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Critical Considerations for Advancing Sustainable People Mobility in Latvia: from Transport Poverty to Sustainable Mobility

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Abstract*—Sustainable transport provision in a country with low population density, a relatively small population and relatively low numbers of tourists is significant for transition toward a greener, more inclusive, and cost-efficient transport system. Latvia's transport policy aligns with the European Green Deal, which aims to shift towards sustainable and smart mobility. While prime concerns are carbon dioxide (CO2) emissions and developing a multimodal public transport network with rail as its backbone and inclusive mobility, transport poverty has not been a priority. To ensure truly inclusive mobility in terms of transport poverty as well, a holistic approach is needed—one that unites social and environmental considerations into transport planning through targeted subsidies, expanded rural transport services and equality in less populated and remote areas, and investments in multimodal infrastructure. The aim of this study is to analyze the current state of sustainable people mobility in Latvia, focusing on the interaction between environmental goals and active transport, accessibility and social equity. Particularly focus on the problem of transport poverty, which is a key challenge for achieving inclusive mobility, especially for the most disadvantaged populations. This study uses the transport poverty indicators mentioned in the European Commission's final report (2024) on transport poverty and data from various sources to identify the situation in Latvia and the European Union. Such a study has not been conducted before in Latvia. This study contributes to the growing discourse on sustainable mobility, highlighting the critical need to address transport poverty in the context of Latvia. Key findings include proposals for promoting active mobility and the transition to low-emission vehicle technologies, as well as how to make mobility more equitable. The results show that Latvia has made progress in reducing greenhouse gas emissions and implementing a public transport policy. Although obstacles such as uneven infrastructure development, the high cost of sustainable transport options and the lack of integration of urban and rural transport networks continue to perpetuate inequalities in mobility access.

Keywords*—green deal, rural mobility, sustainable people mobility, transport poverty.

I. Introduction

Transport sustainability is a critical pillar of sustainable development, encompassing economic growth, social inclusion, and environmental stewardship. A strategically planned transport system enhances accessibility while mitigating adverse effects such as pollution, energy consumption, and resource depletion. However, challenges persist—particularly in low-density regions such as Latvia's border areas, where limited public transport infrastructure contributes to social and economic marginalization.

This paper investigates the dynamics of sustainable mobility and transport poverty within the Latvian context. The analysis is informed by key policy frameworks, including European Union (EU) guidelines, Latvian national planning documents, and the United Nations Sustainable Development Goals (SDGs). Central to this investigation are the concepts of "sustainable transport" and "transport poverty", which require careful clarification due to their conceptual complexity and multidimensional nature.

The 2030 Agenda for Sustainable Development, adopted by all United Nations (UN) Member States in 2015, provides a comprehensive framework for global development, within which transport plays a cross-cutting role [1]. Several SDGs—such as those related to food security (SDG 2), clean water (SDG 6), sustainable cities and communities (SDG 11), responsible

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consumption (SDG 12), and climate action (SDG 13)—are directly or indirectly linked to transport systems. For instance, in Latvia, the improvement in access to quality drinking water from 75% in 2006 to 87% in 2019 [2] reflects broader infrastructural and societal shifts that impact transport needs and patterns. Additionally, the predominance of urban living (with approximately 70% of Latvians residing in urban areas) [3] underscores the importance of sustainable urban mobility strategies, including investment in clean technologies and active transport solutions.

The notion of transport poverty emerged in the early 2000s and has since evolved into a key area of research. Despite the diversity of definitions and methodological approaches, there is growing consensus that transport poverty—encompassing factors such as accessibility, affordability, adequacy, and social dimensions—constitutes a significant barrier to economic opportunity and social inclusion [4], [5], [6], [7]. This paper aims to contribute to the discourse by analyzing how sustainable transport policies can address transport poverty in Latvia and promote more equitable mobility outcomes.

II. Materials and Methods

This study uses qualitative and quantitative methods to evaluate promoted sustainable mobility options for people in Latvia in the context of transport poverty.

This study uses qualitative and quantitative methods to evaluate promoted sustainable mobility options for people in Latvia in the context of transport poverty. Latvia is a Northern European country, a member of the European Union, with a well-developed but evolving transport network. A total area of 64,589 km², a population of around 1.9 million [8] as of the latest data (2024), and a population density of around inhabitants 30 per km² (2024) [9], making it one of the least densely populated countries in the EU. The rail network has a total length of around 1,831 kilometers of which 14% is electrified in 2023 [10]. The total length of other transport infrastructure in Latvia includes 50,000 km of state and municipal roads, as well as 161 km of tram lines and 204 km of trolleybus lines in cities. Since 1990, the total length of these all-transport lines has decreased [11].

The Latvian Sustainable Development Strategy until 2030, in the context of the spatial development perspective, emphasizes the fundamental values of accessibility and availability, (Latvian: sasniedzamība), and individual domestic mobility opportunities for everyone in Latvia [12]. As the strategy was formulated 15 years ago with a target date of 2030, its orientations need to be reassessed considering the key themes addressed in this article, namely transport poverty, sustainable mobility and the green deal. It also raises the question of how far we are from the intended goals and what adjustments may be needed to adapt to the changing sustainability and mobility landscape.

The research methodology includes a policy analysis reviewing international, European and Latvian policy documents related to sustainable transport and mobility planning as well as transport poverty.

Transport poverty is characterized by compilation of the recommended indicators considering four dimensions: availability, accessibility, affordability and adequacy [13]. The method used for this purpose is descriptive statistics sourced from official statistics databases like Eurostat or National Statistical Institutes. The data sources selected for this purpose included time series from 2019 where possible and using the latest available data for comparisons and ranking of the indicators. The indicators of transport poverty were from the Household Budget Survey data (2015; 2016 and 2019), the National Travel Survey (2017 and 2021), EU Statistics on Income and Living Conditions (2019-2024), The Quality of Life in Cities survey (2017 and 2022), Urban Audit (2015, 2019 and 2023), European Union Labour Force Survey (2019 for module of commuting time). Use of comparison method of descriptive statistics was employed where possible with EU (27) averages and neighbouring countries – Lithuania and Estonia.

The indicators were compiled in a separate MS Word document, structured in two parts: Part I: Table 1. Analysis of the availability of transport poverty indicators in Latvia, providing an overview of the indicators identified in the literature for the different dimensions of transport poverty, based on the European Commission's final report on transport poverty, as mentioned earlier in the article. Part II: List of 14 indicators with appropriate coding from Table 1 presented in 18 tables, detailing the available reference years, country comparisons and breakdown. The document included references, enabling consultation of methodologies, additional breakdowns, and reference years for a more comprehensive analysis for experts.

In the next stage of the analysis, the experts carried out the assessment and ranking of the selected indicators. The expert group included four representatives of policy makers with experience in the field of transport policy and transport poverty, and two transport system users with contrasting perspectives: one of them represented a car-oriented perspective, car ownership and mobility in the Riga metropolitan area. The other was car-free, preferring active mobility and public transport.

The experts were invited to familiarize themselves with the dimensions and indicators of transport poverty and to rank the 14 indicators based on their relevance for measuring transport poverty in Latvia, with "1" being the most relevant and "14" the least.

In future studies, expanding the number of transport user representatives, especially from rural and remote areas, would increase the representativeness and depth of the study.

III. Results and Discussion

A. Sustainable transport

Table 1 describes the alignment of sustainable transport objectives with key policy planning documents at the global (UN), European and Latvian national levels,

highlighting their link to the SDGs and strategic frameworks that guide integrated transport planning.

TABLE 1 SDGS RELATED TO TRANSPORT TARGETS

SDG	Europe	Latvia
SDG 3. Ensure healthy lives and promote well-being for all at all ages	3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents (Road safety)	3.7 Road traffic fatalities remain stable, but the number of injuries is falling significantly, but mostly this SDG in Latvia is related to mental health and oncology.
SDG 7. Ensure access to affordable, reliable, sustainable and modern energy for all	7.3 By 2030, double the global rate of improvement in energy efficiency (Energy efficiency)	7.2, 7.3. Promote low- and zero-emission vehicles through support for users and infrastructure, especially in cities, as part of broader plans for green and renewable energy through 2027.
SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all (Sustainable infrastructure)	9.1, 9.4., 9.5. Build an integrated, sustainable transport system, promoting the use of rail as the backbone of a modern and environmentally friendly public transport system. Digitalization as one of priorities.
SDG 11. Make cities and human settlements inclusive, safe, resilient and sustainable	11.2 Ensure inclusive access to safe, affordable, and sustainable transport, especially through public transit, with a focus on vulnerable groups by 2030.	11.1, 11.2, Introduce a unified public transport ticketing system. New electric trains for passenger transport, phased in from 2022, mobility points at railway stations and stops. Increase train speeds. Priorities related to public housing and grants for renovations of housing.
SDG 12. Ensure sustainable consumption and production patterns	12.c Phase out inefficient fossil fuel subsidies that encourage overconsumption, by adjusting taxes and prices to reflect environmental costs—while considering national contexts and protecting vulnerable groups. (Fuel subsidies)	12.4, 12.5. Circular economy as priority in relation with waste management.

Regarding the Sustainable Development Goals and active transportation, a common approach is the implementation of greenways. In Latvia this term describes communication routes reserved exclusively for non-motorized journeys, usually former infrastructure of narrow-gauge railway lines around Latvia. Greenways can help achieve three goals: (1) nature conservation and maintenance of biodiversity by creating ecological corridors in urban areas [14]; (2) the provision of recreational spaces by providing areas for recreation, walking, running, and cycling in vegetated areas having trees, shrubs, and bushes [15]; and (3) active mobility by providing an opportunity for walking or biking instead of moving with motor vehicles [16]. Greenways play a significant role in advancing sustainable development by facilitating eco-friendly and non-motorized transportation modes and strengthening urban ecological resilience. In Latvia, their implementation into transport planning promotes active mobility while contemporaneously preserving natural ecosystems, enhancing public well-being and helping with transport poverty as well.

The main transport document in Latvia is Transport Development Guidelines 2021-2027. The objective of the transport policy is to provide an integrated transport system that provides safe, efficient, accessible, smart and sustainable mobility, contributes to national economic growth, regional development and ensures progress towards a climate-neutral economy. The definition follows: sustainable transport is putting the needs of transport users first by offering them more affordable, accessible, well-being-focused and low-emission alternatives to their current mobility habits [17]. This is only an official definition, but authors have established a more concise definition: sustainable mobility is environmentally and transport system user-available and accessible mobility.

The 2024 evaluation of Latvia's Transport Policy Guidelines indicates that the planned reduction in greenhouse gas (GHG) emissions in the transport sector has not been achieved [18], road transport and privately owned cars would undoubtedly impact that.

The transition to sustainable mobility in Latvia is characterized by the dominance of private cars in daily travel, largely driven by accessibility and affordability constraints as dimensions of transport poverty. In several areas, there are no comparable alternatives to private vehicles in terms of travel time or distance, creating similar challenges as in other countries. As climate goals require policy interventions, including restrictions on hypermobility in travel (French: hyper-mobilité) [19] and freedom of owning a private car, however empirically results from travel surveys already show that not only in Latvia, but also in France, distances traveled, and time spent on the road have been gradually increasing over the years suggests that people may be choosing to live further away from their workplaces due to rising living costs or preferring less populated areas.

An increase in key mobility indicators in Latvia between 2017 and 2021: the average daily travel distance per person increased to 32.2 km (+9%). The average daily travel time per person reached 80.1 minutes (+1%) and the number of trips per day increased by 4%. A similar gradual increase in these indicators has been observed in France, highlighting a broader European trend of increasing travel demand despite efforts to promote sustainable mobility solutions [20].

B. Transport poverty

In 2023, the European Union established the first definition of transport poverty in Regulation 2023/955 concerning the Climate Social Fund. Transport poverty is defined as the inability or difficulty of individuals and households to afford private or public transportation, or their limited access to the transport necessary for reaching essential socioeconomic services and activities. This definition considers the national and spatial context.

Since 2024, the concepts of energy poverty and transport poverty have gained increased attention at both EU and national levels, as National Social Climate Plans are being prepared, aiming to facilitate the implementation of the Social Climate Fund (SCF). This initiative addresses the social impact of climate policy by ensuring equal access to affordable energy and sustainable mobility. The SCF, established alongside Emissions Trading Schemes (ETS2), supports a fair transition towards climate neutrality by mitigating the social and economic impacts of carbon pricing. It provides targeted funding to EU Member States, ensuring that vulnerable groups, including those facing energy and transport poverty, receive direct support during the green transition [21]. Support to address transport poverty can be provided to initiatives that improve accessible and affordable public transport, as well as initiatives that promote access to zero- and low-emission vehicles and bicycles, providing more sustainable and inclusive mobility solutions [22].

In Latvia transport poverty is understudied and needs more research and case studies like in Slovakia, which is similar economically to Latvia (population density in Slovakia - 112 per km2, Latvia - 30 per km²) [8][23]. A significant portion of the rural region of Banská Bystrica faces public transport disadvantages due to high costs, limited availability, and inadequate connections, preventing same day return trips between rural municipalities and the regional center. As a result, residents of small rural municipalities, particularly those outside main transport routes, mitigate social exclusion by purchasing private vehicles rather than relocating. No similar studies have been carried out in Latvia, but based on statistical data, the situation is similar.

The latest National Travel Survey conducted in Latvia in 2021 revealed that 87.6% [24] of annual passenger kilometers were travelled by car. At that time, only 1,205 electric vehicles (EVs) were registered, accounting for just 0.16% of the total passenger car fleet. By 2024, this proportion has increased to 0.81% [25], reflecting the increasing shift towards EV adoption. However, the still dominant use of private cars, accounting for almost 90% of passenger kilometers, is not considered a sustainable mobility option and remains a priority to reduce through policy measures and alternative transport solutions.

Due to the structural limitations of the Latvian transport system, successfully implementing mobility changes necessitates active public engagement and behavioral adaptation through innovative behavioral (green nudging) policies at the city level [26]. Achieving this transition requires significant changes in mobility patterns, including changes in transport mode choices and possible changes in travel time forecasts [27]. Public engagement and awareness are crucial to fostering a more sustainable and adaptive mobility culture that is in line with long-term transport and environmental policy goals. Future mobility will move away from strictly defined modes of transport and the conflicts between them, focusing instead on complementarity, multimodality and intermodality [28]. There are three principles that contribute to the development of sustainable mobility. Firstly, a systemic approach combined with technological integration, using data exchange mechanisms between mobility stakeholders, is essential to improve coordination and optimize transport systems. Secondly, mobility in the future must be transversal, ensuring interconnection between transport modes (including private cars, public transport and active mobility) and between organizations. Transparent data exchange systems are crucial to facilitate informed decision-making and improve mobility management. Finally, the concept of rational mobility must be prioritized, striking a balance between hypermobility and immobility, promoting efficient and rational travel behavior [29].

Exploring the development of sustainable mobility in Latvia using available data sources, the main dimensions of transport poverty are highlighted (Fig.1), which underpin potential reduction strategies. Of particular importance is the reduction of passenger car dependency or the transition to low or zero-emission vehicles. However, such changes are contingent not solely on affordability factors but particularly on the adoption of electric vehicles (EVs). Furthermore, the availability of EV charging infrastructure and its geographical coverage are crucial in ensuring accessibility and feasibility. This perspective highlights the need for a holistic approach to sustainable mobility, incorporating both economic and infrastructure considerations.

The Latvian Sustainable Development Strategy until 2030, from the perspective of spatial development, underscored the importance of equitable access to public transportation services across all regions. The Strategy establishes minimum standards for public transportation, ensuring that residents can access regional centers daily. Additionally, by 2030, the Riga metropolitan region will benefit from enhanced road and street infrastructure to accommodate the rising traffic levels. There will also be improvements in public transport travel times, which will promote greater efficiency and accessibility.

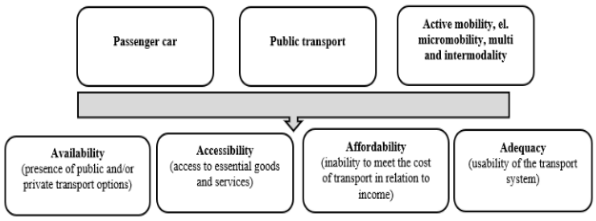

Fig.1. Modes of transport and their interconnectivity with transport poverty dimensions.

Considering the population at the beginning of the year and the positive demographic trends observed in early 2024 compared to 2023, the administrative territories within a 50 km radius of the Riga metropolitan area – Ādaži, Ķekava, Mārupe and Ropaži municipalities – which lack rail access, show a steady population growth and currently account for 7% of the total population. Commuters from these municipalities mostly rely on private cars when traveling to Riga, as public transport options are often not a viable or efficient alternative.

The expert ranking of transport poverty indicators presented in Table 2 ranges from 1 (most relevant) to 14 (least relevant) and includes 14 indicators that characterize transport poverty and its various dimensions. The abbreviations used in Table 2 for these dimensions are as follows: "Av" for Availability, "Acc" for Accessibility, "Aff" for Affordability, and "Ad" for Adequacy.

The outcome of the consultation with experts highlights the distance travelled per person per day (48.6 km) (indicator 2.2.) and travel time (69.4 minutes) (indicator 2.3.) as key indicators. Both indicators show increasing value for passenger cars, making them the dominant mode of transport compared not only in terms of distance, time but also regarding the number of trips, compared to other private and public transport options, except for trains.

Affordability is an important key dimension of transport poverty. According to expert ratings, the indicators monthly transport expenditure per household member in Latvia (62 euros) (indicator 1.2) and the percentage of people who cannot afford to purchase a personal car (10%) (indicator 5.1) received the same total score, highlighting their comparable importance in assessing transport affordability and financial burden. Another affordability-related indicator (1.1.1.), which complements the previous one, looks at the composition of household transport expenditure. It reveals that almost 90% of annual transport expenditure is spent on the purchase and operation of private vehicles, while only 1–4% is spent on public transport services.

Although 13 out of 14 indicators are objective measurements, one (indicator 5.1) is partly subjective. In addition, indicator 4.2.1, which reflects self-reported satisfaction with various aspects of transport, was rated as the least relevant by the experts in Table 2. However, integrating both objective data and subjective perceptions could provide policymakers with a more comprehensive understanding of transport poverty, providing deeper insight [30].

TABLE 2 RESULTS OF THE EVALUATION OF TRANSPORT POVERTY INDICATORS FOR LATVIA BY EXPERT RANKING AND DIMENSIONS

Ranking	Transport poverty indicator in Latvia	Dimensions
1	2.2. Average distance travelled per person per day by main mode of transport for short trips (<300 km) in 2017 and 2021 (kilometers) [31]	Av;Acc
2	2.3. Average time spent per person per day by main mode of transport for short trips (<300 km) in 2017 and 2021 (minutes) [32]	Av;Acc
3	1.2. Absolute expenditures on transport per household member per month in Latvia separately in urban and rural territories (euros) [33]	Aff
4	5.1. Persons who cannot afford a personal car in Latvia, Lithuania and Estonia and EU (2019-2024) (per cent) [34]	Av;Acc; Aff
5	2.1.1. Average number of trips per person per day by main mode of transport for short trips (<300 km) in 2017 and 2021 [35]	Av;Acc
6	1.1.1. Detailed composition of household consumption expenditure on transport goods and services (ECOICOP) on average per household member annually in 2015, 2016 and 2019 (euros) [36]	Aff
7	2.1. Proportion of number of short trips (<300 km) per year by main mode of transport in 2017 and 2021 (per cent) [37]	Av;Acc
8	6.5. Average walking time per trip to the nearest public transport stop (2017; 2021) (minutes) [38]	Av;Acc
9	6.3. Average commute time per trip (travel time between home and workplace) to work with private and public transport (2017; 2021) (minutes) [39]	Av;Acc
10	1.1. Proportion of goods and services related to transport of total household consumption expenditure in 2015, 2016 and 2019 (per cent) [40]	Aff
11	6.1.1. Proportion of people in employment with commuting time 30 minutes or over in 2019 (per cent) [41]	Av;Acc
12	3.1. Proportion of disposable income of households (with expenditure greater than zero) spent on transport goods and services by income quantiles in Latvia, Lithuania and Estonia and EU in 2020 (per cent) [42]	Av;Acc; Aff;Ad
13	9.2. Proportion of trips by public transport commuters as proportion of total commuter trips in Latvia and its urban area (2017; 2021) (per cent) [43]	Av;Acc
14	4.2.1. Self-reported satisfaction with public transport and other aspects of mobility in the cities and its functional urban area with chosen opposite categories: different set of indicators (per cent) [44]	Av;Acc; Aff;Ad

IV. CONCLUSIONS

The 2017 National Travel Survey analyzed the main reasons why people choose cars as their primary mode of transportation. The results revealed that 38% prioritized personal comfort, while 31% cited time efficiency as the main factor. Although the share of passenger kilometers by private cars remained similar to 2017 in 2021 (87.6%), no national survey has been conducted to assess whether individuals using private cars have reasonable alternative transport options.

The most recent statistical data available in Latvia comes from the 2021 National Travel Survey. However, this reference year directly follows the COVID-19 pandemic, a period marked by significant disruptions to mobility patterns due to lockdowns, increased teleworking, and changes in daily travel. Therefore, the 2021 data may no longer accurately reflect current travel behavior, highlighting the need for up-to-date empirical data.

In 2024, the Central Statistical Bureau submitted an EU grant proposal to Eurostat for a travel survey and study entitled: "Analysis of sustainable urban mobility in Latvian cities by 2026: current transport modal split and future growth potential for promoting greener transport solutions."

This study aims to evaluate current mobility patterns and examine opportunities to encourage more sustainable transportation alternatives in urban settings, with the objective of developing a methodology for identifying sustainable mobility options as substitutes for passenger car usage. The primary objective of this methodology is to analyze whether there are viable, rational alternatives (in terms of travel time, distance and travel costs) to passenger car use for trips made by Latvian residents. The analysis endeavors to evaluate the potential for reducing the high share of passenger car use in the modal split by understanding whether alternative sustainable mobility options, such as public transport, active mobility (walking, cycling) or shared mobility (car sharing), are realistic for the relevant trips. This will help urban planners to identify which factors, apart from comfort, municipalities can influence through infrastructure development, public campaigns, or policy measures. Along with the survey, a data collection on cycling infrastructure based on international standards is expected.

In addition to electric vehicles (EVs), active mobility and complementary transport access, there are several proven alternatives to private cars around the world. These include car sharing and carpooling, often combined with high occupancy vehicle (HOV) lanes that allow vehicles with two or more passengers (namely, the car occupancy rate in Latvia in the 2021 National Travel Survey was 1.7).

Other effective measures include zero emission zones (ZEZ) in urban areas, which significantly reduce car use, and express buses that operate in dedicated lanes, as well as express services from park and ride. In rural areas, solidarity buses and on-demand transport solutions have proven valuable in improving accessibility while reducing reliance on private vehicles.

There is a significant shift towards private transport, particularly passenger cars, and a decline in the use of public transport and bicycles. Electric micro mobility vehicles have emerged as a new mode of transport; however, they also contribute to longer commuting distances to workplaces (~50 km). The data also illustrates changes in mobility habits between 2017 and 2021, showing a notable shift toward private vehicles and active mobility while public transport usage has significantly declined. Passenger car trips increased from 46.9% to 52.4%. To sum up, these trends suggest a growing dependency on private and long-distance public transport, the increasing role of micro-mobility, and a shift in travel behaviors that may be influenced by urban planning, policy changes, or external factors like the COVID-19 pandemic. It should be stressed that the market for old cars is very notable, and the railway represents only 4% of the transport sector, while the personal vehicle sector accounts for 86% of road transport. Meanwhile, Latvia's car fleet, on average 15 years old, is one of the oldest in Europe.

As mentioned before in Latvia transport poverty is understudied and needs more research in all aspects not only with the focus on sustainability.

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