Acta geographica Slovenica, 61-2, 2021, 91–107

COVID-19 IMPACT ON DAILY MOBILITY IN SLOVENIA

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DOI: https://doi.org/10.3986/AGS.9390
UDC: 913:331.556:616-036.22(497.4)
COBISS: 1.01

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COVID-19 impact on daily mobility in Slovenia

The Slovenian subsample (n=415) of an international online survey about changes in daily mobility during the COVID-19 outbreak in the spring of 2020 was analysed from a geographical perspective. The dataset was split into three spatial classes (urban, transitional and rural) according to the respondents' place of residence. People's behaviour before and during the COVID-19 lockdown was compared and analysed in terms of commuting frequency, changes in mode choice for commuting and style of grocery shopping. The results show that commuting was reduced drastically during the lockdown while the car remained the main transport mode both for commuting and shopping, especially in rural areas. The study provides an unprecedented insight in travel behaviour changes due to the pandemic and congruously argues for improved transport policies to meet climate change and public health challenges.

KEY WORDS: travel behaviour, modal share, level of urbanization, lockdown, pandemic, Slovenia

Vpliv epidemije covida-19 na dnevno mobilnost v Sloveniji

POVZETEK: Z geografskega vidika smo analizirali slovenski podvzorec (n = 415) mednarodne anketne raziskave o spremembah dnevne mobilnosti, ki je bila izvedena med prvim valom epidemije covida-19 spomladi 2020. Podatkovno bazo smo najprej razdelili v tri skupine glede na kraj bivanja anketirancev (urbani, prehodni in ruralni), nato pa primerjali mobilnost ljudi pred in med zaprtjem države ter jo analizirali z vidika pogostnosti poti na delo, izbora načina potovanja in nakupovalnih navad. Ugotovili smo, da so bila potovanja na delo med zaprtjem države izrazito okrnjena, pri tem pa je osebni avtomobil tako za pot na delo kot nakupovanje ostal prevladujoč potovalni način, zlasti na podeželju. Raziskava nudi edinstven vpogled v spremembe potovalnih navad med epidemijo in podkrepljuje potrebo po bolj trajnostnih prometnih politikah za omilitev podnebne krize in izboljšanje javnega zdravja.

KLJUČNE BESEDE: potovalne navade, modalni delež, stopnja urbanizacije, zaprtje države, pandemija, Slovenija

The article was submitted for publication on January 6th, 2021.
Uredništvo je prejelo prispevek 6. januarja 2021.

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1 Introduction

The COVID-19 pandemic has been affecting the World in an unprecedented manner. When the SARS-CoV-2 virus spread in Europe in early spring of 2020, a diversity of reactions – from pharmaceutical to non-pharmaceutical – ensued. Among the non-pharmaceutical interventions (NPI) enacted by national and/or regional authorities were measures to reduce virus transmission by restricting socializing and public life and limiting human movement (Flaxman et al. 2020) – also called lockdown.

The SARS-CoV-2 virus was also detected in Slovenia. In the first half of March 2020, the spread of infections accelerated and on March 12th, the Government of the Republic of Slovenia declared an epidemic (Odredba o razglasitvi … 2020). Interventions followed quickly: on March 16th, gathering of people in educational institutions was prohibited and the prohibition of public transport was issued as well. In addition, all restaurants and many shops were closed. On March 30th, any movement outside municipalities of residence was also prohibited (with certain exceptions). The total lockdown of public life and many activities lasted about a month, as the first measures to lift the lockdown took effect on April 17th (Odlok o začasni prepovedi in omejitvah … 2020; Odlok o spremembi … 2020; Odlok o začasni prepovedi, omejitvah … 2020). While many EU countries introduced restrictions on public transport (Internet 1; Internet 2; Internet 3), Slovenia was one of the very few countries that decided to shut-down public transport completely. International road and rail-bound public transport was reinstated on June 13th (Odlok o načinu izvajanja … 2020). With such an approach to fighting the epidemic, some sources cite Slovenia ranked high among countries on the stringency index in the first wave (Hale et al. 2020), while others (Hans et al. 2020) cite in general less stringent measures. The same study (Hans et al. 2020) argues that around April 1st 2020 Slovenia's measures during lockdown were among the most stringent in EU, however this phase lasted less than a month. Therefore, the general assessment is that Slovenia faced medium exposure to potential negative impact of COVID-19 lockdown, a medium sensitivity in the eastern and central parts and a low sensitivity in the western part of the country (Hans et al. 2020). This makes Slovenia interesting for research on potential consequences of COVID-19 on human behaviour such as mobility.

After the first COVID-19 wave, many scholars evaluated the worldwide effect of lockdown on human mobility. While some research collectives fathomed the global impact by interviewing transport scholars and professionals (Zhang and Hayashi 2020), other scholars conducted surveys of mobility changes due to COVID-19 for different countries.

A team of researchers from TU Wien – with the aid of international colleagues – designed, translated, launched and distributed an online questionnaire in 21 languages to study the impact of the various intensities of NPI measures on people's daily mobility patterns. An analysis of the obtained international data focuses on the commonalities and discrepancies in commuting behaviour for a subsample of fourteen countries (Shibayama et al. 2021). As Austrians were the most represented participants in this survey, country-specific results were highlighted particularly by Brezina et al. (2020b). Their findings show substantial changes in transport demand and in general a drastic decrease of transport volumes during lockdown.

A major branch of research focused on analysing traffic flows and all reported significant decrease. One such analysis (Internet 4) shows that congestion levels in many cities dropped to 10% during the lockdown, whereas they normally reach around 30–60%. In China, during the Spring Festival rush from January 10th to February 13th, commercial passenger traffic fell by 46.6% and rail, road, waterway and civil air traffic fell by 50.3% compared to the same period of the previous year (Zhou, Wang and Huscroft 2020). In Japan, for example the major Tokaido Shinkansen line reported a 59% drop in passenger numbers in March. A study by Zhang (2020) estimates that between January and March 2020, Japanese domestic intercity rail travel declined by 30%. In India, after the nationwide lockdown on March 25th, a similar decrease of daily mobility was detected with only a slow recovery (Dandapat et al. 2020). In Sweden, for three regions (Stockholm, Västra Götaland and Skane) the number of daily trips from March 1st to April 1st decreased by about 40–60% relative to the same period in 2019 (Jenelius and Cebecauer 2020). In the city of Santander, Spain, Aloi et al. (2020) report significant decrease in public transport and reduction of transport related emissions of pollutants, with emissions of NO_2 reduced by 60%. Arellana, Márquez and Cantillo (2020) made an analysis of official and secondary data of transport systems in seven urban areas within Colombia. In the first three months of the pandemic, freight transport was the most resilient transport component. A German survey studied the effects on the travel behaviour by means of an online survey while distinguishing areas with

different levels of lockdown intensity. Results reveal a shift away from public transport and increases in car usage, walking and cycling (Anke et al. 2021).

From the geographical perspective, also studies on modelling the influence of mobility on the spread of SARS-CoV-2 should be noted, for example by Chang et al. (2021). While many studies focused on COVID-19 impact during the pandemic, some are already trying to foresee how cities will change in order to live with a permanent COVID-19 threat (Florida, Rodriguez-Pose and Storper 2020).

Slovenia represents a good example of polycentric urban development (Nared et al. 2017) and is one of the European countries with the most dispersed settlement system. According to the degree of urbanization (DEGURBA) classification, 44.5% of people are living in thinly populated areas, also classified as »rural« (Local Administrative Units 2021). Trends in daily mobility in recent decades have been associated with an increase in inter-regional traffic flows towards major centres, a weakening of public transport and an increase in car-dependent mobility patterns (Bole 2004, 2011). Travel behaviour changes among the youth show a similar trend: between 1991 and 2016 in primary schools in Novo mesto, the share of pupils who come to school by car increased from 4 to 53% (Plevnik, Balant and Mladenovič 2017).

However, only few studies have been conducted on the impact of the COVID-19 pandemic on travel behaviour in Slovenia so far. A survey by the Slovenian Car Association (AMZS) questioned almost 500 people about the change of their mobility habits, indicating some substantial changes (Poženel 2020). While the survey of the European Consumer Organization shows that occasional work at home in Slovenia increased from 27 to 63% of the population during the lockdown compared to before lockdown, 56% of respondents were still occasionally working from home in October 2020 (Okorn 2020).

Some »pre-COVID-19« mobility studies took spatial differences in transport behaviour into consideration, such as between rural and urban areas. In general, the mobility of the urban-rural continuum is characterized by the fact that as rurality increases, the private car gains in value and public transport loses (Pucher and Renne 2005; Bouwman and Voogd 2005). Studies from the Netherlands have also shown that the number of short distance trips in rural areas decreases and the number of medium distance trips increases (Bouwman and Voogd 2005). Connections between mobility pattern and lifestyle across the urban-rural continuum were also studied in Slovenia by Drozg (2012). Inhabitants of towns and suburbs were found to be more mobile than rural dwellers, while the latter usually travel over longer distances. His study confirms the gap between urbanization of inhabitants (urban way of life) and urbanization of space (accessibility of urban activities).

Our review of existing research and literature shows that a geographic approach to studying the impact of the COVID-19 epidemic on daily mobility has not been used yet. Thus this paper examines the Slovenian subsample of the openly available dataset »International survey on COVID-19 lockdowns and mobility behaviour« (Brezina et al. 2020a) from a geographically differentiated viewpoint. Previous analysis of this available dataset has examined differences and commonalities between 14 countries, Slovenia included, but did not specify geographic differences (Shibayama et al. 2021). Their research also indicates that the Slovenian subsample appears well suited for a detailed geographical analysis, as it shows the best balanced distribution between urban and rural locations. Apart from Slovenia, countries show predominantly urban respondent locations. In this paper, we analyse the replies of respondents from Slovenia, distinguishing by their residential location along the urban-rural continuum. Here we study the changes in daily travel behaviour of the subsample for work commuters and for grocery shopping due to NPIs during the first wave of the COVID-19 pandemic compared to the pre-pandemic period. These types of trips were the only ones allowed during the lockdown, except for emergency trips.

2 Methods and data

2.1 Questionnaire

We utilise the openly accessible dataset of an international online survey in 21 languages on changes in everyday mobility, carried out during the COVID-19 outbreak in spring of 2020 (Brezina et al. 2020a). The online questionnaire was available with its first language versions from March 24th until May 12th, 2020. The Slovene version was available from March 25th on. In total, the dataset contains more than 11,000 responses from over 100 countries. The questionnaire is reported (Shibayama et al. 2021) to have been distributed with the snowball method using email and social media and comprised of 33 total questions with predominantly closed-ended questions. Replies included the option »other« to specify a divergent answer.

The survey gathered information from respondents on:
- the specifics of workplace;
- the specifics of place of education;
- the specifics of grocery shopping;
- the transport means, duration and frequency of trips for these purposes before and during the COVID-19 triggered lockdown;
- the way of and motivation for changing one's behaviour;
- and the COVID-19 triggered changes in child-care.

In addition to age class, gender, education and occupation, household type and country of living, the postcode was also asked to identify the location of the respondents. We use the postcode for spatial classification of responses. The metadata of the dataset gives details on questions and answering options (Brezina et al. 2020a).

2.2 Sample

The Slovenian subsample encompasses 415 total replies of which 244 stated to be female, 167 to be male and 4 people chose diverse or left it unanswered. As for the gender and age class of the respondents, Table 1 shows the age distribution of the sample.

Table 1: Age distribution of the survey participants.

	Sample (n = 411)	
Age class	Male [%]	Female [%]
0–18	0.5	0.5
19–29	4.1	11.2
30–39	11.7	18.0
40–49	11.9	18.0
50–59	6.1	8.3
60–69	5.1	2.4
70 or older	1.2	1.0
Total	40.5	59.2

Out of 415 total participants, 337 (307 + 20 + 10 in Figure 1) stated to be of working occupation. Table 2 gives the number of participants answering to questions being relevant in the course of this analysis.

Table 2: Subsample sizes.

Subsample	n	Reference to
Working occupation	337	Figure 1
Commuting before lockdown	290	Figure 2
Commuting under lockdown	310	Figure 3
Work commute	289	Figure 4
Grocery shopping	351	Figure 5
Workplace type	313	Figure 6
Grocery shopping style before lockdown	387	Figure 7
Grocery shopping style under lockdown	384	Figure 8

As for the respondents' occupational status, 74% were employees, 7.5% were retired, 6.8% were students (working and non-working) and 4.8% were self-employed (see Figure 1). Therefore, occupational status deviates from the national distribution as persons in employment, which account for around 43% of the national population, are overrepresented in the sample on the account of other population groups (Čuk 2020; Razpotnik 2020).

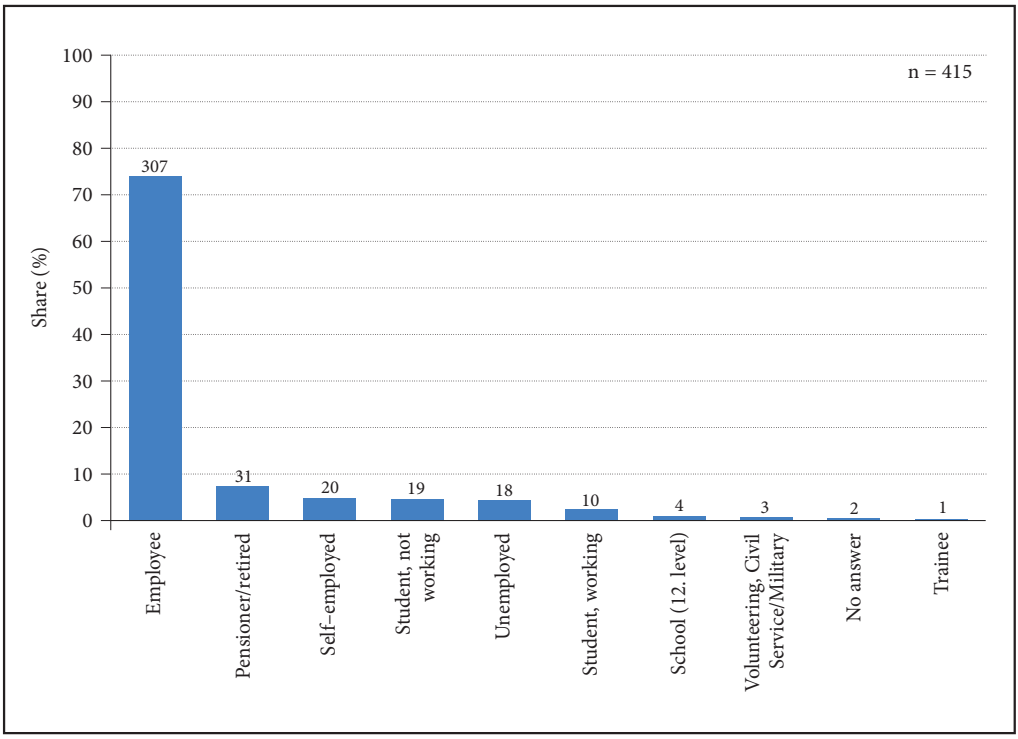

Figure 1: Share of survey respondents by occupation with absolute respondent number over each column.

2.3 Spatial classification

The geographic classification for Slovenia regarding the level of urbanization is also available at the settlement level (n = 5,994) and consists of six types: S1 = city/town, S2 = suburbanized settlement, S3 = urbanized settlement, S4 = strongly urbanized rural settlement, S5 = urbanized rural settlement and S6 = rural settlement (Ravbar 1997; Cigale 2005). As individual survey data records were available on the national postal district level, the data from the survey (available with much smaller granularity) needed to be aggregated to a higher level. For this task we applied the following criteria for determining three postcode types along the urban-rural continuum:

1. Urban area – predominant share (minimum 50%) of urban population (type S1) AND 75% of population together with suburbs (types S1+S2) AND maximum 10% of rural population (types S5+S6).
2. Transitional area – mixed, urban-rural area; does not meet the criteria either for urban or rural areas.
3. Rural area – a minimum of 50% of the population lives in rural or urbanized rural settlements (type S5+S6).

As the type S1 in the original classification of settlements was based on the outdated list of towns from 1981, we slightly revised it and identified cities and towns according to the classification of the Slovenian statistical office's (SURS) criteria numbers one (≥ 3,000 inhabitants) and four (suburban settlements, gradually spatially and functionally integrated with an urban settlement with 5,000 inhabitants or more) (Pavlin et al. 2004).

The results show that 268 respondents are located in districts defined as urban (64.6%), 92 in transitional (22.2%) and 35 in rural (8.4%), while 20 participants (4.8%) provided non-assignable postcode data (Table 3). Participants from a total of 110 postal districts (out of 466) have been recorded. The distribution along the rural-urban continuum is therefore slightly biased with overrepresented urban dwellers (around 50% of the Slovene population lives in urban areas) and underrepresented rural dwellers (their actual share in the national population is around 25%). The share of respondents in transitional areas is comparable to the national average (Cigale 2005). Figure 2 shows the distribution of participants by postcode types over Slovenia.

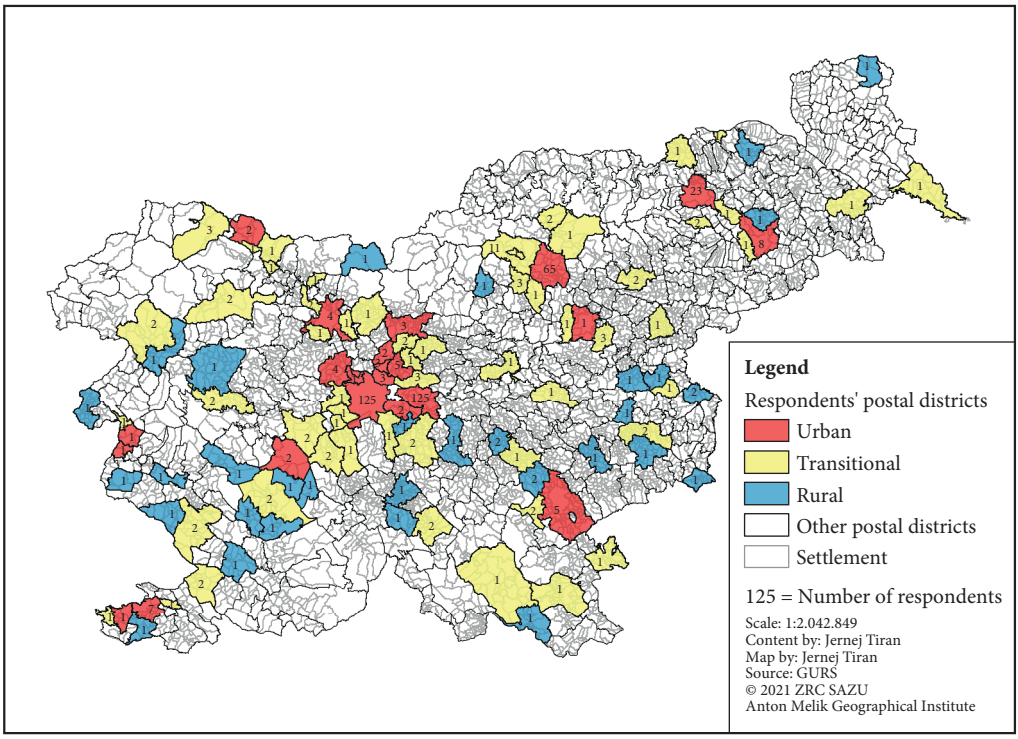

Figure 2: Map of Slovene postcode districts with their level of urbanization and inscribed number of survey participants.

Table 3: Sample sizes and shares of respondents by geographical classification.

Postcode types	Sample size	Sample share [%]
Urban	268	64.6
Transitional	92	22.2
Rural	35	8.4
None	20	4.8
Total	415	100.0

3 Results

The geographical distinction of commuting frequency before COVID-19 lockdown (Figure 3) shows a clear picture, as 81% (transitional) to 92% (rural) of the respondents were commuting five days a week. Under COVID-19 lockdown, the situation changed drastically (Figure 4): around half report that they were not commuting, but were under a mandatory home office regime. When adding those persons whose work was closed (rural 3.4% to urban 10.0%) and those who worked at home voluntarily (rural 6.9% to urban 13.9%), no actual commuting was taking place for a portion of between 62.1% (rural) and 72.2% (urban) of the sample. Only around 10% of respondents commuted the same number of times.

Figure 5 shows the mode choice for work commute (left column) and for grocery shopping (right column) in Sankey (flow) diagrams. The left hand side of each diagram shows the mode choice before COVID-19 lockdown and the right hand side during lockdown.

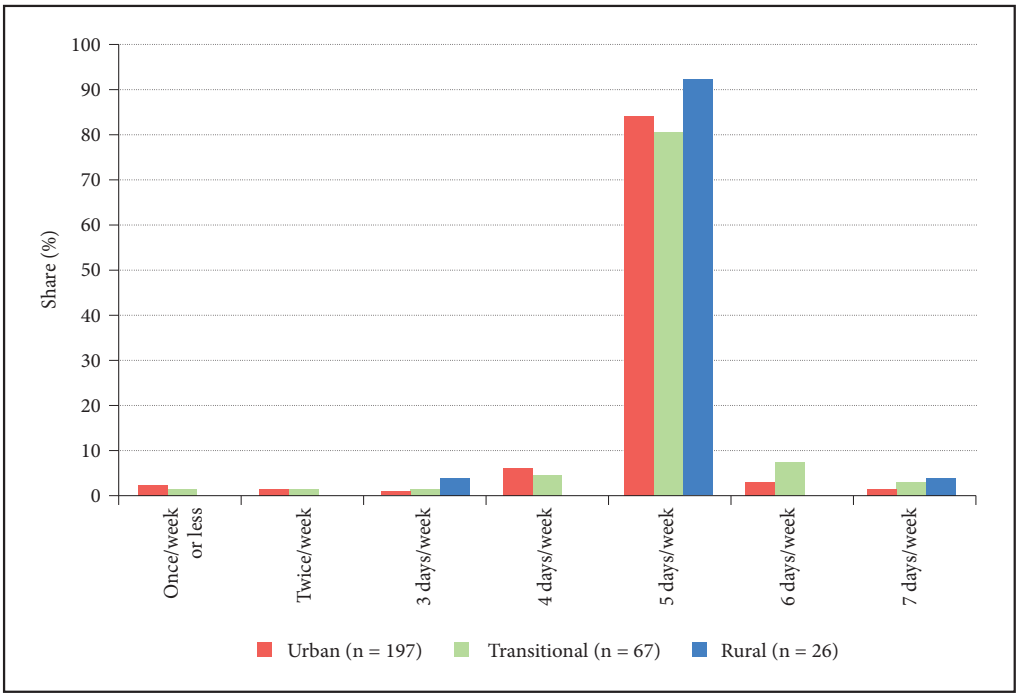

Figure 3: Commuting frequency distribution before COVID-19 lockdown.

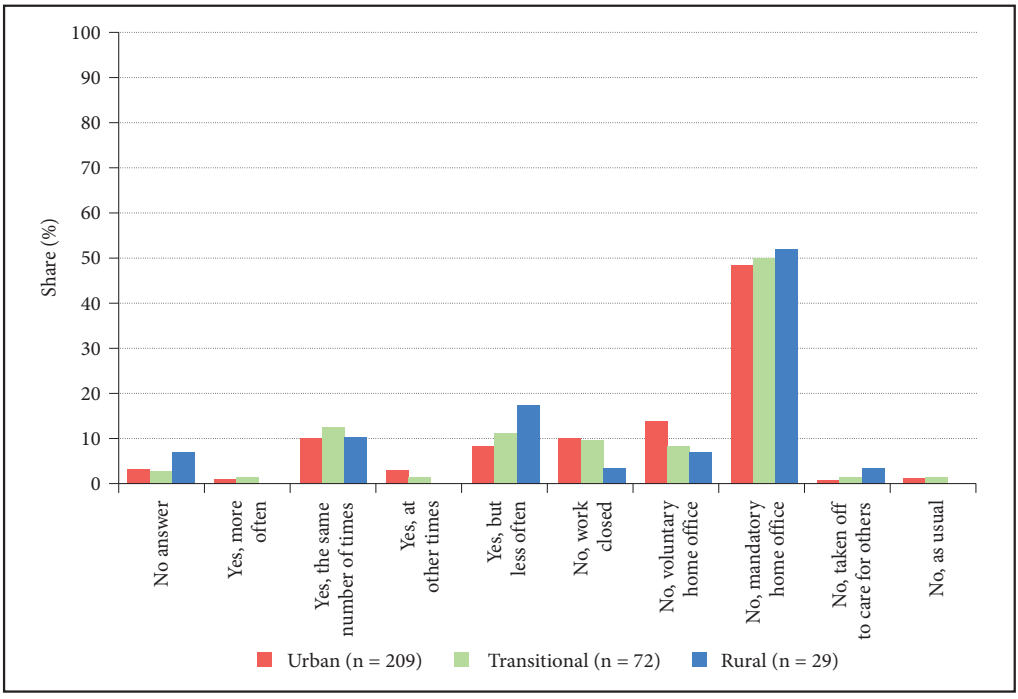

Figure 4: How commuting behaviour changed under COVID-19 lockdown in comparison to before.

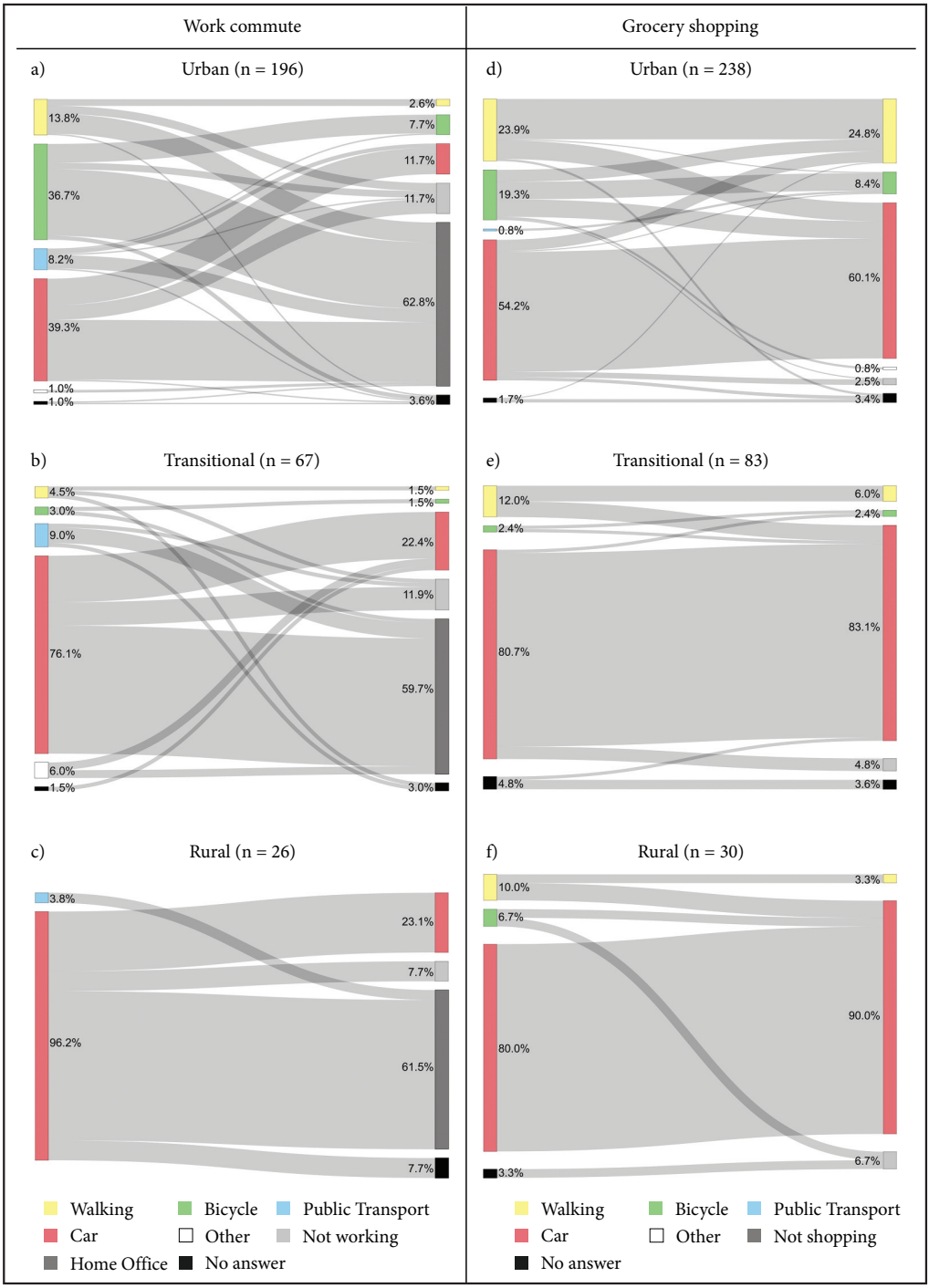

Figure 5: Sankey diagram matrix of changes in commuting mode choice before (left hand side) and during lockdown (right hand side) for workers (left column) and changes in mode choice for grocery shopping (right column) according to the spatial classification urban (top row), transitional (centre row) and rural (bottom row).

There are obvious differences in the mode choice results of the survey for commuting between the spatial classes before the COVID-19 lockdown. In urban areas, we see higher shares in active modes (walking and cycling) and lower levels of private car use than in transitional ones. Especially in rural areas with no share of active modes at all, a very high car share of 96.2% is evident. With 9.0%, the share of public transport was higher in transitional and urban areas (8.2%) than in rural areas (3.8%).

During the COVID-19 lockdown, the percentage of people who were not commuting for work was quite similar in all three areas. Between 59.7% (transitional areas) and 62.8% (urban areas) were in home office and 7.7% (rural areas) to 11.9% (transitional areas) were not working. As public transport was ceased nationwide, its share dropped to zero in all areas. The total shut-down of public transport did not significantly increase car traffic as the share of public transport users was already low before, while its users mostly worked from home. In urban areas there was still a considerable share of active modes in commuting during lockdown with 2.6% of walking and 7.7% of cycling, while in transitional areas only 1.5% walked or cycled to work and even nobody in rural areas. There, cars were the only transport mode used by the commuters.

A similar pattern can be seen for the grocery shopping mode choice. However, before the COVID-19 lockdown, car use was more prevalent in urban areas for shopping than for commuting compared to transitional and rural areas, where it was high for both purposes. During lockdown, the modal share of cars for shopping increased in all three spatial classes. The cessation of public transport did not affect the modal share as public transport use for shopping before the lockdown was extremely rare. In contrast to work commuting, the dominance of the car for shopping purposes persisted, while for work commuting the car's share shrunk in urban areas. For rural areas one can easily state that the car is basically the only commuting mode.

The questionnaire also surveyed a wide variety of main workplace types before COVID-19 (Figure 6). In our sample, a clear trend is visible with the changing perspective from urban to rural settings: 'Office' workplaces decrease from almost 55% to almost 38%, while simultaneously 'Classrooms / lecture hall / stage' increase from 11% to almost 35%.

Workplace types differ in their suitability for switching to working from home. We differentiate between 'home office possible', 'presence essential' and 'undetermined'. For this categorization, we define workplace types 'Home', 'Office' and 'Classroom / lecture hall / stage' to be 'home office possible' and workplace types 'Mobile (customer visits)', 'Customer traffic', 'Hospital, nursing home' and 'At customer site (e.g. construction site)' to be 'presence essential'. 'Customer traffic' denotes working places with stationary customer contact, while service-oriented visits to customers are named 'At customer site'. Results are shown in Table 5. Two trends surface: 'home office possible' increases by a good 10 percent-points when switching from urban (72.6%) to rural (82.8%) settings, while 'presence essential' decreases from 17.5% (urban) to 13.8% (rural). The workplace types that we consider as 'undetermined' decrease from 9.9% to 3.4% with reduced spatial density.

When it comes to the style of grocery shopping before COVID-19 lockdown (Figure 7), the distinction that urban people tend to shop for groceries more often than rural dwellers is notable, as 38.5% of urban respondents do it many times per week, which is 5.5 percentage-points more than for transitional and 9.1 percentage-points more than for rural respondents. Interestingly, twice as many people let others do the shopping in rural areas than they do in urban or transitional ones.

COVID-19 related mobility changes could be explained by changed grocery shopping behaviour during lockdown, depicted in Figure 8. Irrespective of spatial classification, a combined share of 50 to 60% of responses report buying 'larger quantities at once' (18.6 to 21.8%), buying 'long-lasting products' (8.1 to 11.5%) and 'shopping less often' (29.3 to 30.8%). In urban settings 12% of respondents report to 'eat out less often', while in rural settings 10.3% go to 'stores nearby'.

Table 4: Share of workplace types in subsample by spatial classification and distinction between 'home office possible' and 'presence essential'.

Shares [%]	Home office possible	Presence essential	Undetermined
Urban	72.6	17.5	9.9
Transitional	80.6	15.3	4.2
Rural	82.8	13.8	3.4

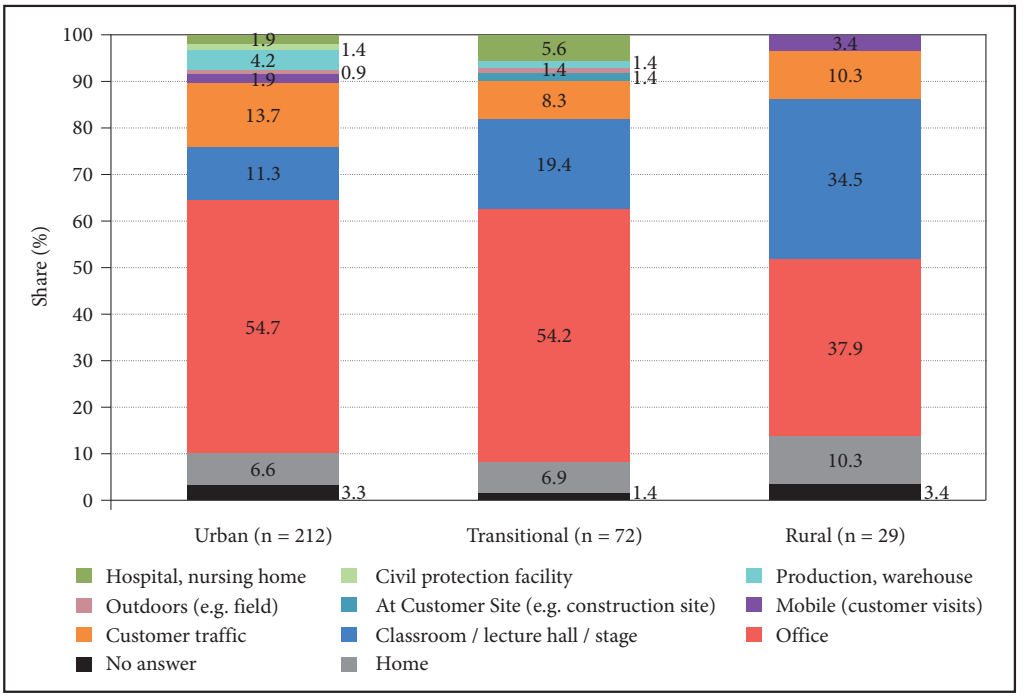

Figure 6: Workplace type before COVID-19 lockdown by spatial classification.

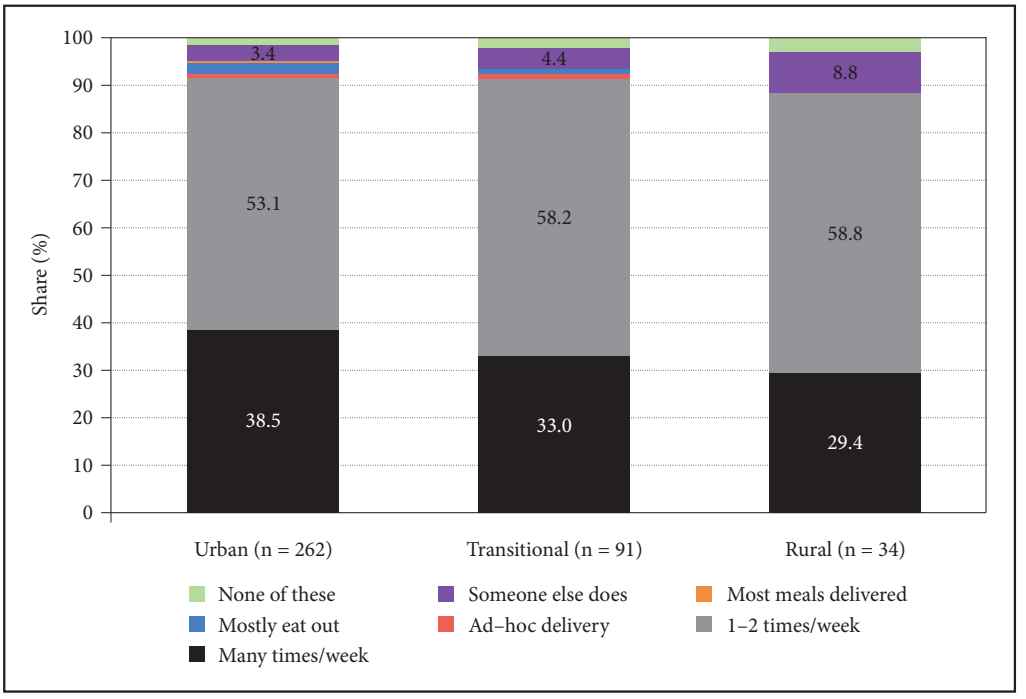

Figure 7: Style of grocery shopping before COVID-19 lockdown by spatial classification.

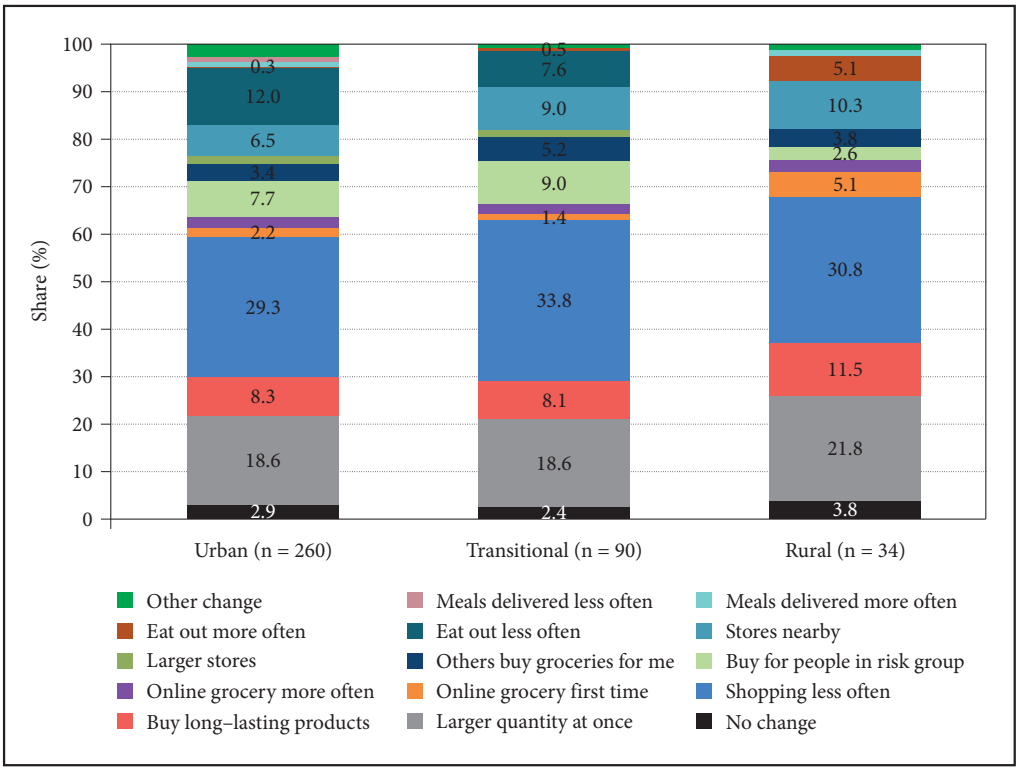

Figure 8: Change in grocery shopping under COVID-19 lockdown by spatial classification. Multiple choices per participant were possible.

4 Discussion

The changes in travel behaviour during the COVID-19 lockdown (comprising of limitations for travelling, closed services and workplaces etc.) can be viewed as a social response to the threat of virus transmission. On one hand, the mobility in Slovenia was reduced due to quite stringent measures, and a large proportion of people working from home and going shopping less often, which is similar to other parts of the world (Aloi et al. 2020; Jenelius and Cebecauer 2020; Dandapat et al. 2020). On the other hand, the private car even reinforced its status as the major transport mode. However, there are some important differences along the urban-rural nexus. Slovenian rural areas are very dependent on car mobility and in the last decades, car dependency has even reinforced (Bole and Gabrovec 2012). While work commuters show a very strong affinity with private cars in transitional and rural areas pre-lockdown as well as during lockdown, the picture looks more diverse in urban settings. There, car-dependency is not as pronounced and is balanced by walking, cycling and the use of public transport. The higher share of non-car users in urban areas in pre-lockdown can be explained with better service of public transport, especially in bigger urban areas (Ogrin and Dovečar 2014) and with shorter distances of daily trips. While more than 30% of urban dwellers still use alternatives to cars for grocery shopping, in transitional and rural areas, the travel behaviour for shopping, as well as for commuting is distinctively dominated by car use. Very few alternatives are used and the situation did not improve during the lockdown. These findings confirm a notion that built environment influences the travel behaviour and frequency through promoting sustainable travel modes (Jiao, Vernez Moudon and Drewnowski 2011; 2016).

The survey of AMZS (Poženel 2020) on travel behaviour changes in Slovenia due to the lockdown shows somehow different results: only 24% used the car about the same, while about 69% of respondents used

the car less, and 3% used the car more than prior to the pandemic. The share of bicycle and walking increased: 18% used the bicycle more often, 31% used it the same and 15% used it less, while 31% walked more, 53% walked the same and only 8% walked less. Their findings are not strictly in line with ours, as trips were not separated by trip purpose and Brezina et al. (2020a) did not explicitly ask for frequency changes. AMZS' survey as well as our inquiry suggest that shopping behaviour changed by shifting from higher frequencies and smaller quantities to lower frequencies and higher quantities – and did so by increasingly using cars for this purpose.

In contrast to previous recent (Shibayama et al. 2021) research, based on the survey's complete dataset, we also studied the spatial distribution of workplace types. The respondents who can work from home have a high share in our sample irrespective of the spatial setting. Regarding changes in lockdown-induced commuting, the scene is set with 82.8% of jobs in rural areas being 'home office possible' and 62.1% of respondents reporting no commute. On the urban end of the spectrum, 72.6% reported to have 'home office possible' jobs and 72.2% had no commute. While in the urban surrounding possibilities and actual behaviour almost coincided, the rural settings saw a discrepancy of about 20 percentage-points. The location of 'presence essential' workplaces in relation to dwelling areas appears to be a crucial perspective in terms of crisis resilient and environmentally friendly transport supplies. With 17.5% the share of such workplaces was highest in urban settings in our case. In general, we suggest that the closer 'presence essential' workplaces are located to dwellings (preferably of their workers), the more attractive it will appear to workers to choose walking and/or cycling as a transport mode for commuting. However, this cannot be always the case due to recent trends of decentralized spatial development (Rebernik 2010), current model of the reimbursement of travel expenses, which favours long-distance commuting by car (Gabrovec et al. 2021), and the lack of infrastructure for sustainable mobility due to allocating funds mostly to road infrastructure in the past (Bole and Gabrovec 2012).

In both cases, safe and attractive infrastructures for public transport and active mobility need to be provided. Consequentially, from a planning perspective, the provision of such infrastructures thus not only asks to be appraised from an ecological perspective but also from the viewpoint of providing resilience in a major health crisis – as was shown by research on pop-up infrastructures (Kraus and Koch 2021).

The lack of public transport use due to measures taken by the government is apparent in all settings and was reflected also in its lower usage after the first wave was over (Čampa et al. 2020). As suggested before, this sector had a remarkable position: Even though its services were cut down by the government, no noteworthy protests from the public opposed this move. The reasons for that appear to be rooted in the ongoing declining relevance of public transport and its low usage (Gabrovec and Bole 2009; Halilović et al. 2020). On first sight, additional reduction of passengers in public transport may lead to an increase in the level of service (ceteris paribus): less crowded vehicles offer more comfort, are more COVID-safe and are expected to run more punctually. But on a systemic level, this passenger reduction has led (and may also do so in the future) to a decrease in cost-recovery rates for un-/tendered public transport services on state and city levels. Other research suggests that urban transport as one of the crucial urban systems will need to introduce pandemic-proof infrastructure and transport management (touchless solutions, capacity monitoring, floor markings, …) (Florida, Rodriguez-Pose and Storper 2020).

Replacement of public transport for individual motorised mobility to avoid COVID-19 disease is not an option. Not only would air quality deteriorate in many urban areas and have a negative impact on public health, the growth of traffic in urban areas would increase the traffic loads on road infrastructures, leading to a rapid increase in congestion and a deterioration in accessibility. Studies from Slovenia's capital Ljubljana confirmed poor air quality in major city roads within the period 2005 to 2013 (Ogrin and Vintar Mally 2013; Vintar Mally and Ogrin 2015). Since then, some streets in the centre of Ljubljana have been closed to motorized individual traffic and remained open to public transport, and air quality in these areas has improved. A return of individual traffic in the city centre would do much more harm than good. But the regional challenges for substantial shifts from non-sustainable to sustainable modes remain persistent in a policy culture that on the one hand eases all matters car and on the other highlights alleged difficulties in providing better public transport (Brezina and Lokar 2020).

The study also has certain methodological limitations. As the data was collected with an online survey, non-probability sampling was used. Even though the sample is not representative of the total population, we insinuate that the snowball method of survey engagement proved functional for quickly harvesting social reactions under a rapidly evolving situation at least among employees, which were the most represented

population group in the sample. We also found the sample to be not too spatially biased, although the rural dwellers were a bit underrepresented. One might also question the accuracy of determining the location of the respondents as it was only available at the postal district level and not at a lower spatial scale, which may be more appropriate for a country with such a disperse settlement system. We are aware that classifying respondents along the urban-rural spectrum may lead to certain generalizations and errors.

On matters of shortcomings, we need to admit that similar to changes in modes and commuting duration, an inquiry of commuting distances would have deemed promising. Commuting distance was asked in the survey, but unfortunately the subsample of valid responses was too small (n = 8 altogether for all three spatial classes) for useful evaluation.

5 Conclusion

In our research we address the COVID-19 pandemic and the corresponding mobility responses in Slovenia from a geographic perspective. Emanating from a worldwide survey, we study the changes in everyday travel behaviour with focus on working commuters and grocery shopping of the Slovene subsample, for which we differentiate responses by three spatial classes: urban, transitional and rural. Depicting the changes in travel behaviour from regular to lockdown shows the persisting and even increasing dominance of the car for shopping purposes, while for work commuting the car's share shrunk due to a high portion of people working from home. Taking into account the spatial perspective, our study confirmed the notion that rural areas remain very car-oriented, while modal share of the urban dwellers is more diverse.

Our results pose a challenging picture for the long-term future which requests transport policy to switch shares of trips from non-sustainable to sustainable modes. Such transport policy does not only need to implement measures which are effective from a sustainability perspective, but – as we may have learned from the COVID-19 pandemic – needs to meet these demands under public health requirements.

Congruously, this also opens avenues for future research on the design and implementation of transport policies that will enable people to move sustainably and in a pandemic dampening way in less densely populated areas – not only in Slovenia but in all European countries.

ACKNOWLEDGMENTS: We thank the reviewers for their valuable comments that helped to finalize the paper. We thank Takeru Shibayama, Fabian Sandholzer, Melissa Kapfenberger, Ulrich Leth, Helmut Lemmerer and Günter Emberger who co-designed and co-implemented the survey. We thank Miha Lokar for the translation of the initial survey into Slovene language. We thank many colleagues who helped in distributing the survey among their peers. The authors also acknowledge receiving financial support from the Slovenian Research Agency, research core funding Geography of Slovenia (P6-0101).

CONTRIBUTIONS: Conceptualization of research: T.B., J.T, M.O.; geographical analysis: J.T.; data analysis: T.B., B.L.; literature review: M.O.; paper writing: T.B., J.T., M.O., B.L.

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