: EU average is not available by degree of urbanisation. The chart shows people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) and are materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator according to footnote 1 by degree of urbanisation. To be noted that the variable "degree of urbanisation" is missing for NL and SI. For DE, EE, LV the category 'towns and suburbs' is missing for DEG in 2022.

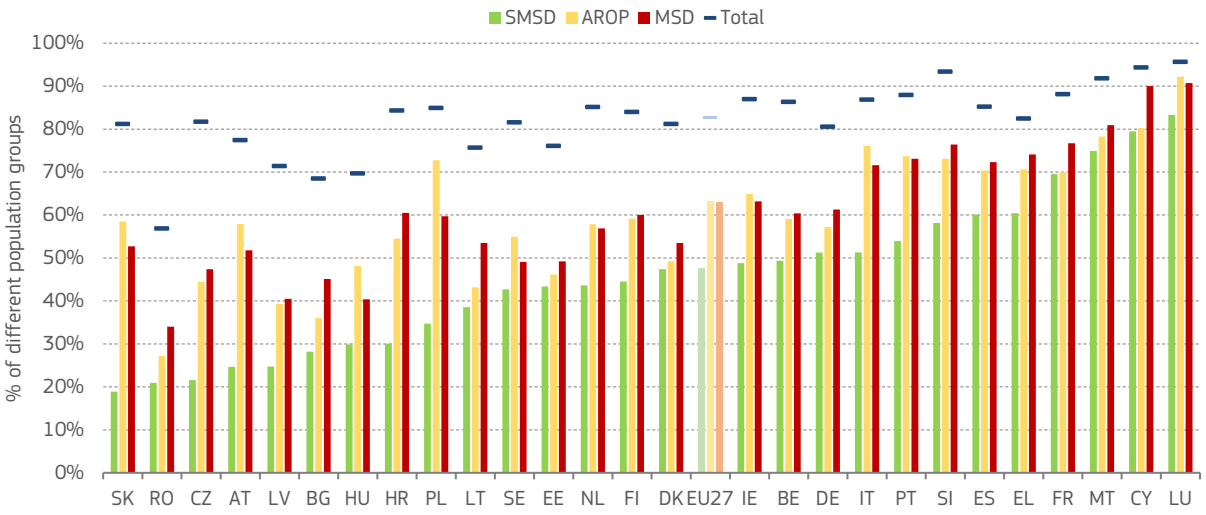
Building on the indicator related to materially and socially deprived individuals owning a car (Figure 25), Figure 27 moves a step back and shows the share of people possessing a car among different population groups. Overall, the share of total population possessing a car ranged between 57% in Romania to 96% in Luxembourg in 2022. The share is much lower, precisely around 63% on EU average, for both people at-risk-of-poverty and people materially and socially deprived. Among those severely materially and socially deprived less than half (48%) possess a car in the EU on average, although there is high heterogeneity across countries (moving from 19% in Romania to 83% in Luxembourg).

Differences between EU-level and national data – the Romanian example

There is a big difference between the EU-SILC data for 2022 and the Romanian HBS for the same year, as the Romanian HBS for 2022 indicates that only 31.8 % of households own at least a car. Official data indicate that at the end of 2022 there were

7.865.186 cars registered in RO, out of which 6.786.873 are privately owned. There are several reasons for the inconsistencies between the EU and national datasets. They have to be taken into account when analysing the data.

Figure 26: Share of the population possessing a car among different population groups, 2022

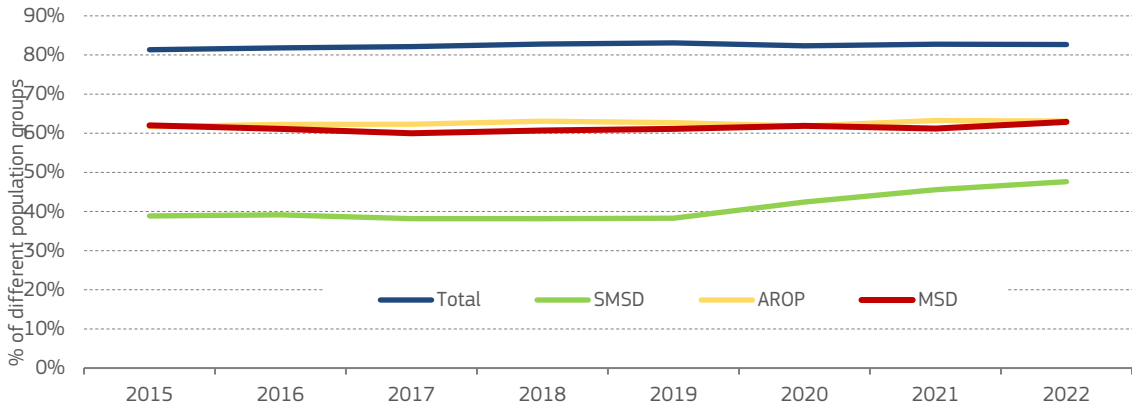


Source: DG EMPL calculations based on EU-SILC micro-data

Notes: EU average is weighted. The chart shows people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) among those who are: 1) severely materially and socially deprived (meaning that they lack at least seven items out of thirteen items included in the new material and social deprivation indicator according to footnote 52, 2) materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator according to footnote 52, 3) at-risk-of-poverty (having an equivalised disposable income below 60% of the national median income) and 4) among the total population.

Figure 28 shows a good level of stability in the share of people in different groups possessing a car throughout the years. Only among the severely materially and socially deprived there was a considerable increase between 2019 and 2022.

Figure 27: Share of the EU-27 population possessing a car among different population groups, 2015-2022



Source: DG EMPL calculations based on EU-SILC micro-data

Notes: EU average is weighted. The chart shows people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) among those who are: 1) severely materially and socially deprived (meaning that they lack at least seven items out of thirteen items included in the new material and social deprivation indicator according to footnote 52, 2) materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator according to footnote 52, 3) at-risk-of-poverty (having an equivalised disposable income below 60% of the national median income) and 4) among the total population.

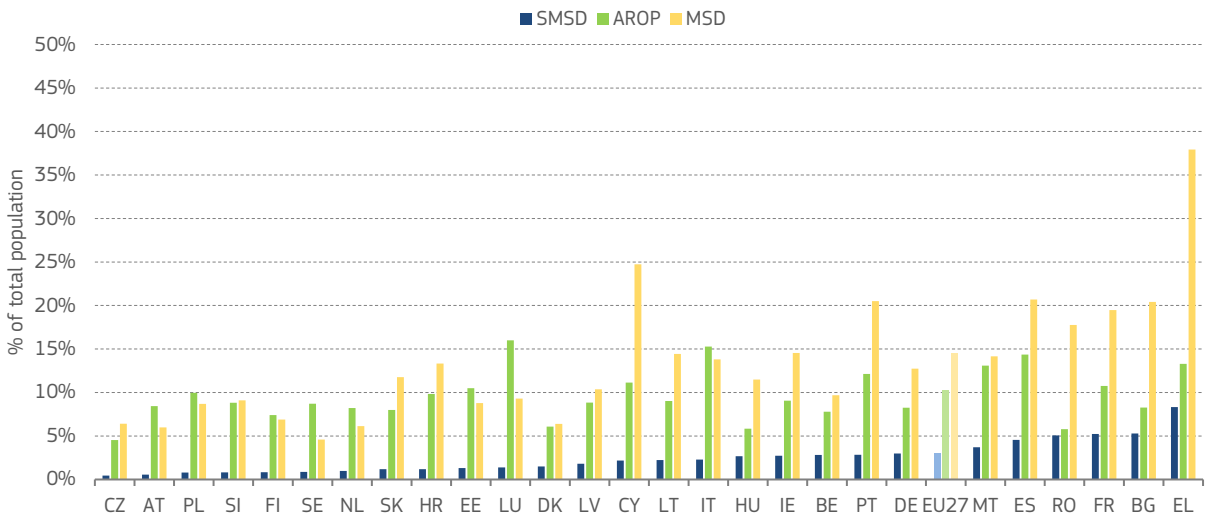
The rise of private car ownership in Romania since the 1990's

The percentage of car ownership in Romania has increased steadily from 1990's, the biggest increase being registered after 2004 when only 14% of households owned a car. Within the Romanian accession into the EU and the mobility of the workforce, more families managed to increase their standards of living through the migrant remittances. Car ownership, especially second-hand car ownership, registered a peak after 2010, as cars became more and more available for the less affluent families. Moreover, rural households with members working abroad managed to invest in appliances and other goods that were previously too expensive. Families that are materially deprived or in other forms of vulnerabilities, some may own a car due to these remittances and the massive import of second-hand cars as the qualitative literature indicates. Results on the indicator combining material and social deprivation and car ownership for Romania, with important percentages across the vulnerable populations indicate that: (i) for lack or with limited public transport options, especially in rural and small urban areas, households have to buy a car, (ii) due to cheap second-hand cars from western Europe, more families can afford to buy cars and (iii) households relied on migrant remittances for improving their quality of life, including the acquisition of cars. ([53])

Based on the analysis above and the consideration of different target groups, Figure 29 shows different alternatives for the indicator combining several vulnerability indicators with car ownership. The most stringent alternative is the severely materially and socially deprived population. The share of people who possess at least a car and are severely materially and socially deprived corresponded to 3.1% of the total EU population in 2022, and this share ranged between 0.4% in Czechia to 8.3% in Greece. The population at-risk-of-poverty is the second stringent alternative, with 10.3% in the EU owning a car and being part of the AROP population in 2022, moving from 4.5% in Czechia, to 16% in Luxembourg. Finally, the share of people who possess at least a car and are materially and socially deprived was 14.5% of the total EU population in 2022, lowest in Sweden (4.6%) and highest in Greece (37.9%).

([53]) See https://migrationcenter.ro/wp/wp-content/uploads/2017/07/Cosciug-Anatolie.-2017.-Transnational-Motorways.-The-secondhand-car-trade-in-a-country-of-emigration-Anthropology-News.pdf and https://ejes.uaic.ro/articles/EJES2020_1101_PLO.pdf

Figure 28: Alternative options: Share of the population that owns a car according to different target populations, 2022



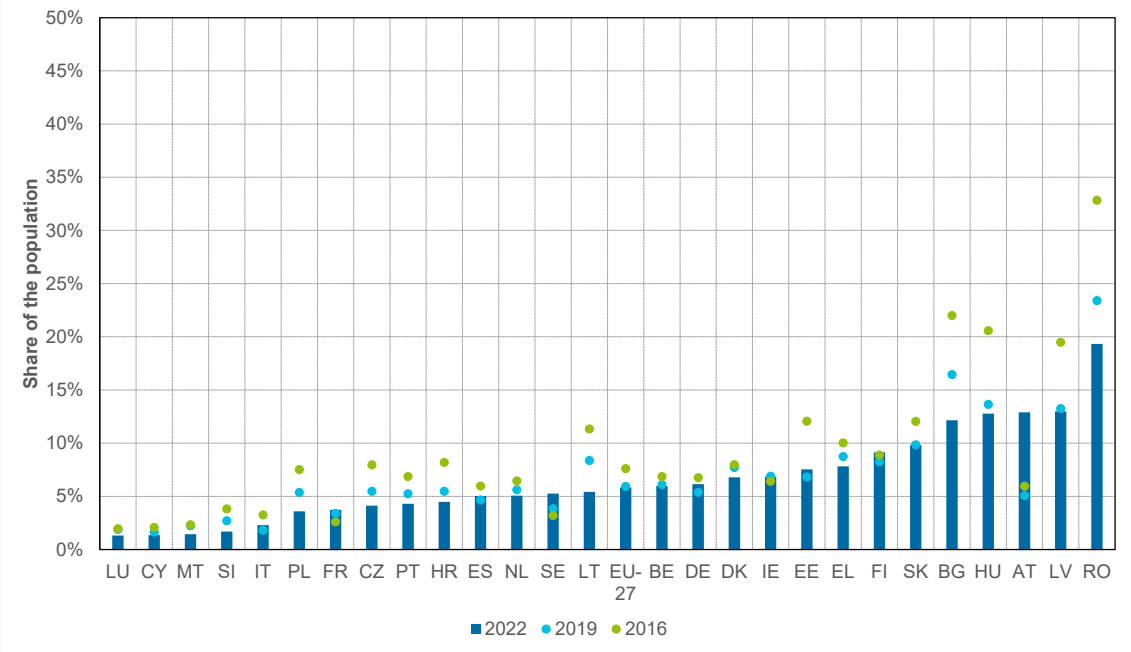
Source: DG EMPL calculations based on EU-SILC micro-data

Notes: EU average is weighted. The chart shows people who possess a car (answered 'yes' to the question of whether they have a car [variable HS110]) and are severely materially and socially deprived (meaning that they lack at least seven items out of thirteen items included in the new material and social deprivation indicator according to footnote 52, materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator according to footnote 52, at-risk-of-poverty (having an equivalised disposable income below 60% of the national median income) as a share of the total population.

1.2. Enforced lack of a car

The “enforced lack of a car” indicator is defined as the share of people who do not have a car because they cannot afford it, hence implying that the car is something that the respondents would like to have. In the EU, the share of the population that could not afford a car was 6% in 2022 (Figure 11/Figure 30). In 2022, the share ranges from 1.3% in Luxembourg to 19.3% in Romania. Generally, the share of the population facing enforced lack of a car has reduced between 2016 and 2019 and further between 2019 and 2022. For Austria, 2016 and 2019 values are much lower than the 2022 value. The 2023 value is again much lower in Austria at 4.9%. ([54]) Generally, countries from the central eastern Europe region seem to score relatively high in this indicator.

Figure 29: Share of the population that faces enforced lack of a car



Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

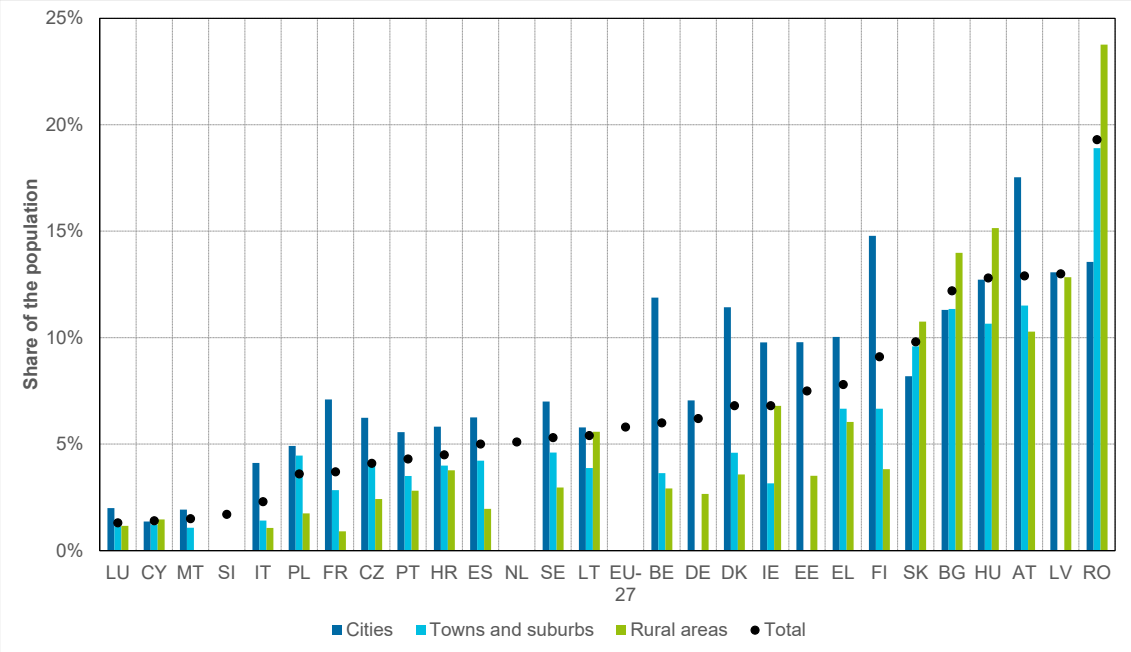
Notes: EU average is weighted. The chart shows people who cannot afford a car (answered ‘no, cannot afford to the question of whether they have a car [variable HS110]).

([54]) https://ec.europa.eu/eurostat/databrowser/bookmark/98085885-e79b-4b14-afa1-22ecf81a915f?lang=en

Figure 12/Figure 31 shows the share of people who cannot afford a car by degree of urbanisation, highlighting that in most countries the enforced lack of a car is more common in cities than in rural areas. Exceptions are Romania, Hungary and Bulgaria where the enforced lack of a car is a bigger issue in rural areas.

The fact that the enforced lack of a car is higher in cities than in rural areas is consistent with previous research (Mattioli 2014) and likely related to different perceptions of affordability, highlighting one of the issues when working with subjective data and perception-based indicators. Working arrangements may also play a role. The Polish experience shows that in cities most people work full-time based on a work contract. In rural areas, people often are formally „the farmers" ([55]) and they may have a car for their company which have some financial benefits. This may happen even in case their real involvement in agriculture is quite limited.

Figure 30: Share of the population that faces enforced lack of a car by degree of urbanisation, 2022



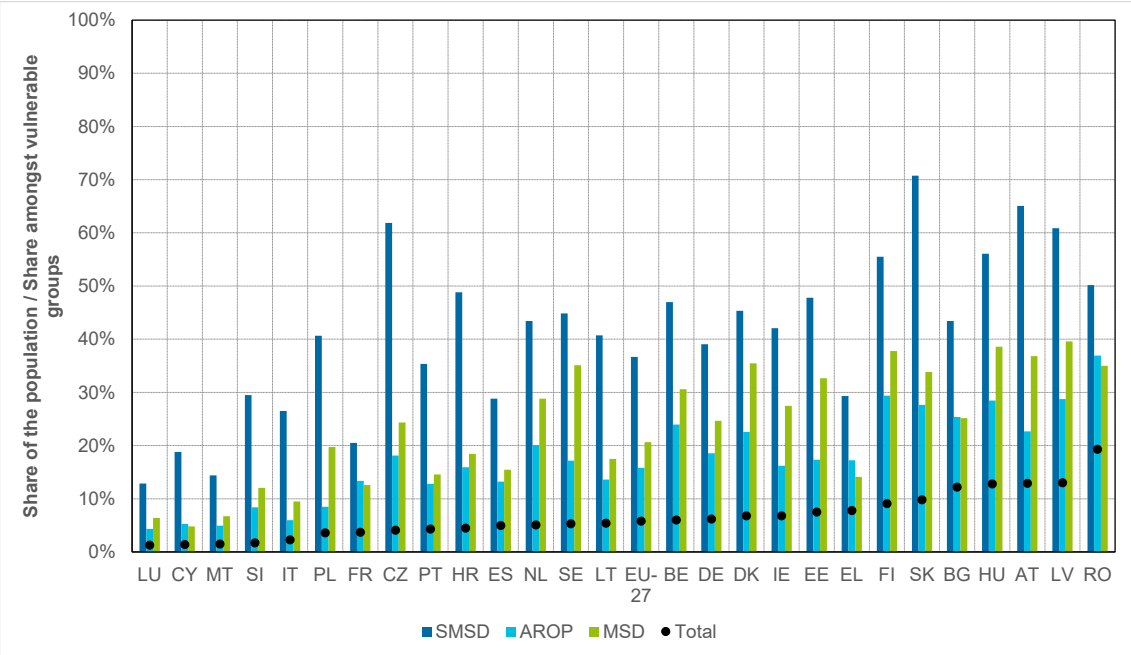
Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

Notes: EU average is not available by degree of urbanisation. The chart shows people who cannot afford a car (answered 'no, cannot afford to the question of whether they have a car [variable HS110]) by degree of urbanisation. To be noted that the variable "degree of urbanisation" is missing for NL and SI. In MT, too few observations in the 'rural' category. For DE, EE, LV the category 'towns and suburbs' is missing for DEG in 2022.

([55]) This is due to more favourable pension schemes for farmers, as well as the high fragmentation of farms compared to other countries.

Figure 22/Figure 32 shows the share of the population that cannot afford a car for the different population groups of at risk of poverty (AROP), materially and socially deprived (MSD) and severely materially and socially deprived (SMSD). The share amongst all these groups is higher than in the total population. As could have been expected, it is particularly high for the SMSD population.

Figure 31: Share of the population that faces enforced lack of a car among different population groups, 2022



Source: DG EMPL and Oeko-Institut own calculations based on EU-SILC microdata.

Notes: EU average is weighted. The chart shows people who face enforced lack of car (answered 'no, cannot afford to the question of whether they have a car [variable HS110]) among those who are: 1) severely materially and socially deprived (meaning that they lack at least seven items out of thirteen items included in the new material and social deprivation indicator, 2) materially and socially deprived (meaning that they lack at least five items out of thirteen items included in the new material and social deprivation indicator, 3) at-risk-of-poverty (having an equivalised disposable income below 60% of the national median income) and 4) among the total population. See footnote 52 for the exact definition of MSD and SMSD.

Car ownership by women and older people – insights from the Spanish case study

Findings in the Spanish case study revealed that in Spain 81.6% of the people without a driving license are women. Also, 50.9% are more than 65 years old (IDAE 2017). Also note that 74.4% of the people that don't have access to a private vehicle are women

2. Indicators based on EU-SILC question from 2014 (2013) ad-hoc module “Do you regularly use public transport?” (PD090)

The indicators in this chapter are based on the question in the 2014 (2013) EU-SILC ad-hoc module “Do you regularly use public transport?” (PD090). The answer modalities were: Yes, No - ticket too expensive, No - station too far away, No - access too difficult, No - private transport, No - other reason. And the following guidance was given in the EU-SILC questionnaire: *Public transport includes any form of transport that charge set fares, run fixed routes, and is available to the public such as buses, subways, boats, trains, etc. in the city or for intercity connections. It covers the following cases:*

- *the household member can cope with daily/regular travelling they have to do using public transport (answer Yes)*
- *the household member cannot cope with daily/regular travelling they have to do using public transport due to the ticket price (answer 2 No - ticket too expensive); or to the lack of a station, bus stop, etc. nearby (3 No - station too far away); or to the difficulties to get to the station in particular for disabled people (4 No - access too difficult); or to a personal choice in using private transport such as bike, moto, car, etc (5 No - private transport) or finally to other reason (6 No - other reason), e.g. timetable not suitable.*

The underlying population for these indicators are persons aged 16 and above, due to the use of personal surveys for this question.

This question will be repeated – with slightly different answer modalities – in the upcoming 2024 EU-SILC rolling module on "Access to essential services" (see Box).

Upcoming EU-SILC rolling modules

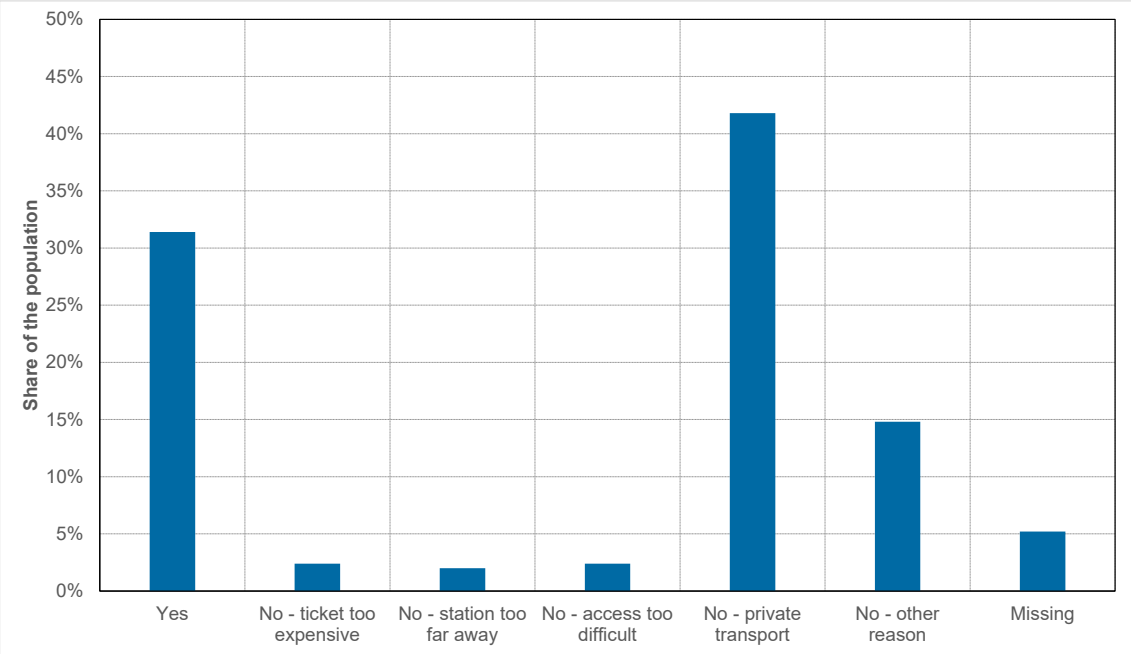
In 2024, 2025 and 2026 a number of questions and variables will be included in rolling or ad-hoc modules of the EU-SILC that can be used to estimate transport poverty indicators. The modules are:

- 2024: A 6-year rolling module on "Access to essential services" including questions on the frequency of public transport use, the financial burden posed by public transport use, as well as the main reason for not regularly using public transport.
- 2025: An ad-hoc module on "Energy and the environment" including questions on the ability to reach essential services within 1 hour and on the main modes of transport used.
- 2026: A 3-year rolling module on "Over-indebtedness, consumption and wealth"

Please see Section 5 for a more detailed overview of the questions and answer modalities in the upcoming modules.

Figure 5/Figure 33 shows the share of responses (weighted) given to the 2014 question. It is important to note that each interviewee could only choose one answer and that, therefore, a large proportion of the people for whom the stop is too far away or the ticket may be too expensive, may simply have answered “No - private transport”.

Figure 32: Share of the population that uses / does not use public transport regularly (Question: ‘Do you regularly use public transport?’)



Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module ‘Material deprivation’.

Notes: The chart shows the share of the EU population answering “Yes”, “No - ticket too expensive”, “No - station too far away”, “No - access too difficult”, “No - private transport”, “No - other reason”.to the question “Do you regularly use public transport?” [PD090].

In order to build our indicator around the three answer modalities “No - ticket too expensive, No - station too far away, No - access too difficult” it is assumed that these answers indicate cases that are particularly important related to transport poverty, as they show the most important reason for individuals for not using public transport and are therefore very useful related to policy making. There are several possibilities to improve information content of this variable related to the estimation of transport poverty indicators. Respondents could be asked to rank main challenges. They could be given more than one answer possibility or asked more than one question. Also, a follow-up question could be asked: “Why do you use private transport?”

Dedicated survey investigating non-use of public transport in the Spanish case study

The Spanish Case study analyses a survey for people who don’t use public transport or barely use it (IDAE 2017). This dedicated survey provides a more in-depth understanding of the service deficiencies or why in some cases people rely on other transport modes. Some of the main results are summarised in this box. The most

common answers for people not evaluating public transport positively were: (i) I prefer walking for ecological or health reasons, (ii) I don't need public transport because I am close to my destination, (iii) I prefer using my car.

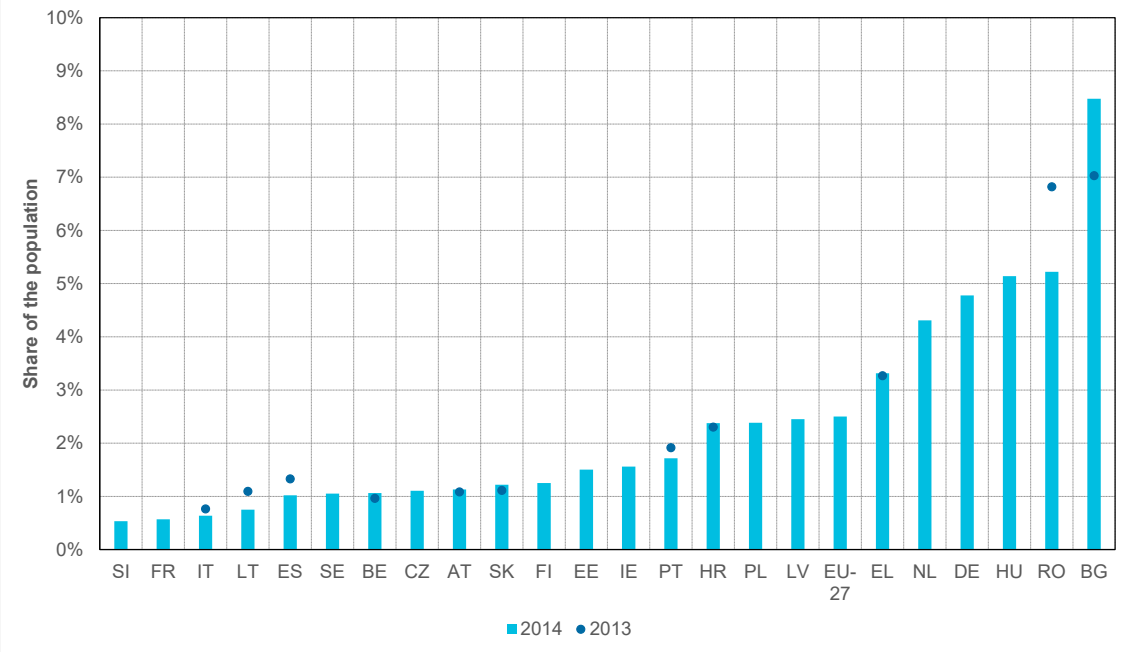
The third item reflects a group of the population who could be potential public transport users. The majority of people who prefer using their own vehicle recognize three benefits that stand out: its availability for immediate use, the possibility to travel very close to a destination, and the freedom of flexibility it offers. Even if one of the three advantages is being removed (for example, if parking in destination was difficult), the report on the survey shows that there is still no clear majority among people surveyed that would change to using public transport.

Other findings from the same study by IDAE reveal that the majority or respondents, comprising 36.7%, expressed a need for increased frequency, emphasizing the significance of having more regular and accessible transport options. Additionally, 24.6% of respondents cited the importance of a cheaper fare, underscoring the financial aspect as a critical factor influencing public transport utilization. However, a noteworthy 20.2% indicated a general unwillingness to use public transport more often, suggesting that addressing specific concerns is vital for encouraging greater adoption.

2.1. Public transport ticket is 'too expensive'

This section looks at the share of the population aged 16 and over stating that they are not using public transport, because the ticket is too expensive (Figure 13/Figure 34). The share for 2014 ranges from 0.5% in Slovenia to 8.5% in Bulgaria. The EU-27 average is equal to 2.1%. Generally, the share of the population who states that the main reason for not using public transport is that tickets are too expensive is relatively small (note also the methodological discussion above). Bulgaria, Romania and Hungary have the highest values, followed by Germany, the Netherlands and Denmark. While in countries with lower overall income levels, such as Bulgaria, Romania and Hungary, the household budget available to pay for the tickets may be the biggest reason for unaffordability, in countries with higher overall income levels, such as Germany, the Netherlands and Denmark, high ticket prices and/or perceptions thereof may cause individuals to choose this answer.

Figure 33: Share of the population for which public transport tickets are 'too expensive'

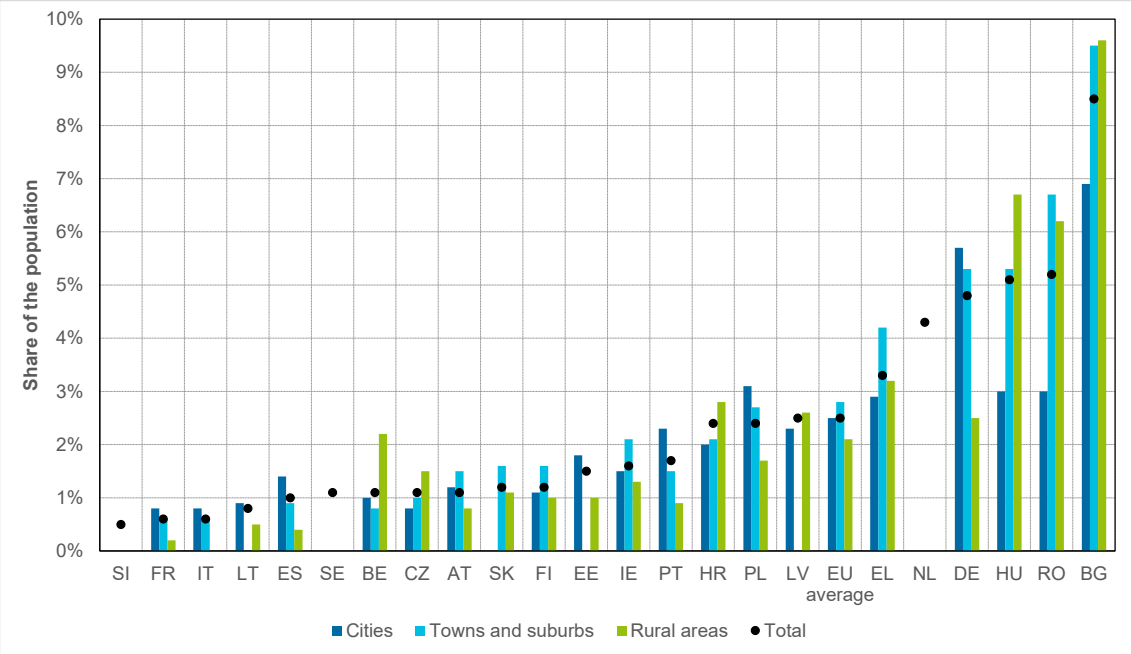


Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, ticket too expensive" to the question "Do you regularly use public transport?" [PD090]. The EU-27 average is weighted. The variable PD090 is missing for CY, CZ, DE, DK, EE, FI, FR, HU, IE, LU, LV, MT, NL, PL, SE, SI in the EU-SILC 2013 data. According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): CY, LU, MT in the EU-SILC 2014 data. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%).

Figure 35 shows the unaffordability of public transport by degree of urbanisation. In Hungary, Belgium, Romania, Czechia, Croatia, Bulgaria, Latvia and Greece the share of the population that cannot afford public transport is higher in rural areas than in cities. In all other Member States, the share in cities is higher than in rural areas. The difference is especially large in Spain, France, Portugal, Germany, Poland and Latvia. In Romania, Greece, Ireland, Slovakia the share is also highest in towns and suburbs. The EU-Average shows the highest share for towns and suburbs.

Figure 34: Share of the population for which public transport tickets are 'too expensive' by degree of urbanisation, 2014



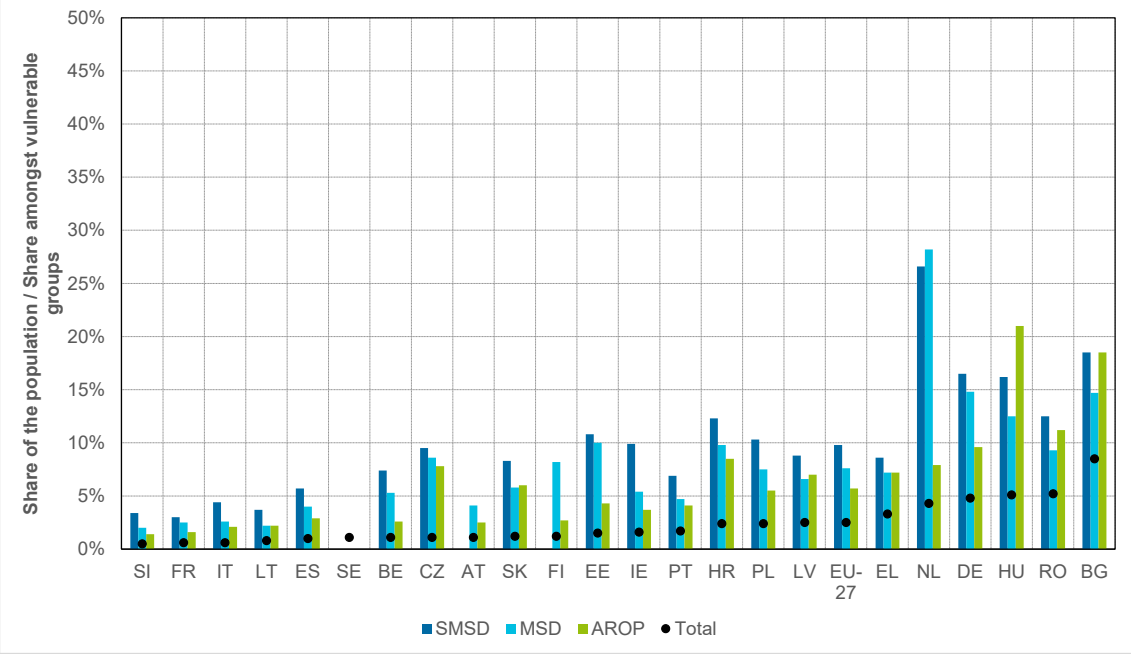
Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, ticket too expensive" to the question "Do you regularly use public transport?" [PD090] by degree of urbanisation [DB100]. Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. For NL and SI there is no information on the degree of urbanisation available. LV and EE have no observations in the category 'towns and suburbs', because the observations in the category "towns and suburbs" were merged to "cities" for anonymisation. MT has no observations in the category "rural areas", because the observations in the category "rural areas" were merged to "towns and suburbs" for anonymisation. Therefore, NL and SI have not been included in the calculation for the EU-Average and LV, EE and MT were included accordingly to the categories available. The EU-Average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): CY, LU, MT for the shares in all degrees of urbanisation and in the total population. SE, SK for the shares in the category "Cities". LT, SE for the shares in the category "Towns and suburbs". IT, SE for the shares in the category "Rural areas". According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): LT, BE, CZ, AT, FI, IE, HR for the shares in the category "Cities". FR, ES, BE, CZ, AT, FI for the shares in the category "Towns and suburbs". FR, LT, ES, BE, CZ, AT, FI for the shares in the category "Rural areas".

As expected the share of the AROP, MSD and SMSD population indicating unaffodability of public transport is much higher than the share in the overall population (Figure 23/Figure 36). The difference is particularly high for both target groups in Czechia, Slovakia and Italy. The difference is particularly low in Bulgaria, Romania and Greece, where the overall population shares are large. In total, the share of the SMSD population facing unaffordability of transport is particularly high in the Netherlands,

Bulgaria, Germany and Hungary. Amongst the AROP population in Hungary, Bulgaria and Romania.

Figure 35: Share of the population for which public transport tickets are 'too expensive' among different population groups, 2014



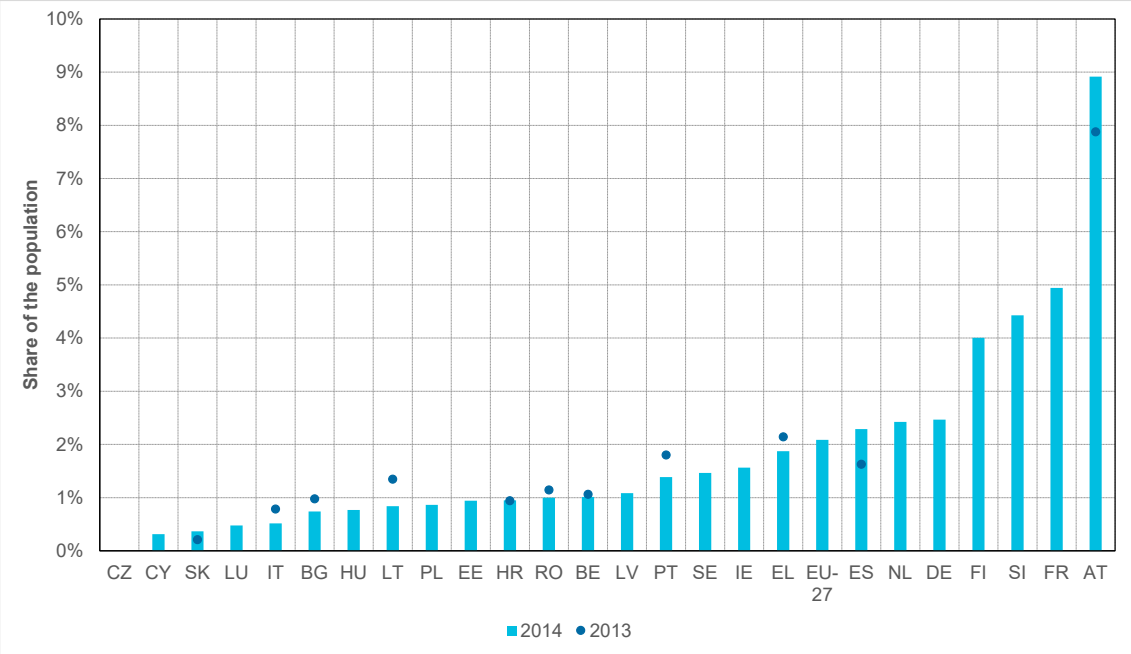
Source: Oeko-Institut own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, ticket too expensive" to the question "Do you regularly use public transport?" [PD090] amongst different population groups: At risk of poverty (AROP) [HX080], severely materially and socially deprived (SMSD) [RX060], materially and socially deprived (MSD). Individuals are AROP if their income is less than 60% of the national median. The SMSD indicator provides a measure related to the (in)ability of individuals to be able to afford seven of thirteen predefined material items. The list of thirteen items includes the following: 1) capacity to face unexpected expenses; 2) capacity to afford paying for one week annual holiday away from home; 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments); 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) ability to keep home adequately warm; 6) have access to a car/van for personal use; 7) replacing worn-out furniture; 8) Having internet connection; 9) Replacing worn-out clothes by some new ones; 10) Having two pairs of properly fitting shoes (including a pair of all-weather shoes); 11) Spending a small amount of money each week on him/herself; 12) Having regular leisure activities; 13) Getting together with friends/family for a drink/meal at least once a month. Individuals are MSD if they are not able to afford five of the thirteen predefined material items. Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. The EU-27 average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): CY, LU, MT for the shares in all amongst all population groups and total population. SE, AT, FI for the shares in the SMSD population. SE for the shares in the MSD population. SE for the shares in the AROP population. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SI, FR, BE for the shares in the SMSD population. AT, FI for the shares in the MSD population. FR, LT, BE, AT, FI, NL for the shares in the AROP population.

2.2. Public transport stop is 'too far away'

Across the whole population the share that says that the stop being too far away is the main issue for not using public transport regularly, is rather small (Figure 6/Figure 37). The share is high in Austria, France, Slovenia and Finland.

Figure 36: Share of the population for which the nearest public transport stop is 'too far away'

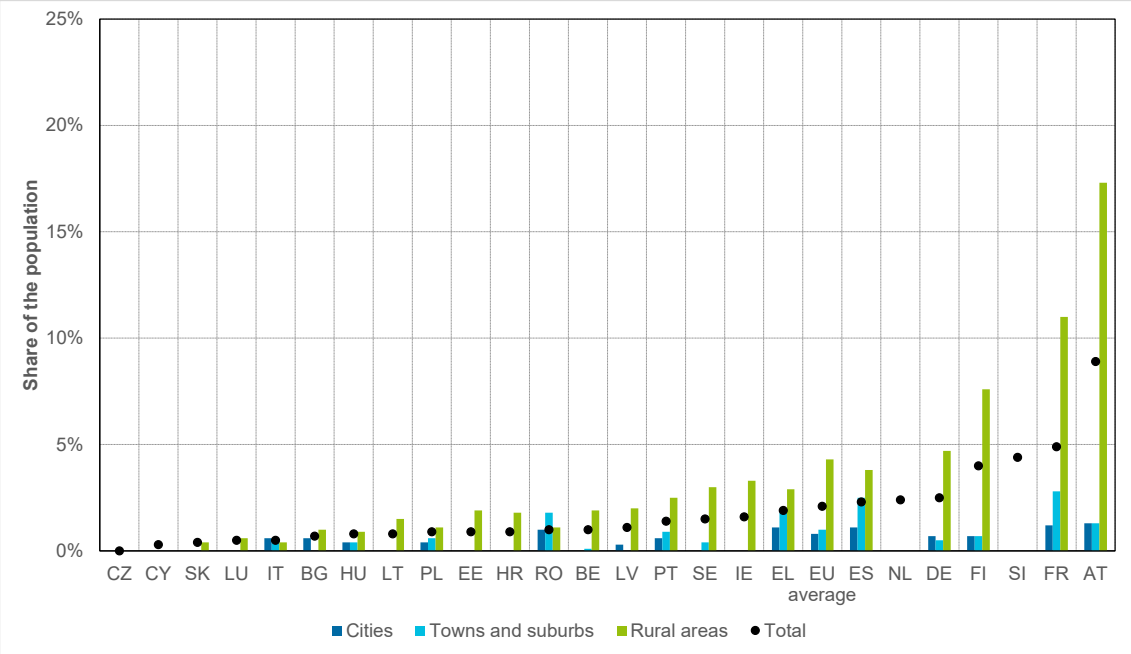


Source: Own calculations based on the EU-SILC 2013 microdata ad-hoc module 'Wellbeing' and the EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, station too far away" to the question "Do you regularly use public transport?" [PD090]. The EU-27 average is weighted. The variable PD090 is missing for CY, CZ, DE, DK, EE, FI, FR, HU, IE, LU, LV, MT, NL, PL, SE, SI in the EU-SILC 2013 data. According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): MT in the EU-SILC 2014 data. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SK in the EU-SILC 2013 data. CY, LU, SK in the EU-SILC 2014 data. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%).

Figure 7/Figure 38 shows the share of the population in cities, towns and suburbs and in rural areas that say that the transport stop is too far away, indicating that this is the main reason why they do not use public transport. In Austria, France, Finland where the share in the overall population was already high, the share amongst the rural population is highest and the increase for the rural population compared to the total population is also highest. A study by the Momentum Institut (2023) shows that the availability of public transport in Austria is highly dependent on the region. Based on an analysis linking the service quality of stops with their accessibility on foot, they show that 48% of the population have insufficient public transport availability - a figure much higher than the one presented here. There are also relevant increases in Germany, Denmark, Greece, Spain, Ireland and Sweden. The availability of public transport in rural areas may depend on the overall size of a country and how it is structured along the different degrees of urbanisation and how well rural areas are connected by public transport.

Figure 37: Share of the population for which the nearest public transport stop is 'too far away' by degree of urbanisation, 2014

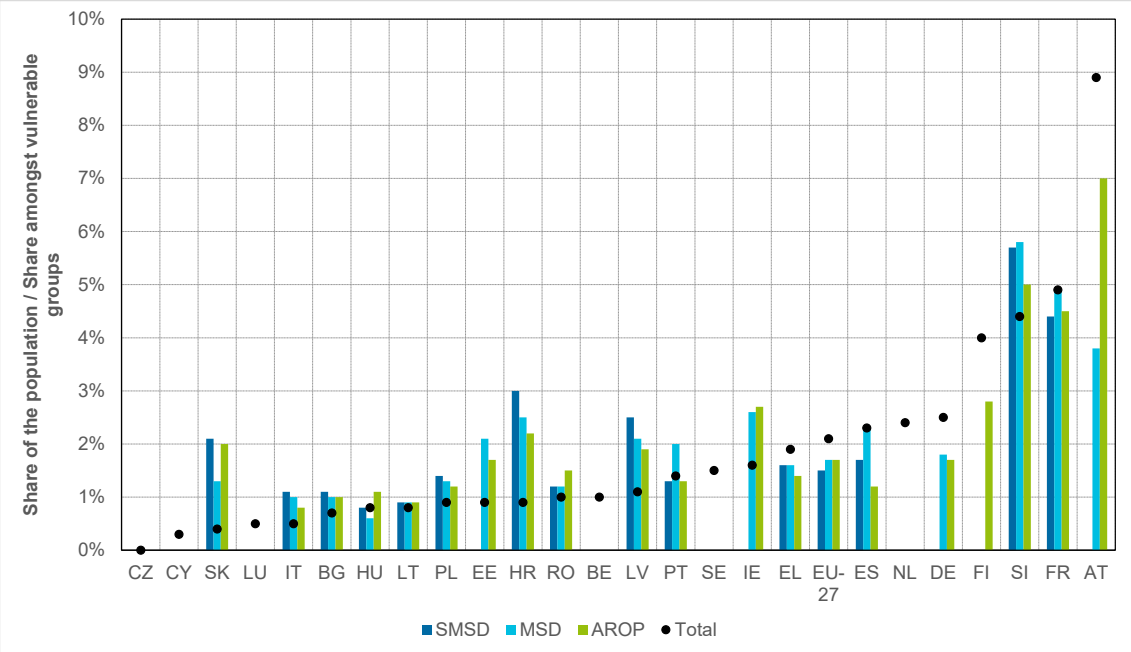


Source: Own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, station too far away" to the question "Do you regularly use public transport?" [PD090] by degree of urbanisation [DB100]. Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. For NL and SI there is no information on the degree of urbanisation available. LV and EE have no observations in the category 'towns and suburbs', because the observations in the category "towns and suburbs" were merged to "cities" for anonymisation. MT has no observations in the category "rural areas", because the observations in the category "rural areas" were merged to "towns and suburbs" for anonymisation. Therefore, NL and SI have not been included in the calculation for the EU-Average and LV, EE and MT were included accordingly to the categories available. The EU-Average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): MT for the shares in all degrees of urbanisation and in the total population. CY, SK, LU, LT, EE, HR, BE, SE for the shares in the category "Cities". CY, SK, LU, BG, LT, HR, IE for the shares in the category "Towns and suburbs". CY for the shares in the category "Rural areas". According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): BG, HU, PL, RO, LV, PT, FI, AT for the shares in the category "Cities". RO, SE for the shares in the category "Towns and suburbs". SK, LU, BE for the shares in the category "Rural areas". CY, SK, LU, IT for the shares in total population.

Figure 39 finally shows the share of SMSD, MSD and AROP population that indicates that the stop is too far away for them to be using public transport. In many Member States, this share is similar or lower than the one in the overall population, in others is it higher with particularly large differences in Slovakia, Croatia and Latvia. Since the degree of urbanisation is such an important driver of the distribution of this variable (cf. Figure 38), it is likely that the question of whether SMSD, MSD and AROP populations rather live in urban or rural areas also drives this result.

Figure 38: Share of the population for which the nearest public transport stop is 'too far away' among different population groups, 2014



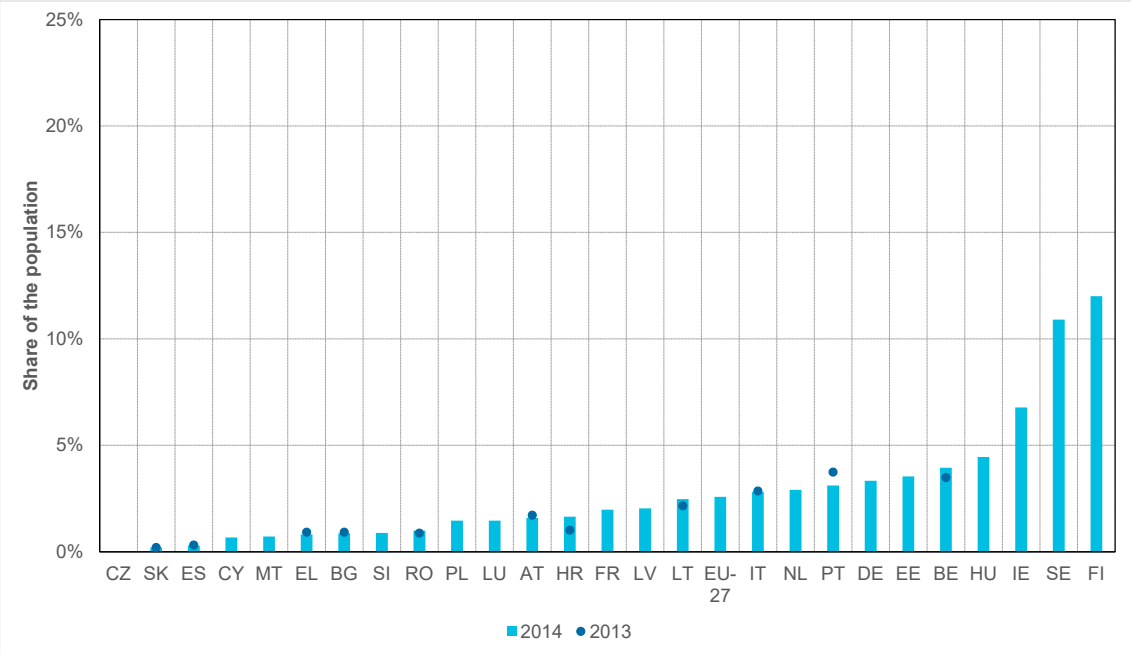
Source: Own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, station too far away" to the question "Do you regularly use public transport?" [PD090] amongst different population groups: At risk of poverty (AROP) [HX080], severely materially and socially deprived (SMSD) [RX060], materially and socially deprived (MSD). Individuals are AROP if their income is less than 60% of the national median. The SMSD indicator provides a measure related to the (in)ability of individuals to be able to afford seven of thirteen predefined material items. The list of thirteen items includes the following: 1) capacity to face unexpected expenses; 2) capacity to afford paying for one week annual holiday away from home; 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments); 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) ability to keep home adequately warm; 6) have access to a car/van for personal use; 7) replacing worn-out furniture; 8) Having internet connection; 9) Replacing worn-out clothes by some new ones; 10) Having two pairs of properly fitting shoes (including a pair of all-weather shoes); 11) Spending a small amount of money each week on him/herself; 12) Having regular leisure activities; 13) Getting together with friends/family for a drink/meal at least once a month. Individuals are MSD if they are not able to afford five of the thirteen predefined material items. Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. The EU-27 average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): MT for the shares in all amongst all population groups and total population. CY, EE, BE, IE, NL, DE, FI, AT for the shares in the SMSD population. CY, LU, BE, NL, FI for the shares in the MSD population. CY, BE, SE, NL for the shares in the AROP population. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SK, IT, BG, HU, LT, PT, ES, FR for the shares in the SMSD population. SK, LT, EE, DE, AT for the shares in the MSD population. SK, IT, BG, HU, LT, EE, LV, PT, FI for the shares in the AROP population. CY, SK, LU for the shares in the total population.

2.3. Access to public transport is too difficult for persons with reduced mobility

Figure 9/Figure 40 shows the share of the population for whom difficult access to public transport is the main reason for not using it. The guidance of the EU-SILC questionnaire refers specifically to persons with reduced mobility in this regard. Shares are particularly high in Finland, Sweden and Ireland. Shares are particularly low in Czechia, Slovakia and Spain.

Figure 39: Share of the population with too difficult access to public transport for persons with reduced mobility

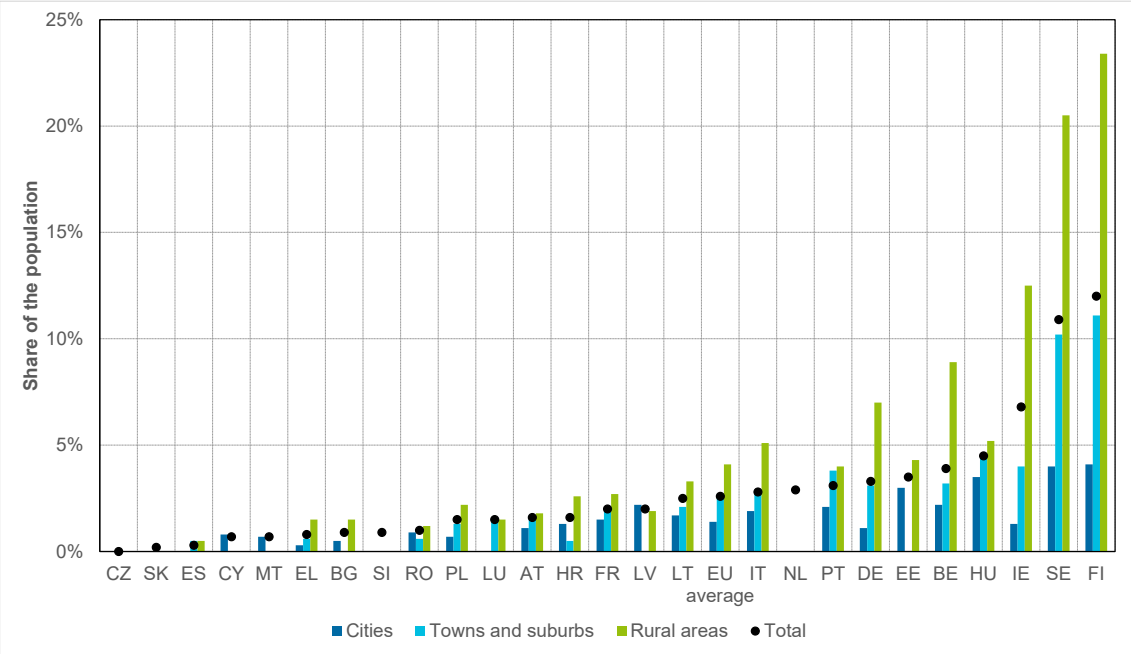


Source: Own calculations based on the EU-SILC 2013 microdata ad-hoc module 'Wellbeing' and the EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, access too difficult" to the question "Do you regularly use public transport?" [PD090]. The description of the variable defines the answer "No - access too difficult" as "Difficulties in getting to the station, especially for disabled people". The EU-27 average is weighted. The variable PD090 is missing for CY, CZ, DE, DK, EE, FI, FR, HU, IE, LU, LV, MT, NL, PL, SE, SI in the EU-SILC 2013 data. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SK in the EU-SILC 2013 data. SK in the EU-SILC 2014 data. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%).

Figure 41 displays results for the population in cities, in towns and suburbs and in rural areas. Similar as for the whole population, the access to public transport, especially for those less mobile, is particularly high in rural areas in Finland, Sweden and Ireland.

Figure 40: Share of the population with too difficult access to public transport for persons with reduced mobility by degree of urbanisation, 2014

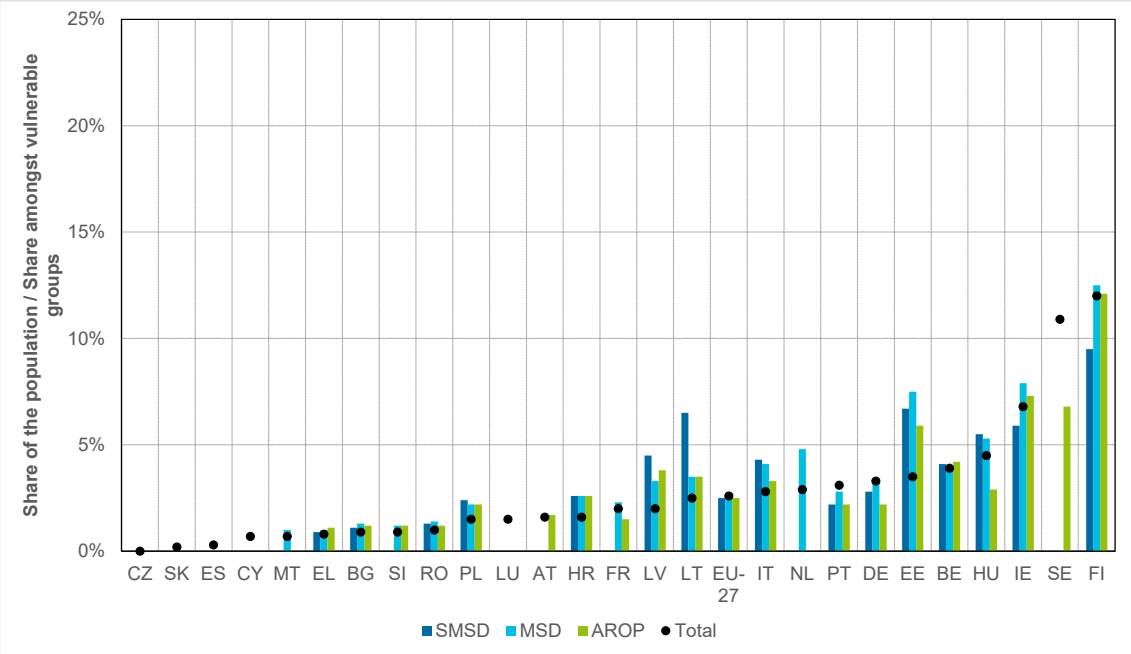


Source: Own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

Notes: The chart shows the share of the population responding "No, access too difficult" to the question "Do you regularly use public transport?" [PD090] by degree of urbanisation [DB100]. The description of the variable defines the answer "No - access too difficult" as "Difficulties in getting to the station, especially for disabled people". Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation For NL and SI there is no information on the degree of urbanisation available. LV and EE have no observations in the category 'towns and suburbs', because the observations in the category "towns and suburbs" were merged to "cities" for anonymisation. MT has no observations in the category "rural areas", because the observations in the category "rural areas" were merged to "towns and suburbs" for anonymisation. Therefore, NL and SI have not been included in the calculation for the EU-Average and LV, EE and MT were included accordingly to the categories available. The EU Average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): SK, ES, LU for the shares in the category "Cities". SK, CY, MT, BG for the shares in the category "Towns and suburbs". SK, CY for the shares in the category "Rural areas". According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): CY, EL, BG, RO, AT, HR, IE for the shares in the category "Cities". ES, EL, RO, LU, HR, LT for the shares in the category "Towns and suburbs". ES for the shares in the category "Rural areas". SK for the shares in total population.

Inaccessibility of public transport for people with reduced mobility amongst the SMSD and AROP population is often similar or lower than in the overall population. Exceptions are Estonia, Italy, Lithuania, Latvia, Croatia and Poland, where the access to public transport for persons with disabilities is more difficult among the SMSD and AROP groups than for the overall population (Figure 42).

Figure 41: Share of the population with too difficult access to public transport for persons with reduced mobility among different population groups, 2014



Source: Own calculations based on EU-SILC 2014 microdata ad-hoc module 'Material deprivation'.

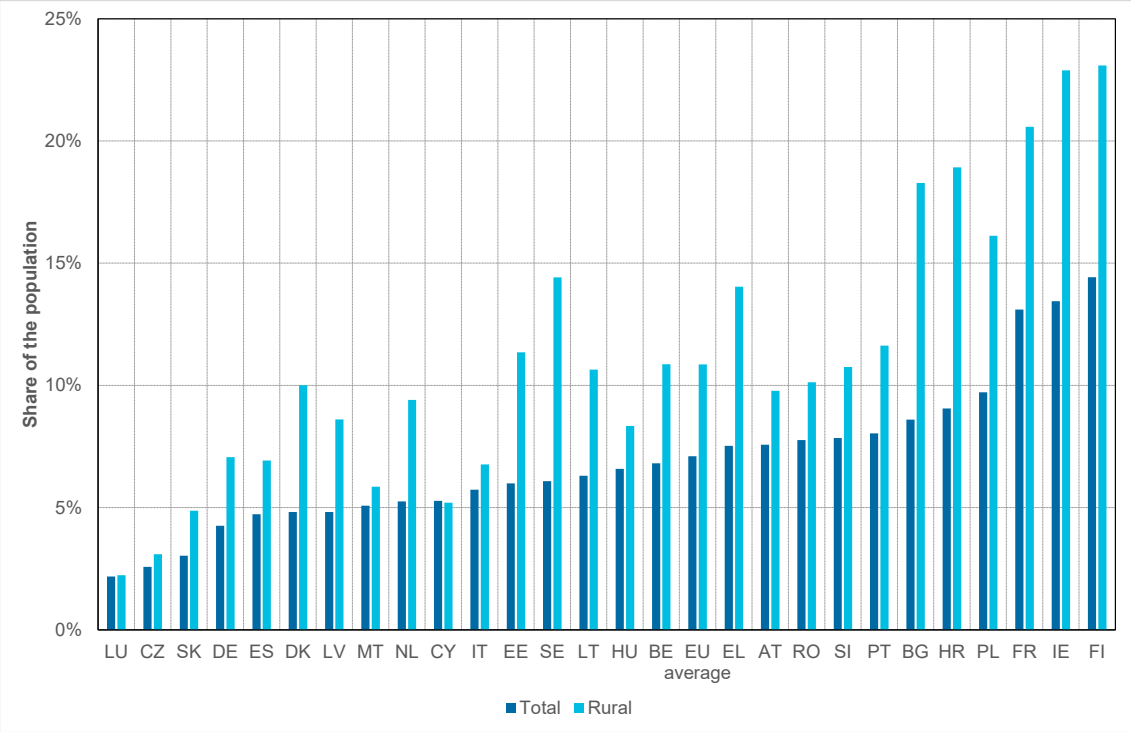
Notes: The chart shows the share of the population responding "No, access too difficult" to the question "Do you regularly use public transport?" [PD090] amongst different population groups: At risk of poverty (AROP) [HX080], severely materially and socially deprived (SMSD) [RX060], materially and socially deprived (MSD). Individuals are AROP if their income is less than 60% of the national median. The SMSD indicator provides a measure related to the (in)ability of individuals to be able to afford seven of thirteen predefined material items. The list of thirteen items includes the following: 1) capacity to face unexpected expenses; 2) capacity to afford paying for one week annual holiday away from home; 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments); 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) ability to keep home adequately warm; 6) have access to a car/van for personal use; 7) replacing worn-out furniture; 8) Having internet connection; 9) Replacing worn-out clothes by some new ones; 10) Having two pairs of properly fitting shoes (including a pair of all-weather shoes); 11) Spending a small amount of money each week on him/herself; 12) Having regular leisure activities; 13) Getting together with friends/family for a drink/meal at least once a month. Individuals are MSD if they are not able to afford five of the thirteen predefined material items. The description of the variable defines the answer "No – access too difficult" as "Difficulties in getting to the station, especially for disabled people". Individuals that did not respond to the question "Do you regularly use public transport?" [PD090] were excluded from the calculation. The EU-27 average is weighted. According to Eurostat rules, DK is excluded due to a high non-response rate for PD090 (> 50%). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): SK, ES, CY, MT, SI, LU, AT, FR, NL, SE for the shares in the SMSD population. SK, ES, CY, LU, AT, SE for the shares in the MSD population. SK, ES, CY, MT, LU, NL for the shares in the AROP population. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): EL, BG, PT, DE, BE, FI for the shares in the SMSD population. MT, SI, NL for the shares in the MSD population. EL, BG, SI, RO, AT, FR for the shares in the AROP population. SK for the shares in the total population.

2.4. Supporting indicator: 'Very difficult' access to public transport (Eurofound EQLS 2016)

Figure 8/Figure 43 shows the share of the population (total or rural) by Member State which considers access to public transport to be 'very difficult'. In most Member States, individuals living in rural areas are disproportionately more affected by the unavailability of public transport. The largest differences are seen in Bulgaria, Croatia, Finland and Ireland, where the share of transport-poor in rural areas is around 10 percentage points higher than in the overall population. Both Finland and Ireland also show high shares for the overall and rural population according to the EU-SILC indicator (cf. Figure 38). However, Bulgaria and Croatia have much higher values in this indicator compared to the EU-SILC one. In smaller Member States, such as Cyprus, Luxembourg or Malta, the difference between overall and rural populations are less pronounced.

One has to take into account that the Eurofound EQLS question is very different from the EU-SILC one, as respondents have to rate the access to public transport on a scale, whereas for the EU-SILC question they have to choose one answer category for why they do not use public transport out of several possible ones (cf. Section 2). When interpreting the Eurofound EQLS indicator values, caution is advised, given the relatively small sample size of the survey (around 1,000 per MS) and the subjectivity of the question posed.

Figure 42: Share of the population with 'very difficult' access to public transport by total population and rural population, 2016



Source: Own calculations based on Eurofound 2016 European Quality of Life Survey microdata.

Notes: The chart shows the share of the population responding to the question "Q56 (Q51) Thinking of physical access, distance, opening hours and the like, how easy or difficult is your access to the following services? – b. Public transport facilities (bus, metro, tram, train etc.)" [Y16_Q56b] with "Very difficult"

among different population groups: Total (overall) population; Rural population [urb_subjective]. MS are ordered by the shares in the total population (smallest to largest). Individuals that responded to the question [Y16_Q56b] with the following answers were excluded from the calculation: Refusal; Not applicable (service not used); Don't know. The following answers were included: Very easy; Rather easy; Rather difficult; Very difficult. The EU-27 values are calculated across the entire sample of the 27 Member States.

3. HBS affordability indicators: 6% and 2M

Based on Eurostat HBS data, the indicators capture households that spend a relatively high share of their total expenditures on transport, indicating high financial pressure. For the purposes of estimating the 6% and 2M indicators, transport expenditure encompasses the costs of fuel, as well as the recurrent costs of road and railway transport services.

- **6% indicator**: Households are identified as transport poor if they spend more than 6% of their total expenditures on transport.
- **2M indicator**: Households are identified as transport poor if their share on transport in total expenditures is more than twice the national median expenditures on transport.

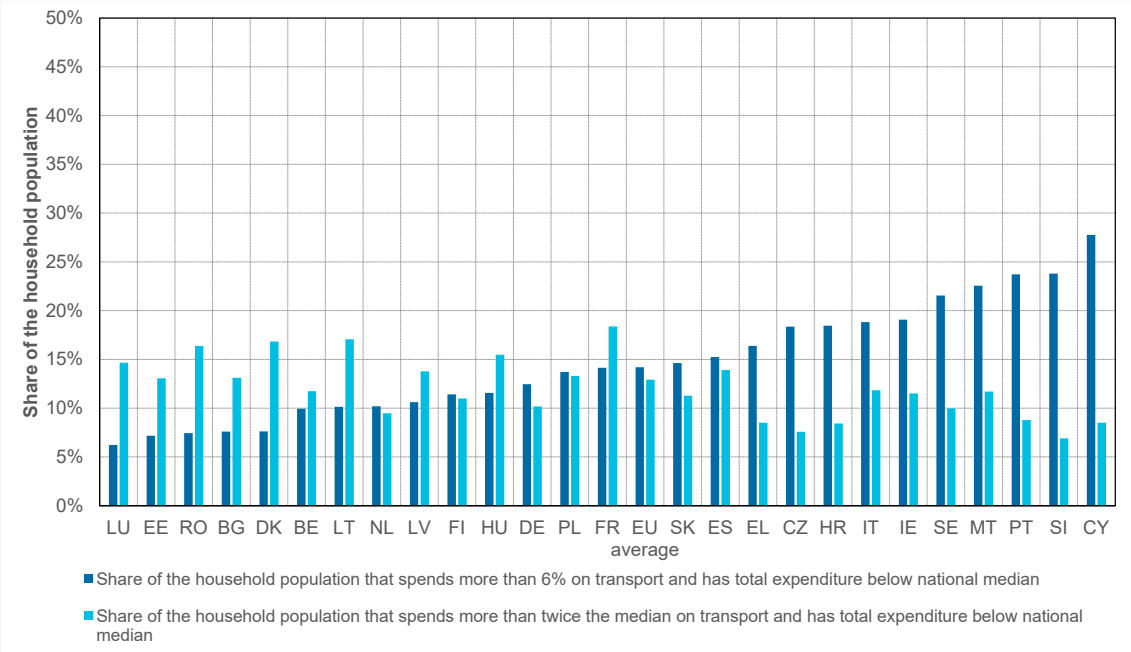
The 6% indicator is similar to the one estimated for the European Semester 2023. There, the households identified as transport poor were restricted to those at risk of poverty (AROP) (European Commission 2023). Also, the expenditure categories used for estimating transport expenditure are slightly different from the European Semester indicator (see Section 3.1) and display the share of households rather than the share of individuals except for the sensitivity analysis in Figure 16/Figure 45.

The 2M indicator is adapted from the set of energy poverty indicators recommended by the EPOV and EPAH (Thema and Vondung 2020; Gouveia et al. 2022). National median values are used as thresholds and will vary depending on the dataset used.

In our analysis, both the 6% indicator and 2M indicator are restricted to the bottom half of the expenditure distribution of households. This means that only households can be identified as transport poor that have total (equivalised) expenditures below the national median. The reason for this restriction is that otherwise a relatively large share of households identified as transport poor by these two indicators is amongst the richer households, as expenditures for transport and in several Member States also the share of the budget spent on transport rises with income (cf. Annex with HBS descriptive statistics in Section 6).

Figure 15/Figure 44 shows the share of households that spends more than 6% or more than twice median on transport and where total expenditures are below the national median. The figure illustrates very well that these two indicators tend to point in different directions in terms of the Member State ranking. The 6% indicator is particularly high in Cyprus, Slovenia, Portugal, Malta and Sweden, while the 2M indicator is highest in France, Lithuania, Denmark, Romania and Hungary.

Figure 43: Share of the household population identified by the 6% and 2M indicators of transport affordability, 2015



Source: Own calculations based on HBS 2015 microdata.

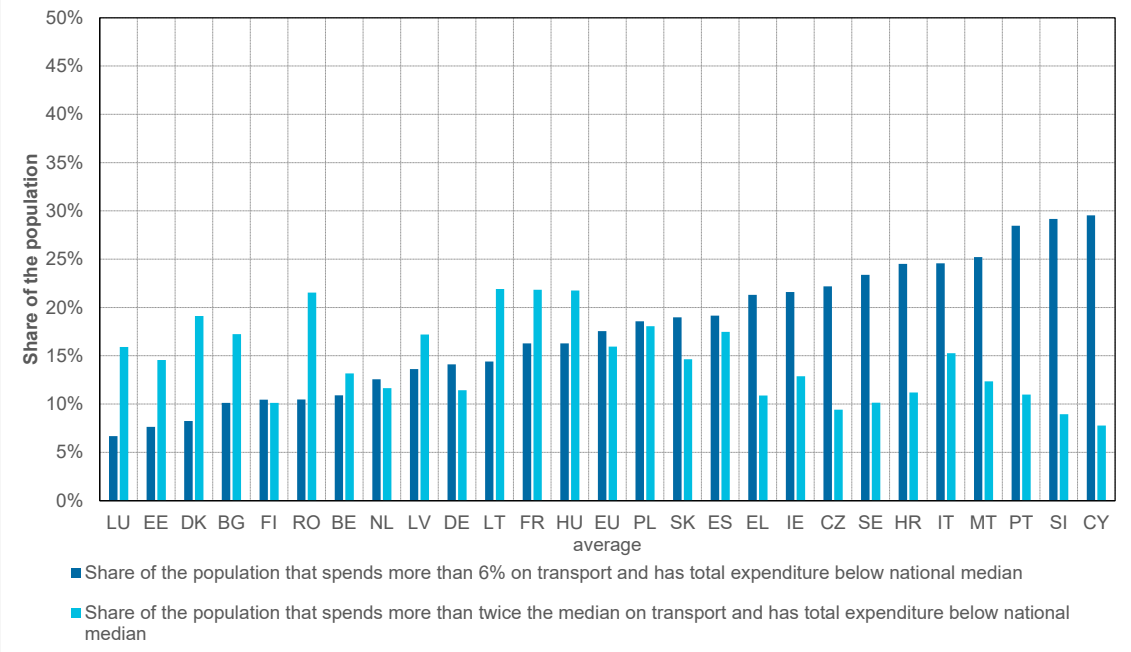
Notes: The chart shows the share of households that spends more than 6% or more than twice the national median on transport and has total expenditure below national median. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure).

Figure 16/Figure 45 shows the share of the population that spends more than 6 % or more than twice the median on transport and whose total expenditure is below the national median. The indicators are the same as those used in Figure 15/Figure 44, but the results are presented as share of the population instead of share of the household population. In order to present the share of the population, the number of individuals in transport poor households has been multiplied by the weight of the household to obtain the number of individuals in a country who are transport poor. This approach assumes that all household members have the same level of transport poverty, which is not a result that can be obtained from household budget data.

Comparing the share of the household population in Figure 15/Figure 44 to the share of the population in Figure 16/Figure 45 shows that almost all countries have higher shares of the population for both the 6% and the 2M indicators. The only exceptions are Cyprus for the 2M indicator and Finland for the 2M and the 6 % indicator, where the share of the population is 0.7 percentage points and respectively 0.9 and 1.0 percentage points lower than the share of the household population. Apart from Cyprus and Finland, the difference between the results presented as the share of the population and the share of the household population ranges from 0.1 percentage points in Sweden to 6.3 percentage points in Hungary for the 2M indicator. For the 6% indicator, the difference between the results presented as the share of the population and those presented as the share of the household population ranges from 0.4 percentage points in Luxembourg to 5.7 percentage points in Italy. This suggests that

transport poor households tend to have a higher average number of household members than those that are not transport poor.

Figure 44: Share of the population identified by the 6% and 2M indicators of transport affordability, 2015

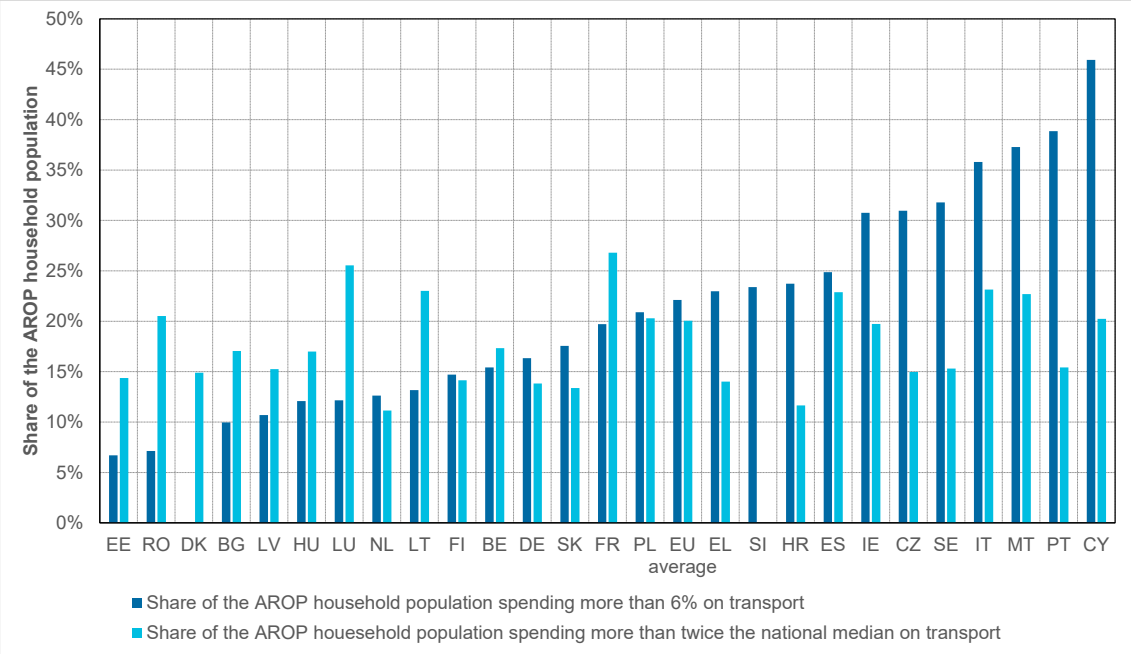


Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of population that spends more than 6% or more than twice the national median on transport and has total expenditure below national median. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure).

Figure 24/Figure 46 shows the share of the AROP household population spending more than 6% or more than twice the national median on transport. As expected, the share is higher than in Figure 15/Figure 44. The ranking of Member States along the 6% indicator is very similar amongst the AROP household population with Cyprus, Portugal, Malta, Italy and Sweden showing the highest values. Amongst the AROP household population, the highest values for the 2M indicator can be found in France, Luxembourg, Italy, Lithuania and Spain.

Figure 45: Share of the AROP household population identified by the 6% and 2M indicators of transport affordability, 2015

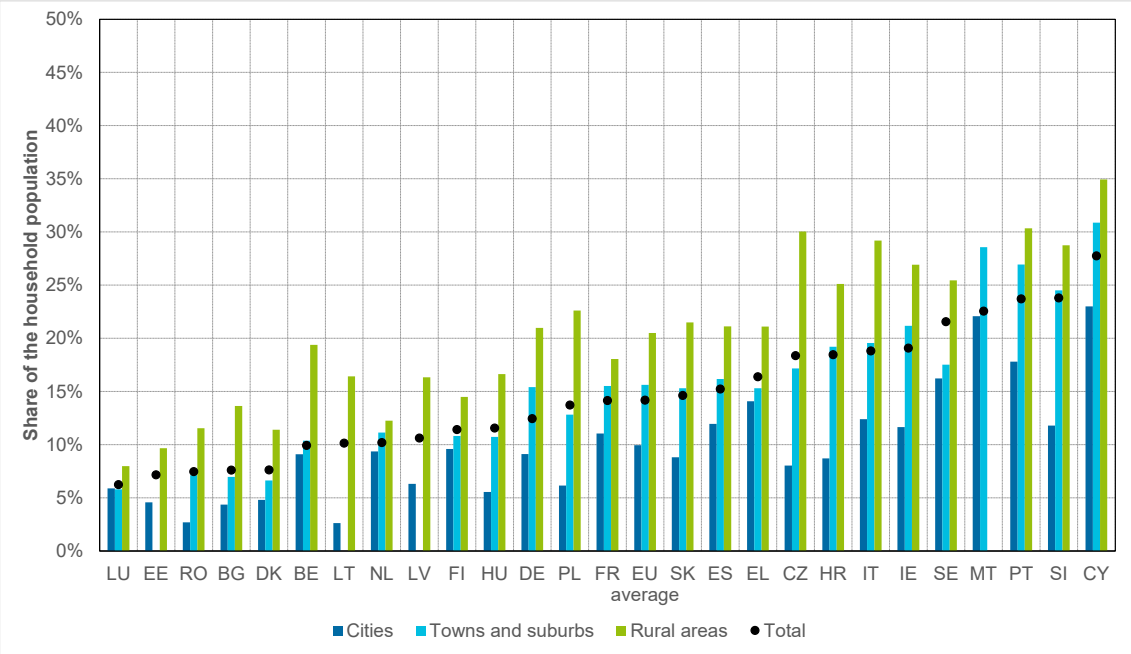


Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households amongst the AROP population of households that spends more than 6% or more than twice the national median on transport. A household is AROP (at-risk-of-poverty) if it has total expenditure below 60% of the national median total expenditure. Total expenditure is used as a proxy for income, because income is not available for all countries. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, CZ, DK, HR should be flagged for the 2M indicator due to a low number of observations (20-49 observations). According to Eurostat rules, SI is excluded for the 2M indicator due to a low number of observations (<20 observations). According to Eurostat rules, BG should be flagged for the 6% indicator due to a low number of observations (20-49 observations). According to Eurostat rules, DK is excluded for the 6% indicator due to a low number of observations (<20 observations).

Figure 19/Figure 47 explores the 6% indicator by degree of urbanisation. At 20% of the household population, the indicator is twice as high in rural areas compared to cities in the EU. The highest value in rural areas is recorded with 35% in Cyprus, which also had the overall highest value at 28%.

Figure 46: Share of the household population identified by the 6% indicator of transport affordability by degree of urbanisation, 2015

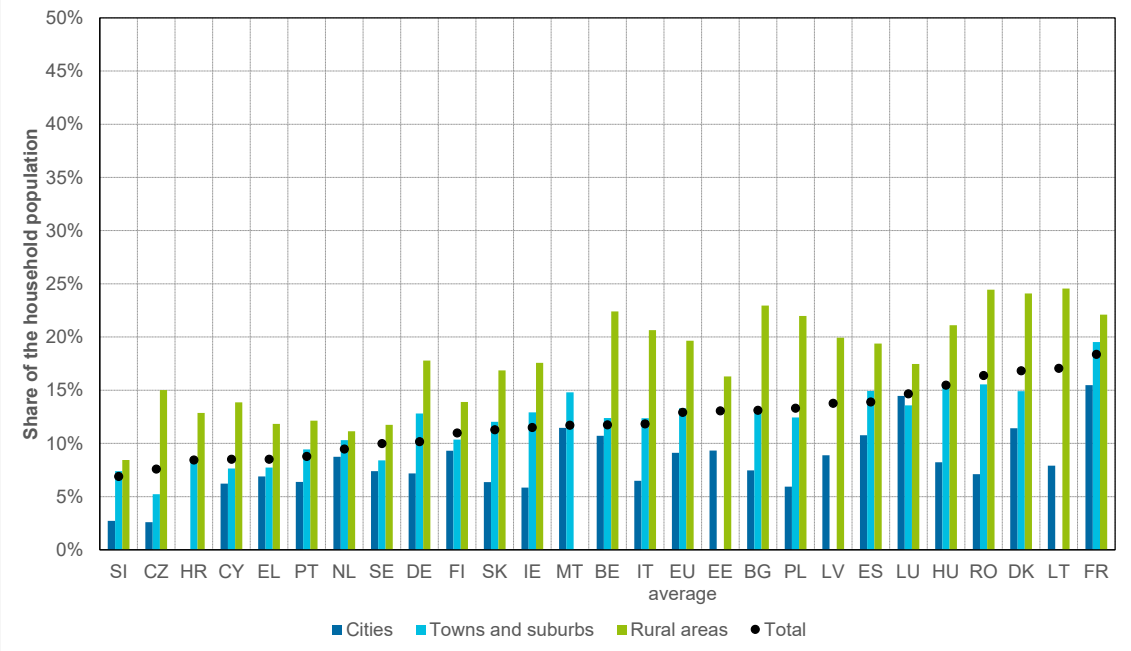


Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households that spends more than 6% on transport and has total expenditure below national median by degree of urbanisation. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU-Average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): EE; LT, LV for the category 'Towns and suburbs'. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): DK for the category 'Cities', BG for the category 'Towns and suburbs'.

Similarly, the 2M indicator is also twice as high in rural areas than cities in the EU on average (Figure 20/Figure 48). At 24-25% it is particularly large in rural areas in Lithuania, Romania and Denmark.

Figure 47: Share of the household population identified by the 2M indicator of transport affordability by degree of urbanisation, 2015

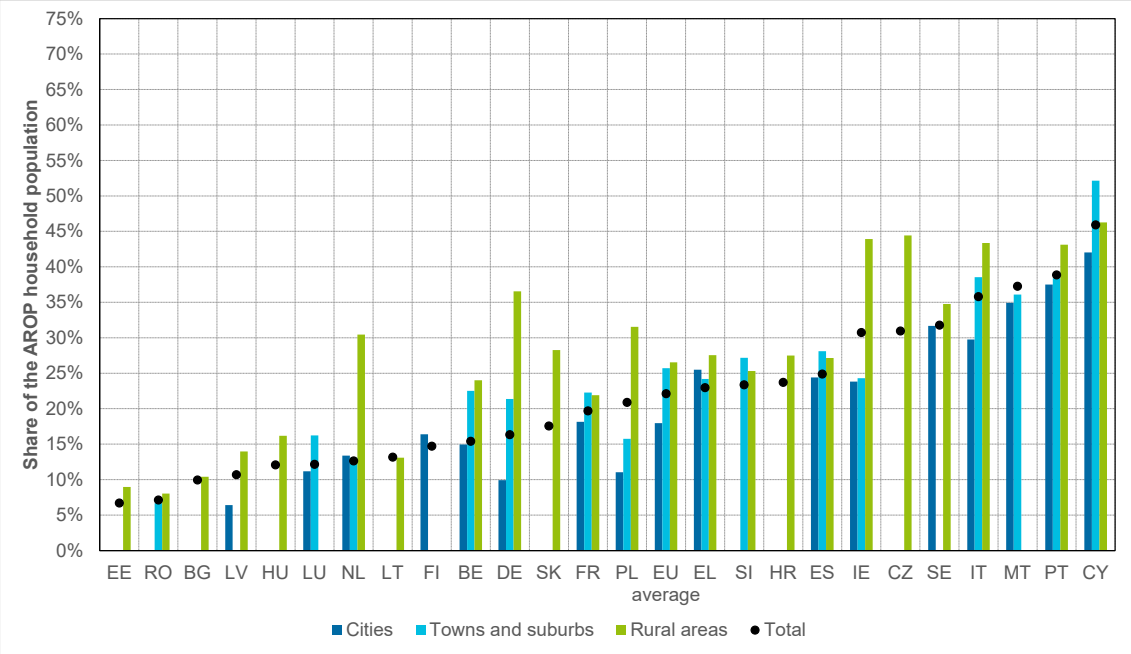


Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households that spends more than twice the national median on transport and has total expenditure below national median by degree of urbansation. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU-Average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): HR for the category 'Cities'. EE, LV, LT for the category 'Towns and suburbs'. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): SI, CZ for the category 'Cities'. CY, SE, MT for the category 'Towns and suburbs.

Figure 21/Figure 49 and Figure 50 combine information on the risk of poverty with the degree of urbanisation. They illustrate that affordability of transport is a particularly important issue in poorer rural areas.

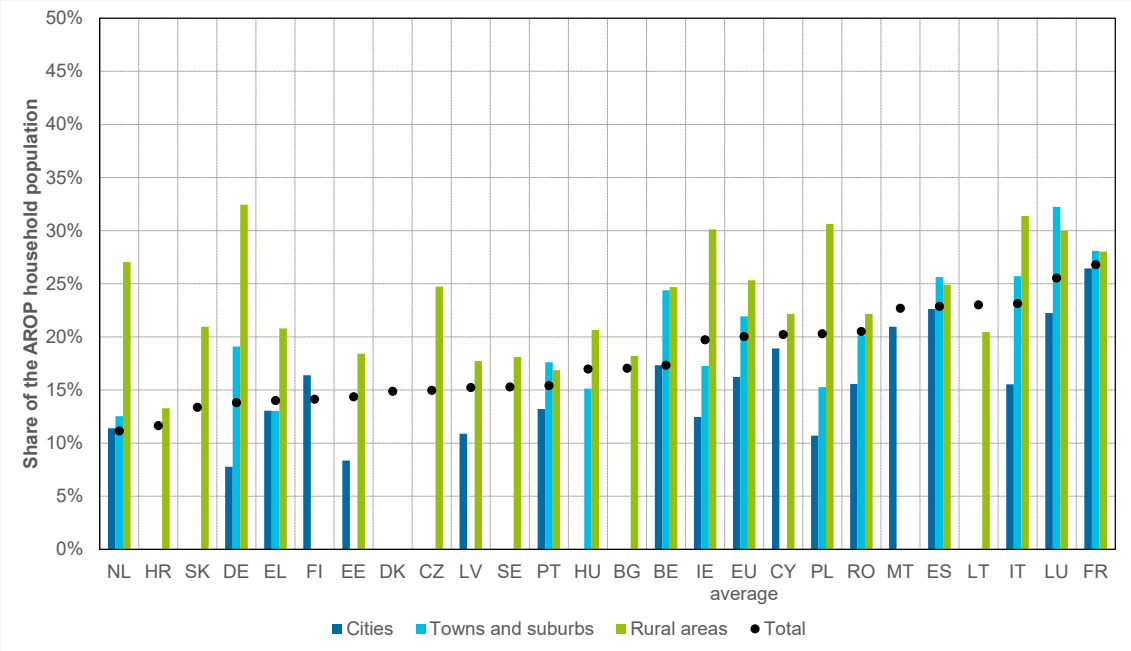
Figure 48: Share of the AROP household population identified by the 6% indicator of transport affordability by degree of urbanisation, 2015



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households amongst the AROP population that spend more than 6% on transport by degree of urbanisation. A household is AROP (at-risk-of-poverty) if it has total expenditure below 60% of the national median total expenditure. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU-Average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): EE, RO, BG, LT, HU, SK, HR, CZ, SI for the category 'Cities'. EE, FI, BG, LV, HU, LT, SK, HR, CZ, SE for the category 'Towns and suburbs'. LU, FI for the category 'Rural areas'. DK for all categories. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): LU, LV, FI, SE for the category 'Cities'. RU, LU, NL, SI, MT for the category 'Towns and suburbs'. EE, BG, NL, BE, SK, SI, CZ for the category 'Rural areas'. BG for the category 'Total'.

Figure 49: Share of the AROP household population identified by the 2M indicator of transport affordability by degree of urbanisation, 2015



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the share of households amongst the AROP population that spend more than twice the national median on transport by degree of urbanisation. A household is AROP (at-risk-of-poverty) if it has total expenditure below 60% of the national median total expenditure. The EU-Average is weighted. AT is missing from the data and is therefore not included in the EU-Average. MT has no observations in the category 'Rural areas'. Therefore, MT has been included in the EU-Average accordingly to the categories available. DE has zero expenditure on transport services for all observations. DK has zero expenditure on transport services for all observations in three out of four categories of transport services. Results with caveat for countries DE, DK, EE, FR, HU, LT, LV, RO due to high number of zeroes in transport expenditure (> 30% of total obs. have zero transport expenditure). According to Eurostat rules, the following countries are excluded due to low number of observations (less than 20 observations): HR, CZ, SE, SK, DK, HU, BG, LT for the category 'Cities'. HR, SK, FI, EE, DK, CZ, LV, SE, BG, CY, MT, LTfor the category 'Towns and suburbs'. FI, DK for the category 'Rural areas'. SI for all categories. According to Eurostat rules, the following countries should be flagged due to a low number of observations (20-49 observations): NL, EL, FI, EE, LV, IE, CY, ROfor the category 'Cities'. NL, EL, IE, HU for the category 'Towns and suburbs'. NL, HR, SK, CZ, BE, CY, LU for the category 'Rural areas'. HR, CZ, DK for the category 'Total'.

The next sections discuss the important methodological choices made when estimating the HBS indicators.

3.1. Categories of transport expenditure

The HBS provides aggregate categories of transport expenditure as well as several subcategories specifying expenditure on, for example, the purchase of vehicles, fuel or transport services. Only the recurrent costs of fuel, as well as the recurrent costs of

road and railway transport services ([56]) were included in the calculation, as irregular transport costs such as the purchase of vehicles or the repair of personal transport equipment need to be analysed over a long period of time, which cannot be calculated based on the current available data.

The costs of road and railway transport services are used as a proxy for public transport costs. The costs of passenger transport by air and sea are excluded from our analyses as it is assumed that most households in the Member States do not use these transport modes for their daily transport needs. ([57]) Separate indicators for fuel costs and transport service expenditure were initially calculated in order to assess transport affordability for private and public transport separately. Unfortunately, the quality of HBS data on transport service expenditure is particularly poor (see Table 1 for more information), making it impossible to calculate expenditure indicators for public transport separately. The indicators were calculated on the basis of both private and public transport costs, even though the indicators are mainly driven by fuel expenditure and excluding expenditure on transport services does not change the results much.

3.2. Income concepts

For the 2M indicator relative transport expenditure needs to be calculated, for which total consumption expenditure [EUR_HE00], monetary net income [HH095] or net income [HH099] is available in the HBS. Total consumption expenditure is an aggregate of all expenditure categories, while monetary net income is defined as total monetary income from all sources minus income taxes. Total net income is defined as monetary net income plus non-monetary components like income in kind or imputed rents. While the energy poverty indicators recommended by the EPOV and EPAH based on the HBS are calculated using net income (Thema and Vondung 2020; Gouveia et al. 2022) following the argument of Temursho et al. (2020) not to use the net income variable due to missing or ambiguous data. Not all countries report all non-monetary income components, and the method of imputing rents varies considerably between Member States, making comparisons between variables unreliable (Eurostat 2020). The alternative use of monetary net income has the disadvantage of neglecting the non-monetary components of income, which can be substantial, especially for low-income households. Instead, it is used total consumption expenditure as a proxy for long-term income. For a discussion on consumption as a suitable proxy for long-term resources see e.g. Atkinson et al. (2017). The modified OECD scale is used to calculate the national median of total expenditure and construct expenditure deciles.

([56]) The following variables are included in transport expenditure for the calculation: Diesel [EUR_HE07221], Petrol [EUR_HE07222], Passenger transport by train [EUR_HE07311], Passenger transport by underground and tram [EUR_HE07312], Passenger transport by bus and coach [EUR_HE07321], Passenger transport by taxi and hired car with driver [EUR_HE07322]. We include expenditure on passenger transport by taxi and hired car with driver to cover the more informal transport options that are more common in rural areas.

([57]) Of course, there are regions in the EU, in which households rely on passenger transport by air and sea for their daily transport needs. Unfortunately, we cannot identify the households living in these regions from the HBS data due to the low geographical granularity of the data (NUTS 1).

3.3. Transport-related equivalence scales

Depending on personal characteristics like employment status or age individuals have different transport needs, resulting in different levels of transport expenditures. For example, to assess minimum transport needs, Menyhért et al. (2021) construct transport-related equivalence scales, assuming that “young children (aged 0-6) do not create additional transport needs, and that school-age children’s minimum needs are proportional to those of working-age adults [30% weight]” (Menyhért et al. 2021, p. 77). Transport-related equivalence scales could be used to improve the calculation of the expenditure-based HBS indicators and better reflect household transport needs. It has been decided not to use differentiated transport-related equivalence scales for our analyses in order to make it easier for countries to replicate the results. In addition, personal transport needs can vary considerably between countries and even between individuals with similar characteristics, making it very difficult to find transport related equivalence scales that are suitable for all Member States. It is therefore assumed an equivalence elasticity of zero.

3.4. 2020 HBS data and inflating HBS expenditures

During our analysis HBS 2020 data was made available, but in November 2023 withdrawn due to errors. The data structure of the first Eurostat release was analysed, and a very high number of zeros for transport expenditure categories in several countries compared to HBS 2015 data was found. Given the observed data quality issues and the fact that the HBS 2020 data were collected during the COVID-19 period, it has been decided to continue with the HBS 2015 data and inflate the recorded expenditure using Eurostat's average monthly Harmonised Consumer Price Indices (HCPI) to reflect price changes. It was inflated to 2019, as well as to 2022/2023 (using the CPI between January 2022 and September 2023) to reflect pre-crisis and post-crises levels. This method requires us to assume that transport consumption patterns are still similar to those observed in 2015. Looking at indicators based on data inflated to 2019 price levels, there are very little difference with indicators based on 2015 data. For the 6% indicator based on data inflated to 2022/2023 price levels have higher shares. As the 2M indicator is based on national medians, there are no large differences. Due to the uncertainty regarding the changes in transport consumption patterns over time and in times of crisis, as well as the minimal differences using data inflated to 2019 price levels, the indicators above use the 2015 uninflated data.

3.5. Data Quality

Using the HBS 2015 data, several data issues can be observed, such as negative values for expenditure or the fact that aggregates do not necessarily equal the sum of subcategories. As a solution to these two issues, it excludes negative expenditure entries due to their low share of observations in the respective expenditure categories and use the subcategories to calculate the indicators. Another very important issue is the presence of implausible zeros in expenditure categories. Eurostat recommends the use of dots to indicate missing data, but the high number of zeros for transport expenditure suggests that some of the reported zeros are in fact missing data that have not been correctly labelled. As Member States are responsible for the compilation and

transmission of the data, Eurostat is not able to trace back the original entries and identify implausible data points.

As high shares of zero fuel expenditure may reflect a society with a high use of public transport of active mobility, the report analyses how many observations in each country have zero expenditure in all transport expenditure categories included in our indicator calculation. Countries with more than 30% of observations with zero expenditure in all transport expenditure categories as unplausible are flagged.

Table 5 presents the results of different analyses of the distribution of zeros in transport expenditure categories. For each country, the share of observations with zero fuel expenditure is shown as an example. In several countries shares of more than 50% and in Romania a share of almost 78% is observed, which is not consistent with national vehicle registration data (Eden et al. 2023).

As high shares of zero fuel expenditure may reflect a society with a high use of public transport of active mobility, the report analyses how many observations in each country have zero expenditure in all transport expenditure categories included in our indicator calculation. Countries with more than 30% of observations with zero expenditure in all transport expenditure categories as unplausible are flagged.

Table 5 – Distribution of zeros in transport expenditure categories

Country	Share of obs. with zero fuel expenditure	More than 30% of total obs. have zero transport expenditure	Zero expenditure on transport services for all obs.
BE	23.4		
BG	50.1		
CY	16.3		
CZ	20.3		
DE	17.4		x
DK	39.8	x	x
EE	59.9	x	
EL	35.7		
ES	37		
FI	43		
FR	56.6	x	
HR	34.2		
HU	52.6	x	
IE	26.8		

IT	26		
LT	56.5	x	
LU	35.3		
LV	62.8	x	
MT	24.7		
NL	11.5		
PL	41		
PT	25		
RO	77.7	x	
SE	22.3		
SI	12.2		
SK	51.2		

Source: Unweighted HBS 2015 data. AT is missing from the data. DK has zero expenditure on transport services for all observations in three out of four categories of transport services.

One explanation for zero transport expenditure may be the short reference period of the HBS, which is only a few weeks in all Member States (European Communities 2003). Eurostat HBS data is mapped to an agreed reference year but is not annualised. Therefore, if households have irregular expenditure, e.g. buy a public transport ticket once a year or fill up their car once a month, zero or high expenditure for these households in the HBS data are observed. In addition, the data do not provide any information on the regularity of the purchase, so expenditure cannot be broken down by month of use. However, the problem of time of recording should not be as great as for heating expenditure, for example. Another explanation for zero transport expenditure could be a high level of active mobility (walking, cycling). Countries with zero expenditure on transport services [recurrent costs of road and railway transport services] for all observations are also flagged.

3.6. Finding a suitable threshold for affordability indicators

The HBS indicators are calculated on the basis of different thresholds identifying households as transport poor. The 2M indicator requires the national median share of transport in total expenditure, while the 6% indicator uses a fixed share of transport in total expenditures for all Member States.

There is a wide variation in the national medians for transport as a share of total expenditure and in the national medians for equivalised transport expenditure across Member States (Table 6). Some countries, such as Estonia, Lithuania and Romania, have very low values, which can be explained by the high number of zeros in the

transport expenditure categories. The lower the median values, the higher the probability of being classified as transport poor despite spending very little on transport, e.g. in Estonia everyone with any transport expenditure is classified as transport poor using the 2M indicator. On the one hand, the presence of missing values represented as zeros may underestimate the number of households in transport poverty, as they may in fact have high transport expenditure. On the other hand, a high number of zeros leads to small medians, which may then lead to a higher number of households being labelled as transport poor. Data quality therefore plays an important role in the calculation of expenditure-based transport indicators.

Table 6 – National medians of relative and absolute transport expenditure

Country	Median share of transport in total expenditure	Median equivalized transport expenditure	Country	Median share of transport in total expenditure	Median equivalized transport expenditure
BE	2.78%	617	IE	4.27%	965
BG	1.73%	55	IT	4.20%	721
CY	6.03%	1013	LT	0.34%	16
CZ	5.00%	294	LU	1.88%	651
DE	3.36%	676	LV	1.57%	72
DK	1.16%	321	MT	4.96%	599
EE	0.00%	0	NL	3.13%	683
EL	4.32%	457	PL	3.09%	160
ES	3.28%	497	PT	5.83%	640
FI	3.11%	728	RO	0.73%	18
FR	1.62%	287	SE	5.15%	1136
HR	4.95%	317	SI	6.40%	734
HU	1.78%	85	SK	3.65%	240

Source: Weighted HBS 2015 data. AT is missing from the data.
Note: the transport is equivalised using the modified OECD scale.

In order to assess the appropriateness of the chosen thresholds for the 6 % indicator, this report shows calculation for the following values for the share of transport in total expenditure using HBS 2015 data:

- Average of all national median values for the share of transport in total expenditure: 3.25% (2015), 3.55% (inflated to 2022/23)

- Median of all national median values for the share of transport in total expenditure: 3.21% (2015), 3.63% (inflated to 2022/23)

- Median share of transport in total expenditure over all EU-households: 3.34% (2015), 4.00% (inflated to 2022/23)

If the threshold for transport poverty is set at twice the median/average (similar to the 2M indicator), we would be at around 6.4 - 6.7% with the figures based on the 2015 HBS above. Therefore it has been decided to use 6% as the threshold value.

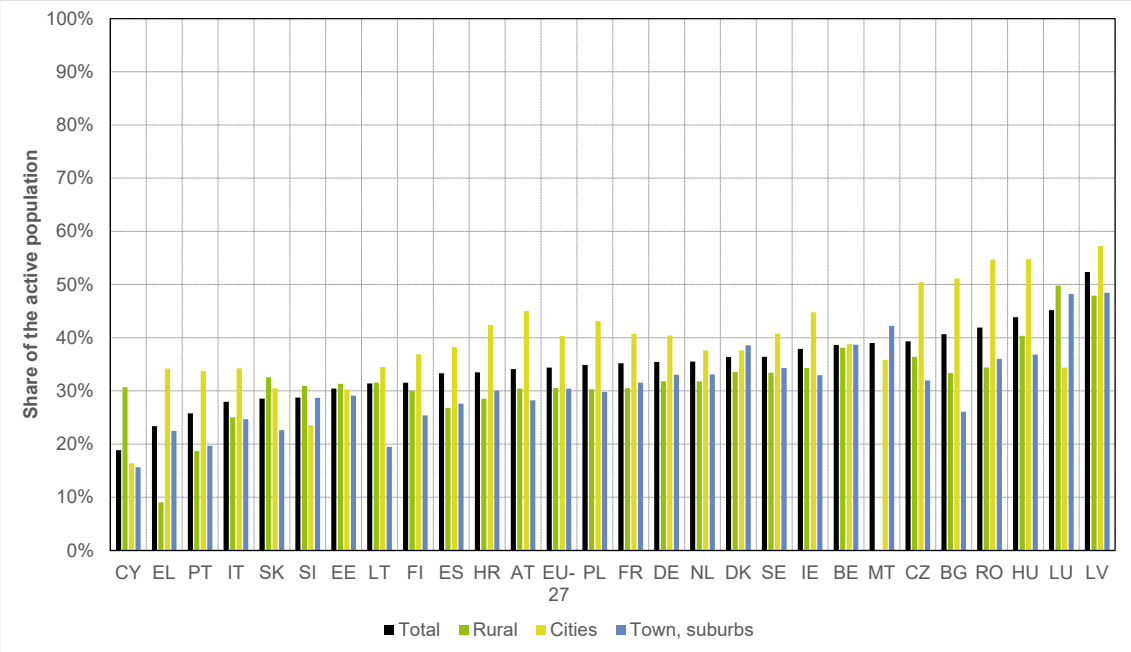
Both a national and an EU-wide threshold have their advantages and disadvantages. A national threshold is better suited to capture country-specific effects, but an EU-wide threshold may be easier for Member States to apply and makes it easier to compare values over time. National thresholds using median values change over time and indicators may not be very sensitive to rising prices if they are based only on median values (2M indicator). Of course, the median itself is an artificial threshold, but it is more robust to outliers than the average. Researchers have also suggested to calculate the 2M indicator for a specific year and then fixing the threshold at this value going forward (Alonso-Epelde et al. 2023; Heindl and Schuessler 2015).

4. LFS accessibility indicator: One-way commute to work greater than 30 mins

Based on the published LFS 2019 ad-hoc module on work organisation and working time arrangements, this indicator captures the share of individuals who commute for more than 30 minutes to their workplace (one way). The selection of the threshold of 30 minutes was informed by the estimated average commute time (25 minutes) across the EU population and the disaggregations available in the published data. Figure 10/Figure 51 shows the share of the active population – by Member State – that spends more or less than 30 minutes to commute to work (one-way). Next to the total (overall) population, shares are presented also by degree of urbanisation.

In the EU-27, 34% of the active population spend more than 30 minutes commuting to work, but the variation across Member States is large, ranging from 19% in Cyprus to 52% in Latvia. The high share of people with a long commute in Luxembourg is likely due to a high incidence of cross-border commuting. Comparing the shares of people with a long commute in rural areas to the overall population, only five Member States have a higher share in rural areas (Cyprus, Estonia, Luxembourg, Slovenia, Slovakia), while in other Member States, people living in rural areas tend to be less affected by long commute times. This may be due to higher use of private transport and lower levels of congestion of the transport infrastructure. In fact, the share of people with long commute times is often the highest within cities.

Figure 50: Share of the active population spending more than 30 minutes commuting to work (one-way) by degree of urbanisation, 2019



Source: Own calculations based on Eurostat [lfso_19plwk28] 'Persons in employment by commuting time, educational attainment level and degree of urbanisation'.

Notes: The chart shows the share of the active population aged from 15 to 74 years who spend more than 30 minutes commuting to work (on-way). MS are ordered by the shares in the total population (smallest to largest). The data is obtained from the statistics published by Eurostat based on the European Union Labour Force Survey (EU-LFS) 2019 module on work organisation and working time arrangements. For the calculation of the shares, the number of people with a commute time of '30 minutes or over' was divided by the sum of people with the following commute times: 'Zero minutes'; 'From 1 to 14 minutes'; From 15 to 29 minutes'; '30 minutes or over'. For MT, the values for 'Rural' was missing (flagged as 'confidential'). For HR and LU, the values for 'Zero minutes' in 'Cities' were flagged as 'unreliable', as was the value for HR for 'Zero minutes' in 'Towns and suburbs'.

5. Information on upcoming EU-SILC rolling modules

Table 7 – Questions in 2024 EU-SILC 6-year rolling module on Access to services

Variable	Answer modalities	Individual / Household question
PC280 Frequency of use of public transport	Daily, Every week (not every day), Every month (not every week), Less than once a month, Never	Individual (aged 16 and over)
PC290 Main reason for not using regularly public transport	Too expensive, No public transport available in the area, Physical access too difficult, Frequency too low or inconvenient schedules, Too long travel time, Safety or security concerns, Other reason	Individual (aged 16 and over)
HC300 Financial burden of public transport	Heavy burden, Somewhat burden, Not a burden at all, No one in the household used pubic transport	Household

Source: Eurostat

Table 8 – Questions in 2025 EU-SILC ad-hoc module on energy and environment

Variable	Answer modalities	Individual / Household question
PEE03 Ability to access within 1 hour work/school/university by public transport, bicycle or walking	Yes, No, I am working/studying full time from home and do not commute	Individual (aged 16 and over)
PEE04 Primary transport used	Car (private, company, leased car or taxi, car share), Collective public transport (bus, tram, train, metro, ferry, etc.), Bicycle (incl. electric bicycle or electric scooter), Moped or motorbike (incl. electric), Walking, Unable to leave the house	Individual (aged 16 and over)
PEE05 Secondary transport used	Car (private, company, leased car or taxi, car share), Collective public transport (bus, tram, train, metro, ferry, etc.), Bicycle (incl. electric bicycle or electric scooter), Moped or motorbike (incl. electric), Walking, No other transport used	Individual (aged 16 and over)

Source: Eurostat

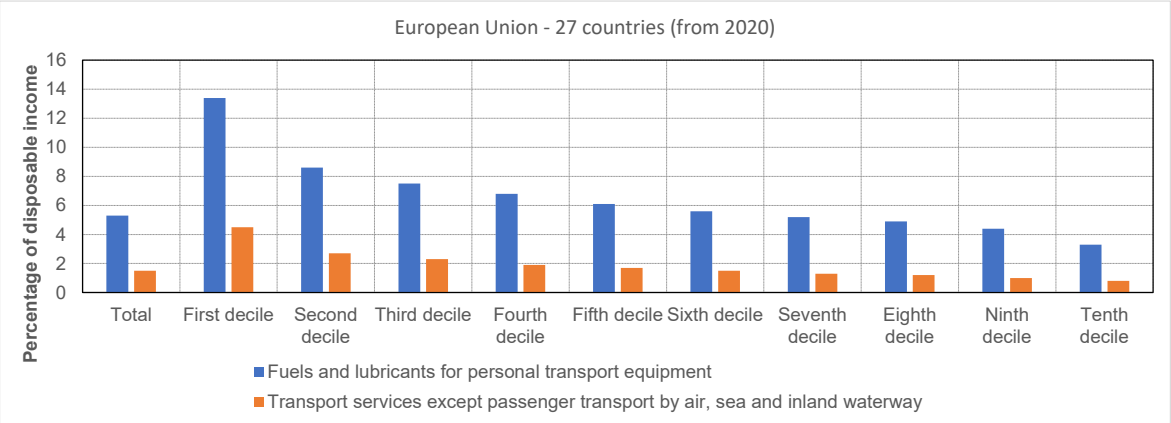
6. Descriptive statistics of transport expenditure

This section shows descriptive statistics related to transport expenditure from two different sources:

- Eurostat experimental statistics of the linked HBS and EU-SILC datasets [icw_aff_01]
- HBS 2015 data (as used for the indicators)

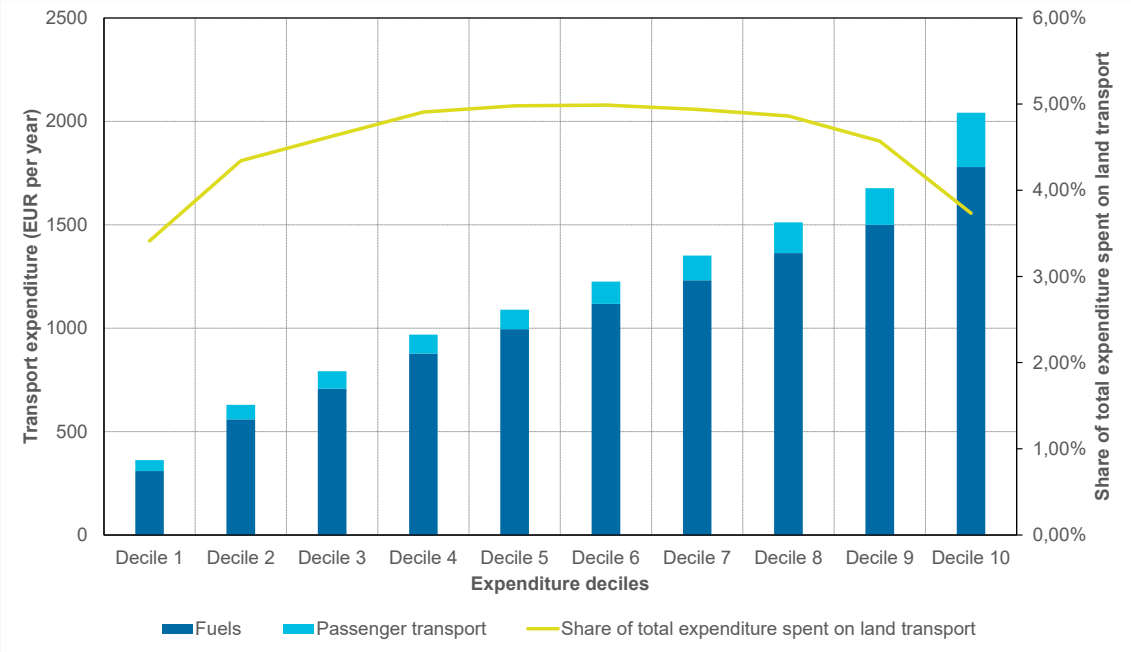
The results on the share of total expenditure / share of income spent on transport are very different. Figure 52 using the experimental statistics indicates that on average, 6.8% of household income are spent on transport. Using the HBS 2015 data, the average share of total expenditures spent on transport is 4.6% and therefore much lower. There are some countries, like Croatia (Figure 74) where the share of income spent on transport in the lower deciles is particularly high. In Croatia at 50%. This may have to do with the fact that negative incomes were not excluded from the analysis of the experimental statistics.

Figure 51: Percentage of disposable income spent on transport (EU27)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01]. Notes: EU aggregates are calculated as the population-weighted arithmetic average of individual country figures.

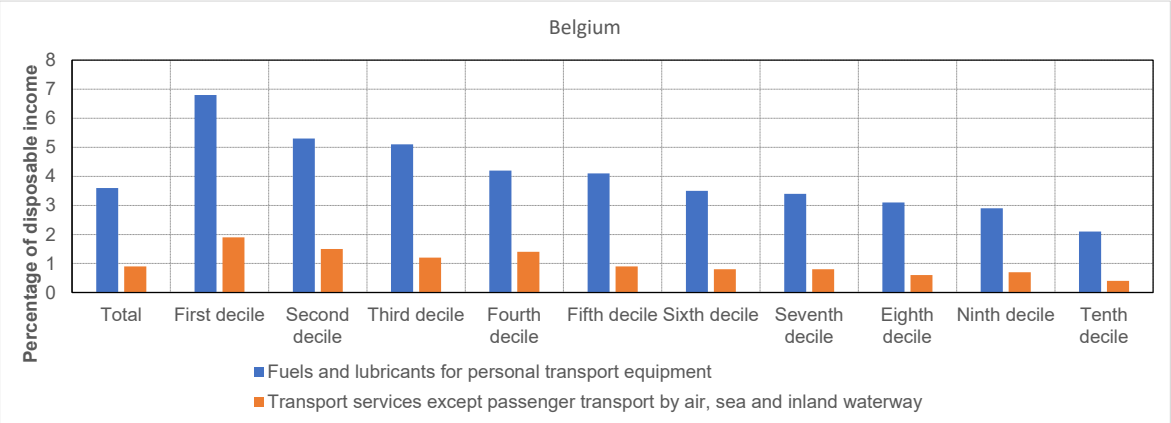
Figure 52: Total and relative transport expenditure per expenditure decile (EU27)



Source: Own calculations based on HBS 2015 microdata.

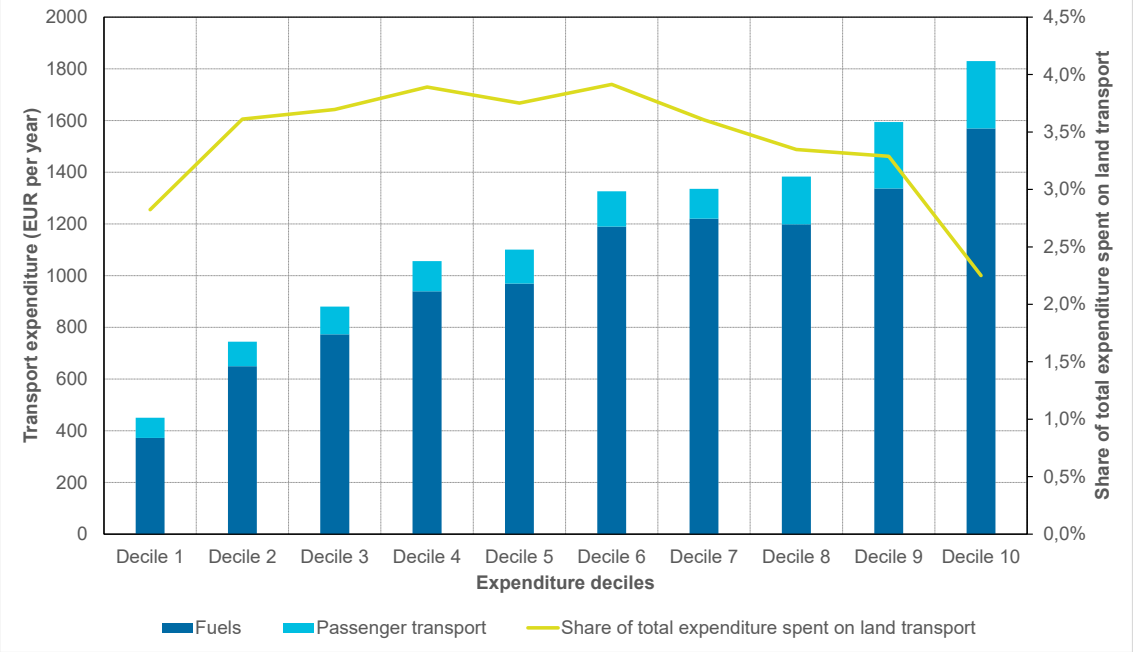
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. AT is missing from the data. The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 53: Percentage of disposable income spent on transport (Belgium)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

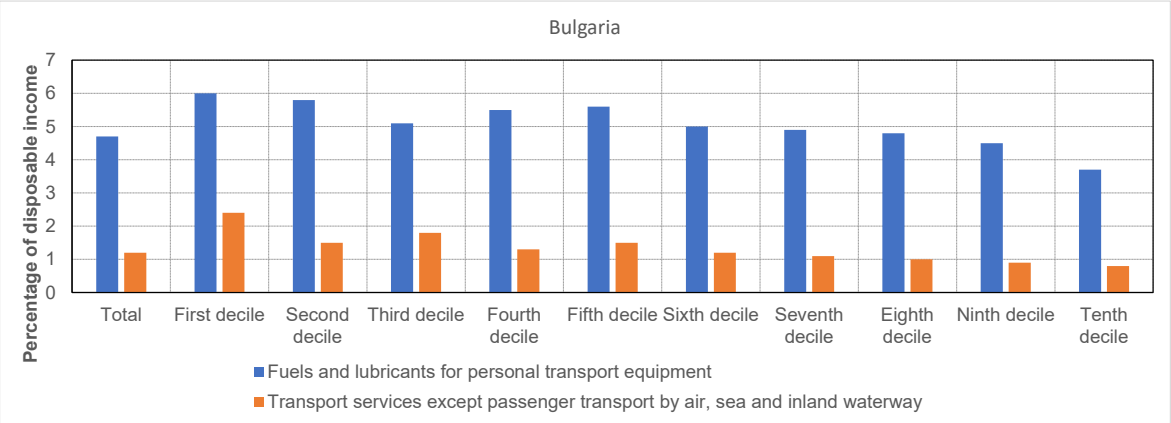
Figure 54: Total and relative transport expenditure per expenditure decile (Belgium)



Source: Own calculations based on HBS 2015 microdata.

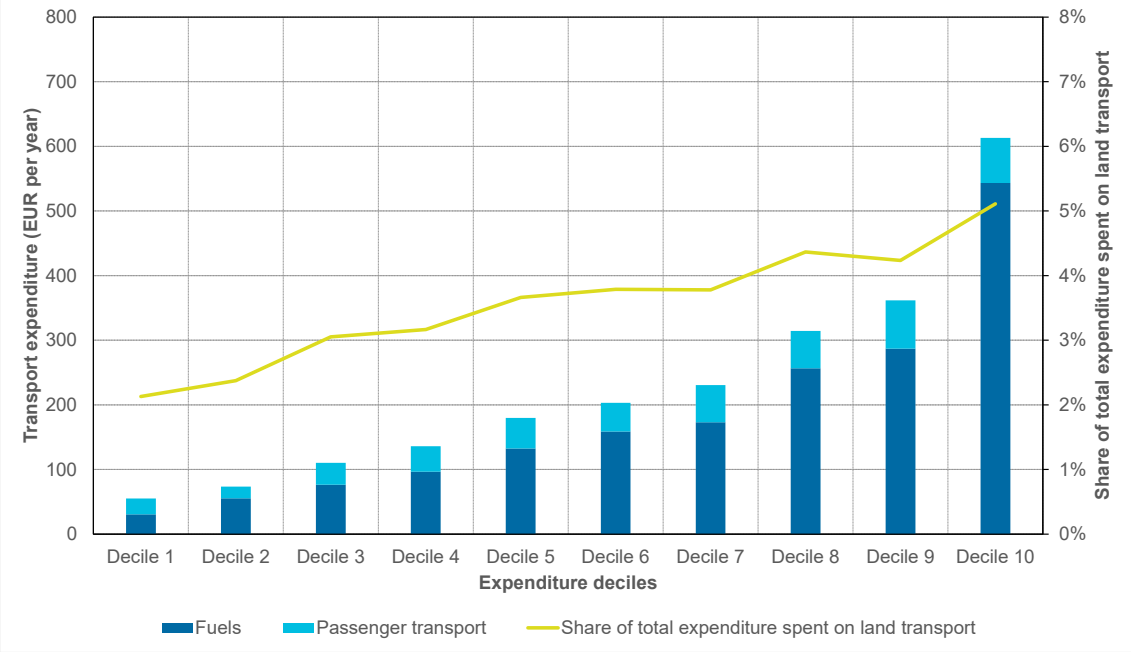
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 55: Percentage of disposable income spent on transport (Bulgaria)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

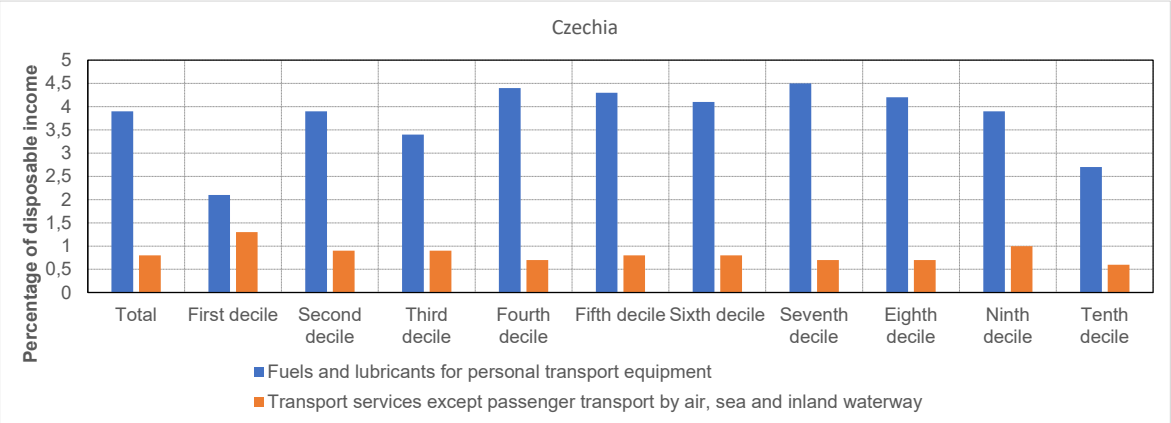
Figure 56: Total and relative transport expenditure per expenditure decile (Bulgaria)



Source: Own calculations based on HBS 2015 microdata.

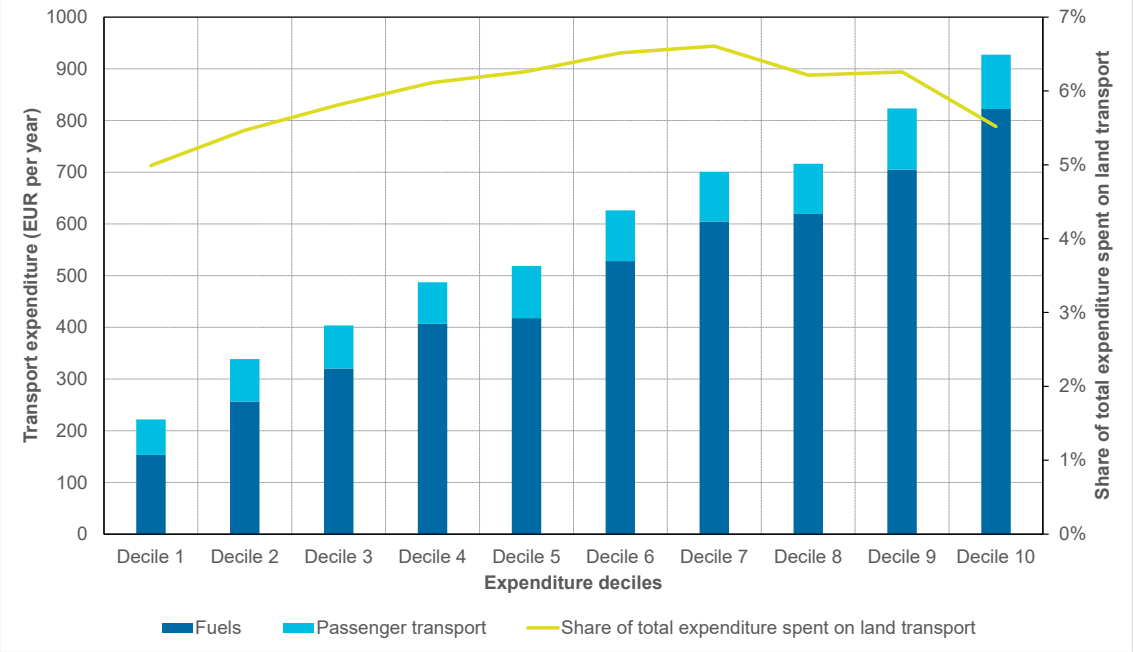
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. According to Eurostat rules, the category 'passenger transport' in decile 1 should be flagged due to a low number of observations (20-49 observations). The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 57: Percentage of disposable income spent on transport (Czechia)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

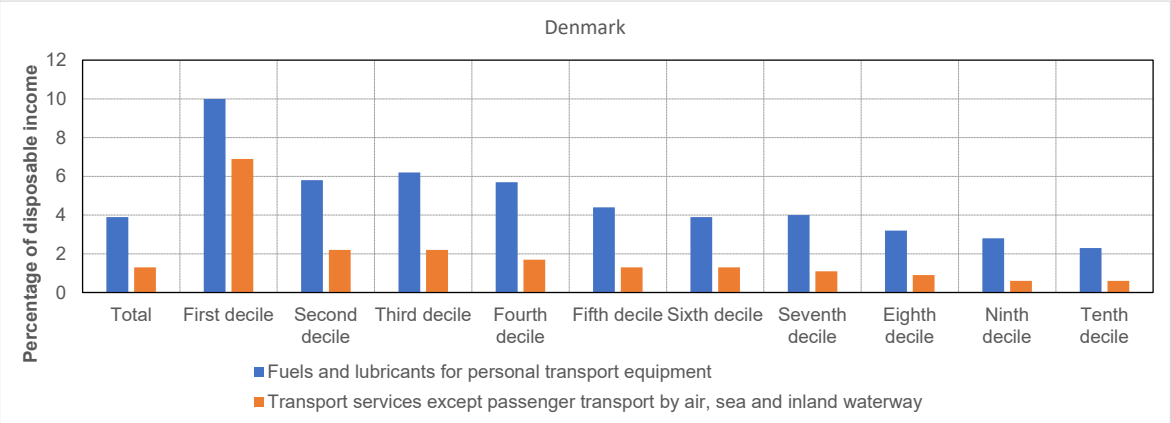
Figure 58: Total and relative transport expenditure per expenditure decile (Czechia)



Source: Own calculations based on HBS 2015 microdata.

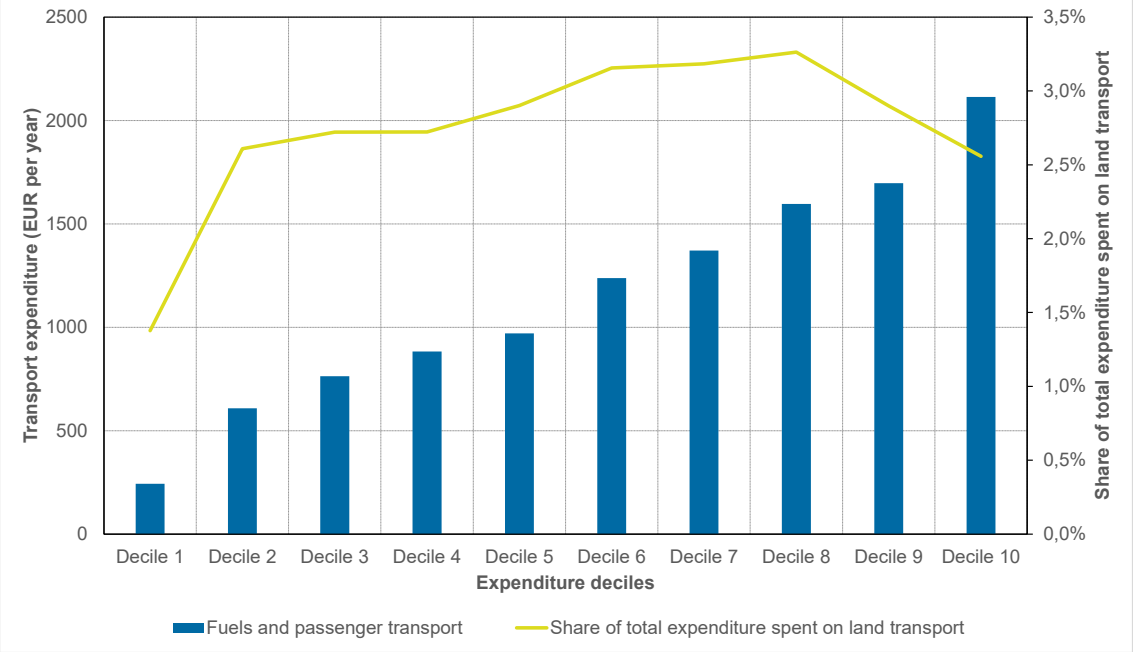
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 59: Percentage of disposable income spent on transport (Denmark)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

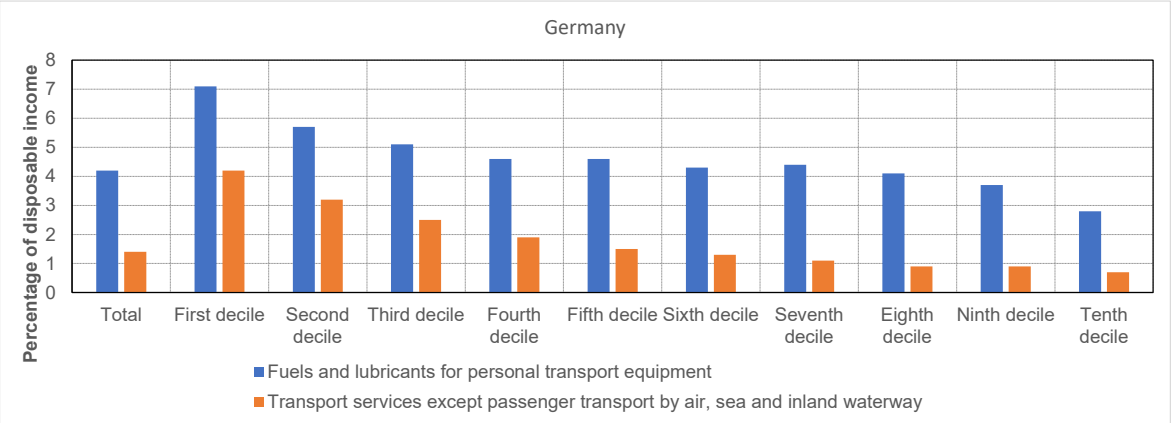
Figure 60: Total and relative transport expenditure per expenditure decile (Denmark)



Source: Own calculations based on HBS 2015 microdata.

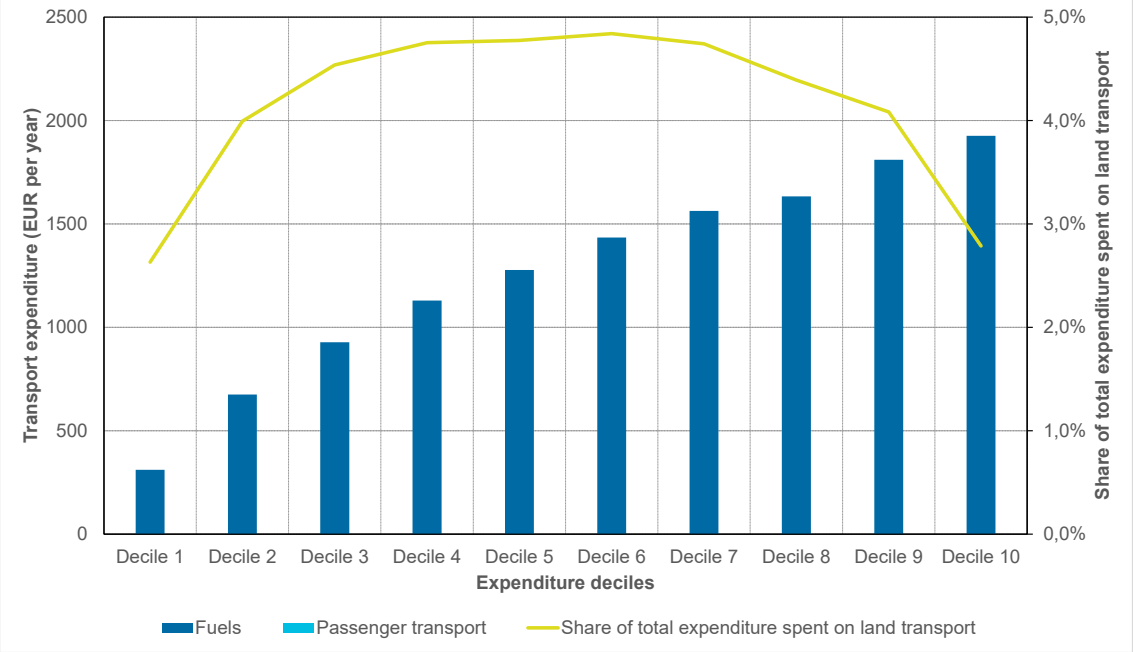
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. According to Eurostat rules, decile 1 should be flagged due to a low number of observations (20-49 observations). Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure). DK has zero expenditure on passenger transport for all observations in three out of four categories of passenger transport. The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 61: Percentage of disposable income spent on transport (Germany)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

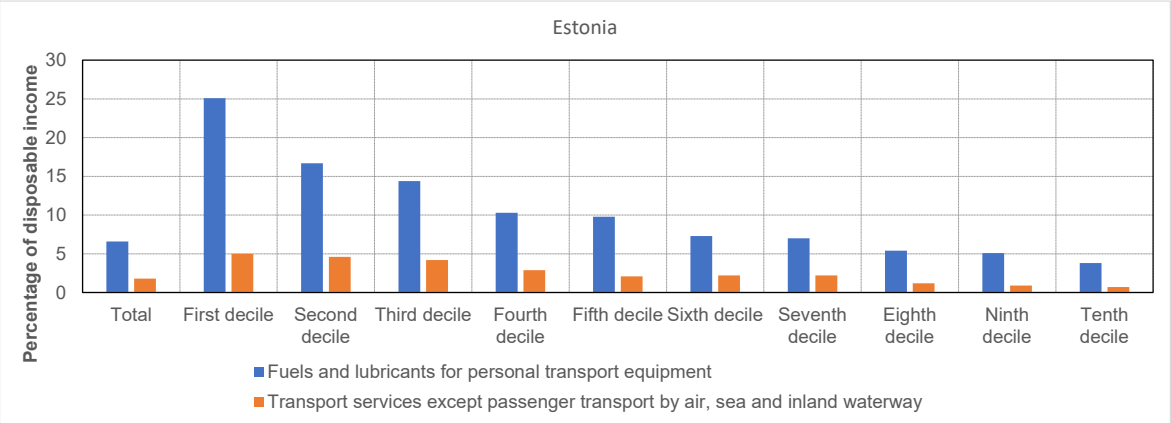
Figure 62: Total and relative transport expenditure per expenditure decile (Germany)



Source: Own calculations based on HBS 2015 microdata.

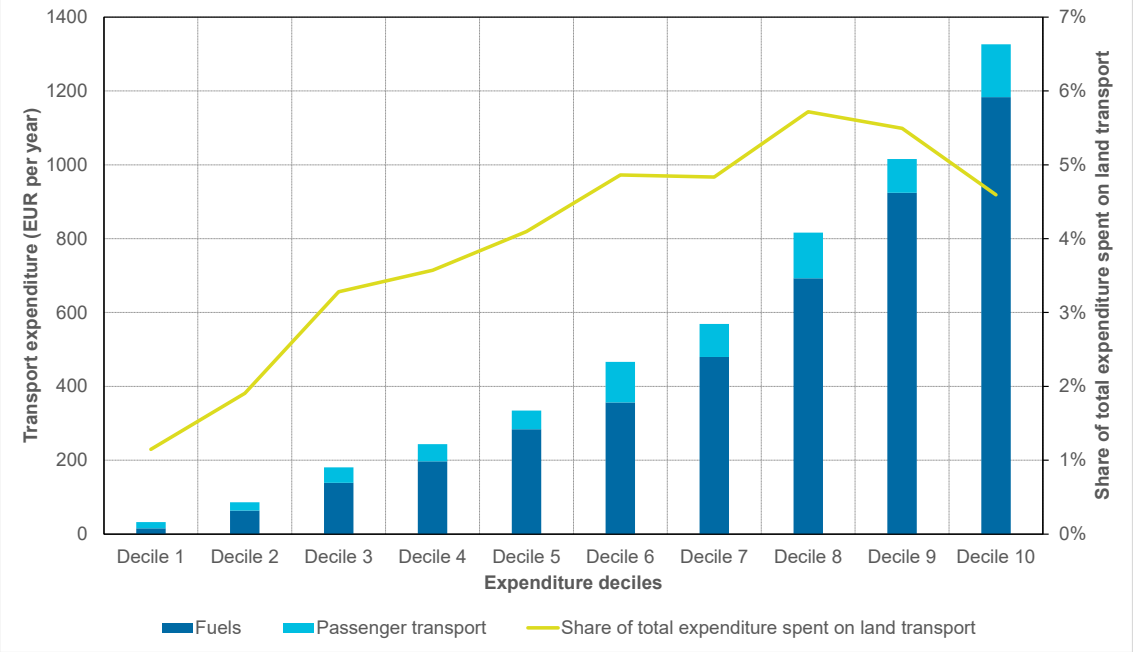
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure). DE has zero expenditure on passenger transport for all observations. The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 63: Percentage of disposable income spent on transport (Estonia)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

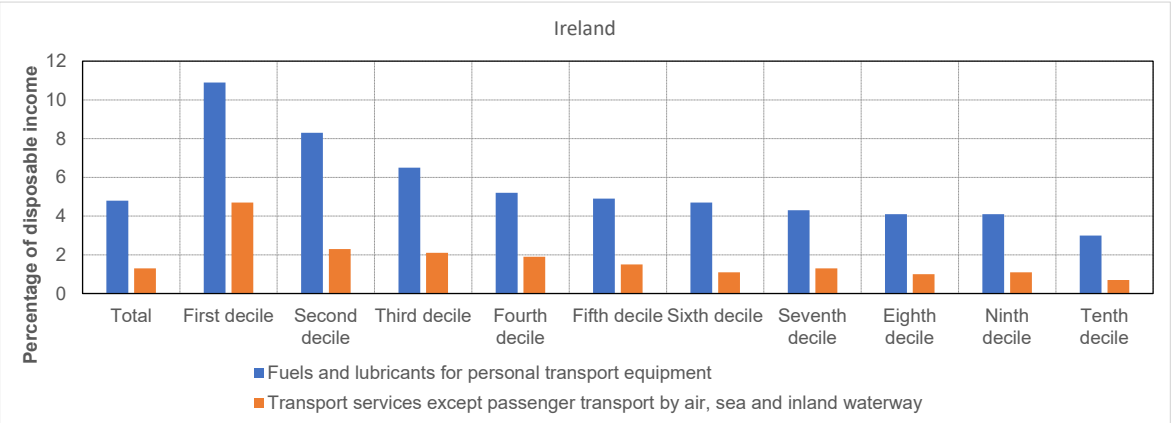
Figure 64: Total and relative transport expenditure per expenditure decile (Estonia)



Source: Own calculations based on HBS 2015 microdata.

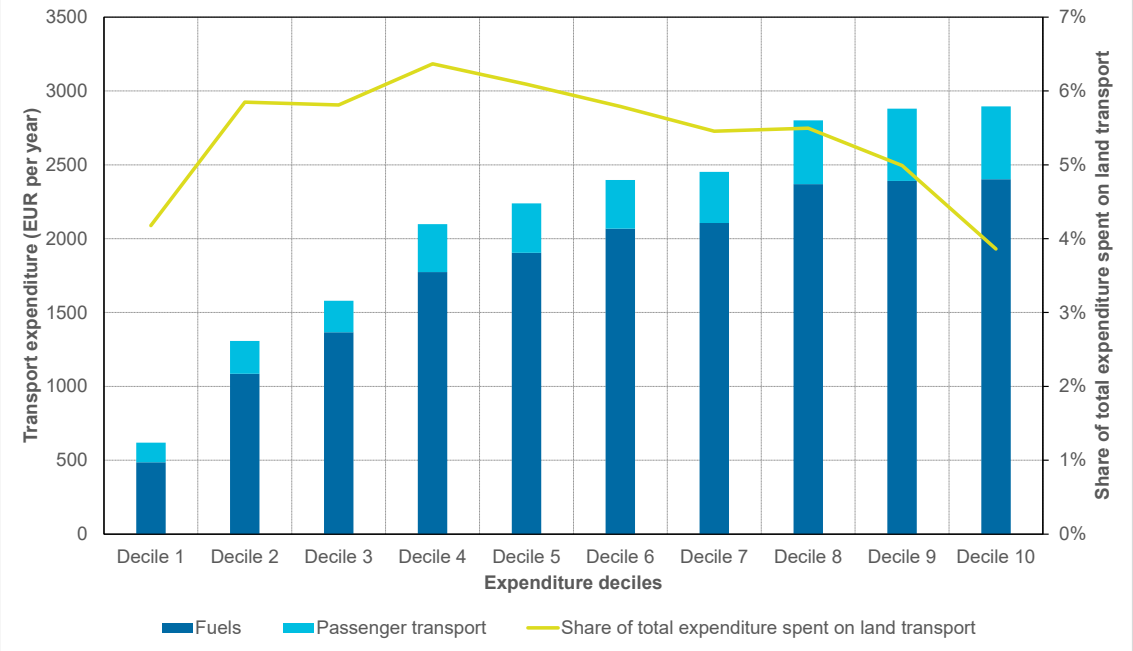
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. According to Eurostat rules, the category 'fuels' in deciles 1 and 2, the category 'passenger transport' in decile 2 & 3 should be flagged due to a low number of observations (20-49 observations). Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure). The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 65: Percentage of disposable income spent on transport (Ireland)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

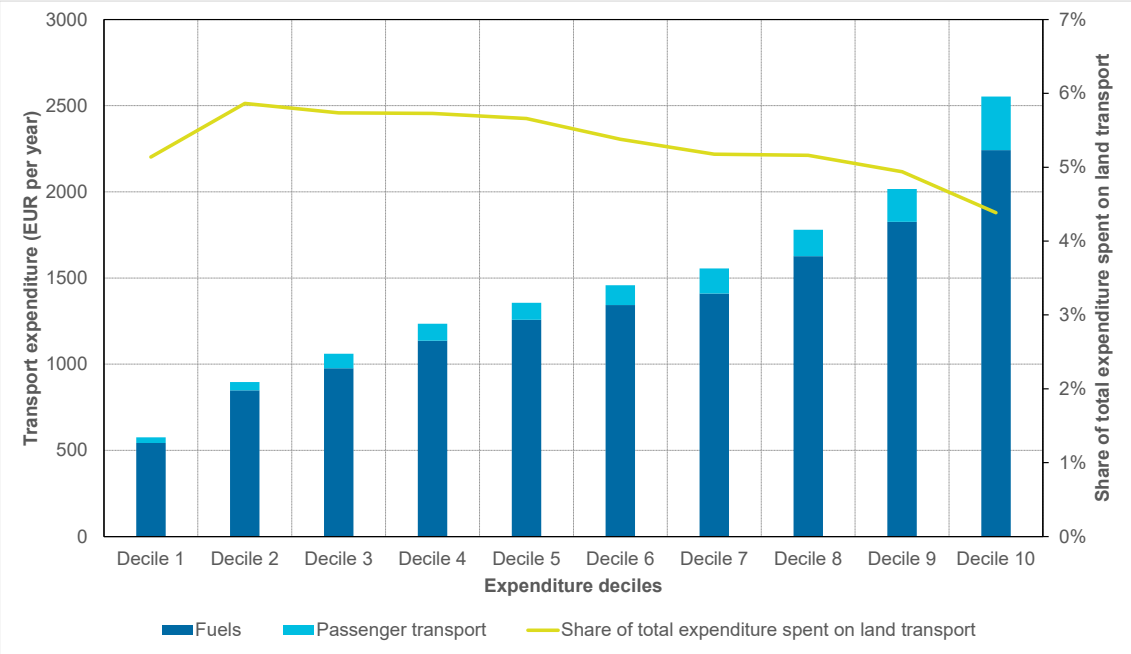
Figure 66: Total and relative transport expenditure per expenditure decile (Ireland)



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

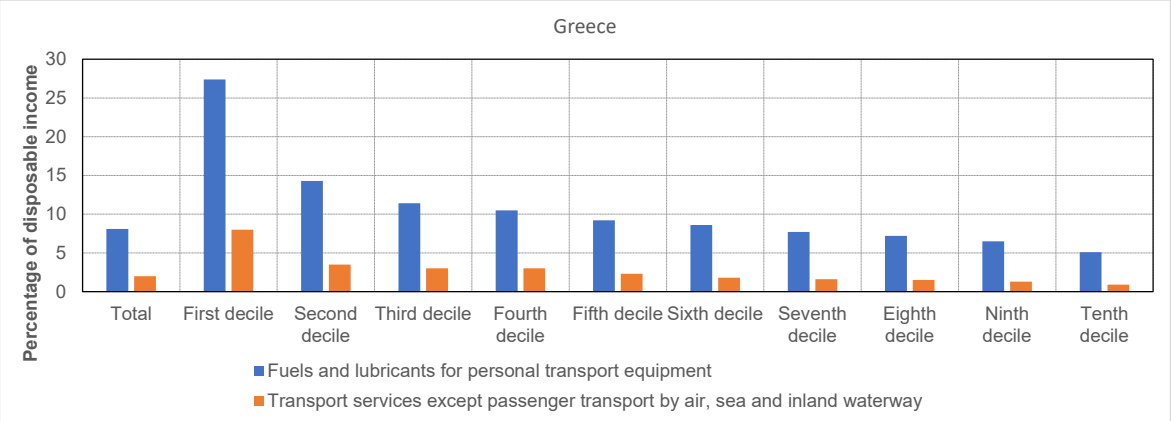
Figure 67: Total and relative transport expenditure per expenditure decile (Italy)



Source: Own calculations based on HBS 2015 microdata.

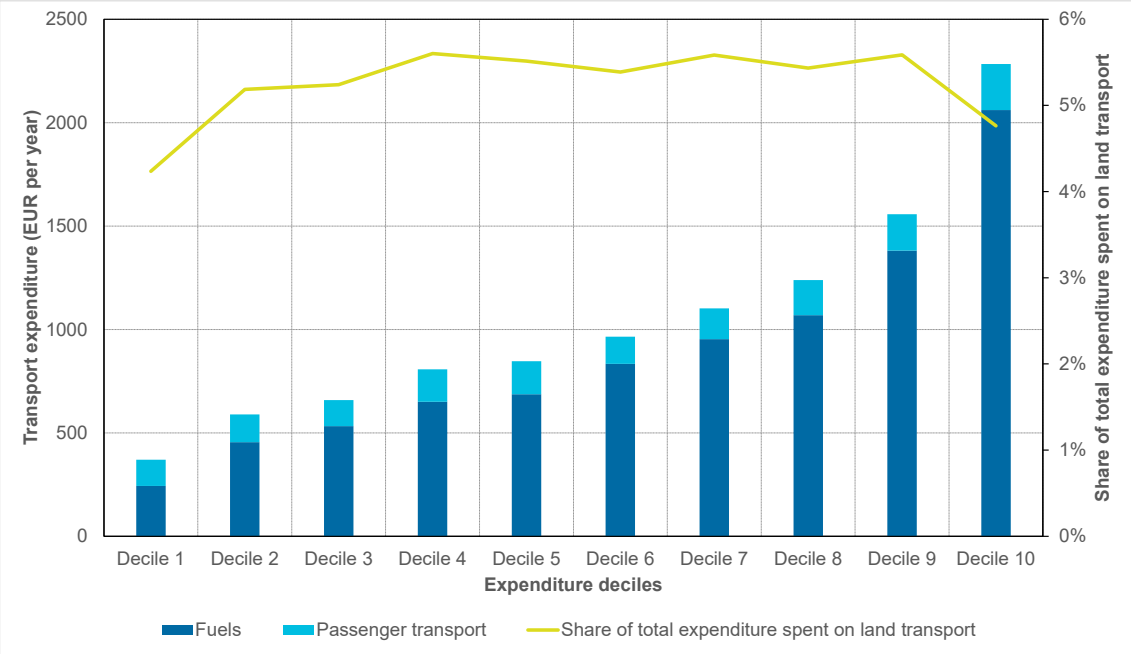
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 68: Percentage of disposable income spent on transport (Greece)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

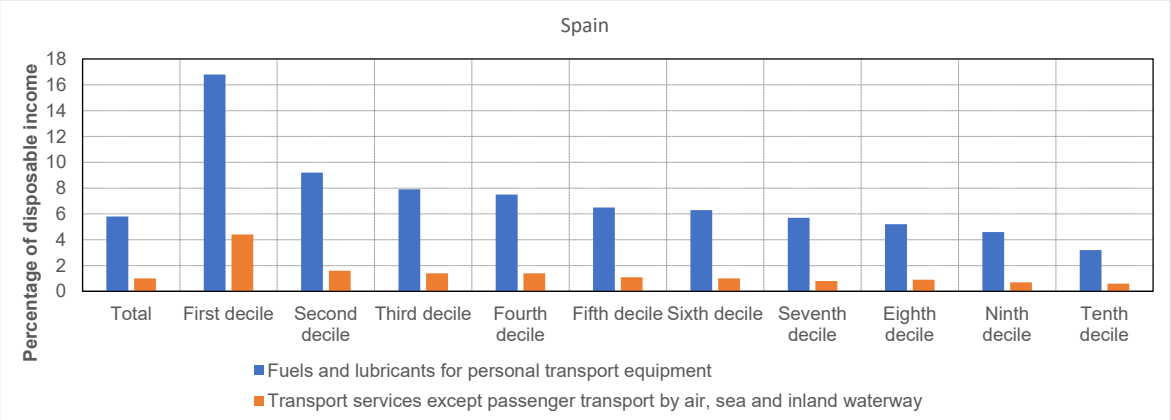
Figure 69: Total and relative transport expenditure per expenditure decile (Greece)



Source: Own calculations based on HBS 2015 microdata.

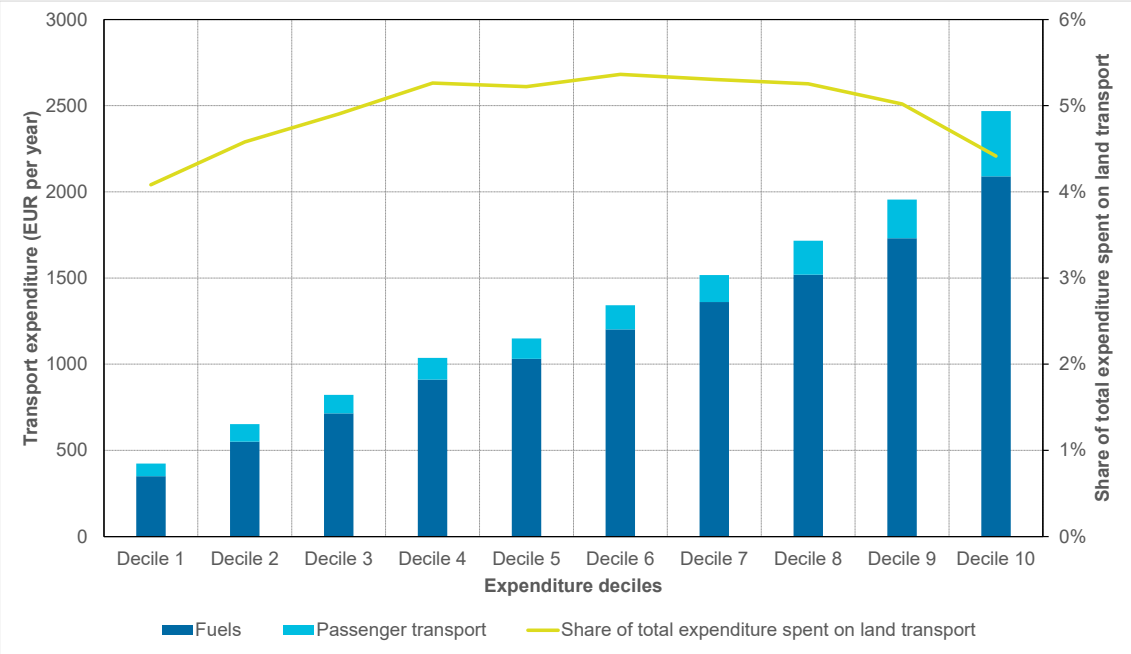
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 70: Percentage of disposable income spent on transport (Spain)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

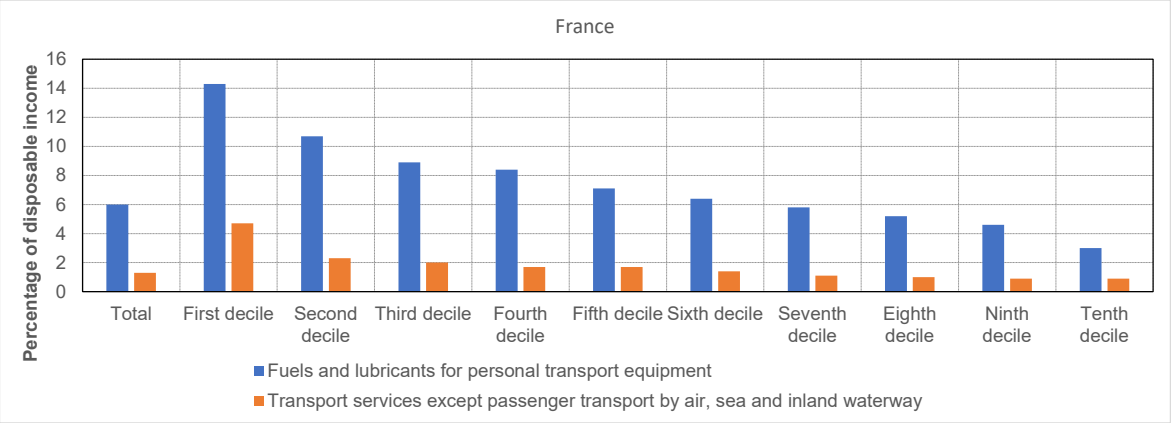
Figure 71: Total and relative transport expenditure per expenditure decile (Spain)



Source: Own calculations based on HBS 2015 microdata.

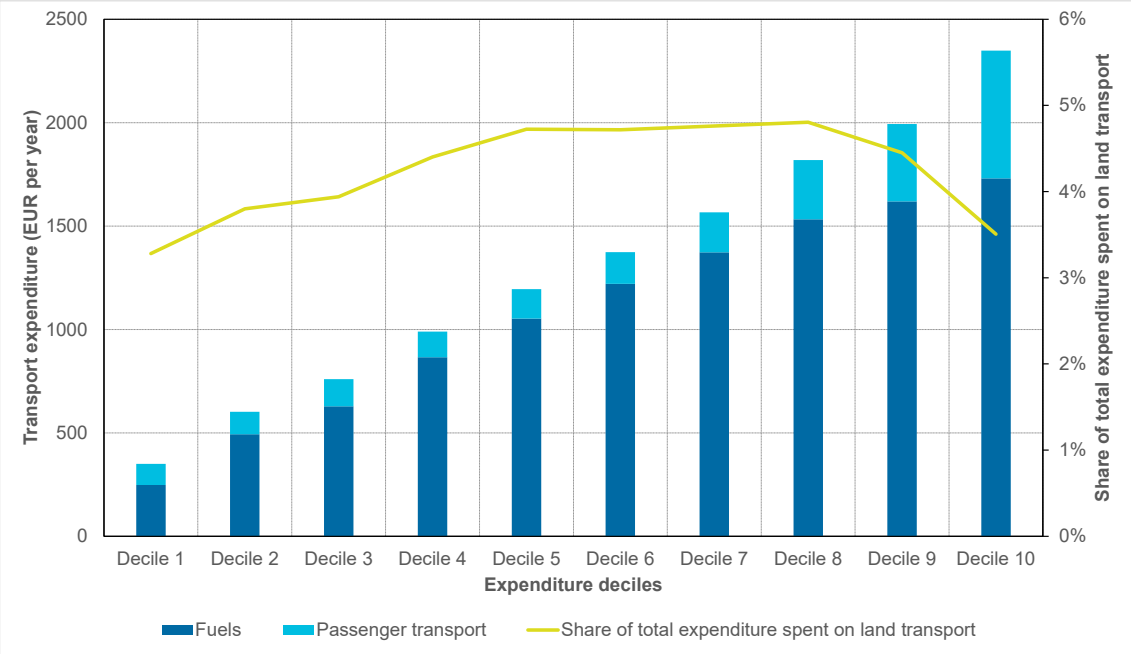
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 72: Percentage of disposable income spent on transport (France)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

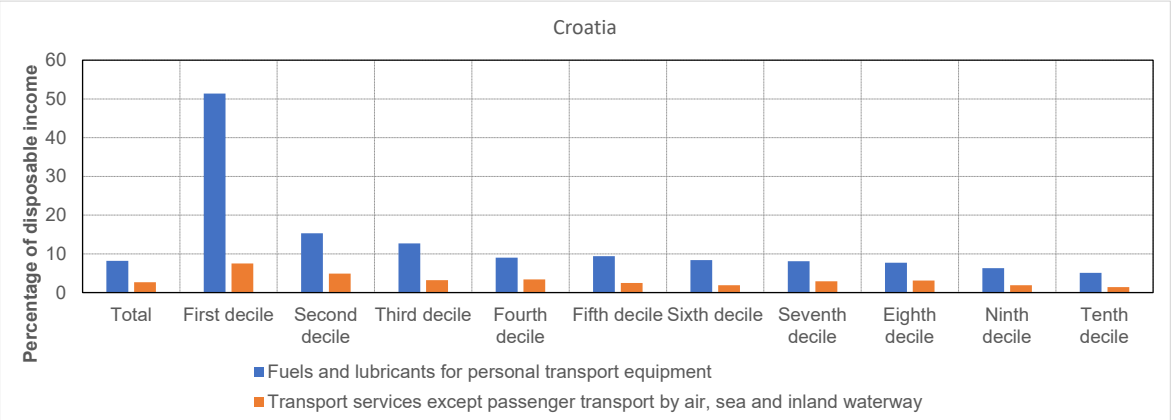
Figure 73: Total and relative transport expenditure per expenditure decile (France)



Source: Own calculations based on HBS 2015 microdata.

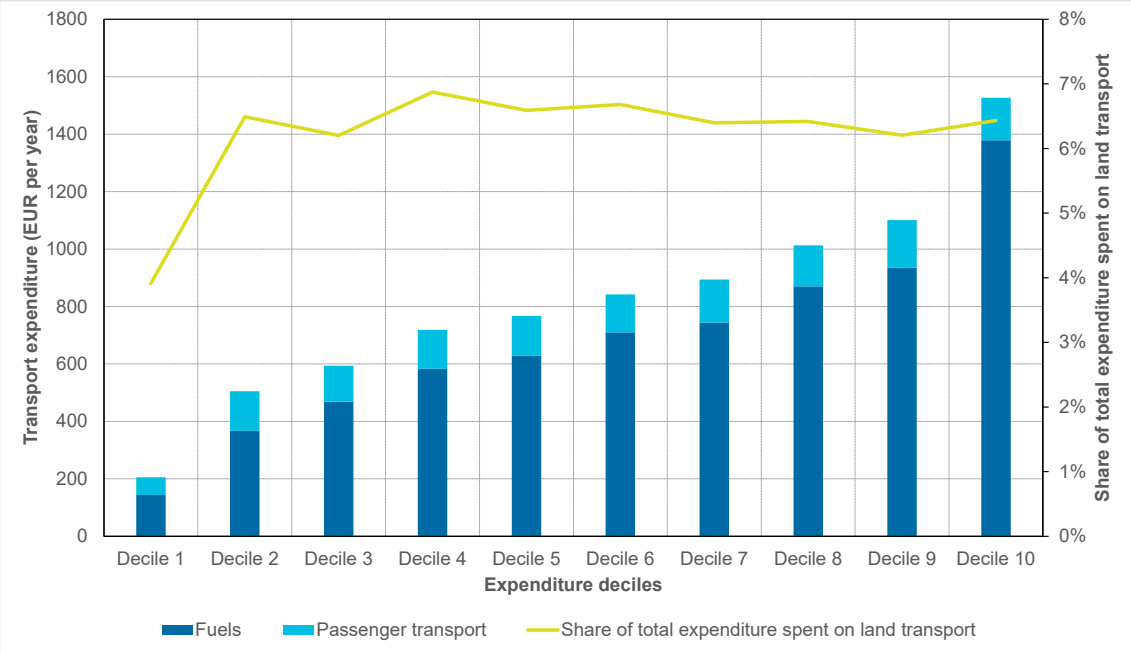
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure).

Figure 74: Percentage of disposable income spent on transport (Croatia)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

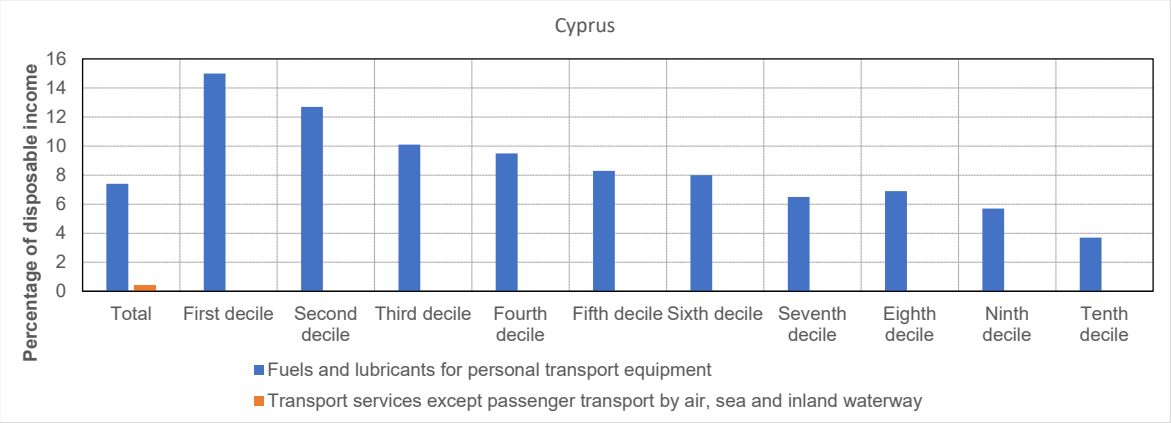
Figure 75: Total and relative transport expenditure per expenditure decile (Croatia)



Source: Own calculations based on HBS 2015 microdata.

Notes The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

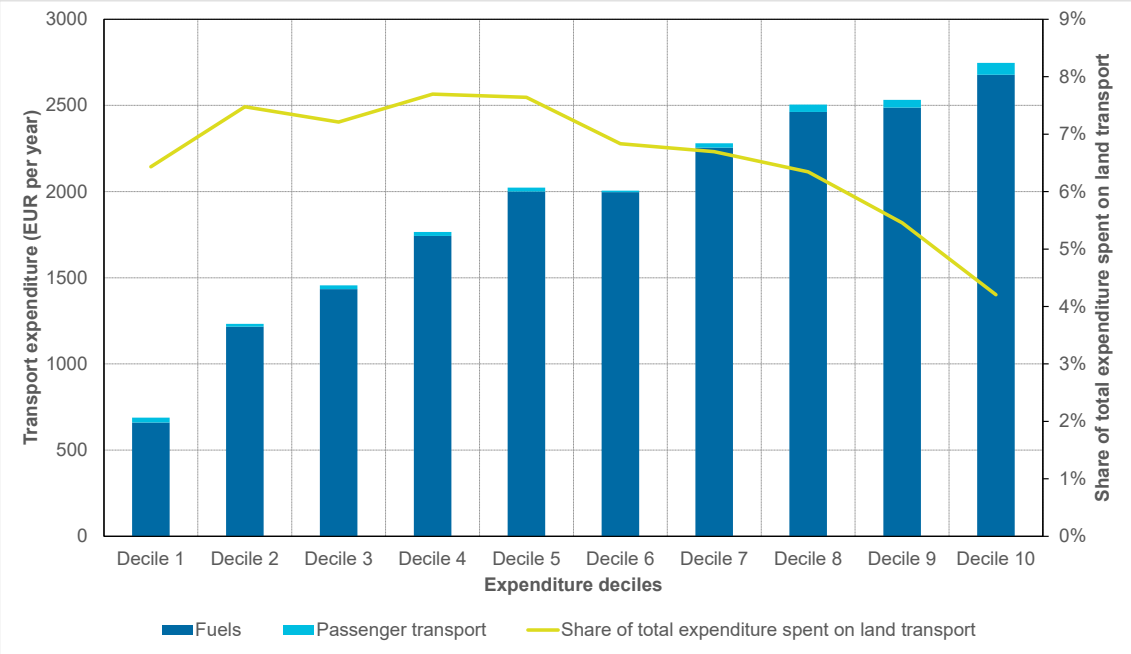
Figure 76: Percentage of disposable income spent on transport (Cyprus)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

Notes: Percentage of disposable income spend on transport services except passenger transport by air, sea and inland waterway not available by deciles.

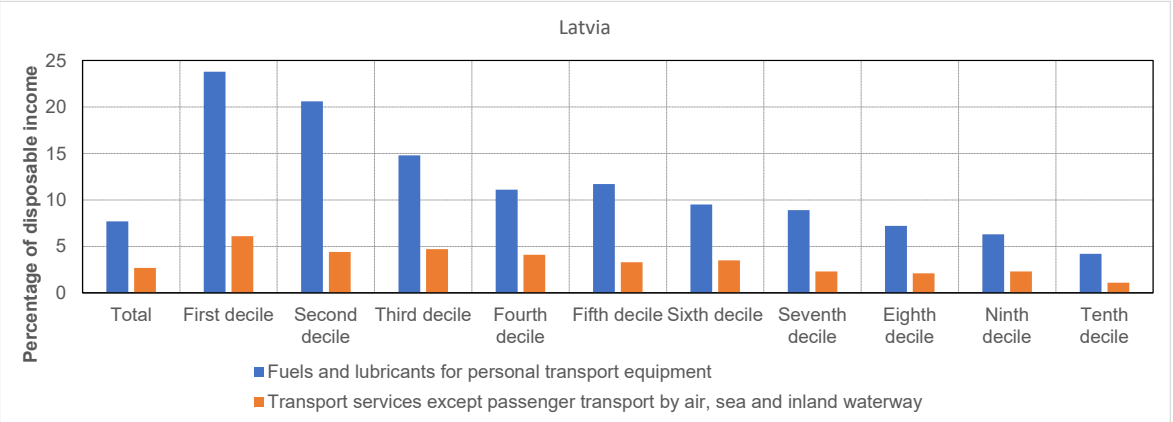
Figure 77: Total and relative transport expenditure per expenditure decile (Cyprus)



Source: Own calculations based on HBS 2015 microdata.

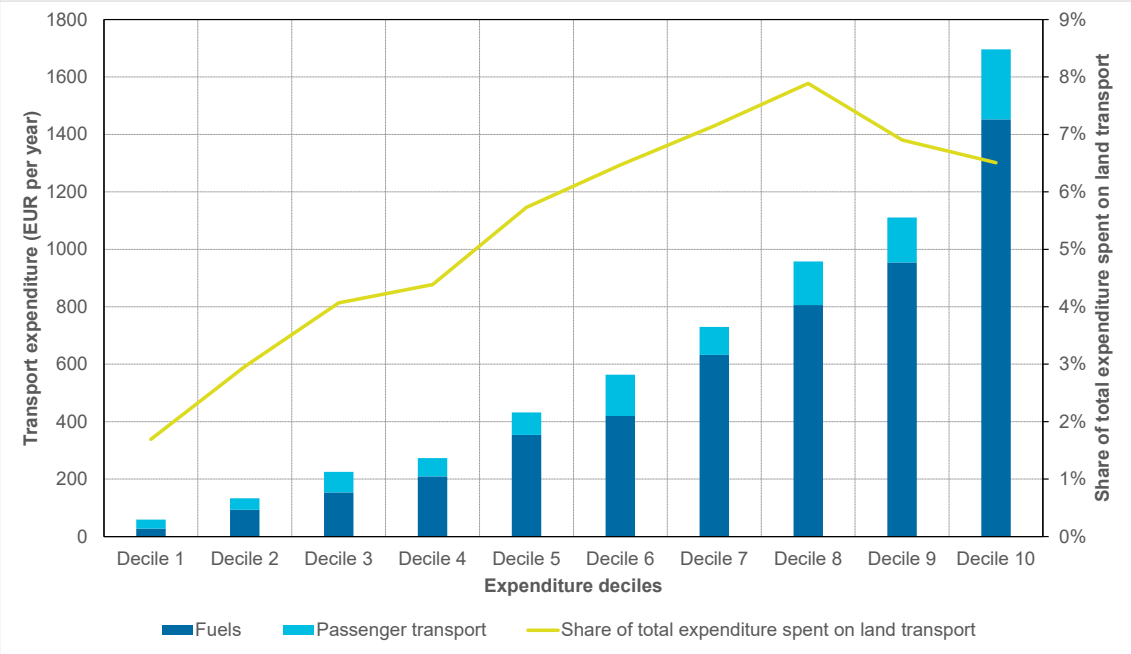
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. According to Eurostat rules, the category 'passenger transport' in decile 1 - 9 should be flagged due to a low number of observations (20-49 observations). The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 78: Percentage of disposable income spent on transport (Latvia)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

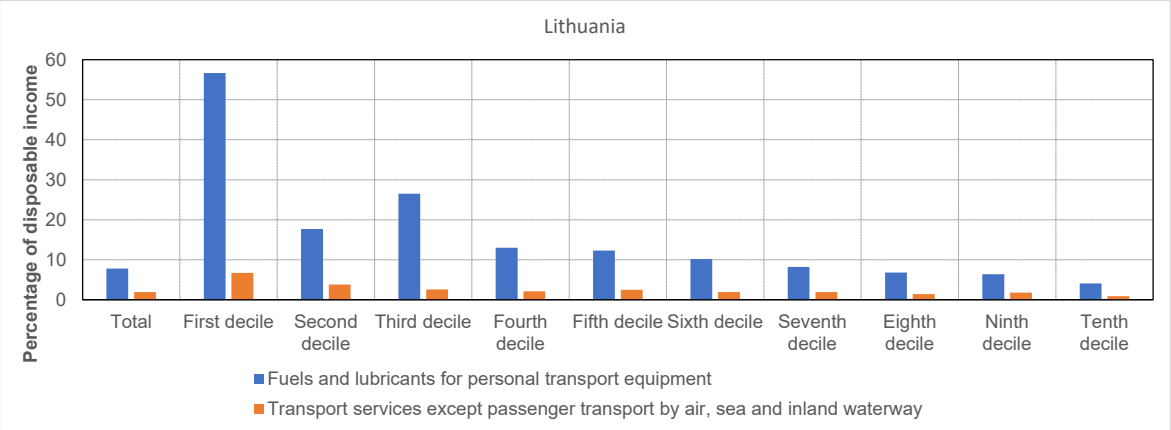
Figure 79: Total and relative transport expenditure per expenditure decile (Latvia)



Source: Own calculations based on HBS 2015 microdata.

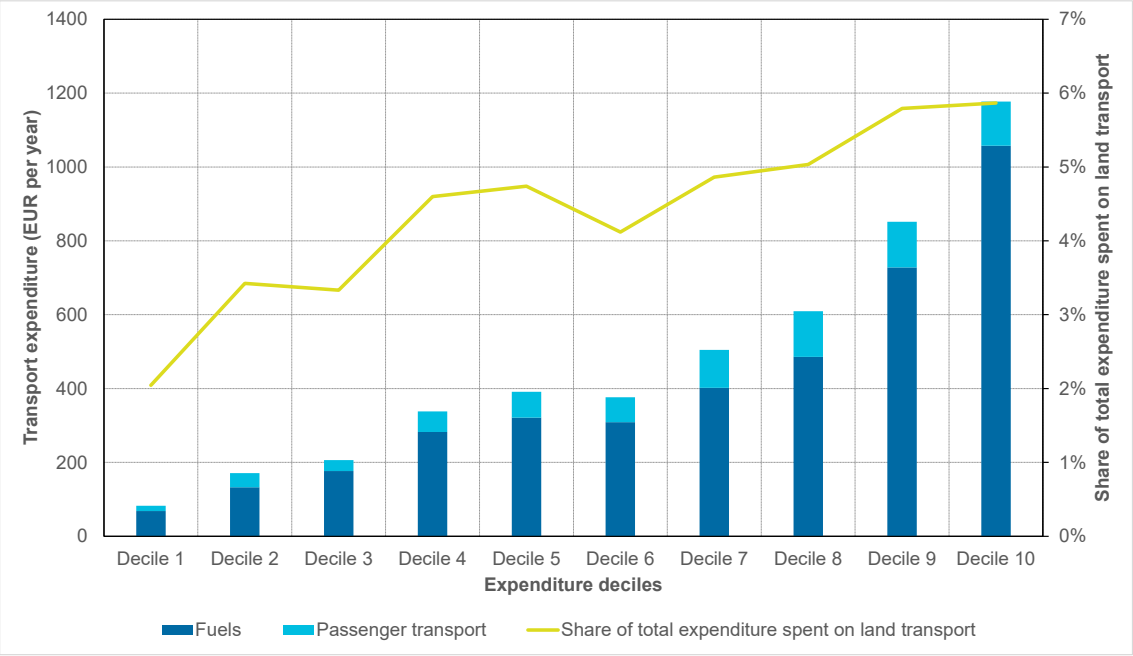
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. According to Eurostat rules, the category 'fuels' in decile 1 should be flagged due to a low number of observations (20-49 observations). Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure). The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 80: Percentage of disposable income spent on transport (Lithuania)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

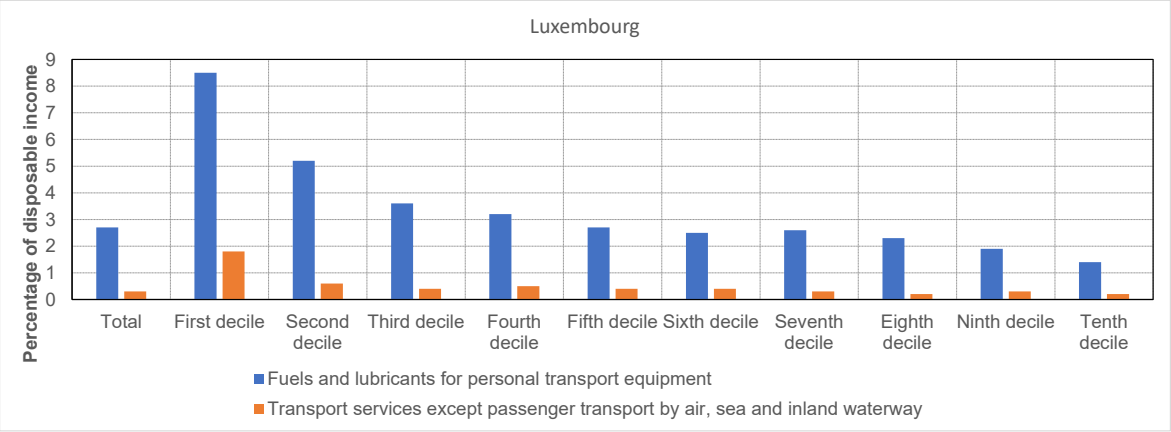
Figure 81: Total and relative transport expenditure per expenditure decile (Lithuania)



Source: Own calculations based on HBS 2015 microdata.

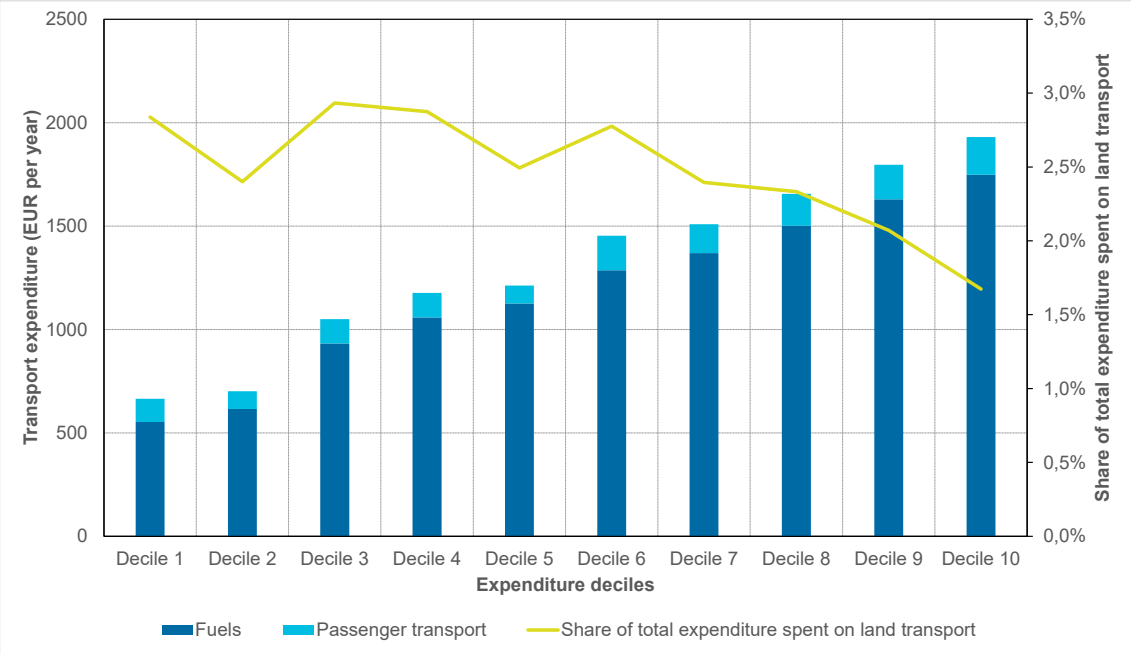
Notes The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. According to Eurostat rules, the category 'fuels' in decile 1, the category 'passenger transport' in decile 1 & 2 should be flagged due to a low number of observations (20-49 observations). Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure).

Figure 82: Percentage of disposable income spent on transport (Luxembourg)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

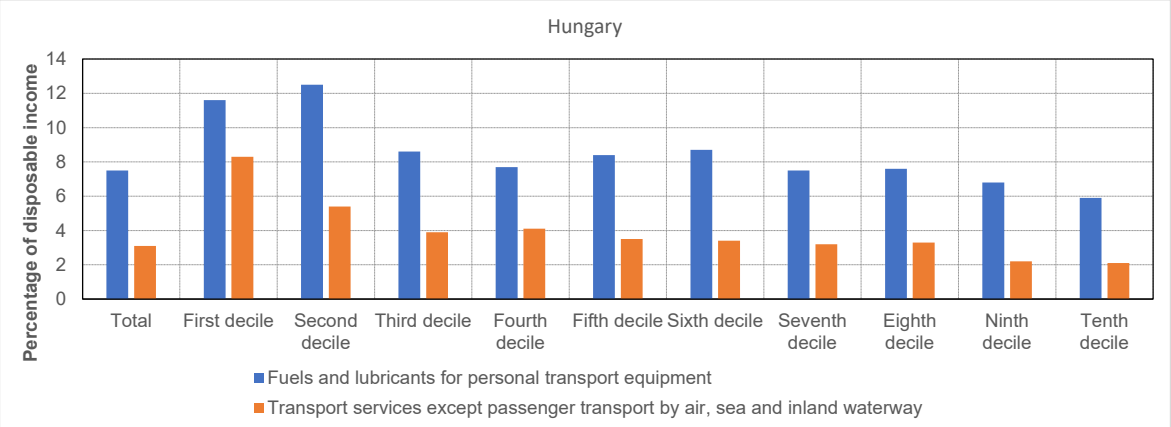
Figure 83: Total and relative transport expenditure per expenditure decile (Luxembourg)



Source: Own calculations based on HBS 2015 microdata.

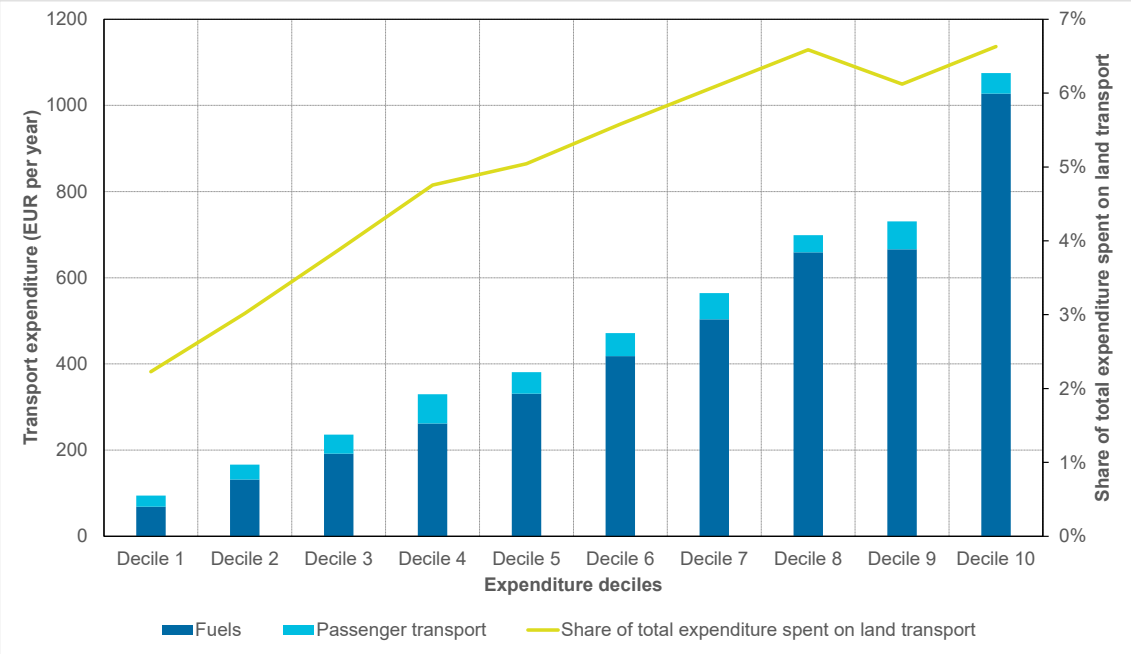
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 84: Percentage of disposable income spent on transport (Hungary)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

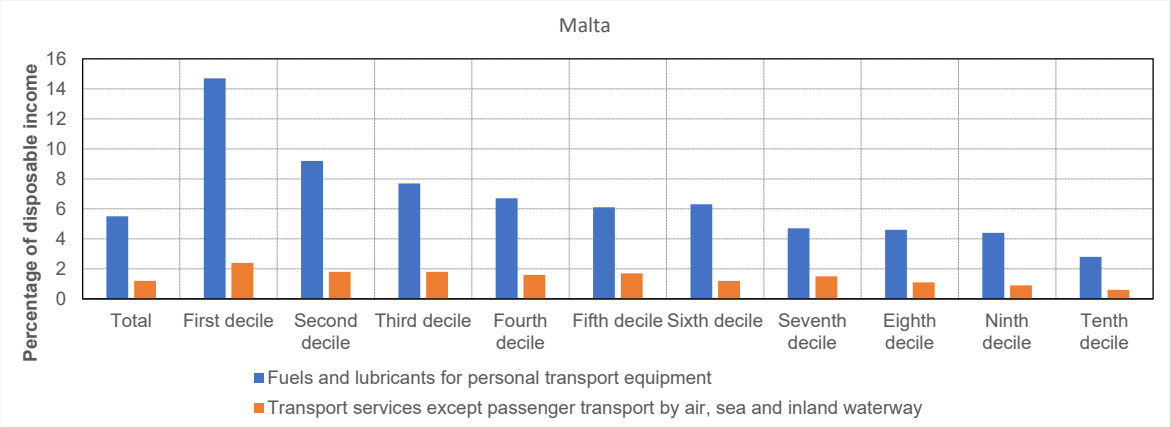
Figure 85: Total and relative transport expenditure per expenditure decile (Hungary)



Source: Own calculations based on HBS 2015 microdata.

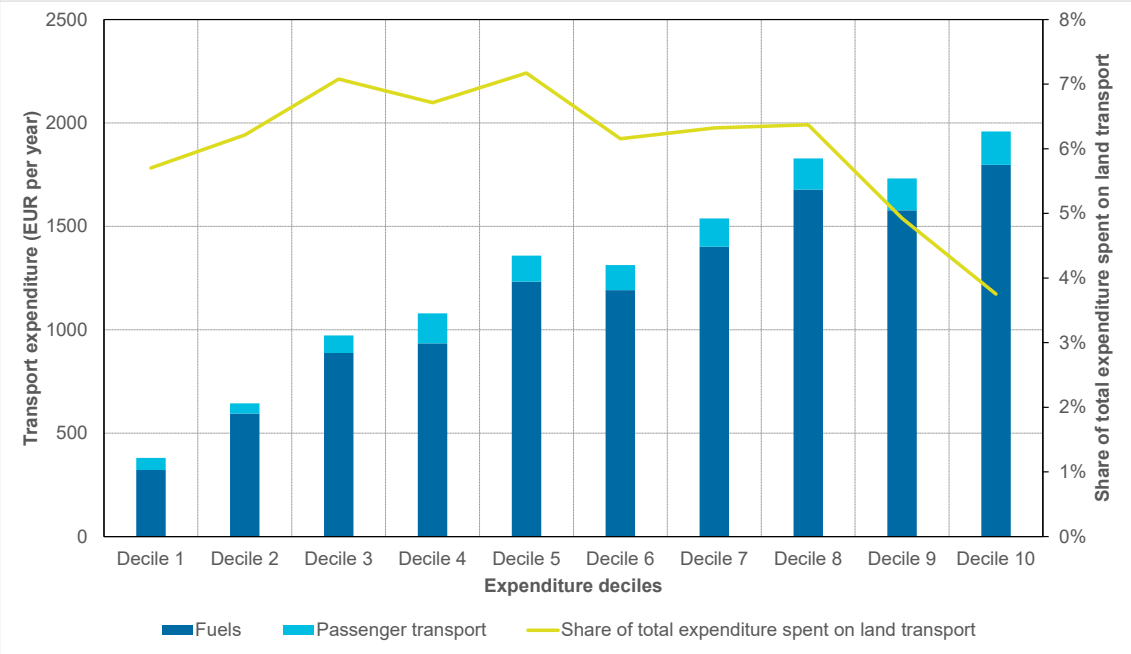
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure). The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 86: Percentage of disposable income spent on transport (Malta)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

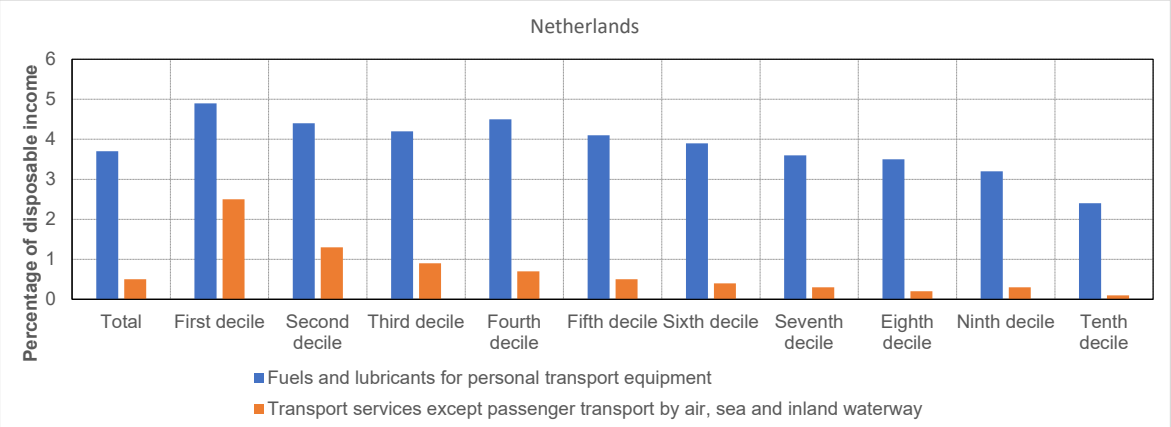
Figure 87: Total and relative transport expenditure per expenditure decile (Malta)



Source: Own calculations based on HBS 2015 microdata.

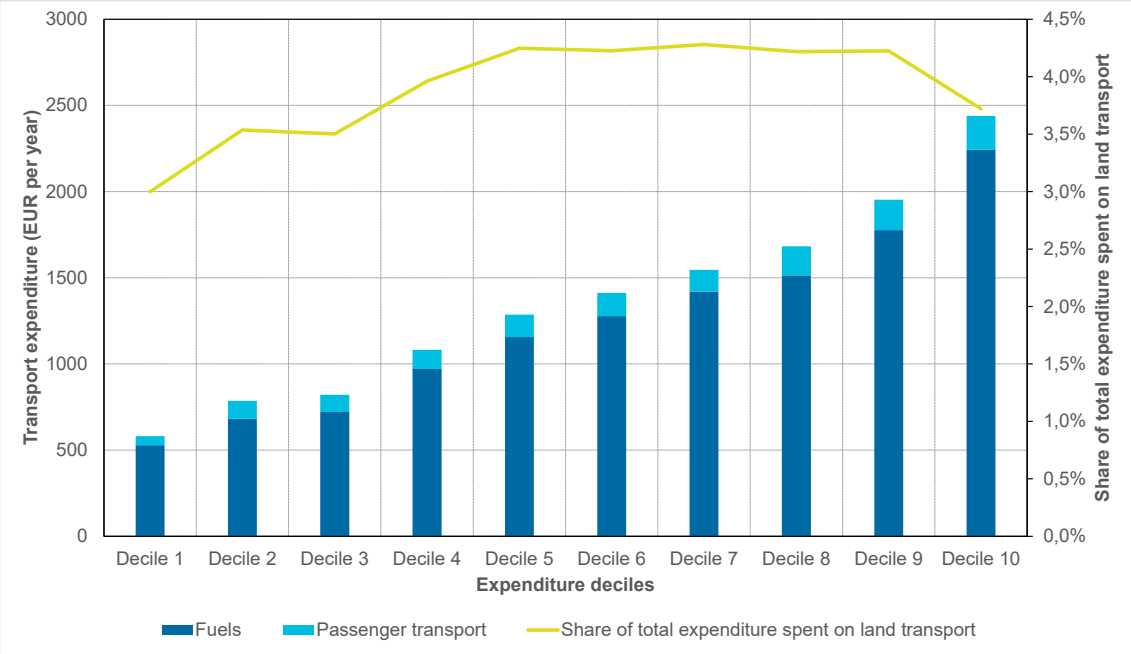
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 88: Percentage of disposable income spent on transport (Netherlands)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

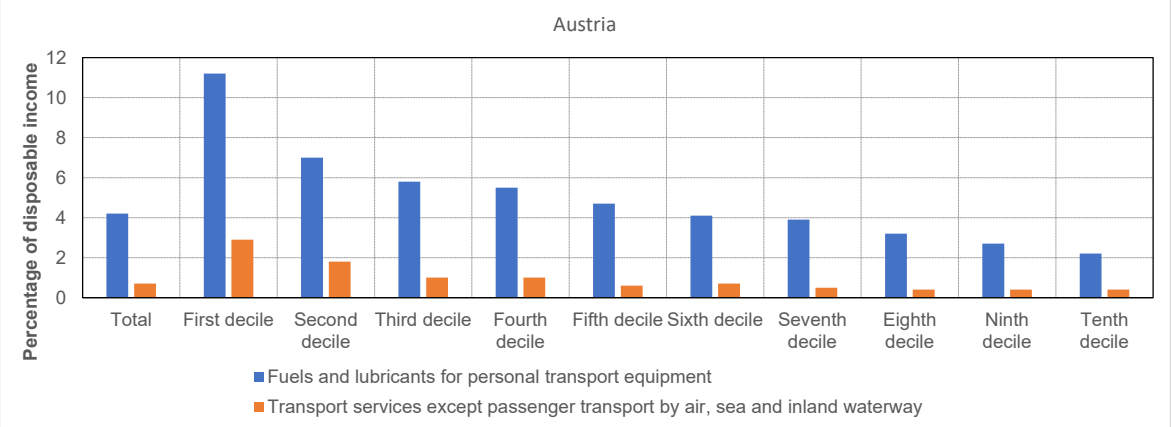
Figure 89: Total and relative transport expenditure per expenditure decile (Netherlands)



Source: Own calculations based on HBS 2015 microdata.

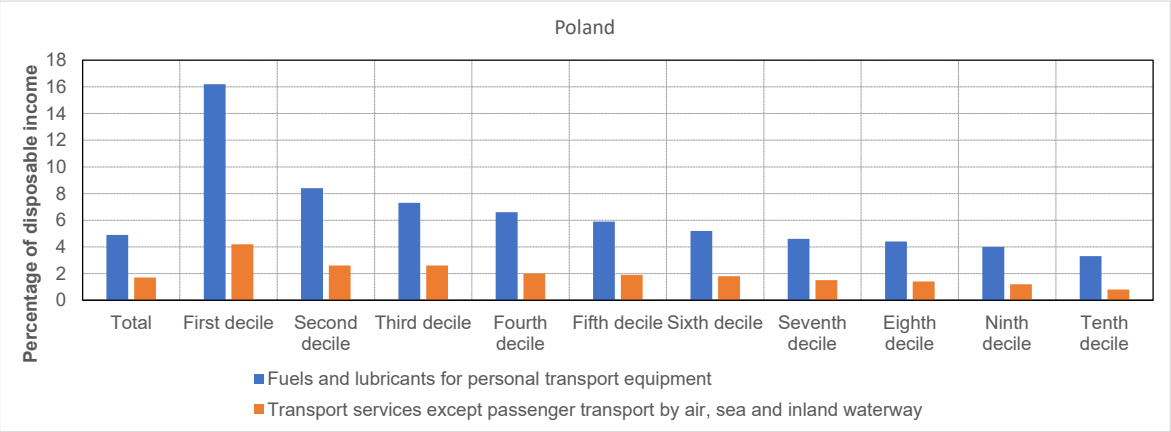
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. The modified OECD equivalence scale is used to calculate the expenditure deciles.

Figure 90: Percentage of disposable income spent on transport (Austria)



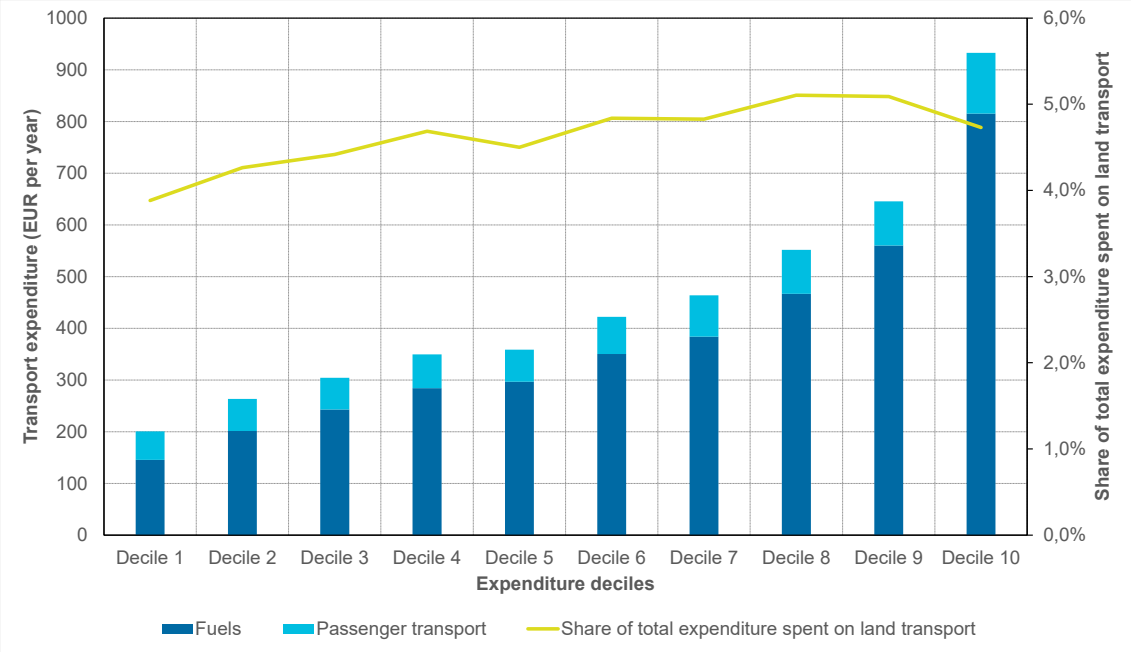
Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

Figure 91: Percentage of disposable income spent on transport (Poland)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

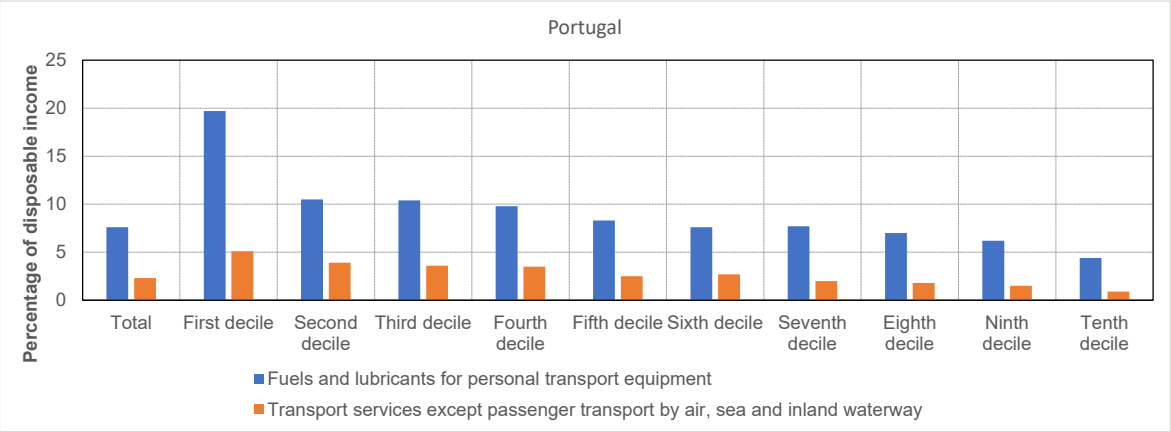
Figure 92: Total and relative transport expenditure per expenditure decile (Poland)



Source: Own calculations based on HBS 2015 microdata.

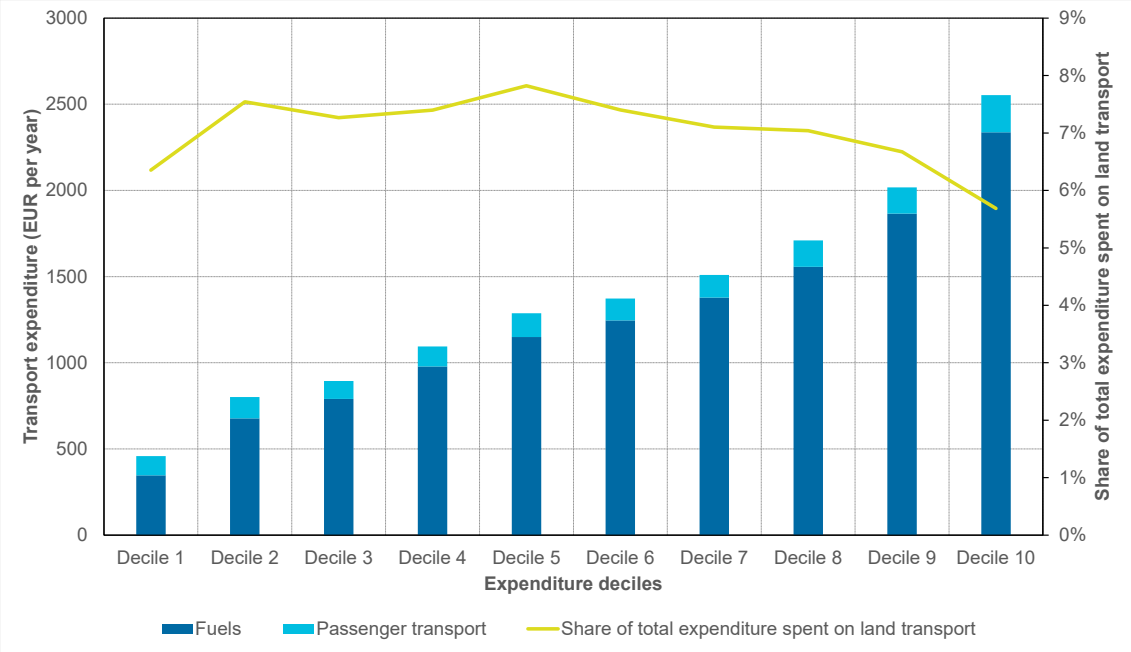
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 93: Percentage of disposable income spent on transport (Portugal)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

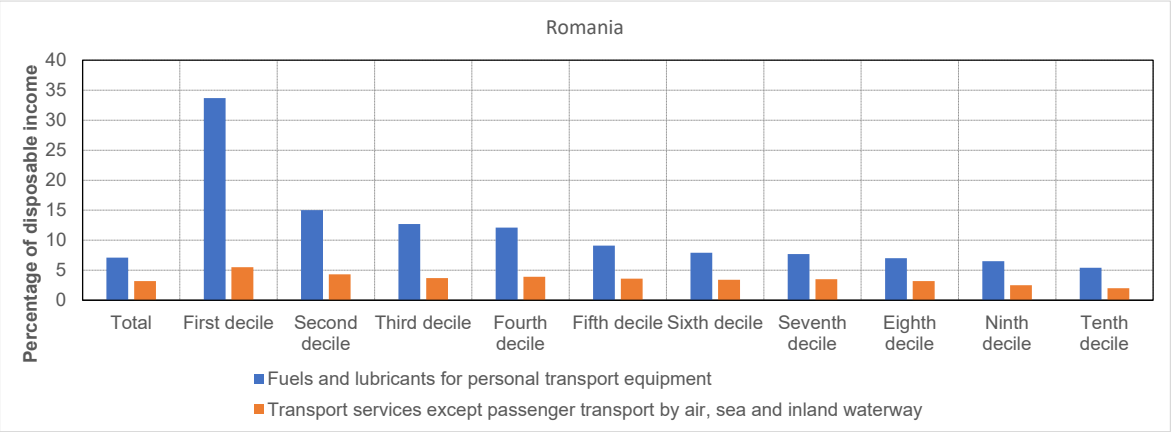
Figure 94: Total and relative transport expenditure per expenditure decile (Portugal)



Source: Own calculations based on HBS 2015 microdata.

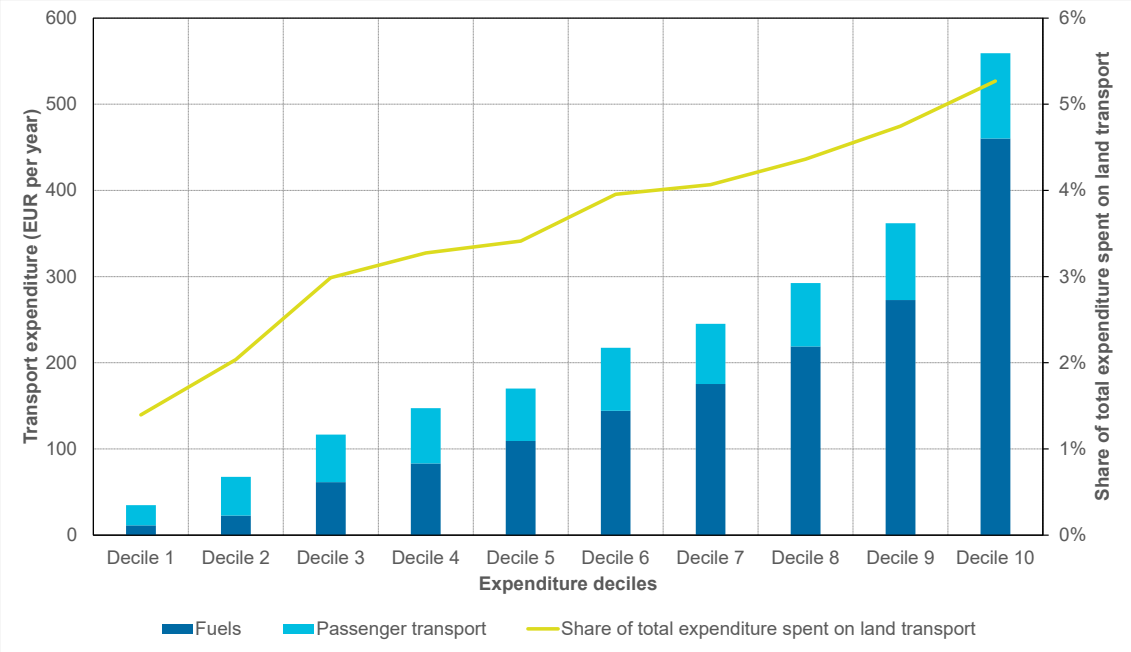
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 95: Percentage of disposable income spent on transport (Romania)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

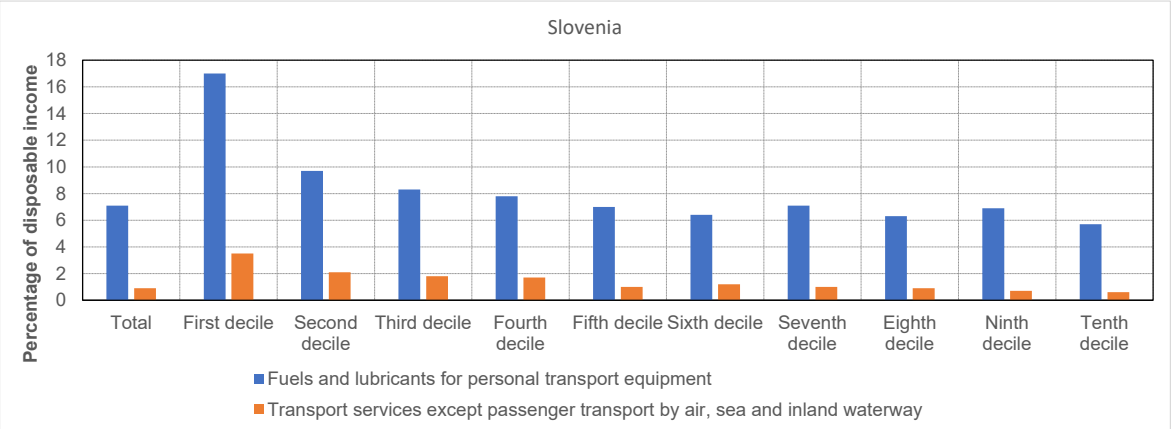
Figure 96: Total and relative transport expenditure per expenditure decile (Romania)



Source: Own calculations based on HBS 2015 microdata.

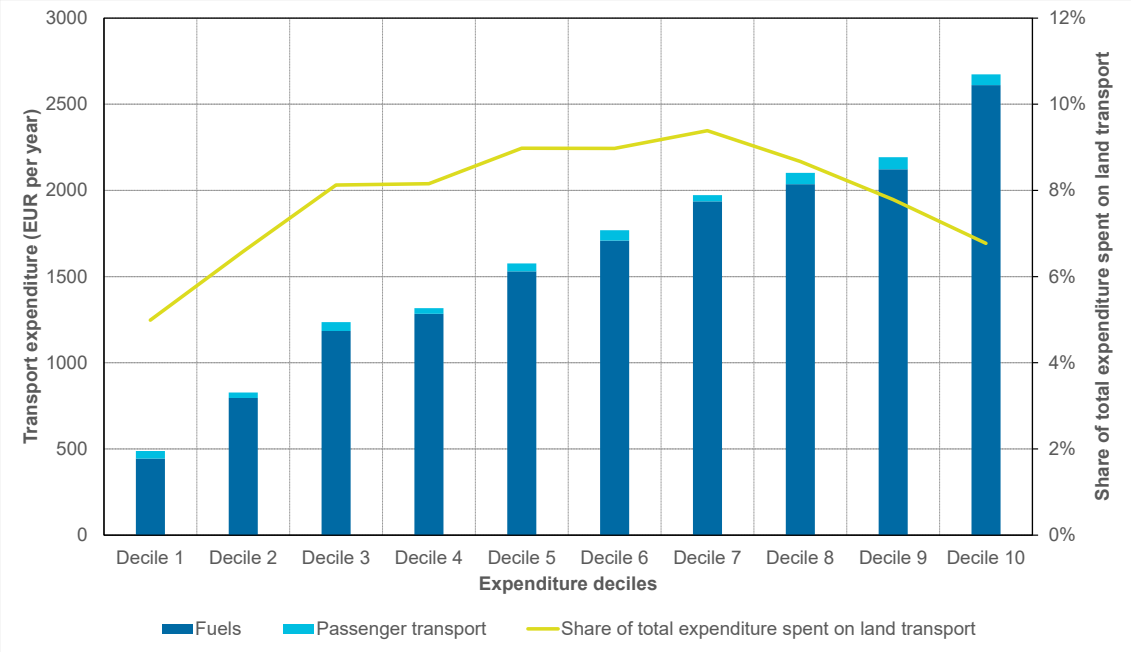
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver. Results with caveat due to high number of zeroes in included transport expenditure categories (> 30% of total obs. have zero transport expenditure).

Figure 97: Percentage of disposable income spent on transport (Slovenia)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

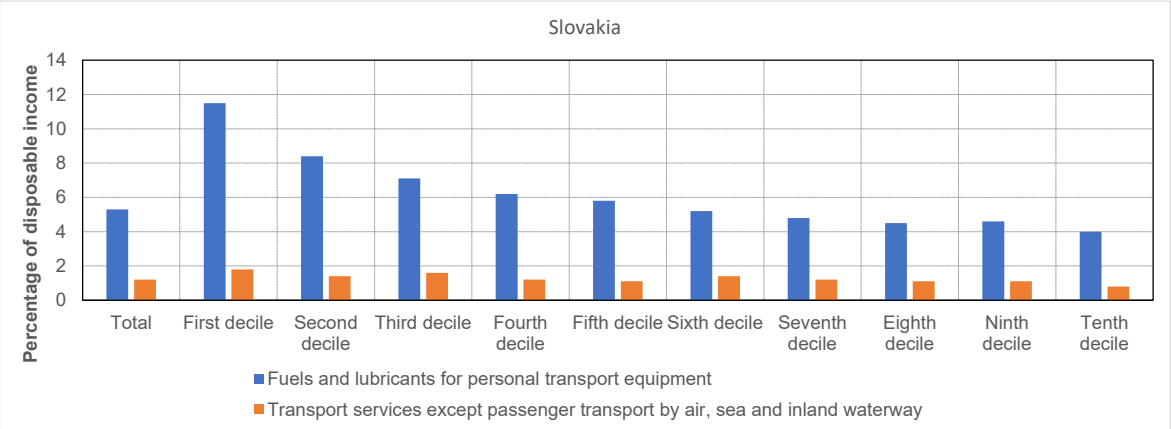
Figure 98: Total and relative transport expenditure per expenditure decile (Slovenia)



Source: Own calculations based on HBS 2015 microdata.

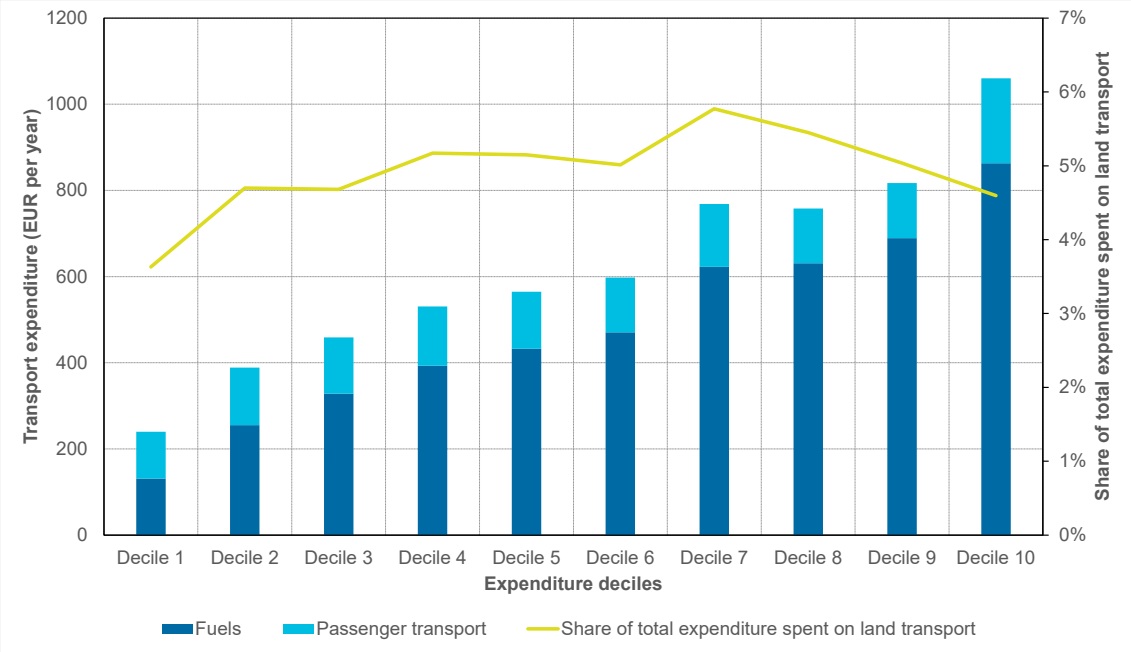
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 99: Percentage of disposable income spent on transport (Slovakia)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

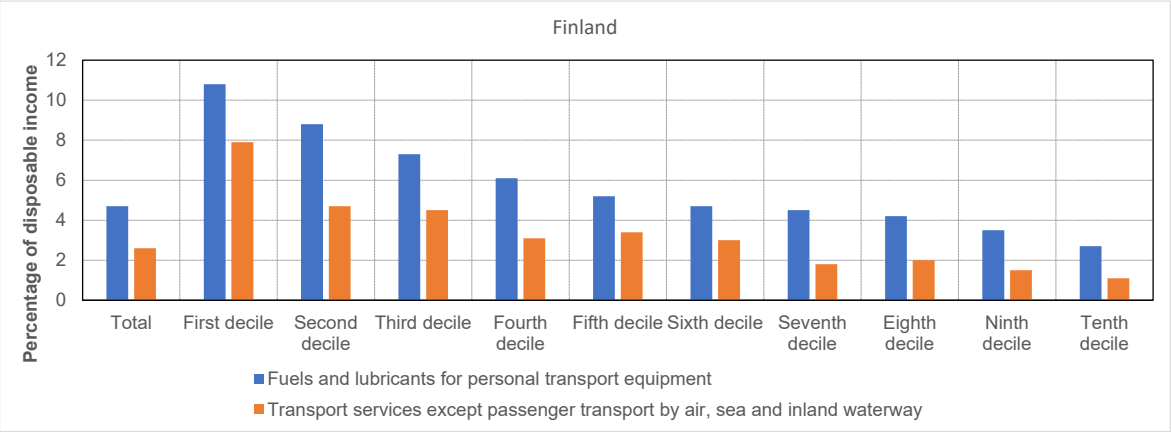
Figure 100: Total and relative transport expenditure per expenditure decile (Slovakia)



Source: Own calculations based on HBS 2015 microdata.

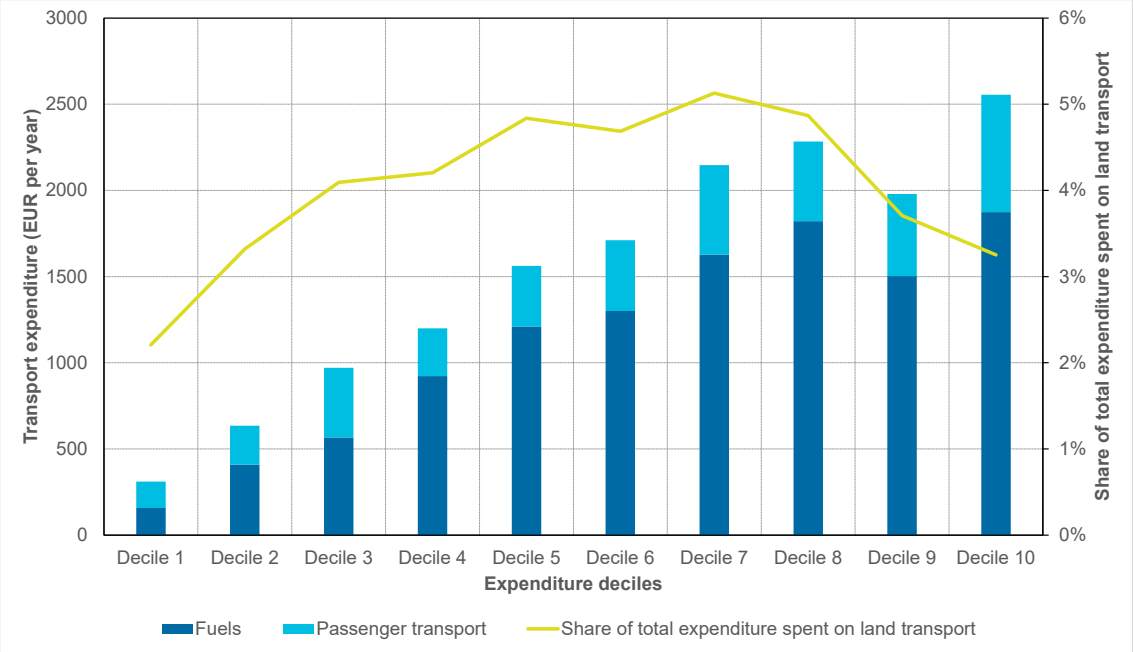
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 101: Percentage of disposable income spent on transport (Finland)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

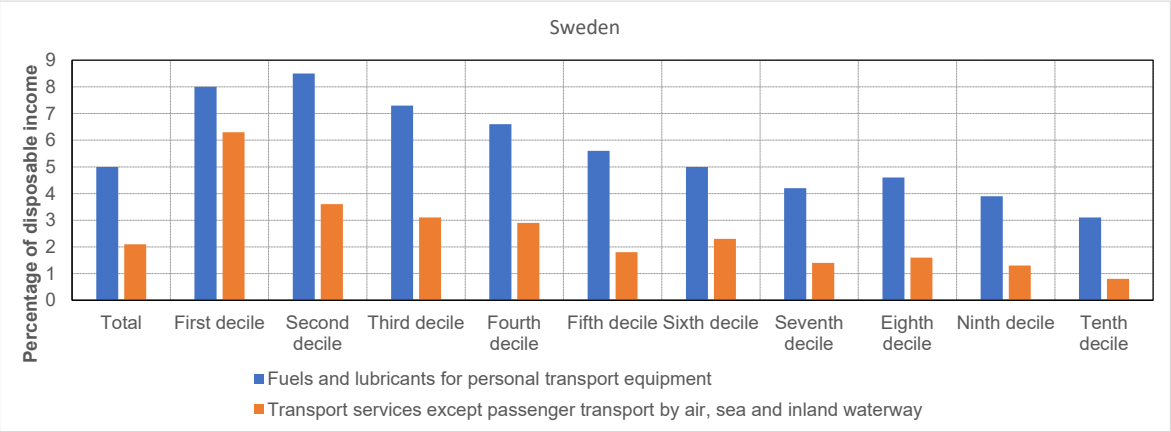
Figure 102: Total and relative transport expenditure per expenditure decile (Finland)



Source: Own calculations based on HBS 2015 microdata.

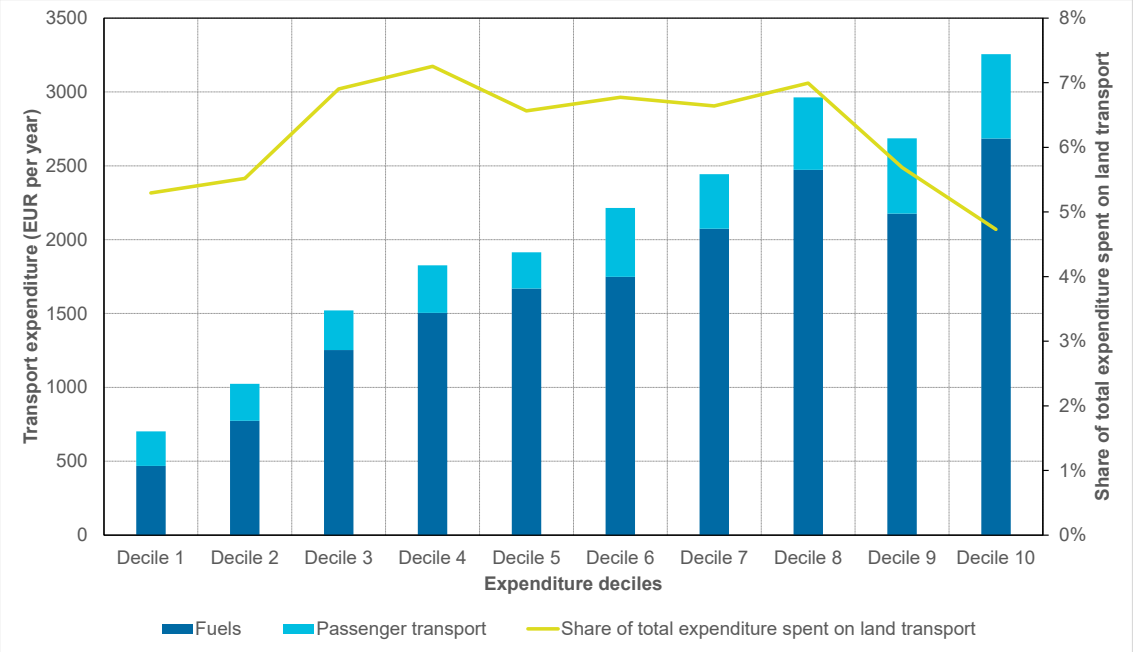
Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

Figure 103: Percentage of disposable income spent on transport (Sweden)



Source: Based on Eurostat experimental statistics combining HBS and EU-SILC for the year 2015 [icw_aff_01].

Figure 104: Total and relative transport expenditure per expenditure decile (Sweden)



Source: Own calculations based on HBS 2015 microdata.

Notes: The chart shows the average expenditure on transport per expenditure decile (left y-axis) and the share of total expenditure spent on land transport per expenditure decile (right y-axis). The category 'fuels' includes expenditure on diesel and petrol. The category 'passenger transport' includes expenditure on passenger transport by train, underground, tram, bus, coach, taxi and hired car with driver.

7. Transport poverty scoreboard for the EU-27

This annex presents a preliminary scoreboard based on the indicators examined in this study. Given the significant caveats and limitations associated with current EU-level data collection, the results of this scoreboard should be interpreted with caution. A comprehensive assessment of transport poverty and the comparative performance of Member States would necessitate more precise and consistently updated data.

In light of the previously mentioned limitations regarding data collection, the setup of the scoreboard while grounded in the conceptualisation of transport poverty outlined in Section 2, should be approached with caution. The three dimensions of availability, accessibility and affordability become three pillars in the scoreboard. The scoreboard is established based on the methodology for constructing composite indicators and scoreboards established by the OECD et al. (2008). Although it provides a framework to measure the relative performance of different Member States across the different aspects of transport poverty, it is important to recognise that these comparisons are contingent on the reliability and consistency of the available data. The relative performance is illustrated by the colour grading in Figure 17, and reflects a range between the best and worst obtained values for each indicator, with no clear top performer emerging.

Figure 105: Results of the transport poverty scoreboard for the EU-27

Country	Materially and socially deprived individuals owning a car (EU-SILC 2022)	Public transport stop 'too far away' (EU-SILC ad-hoc 2014)	Very difficult' access to public transport (Eurofound EQLS 2016)	Access to public transport too difficult for persons with reduced mobility (EU-SILC ad-hoc 2014)	One-way commute to work of more than 30 minutes (LFS ad-hoc 2019)	Expenditure on transport exceeds 6% of total expenditure and bottom 50% of national income dist. (HBS 2015)	Expenditure on transport higher than twice the median and bottom 50% of national income dist. (HBS 2015)	Enforced lack of a car (EU-SILC 2022)	Public transport is 'too expensive' (EU-SILC ad-hoc 2014)
BE									
BG									
CZ									
DK									
DE									
EE									
IE									
EL									
ES									
FR									
HR									
IT									
CY									
LV									
LT									
LU									
HU									
MT									
NL									
AT									
PL									
PT									
RO									
SI									
SK									
FI									
SE									

Source: Cambridge Econometrics and Oeko-Institut based on various datasets as detailed in the Annex.

Notes: Member State performance based on an indicator should be interpreted as follows: Dark green highest performing (top/fifth quintile); light green – higher-than-average performing (fourth quintile); yellow – average performing (third quintile); orange – below-average performing (second quintile); red – lowest performing (bottom/first quintile). The performance is always relative to the best/worst performance in the specific indicator (based on minimum and maximum value currently observed for the indicator). Grey – missing data. Results for the affordability indicators 'Expenditure on transport higher than twice the median' and 'Expenditure on transport exceeds 6% of total expenditure' should be interpreted with caution for countries DE, DK, EE, FR, HU, LT, LV, RO due to ambiguous data (for mor information see the Annex to this report).

The scoreboard confirms that transport poverty is a complex phenomenon which cannot be measured with a single indicator and that different indicators are needed to measure whether an individual or household is affected by any of the aspects of transport poverty.

Scoreboard results related to availability aspects

In relation to transport availability, the indicator capturing individuals owning a car while being materially and socially deprived indicates that these individuals likely face availability challenges as they would generally not be able to afford a car due to deprivation but need to own at least one car to serve their essential needs as no alternative is available. Car ownership among materially and socially deprived individuals indicates poor performance among the Southern European Member States (e.g., Greece, Cyprus, Spain and Portugal), as well as other Member States (e.g., Bulgaria and France).

The indicator 'Public transport stop 'too far away' captures the share of individuals, who are unable to use public transport regularly because the distance to the stop is too far for them, which also indicates a lack of transport availability. Member States who perform poorly in this context include Austria, France, Slovenia and Finland. The supporting indicator 'very difficult access to public transport' similarly indicates that transport availability is challenging in these Member States. Finland and France also perform low in this indicator, suggesting that in these two countries, the population sees an issue in the unavailability of public transport. Austria and Finland also perform poorly in the 'enforced lack of a car' indicator, which is sorted into the affordability pillar. Since this indicator is also related to availability, Austria, Finland and France seem to face a particular challenge in relation to both private and public transport availability according to the scoreboard.

Another indicator captures the extent to which access to public transport is difficult for persons with reduced mobility. In the context of the scoreboard, it is interpreted to mean that there is an availability issue with public transport for these groups. A number of Member States are faced with this concern: Ireland, Finland, Sweden, Hungary, and Belgium. As indicated in the core text, in addition to potential data collection inconsistencies or regional disparities, other factors such as harsh weather conditions, which can impact public transport reliability and accessibility, as well as subjective perceptions of accessibility, where populations in these countries might demand higher standards or have greater expectations, may contribute to these findings.

Scoreboard results related to accessibility aspects

The accessibility dimension of transport poverty refers to how easily essential destinations can be reached via the transport system and is therefore on of the elements in the analysis of transport poverty. Due to data limitations in this study, only one potential accessibility indicator based on available EU-level data is estimated. The 'one way commute to work of more than 30 minutes' indicator measures how accessible one particular key destination - the workplace – is in terms of the time it takes to get there (employment, together with education and health care are considered key services that enable an upward social convergence and that should be considered when measuring accessibility). This metric overlooks other important accessibility needs like access to education and training, to healthcare, welfare services and others.

There is little variation between Member States related to the commute time indicator. In most Member States, the share of the active population with a commute-time that is longer than 30 minutes is relatively high. The Member States in which long commute times are a particular challenge are Latvia, Luxembourg, Hungary, Romania, Bulgaria, the Czechia and Malta. In the case of Luxembourg, the relatively high share of the active population with a long commute is likely a consequence of the high incidence of cross-border commuting in the Member State.

Scoreboard results related to affordability aspects

Looking at the two potential affordability indicators based on the HBS, the performance of Member States is quite erratic. In fact, the two indicators are negatively correlated, which as explained in Section 3.4.3 is related to the distribution of transport expenditures in society and for some countries related to data quality issues with the HBS[58]: However, in a number of Member States, the share of households with excessive transport expenditure is relatively high according to both indicators, especially Malta and Spain. Among the Member States with the highest shares of below-median expenditure households with transport expenditure that exceeds 6% of total expenditure are Cyprus, Slovenia, Portugal, Malta and Sweden. Considering the same household population and examining those with transport expenditure as a share of total expenditure that is higher than twice the national median, the following Member States have the largest transport affordability concerns: France, Lithuania, Denmark, Romania, Hungary, Luxembourg and Spain.

A few Member States that perform poorly in one or both of the HBS indicators also have a relatively high share of materially and socially deprived individuals owning a car. These are Greece, Cyprus, Spain and Portugal. Since also this third indicator is at least partially related to affordability, this may reflect a particular affordability issue in these Member States.

When considering the 'enforced lack of a car' indicator, which indicates how a Member State performs in terms of the share of the population reporting to be unable to afford a car, Romania scores lowest compared to all other Member States. The indicator captures individuals who do not own a car, because they cannot afford it, hence implying that the car is something that the respondents would like to have. Other Member States in which this is a challenge include Latvia, Austria, Hungary and Bulgaria as well as (to a lesser extent) Finland and Slovakia.

Bulgaria, Romania, Hungary, Germany and the Netherlands show the lowest performance specifically related to the affordability of public transport as they have the highest share of the population stating that the public transport ticket is too expensive.

8. Detailed information on datasets used to estimate EU-level indicators

European Union Statistics on Income and Living Conditions (EU-SILC)

The survey provides data on household income, direct taxes and social contributions as well as further variables on social exclusion and living conditions. It is designed by Eurostat and conducted every year since 2004. It provides cross-sectional data as well as longitudinal data, observed periodically over a 4-year period. The data from this annual EU-SILC survey was used to obtain indicators related to car ownership.

In addition to the core topics collected each year, EU-SILC also includes various modules, through which more detailed information on specific topics is collected and which are either repeated at lower frequencies (3-year rolling module; 6-year rolling module) or are only conducted once (ad-hoc modules). Various indicators in this study were constructed using ad-hoc modules of the EU-SILC survey. These relate to, for example, satisfaction with commute times or affordability of public transport.

Generally, EU-SILC is considered a robust and representative dataset. However, given the fact that a number of the underlying surveys used to construct transport poverty indicators were conducted several years prior to this study, with no indication of a repetition, the timeliness of the data represents a challenge. The transition of EU-SILC to including more rolling rather than ad-hoc modules is welcome, especially since a number of transport poverty related variables are planned for upcoming modules.

Household Budget Survey (HBS)

The survey reports household spending and is used at national level to calculate weights for the Consumer Price Index. It is conducted by the national statistical office of each EU country. Microdata is available for the years 2010 and 2015. The 2020 data became available in December 2023, but was not used in this study, because 2020 is one of the years affected by the Corona shutdowns, which greatly affected mobility (spending) of households.

For this study, the HBS 2015 is used to construct expenditure-based indicators related to affordability. The study calculates household expenditure on transport as the share in total expenditure, various indicators of transport affordability were derived. These are similar to those used commonly in the energy poverty field, such as the share of households with expenditure above a certain threshold (e.g., twice the national median or above 6% of total expenditure).

Limitations of the HBS relate to the frequency of updates at EU-level as well as several data issues, such as negative values for expenditure or the fact that aggregate expenditure categories do not necessarily equal the sum of subcategories. One very important issue is the presence of implausible zeros in expenditure categories, which may distort the results for some countries.

Another challenge is that the data available at the time of this study – from 2015 – is quite old. The study performed an analysis inflating expenditures observed in the data using CPI to 2019, as well as 2022/23 and concluded that prices were very similar in 2019 compared to 2015. Therefore, using the 2015 is likely a relatively accurate reflection of the situation in 2019, before the Corona crisis (and later the energy price crisis) hit.

EU Labour Force Survey 2019 ad-hoc module

The EU Labour Force Survey (LFS) 2019 module on work organisation and working time arrangements gathers information on workers' experiences with work practices and arrangements at the European level. It is divided into three submodules: (1) Flexibility of working times, (2) Methods at work, and (3) Place of work. In particular,

the third submodule is of importance for this study, as it investigates commuting times, which was used for estimating an indicator for accessibility.

Eurofound European Working Conditions Surveys (EWCS)

The survey provides information on working conditions and the quality of work and employment since 1990, enabling the monitoring of long-term trends in working conditions. The survey is carried out in five-year intervals, with the latest round implemented in 2021. Themes addressed in the survey include: employment status, working time arrangements, learning and training, physical and psychological risk factors, health and safety, work-life balance, and work and health.

For this study, the survey was used to obtain indicators of commute-to-work times, which again is used for estimating an indicator for accessibility.

Eurofound European Quality of Life Surveys (EQLS)

The survey offers a comprehensive image of living conditions in European countries and was carried out in four-to-five-year intervals since 2003. It covers a range of indicators on quality-of-life aspects, including objective and subjective elements. Themes addressed in the survey include subjective well-being, health and mental well-being, work-life balance, housing, access to public services, neighbourhood quality and services (e.g. traffic, public transport access, time spent in getting to and from work or study), trust and social tensions, social exclusion and support.

For this study, the survey was used to gather information on self-reported assessments of how easily (of difficult) public transport is accessible and, more generally, public transport quality.

9. Indicators estimated in the literature for the different dimensions of transport poverty

Table 9 – List of household and individual indicators found in the literature

Indicator	Availability	Accessibility	Affordability	Adequacy	Sources
Individual indicators - expenditure based					
Proportion of household income or expenditure spent **on public or private transport or both**			x		Alonso-Epelde et al. (2023) Awaworyi Churchill (2020) Berry et al. (2016) Diaz Olvera et al. (2015) Gómez-Lobo (2011) Harrington et al. (2008) Jeekel and Martens (2017) Mattioli et al. (2018) Mayer et al. (2014) Venter (2011)
Absolute expenditures on transport			x		Burger and Christian (2020) Diaz Olvera et al. (2015) Menyhért et al. (2021)
Individual indicators - self-reported travel behaviour					
Number of trips / travel frequency: Public, private or both	x	x	(x)		Diaz Olvera et al. (2015) Giesel and Köhler (2015) Lucas et al. (2016) Lucas et al. (2018) Yousefzadeh Barri et al. (2021) Zhao and Yu (2021)
Distance travelled	x	x	(x)		Berry et al. (2016) Burger and Christian (2020) Giesel and Köhler (2015)
Travel time budget: Public, private or both	x	x			Berry et al. (2016) Diaz Olvera et al. (2015) Lucas et al. (2016)
Range of transport options available / regular use of modes (car, public transport, bicycle)	x	x			Groth (2019) Menyhért et al. (2021)
Individual indicators - self-reported satisfaction					
Self-reported affordability and effort	(x)	(x)	x	(x)	Chen et al. (2022) Venter (2011) Upham et al. (2022)
Self-reported availability and accessibility of public transport	x	x			Berry et al. (2016) Chen et al. (2022) Farber et al. (2018) Lowans et al. (2023) Upham et al. (2022)

Self-reported commuting satisfaction	x	x	x	x	Ye and Titheridge (2019)
Self-reported neighbourhood safety at night				x	Lucas et al. (2018)
Indicators related to (forced) car ownership					
Car ownership (forced car ownership, zero car ownership)	x	x	(x)	(x)	Berry et al. (2016) Currie et al. (2009) Currie and Senbergs (2007) Currie and Delbosc (2013) Giesel and Köhler (2015) Jeekel and Martens (2017) Mattioli (2017) Pritchard et al. (2022)
Self-reported essentiality of car ownership	x	x	(x)	(x)	Lowans et al. (2023)
Combined indicators - expenditure-based and self-reported					
Absolute expenditures on transport and low income and self-reported travel restrictions	x	x	x	x	Berry et al, 2016

Source: Own compilation

Table 10 – List of spatial indicators found in the literature

Indicator/Variable	Availability	Accessibility	Affordability	Adequacy	Sources
Travel time					
Number of job opportunities or other essential services within a given travel time for private and public transport (30 to 45 minutes)	x	x			Allen and Farber (2019) Lunke (2022) Peipins et al. (2013) Pritchard et al. (2022)
Travel time by foot and car to the nearest (early) childhood education and public employment services	x	x			Almeida et al. (2024)
Average commute time (travel time between home and workplace) to work with private and public transport	x	x			Niedzielski and Boschmann (2014)
Accessibility (travel time) to the nearest urban centres by car	x	x			Tagai et al. (2019)
Walking time to a nearest public transport stop	x	x			Lizárraga et al. (2020)

Distance and environment quality					
Number of common destinations (including commercial services, eating and drinks, education, health, recreation, and retail services, employment centre) within 400/800m	x	x			Farber et al. (2018)
Distance to stops	x	x			Giesel and Köhler (2015)
Urbanization rate (higher often indicates more access)	x				Martens and Bastiaanssen (2019)
Travel time and socio-economic data					
Travel times to essential services other than with car paired with cost burden of personal transport with income level	x	x	x		Mattioli et al. (2019) Giordano et al. (2024) Karner et al. (2024)
Spatial index of Transport Poverty Risk (TPRI)	x	x	x		Kelly et al. (2023)
Environment and Urban Quality Index (EUQI): quality of walking environment	x	x			Tiznado-Aitken et al. (2018)
Physical Accessibility Indicator (PAI): proximity to public transport stops	x				Tiznado-Aitken et al. (2018)
Level of service					
Weighted number of public transport trips in area	x				Sun and Thakuriah (2021)
Share of public transport commuters	x	x			Kramer (2018)
Number of public transport trips accessible within a 15 minute walk	x	x			Farber et al. (2018)
Public Transport Availability Index (PTAI)	x				Minocha et al. (2008)

Source: Own compilation

10. Template used for data collection on policies and measures

Table 11 – Policy Template: Mapping existing policies, actors, procedures and existing practices

Policy measure

Name of the measure (if it has any)	
Type of measure	
Geographical coverage	
Policy area	
Status	
Actors involved in policy design and policy implementation	
Beneficiaries / Target group	
Short Description	
Policy evaluation	
Which one of the three A's does it address?	Availability / Accessibility / Affordability
Targeting	1 = covers vulnerable group only and completely, 2 = covers vulnerable group only but not completely 3 = covers everybody
Cost-burden impacts	1 = very good immediate relief/support 2 = good relief/support 3 = no relief/support
Is it a long term / short term measure?	1= tackles transport poverty over long term 2 = tackles transport poverty medium term 3 = Simply direct short-term support;
Climate-conscious design	1 = takes climate impacts into account in design/implementation 2 = partly considers but doesn't fully connect up policies – pilot projects

	are in place to start doing this integration 3 = does not consider climate impacts at all
Total	
*If there are any other details that should be mentioned about a specific policy, please add it here	

Table 12 – General overview of the national context

The role of political parties and their agenda	Do political parties include in their agenda programmes to tackle transport poverty? What kind of measures?
Decision making processes and procedures	What are the administrative procedures and practices that enable or hinder actors in developing policies that tackle transport poverty? *There may be aspects related to the type of governance, local culture of decision making, access to data, political awareness, etc.*
Challenges	What are the main challenges identified in developing / implementing policies? *Administrative capacity / structure of governance / limited financial capacity / know-how, political opportunity, etc*
Climate relevance	Are the transport policies discussed/developed in a climate policy context, or not?

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