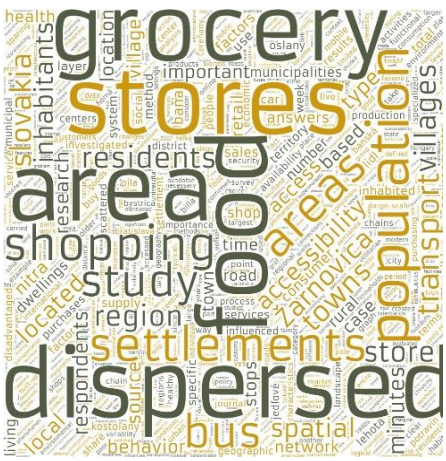
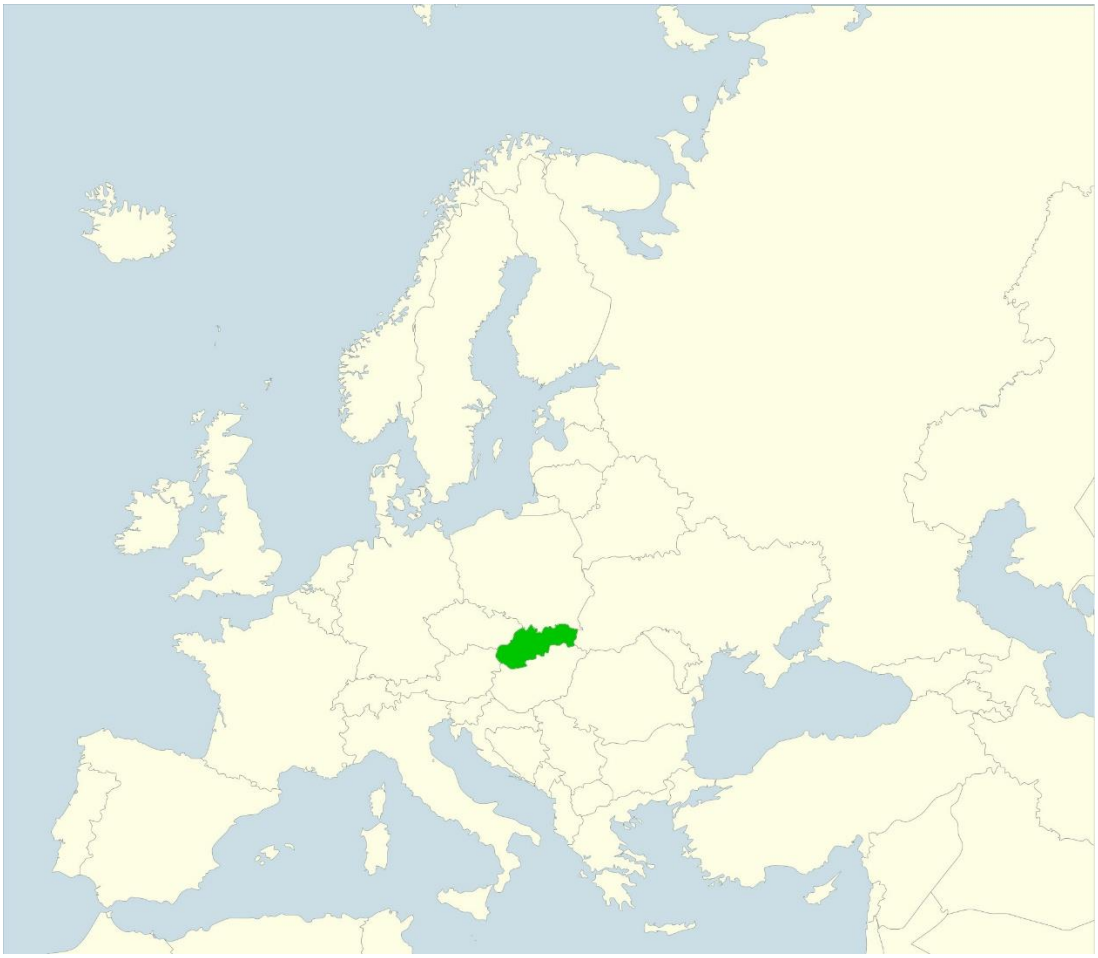
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SHOPPING BEHAVIOR AND ACCESS TO FOOD IN THE AREAS OF SLOVAKIA WITH DISPERSED SETTLEMENTS: A CASE STUDY

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Abstract: The aim of the research was a spatial and functional analysis of the accessibility of retail food environments in relation to the inhabitants of dispersed settlements who are socially and geographically disadvantaged in purchasing g food. The consumer behavior and food shopping habits of the inhabitants of these areas largely depend on the spatial and functional characteristics of the dispersed settlement and the surrounding area. In terms of food consumption, an important determinant is the availability of convenience stores, defined by the economic and physical ability to access food sources. The ability to access stores is strongly influenced by transport options and transport infrastructure. The investigated area belongs to a group of specific areas with dispersed settlements. This type of settlement, typical in the mountains of Slovakia and on the border with the Czech Republic, can also be found around the town of Nová Baňa, located in the west of central Slovakia. This area consists of two towns and 12 municipalities and is referred to as the "Novobanská štálová oblasť ". These specific territories are characterized by a lack of access to fresh and affordable food, which can contribute to social disparities in diet and endanger people's health with various serious diseases. Spatial identification of areas with difficult access to food stores in the Novobanská štálová area has been a pioneering attempt to visualize areas with the highest demand for improvement in food access, and this process may be helpful in identifying other areas with similar characteristics. The methods utilized represent an accessible, transparent and reproducible process for assessing the accessibility of grocery stores. These methods can be used for cost-effective, periodic surveillance and meaningful engagement with communities, retailers and policy makers. The conclusions and results of our research should positively contribute to the growing debate on the inequality of living conditions and marginalization of rural municipalities.

Key words: shopping behaviour, food retail network, accessibility to food stores, dispersed settlement

Súhrn: Cieľom príspevku je priestorová a funkčná analýza dostupnosti maloobchodného predaja potravín vo vzťahu k obyvateľom rozptýleného osídlenia, ktorí sú sociálne aj geograficky znevýhodnení pri nákupoch potravín. Od priestorových a funkčných charakteristík sa do veľkej miery odvíja spotrebiteľské správanie a nakupovanie potravín obyvateľmi tohto regiónu. V spotrebe je významným determinantom práve dostupnosť predajní potravín, ktorá predstavuje ekonomickú a fyzickú schopnosť sa k zdrojom potravín dostať. Táto schopnosť je silno ovplyvňovaná možnosťami transportu a dopravnou infraštruktúrou. Skúmané uzemie patrí do skupiny špecifických oblastís rozptýleným osídlením. Vyskytuje sa len v pohoriach Slovenska a na hraniciach s Českou republikou. V okolí mesta Nová Baňa takúto oblasť tvoria 2 mestá a 12 obcí a je označovaná ako "Novobanská šťálová oblasť". Tieto špecifické územia sú charakterizované nedostatočným prístupom k čerstvým a cenovo dostupným potravinám, čo môže prispievať k sociálnym disparitám v stravovaní a k ohrozeniu zdravia ľudí rôznymi vážnymi ochoreniami. Priestorová identifikácia oblastí so sťaženou dostupnosťou do predajní potravín v Novobanskej štálovej oblasti je priekopnícky pokus vizualizovať oblasti s najvyššími požiadavkami na zlepšenie v prístupe k potravinám a môžu byť použiteľné aj pre iné oblasti s podobnými vlastnosťami. Použité metódy predstavujú prístupný a transparentný, reprodukovateľný proces dostupnosti predajní potravín. Tieto metódy možno použiť na nákladovo efektívny, pravidelný dohľad a zmysluplnú spoluprácu s komunitami, maloobchodníkmi a tvorcami politík. Článok tak prispieva k rastúcim diskusiám o nerovnosti životných podmienok a marginalizácii vo vidieckych obciach.

Kľúčové slová: nákupné správanie, potravinová maloobchodná sieť, dostupnosť predajní potravín, rozptýlené osídlenie

Highlights:

- rural shopping behavior
- transport options for visits to food stores
- the importance of the social parameter as a reason for visiting a grocery store
- spatial variability of factors affecting food purchases
- the usefulness of measuring and describing of the accessibility of grocery stores for stimulating discussion

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1. Introduction

A landscape with scattered settlements is a specific type of area, and relatively uncommon. In Slovakia, there are several rural regions/areas with scattered settlements that display the typical characteristics, namely: a territory with hilly relief and pastures, dense forests, poor agricultural land, or an area with an extreme climate. Scattered settlements are those where the dwellings are spread over a wide area and do not have a central core.

These types of settlements are not unique to smaller or less developed countries, however; they can also be observed in highly productive countries, in which they arose for sociocultural or historical reasons (e.g., France or the USA). The most common economic activities in sparsely populated regions are agriculture and logging. Dispersed settlements are a relatively new phenomenon as throughout history, people have generally lived in closed communities.

In many rural locations, grocery stores have disappeared due to the emigration of the population and the influence of supermarkets in nearby towns and cities. In the last two years during the COVID-19 pandemic, people have often had limited freedom of movement and consequently, food could only be purchased in nearby stores. For this reason, food availability has become very topical. Food supply has different forms: i) self-supply, ii) exchange, iii) trade, iv) local network, and v) external suppliers.

For centuries, business activities have been carried out at trade fairs – regular or annual markets. After the establishment of socialist Czechoslovakia, the trading network was nationalized and in Slovakia, the network of state stores (Zdroj), along with the co-operative stores (Jednota), were gradually expanded. During this period, residents living in remote areas were supplied by mobile grocery stores – a modified bus that visited the scattered settlements at least once a week (today's seniors maintain fond memories of mobile stores that provided supplies of fresh bread, pastry and meat products). The service operated until the 1990s. The sales network of food in rural areas with a small population was also subsidized by the state.

After the change of the state regime in 1989, the economic situation was diametrically changed from a centrally planned one to a free-market economy. Many networks that were transformed, liberalized and subsequently privatized were later unable to survive economically.

During the 1990s, the arrival of foreign retail chains and the construction of large-scale shops (supermarkets, hypermarkets and shopping centers) fundamentally changed the way people do their shopping. The territorial planning regulations for the technical elements – spatial planning regulations for settlements defining the minimum number of amenities for settlements according to the number of inhabitants – ceased to apply and the number of retail establishments increased radically. In the present marketplace, there are many elements that have been revitalized from the original system, including the organization of sales fairs and farm markets. Several new forms of supply have also been introduced, e.g., direct home supplies, sales from the farmyard, crate sales, which along with the digitalization of life and the development of electronification of other areas, have contributed to the expansion of comfortable forms of shopping from the living room. The market also responded to the restrictions of the coronavirus lockdown and the closure of restaurants by increasing the supply of food and ready-to-eat meals (Wolt Delivery, etc.).

Returning to the conditions that existed before the COVID-19 pandemic is difficult due to the changes in the supply of goods, the provision of energy resources and the sharp increase in transport costs. These factors are particularly relevant when considering the needs and supply of sparsely inhabited regions. The logical starting point in terms of food procurement is the further development of self-sufficiency; the fresh and healthy products thus obtained will contribute to the nutritional needs of the population.

The natural relationship with the land, which was built up by generations of farmers, was seriously disturbed in the last century. Global climate change and environmental shifts have necessitated a change in the way that people use and work the land. Areas of scattered settlements that had declined and become unpopulated are again settled with permanent residents (for example, Zaježová), often highly educated people who, thanks to digitalization and the expansion of telecommunications networks, can work at home rather than in their urban workplaces. Local conditions in scattered settlements do not allow the use of supply services due to disproportionate transport costs, which encourages gardening activities and more efficient use of the land. The capacity of self-cultivation can and will expand. Such tendencies and development are extremely important for the inhomogeneous spaces of scattered settlements since a lack of both public transport and car ownership makes shopping for food a challenge in rural areas (Sharkey and Horel, 2008).

Food security was first recognized as a global issue in 1996 (Lê et al., 2015, pp. 1017) when it was defined as a situation that exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996).

The aim of the research was a spatial and functional analysis of the accessibility of retail food environments in relation to the inhabitants of dispersed settlements who are socially and geographically disadvantaged in purchasing food. Consumer behavior and the food shopping habits of the inhabitants of the study area will largely depend on spatial and functional characteristics. This study is important when considering the needs of the emerging retail market and the direction of its future growth.

To obtain it, we set two hypotheses:

Hypothesis 1 (H1). A high degree of time will be needed to access food stores in the specific geographical area with dispersed settlements that was researched.

Hypothesis 2 (H2). Access to food stores will depend on the transport serviceability of the area in the investigated specific geographical area with dispersed settlements

2. Theoretical background

According to Petrovič (2006), dispersed settlements (also known as scattered settlements), often called "lazy" or "kopanice", can be characterized as deconcentrated settlements chaotically scattered over the landscape around the core of the given area, which is the center of a village or town. The regional names of this type of settlement vary a lot within Slovakia (e.g., lazy, štále, rale, pľace, klčoviská, kopánky, nivky, vrchy and others). The originality of this type of landscape with a dispersed type of settlement, even in the sense of the European Convention on Landscape, lies in its limited occurrence (Šolcová, 2008, Petrovič and Petrikovičová, 2021).

Marginal and marginalized territories in the cultural landscape represent a specific environment with distorted functional and spatial relationships that result from the uneven functioning of mutually conditioned political, economic, social, cultural and environmental factors (Szczyrba et al., 2013; Bilková et al., 2018; Ira, 2019, Vaishar and Šťastná, 2019). Marginality research focused on many different topics which considered the scale and type of marginal region that the specific research is dealing with (Hanušin et al., 2020). The study of the individual perception of marginality may contribute to the understanding of the similarities and differences in defining marginality from two different perspectives: objective and subjective (Mikuš et al., 2016).

The risk of security breaches due to the isolation of individual households is a major disadvantage of this type of residence. Minimal social interaction between the households in a dispersed settlement is another consequence of household isolation, as is the challenge of access to public facilities such as schools, hospitals, municipal and state offices and shops (Vaishar and Šťastná, 2021), including access to food. However, living in a dispersed settlement also brings advantages, which were clearly demonstrated in the COVID-19 lockdown period; seclusion of households provides privacy for residents, along with a peaceful and calm atmosphere, and in general, the air has fewer pollutants due to the transport infrastructure not operating.

The food environment is defined as the collective economic, policy and social surroundings, opportunities and conditions that influence people's food and beverage choices and nutritional status (Swinburn et al., 2013). Most authors regard this food environment as the food supply chain, which includes production, distribution, sale and consumption (Rutten et al., 2011; Reid et al., 2012; Ericksen 2013; Marsden and Morley, 2014; Lê et al., 2015; Bilková et al., 2018; Tolmáči and Tolmáči, 2020). It has three subsystems – production, distributional and consumerist (Sobal et al., 1998). The objective of our research is the consumer subsystem, that is, the sale and consumption of food.

The fast expansion of discount chains (in Slovakia the Lidl chain) all over the world significantly shifted market power structures, and in the span of a few years changed the entire structure of the small retailer business sector (Sikos and Kovács, 2022). There are relatively few studies conducted on the analysis of retail networks at the regional or local level in Eastern-Central Europe, but there has been a revival of interest in this research field in recent times (e.g., Sikos, 2019; Kunc et al., 2022; Trembošová et al., 2022a). The territorial analysis of retail store networks is particularly important in the current crisis period, as food security has become one of the most important sustainability challenges of our time. Grocery retail chains are playing an essential role in this area (Sikos, 2019).

Shopping is a complex and interdisciplinary phenomenon, studied and evaluated by several branches of science. Shopping behavior is an important sociological phenomenon, understood as a manifestation of a way of life largely influenced by a society in which the consumer uses goods and services (Trembošová and Vlačuhová, 2016.) It includes the reasons that lead the customer to become a consumer of a certain product (goods/service). The level of consumer behavior is influenced by the availability of goods, the culture of sales, the offer of sales concepts, the real incomes of households, and the lifestyle and marketing activities of the sellers. It affects not only the economy but also has significant social and cultural impacts. Trembošová et al., (2022a) reported that, in specific cases, it also has an important spatial function in terms of preference when selecting a shopping center.

Consumer behavior strategies are influenced by the economic or political environment; during an economic crisis, for example, the income of the population is reduced, manifesting in the consumer's reduced purchasing power of goods and services. The choice of the place of purchase is the most often analyzed domain in the field of consumer mobility for services in the context of the shopping gradient, e.g., in the works of Frantál et al. (2012), Maryáš et al. (2014), Trembošová and Dubcová (2016), and others. A wide range of studies have also investigated the relationships between community retail food environments and areas of socioeconomic deprivation (such as those by Apparicio et al., (2007), Walker et al., (2010), and others).

Consumers purchase food most often in retail establishments. Križan et al., (2020, p. 77) describe grocery stores as essential service facilities in rural municipalities. In connection with the ongoing globalization processes and the entry of multinational chains into the Slovak market after the year 2000, there were also organizational changes in the countryside, the allocation of investment funds (also to small towns and large municipalities) in the form of large-scale retail formats such as supermarkets, hypermarkets and shopping (business) centers (Križan et al., 2020). In many rural locations, as a result of population decline and the existence of supermarkets in towns and cities, grocery stores have disappeared.

The new spatial localization of food stores, and a strong orientation towards the motorized customer, led to the creation of territories where the possibility of obtaining adequate food is insufficient, or limited (Križan et al., 2020). According to Sikos and Kovác (2022), the average journey time to a discount store on

foot in Hungary is somewhere between 25 and 30 minutes; using the example of the Slovak city of Nitra, with 13 urban districts in an area of 100.4 km² and a population of 76,553 (Trembošová and Jakab, 2021), access to a grocery store on foot ranges from one minute to 56 minutes, with a mean time of 18 minutes.

As a threshold for adapting the definition of areas with difficult access to food stores, distance/accessibility to food stores is usually taken into account. Widener et al., (2015, p. 73) set the rule to more than 10 miles to the nearest supermarket, supercenter or large-scale grocery store for rural settings. According to Guy and David (2004, p. 223), the main features which characterize areas with limited access to food stores are: i) the inhabitants are physically disadvantaged in terms of mobility and accessibility; ii) the inhabitants are economically disadvantaged, generally due to a lower income; iii) as a result of the previous two factors, they usually look for cheaper products, leading to unfavorable nutrition; iv) the residents of such areas are spatially disadvantaged due to the insufficient selection of grocery stores in their surroundings; and v) the local (small-scale) stores which are present have a limited selection of food and at higher prices than large-scale stores. In this context, we can consider local food systems in areas of Slovakia with scattered settlements as ideal territories for the occurrence of areas with difficult accessed stores.

In the last two years during the COVID-19 pandemic, the movement of people was restricted several times, and people were only permitted to buy food in nearby stores. The supply of food to the population in scattered settlements was not expressly addressed by the state during the pandemic; on the contrary, in many such areas, the local (small-scale) stores were not operating. This process thus further deepened the vulnerability of the rural population's food supply and highlighted the existence of areas with difficult access to food stores. However, the occurrence of this phenomenon is not unique to scattered settlements; it can be presumed in all residential units that do not have a single grocery store, e.g., in the villages of southern Slovakia. According to Panagiotopoulos and Kaliampakos (2018), the inaccessibility of these services is an important factor in rural deprivation, since depopulation, population ageing and the decline of services are all interconnected features (Thiede et al., 2017).

Although many studies have been conducted internationally and nationally on geographic access to healthy food (Lê et al., 2015), there is a complete absence of evidence concerning this issue in the regional and rural areas of Slovakia. Within this context, this study was conducted with a view to building a more evidence-based understanding of the spatial and environmental aspects of food access in dispersed settlements.

In the main, settlements such as those included in our research have an older population, which was also confirmed by behavioral studies. Older people have an increasing share of consumption, enlarging their impact on production and consumption patterns. According to Schaffnit-Chatterjee (2007), aging of the population significantly affects the nature of demand within individual segments of goods and services (Trembošová et al., 2021). The elderly are also strongly affected by their local food environments. As people age, they gradually become less mobile (Torres de Araújo et al., 2018). Car usage declines (Ryan and Wretstrand, 2019) and their average daily walking distance decreases (Payn et al., 2008). This restricts the number of food retailers to which they have access (Smets et al., 2022).

A growing form of food procurement in the Slovak countryside is the so-called self-supply, food that is increasingly produced organically (without the use of pesticides and chemicals). According to Buchta (2016), self-sufficient households have not disappeared and are not "dead" but are still relatively widespread in rural areas, representing a certain type of rural lifestyle. The original model of self-supply – largely spatially dispersed – has transformed into a smaller spatial dispersion, with higher economic efficiency and profile of these activities. Domestic food production, work and values created on one's own land are an important expression of rural identity.

3. Method

Information about the customer can be obtained from several sources, e.g., loyalty cards monitoring the movements of shoppers in shopping centers and other areas, but the most useful source is from the data extrapolated from completed questionnaire surveys. We used the questionnaire survey as

a method to ascertain people's preferences when purchasing food. The questionnaire, as a tool of perception, was divided into several parts. The survey was conducted on May 14th and 15th, 2022, during the days of the weekend. The first part consisted of classification questions – gender, age, education, employment and residence (permanent or not). According to the most frequent answers, the profile of a typical respondent of this study was presented as a woman (50.69%), 65 years of age and older (21.33%) and 30–39 years (21.33%), with a secondary education (67.8%), working as an employee (44.75%). Pensioners overall were represented at 31.47% of the sample.

Seven questions were analyzed for the purposes of this paper:

1. *Indicate in which shop you most often buy foodstuffs (address).*
2. *What mode of transport do you prefer to get to the grocery shop?*
    A) car B) bus C) bicycle D) walking
3. *In what type of shop do you most often buy foodstuffs? (circle one option)*
    A) grocery B) specialized shop C) supermarket D) hypermarket E) shopping center
4. *How often do you go shopping at a grocery store? (circle one option)*
    A) regularly, almost every day B) 3–4 times a week C) 1–2 times a week D) never
5. *Evaluate your satisfaction with the grocery store (1 – very dissatisfied, 5 – very satisfied, 0 – I don't know)*
6. *Which factor influences you the most when choosing a grocery store?*
7. *Which shopping behavior best describes you?*

A number of typologies of people's purchasing behavior have been described in scientific articles. From the number of available typologies that are adequate for the purposes of this contribution, the typology using the self-assessment method according to the Typology of Media Behavior of Income Research Gfk Praha from 2003 (Stárová, 2003) was used. The respondents chose their shopping orientation according to the characteristics of shopping types. This methodology is focused on the different types of shopping behavior and their characteristics, which are based on the forms, motivations and methods of shopping. It consists of two basic types and several subtypes of shopping orientation: (1) traditional (conservative, sparing, loyal and undemanding), and (2) modern (influenced, challenging and mobile). The questions were focused only on shopping in brick-and-mortar stores. Respondents were personally approached by researchers outside shopping malls so as not to be directly affected by the atmosphere in the malls. The results of the survey were evaluated by classical methods – graphical and cartographic methods and then interpreted.

Based on the results of the survey, our assumption that the majority of residents of the dwellings in scattered settlements use car transport for shopping was confirmed. In terms of the theory of areas with difficult accessibility to grocery stores, we expressed the time availability of each area of dwellings to the nearest food source for both cars and buses.

In order to gain the geo-spatial access to the issue of areas with difficult accessibility to food stores, it was necessary to proceed in four logical steps (Trembošová and Jakab, 2021):

i) The input primary data for solving the research task was based on field research and certification in the dispersed settlement "Novobanská štálová area" in 2022. During the reconnaissance of the territory, retail units of different sizes were identified in order to describe their basic characteristics: address, sales area and product range structure. The selection criterion thus established is standard for shops with a valid grocery name (excluding delicacies, buffets, and sales from stall).

ii) The spatial data in the table containing the addresses of food stores was geocoded into the point vector layer via the MMQGIS plugin in QGIS software (www.qgis.com).

iii) The cumulative accessibility calculation was also calculated using GRASS GIS 7.8.0. The basic input was the road layer (www.openstreetmap), which was filtered for pedestrian accessibility, connected to the point layer of stores (v.net tools) and transformed from vector format to raster (v.to.rast) with

a spatial resolution of five meters. The calculation of cumulative accessibility itself was carried out through the r.cost tool. The tool r.cost determines the cumulative cost of moving to each cell on a cost surface (the input raster road layer with a spatial resolution of five meters) from other cells (the point layer of the grocery stores), whose locations are specified by their geographic coordinates. The result is an output raster map of roads in which each cell contains the lowest total cost of traversing the space between each cell of road and the points presenting the grocery stores. The resulting raster map of roads has a precisely defined value in each cell in relation to the distance to the nearest food store. The next step was interpolation (tool r.surf.idw), by which we expressed accessibility values for the built-up residential areas of the city occurring near roads. The differences in the settlement structure in 2019 were manually modified by the digitalization of the base map www.openstreetmap on the scale of 1:25,000.

iv) For the purpose of identifying the areas with difficult access to food stores, the resulting values were reclassified into two parts: availability within five minutes and availability over five minutes.

4. Results

4.1 Case study area

The investigated area belongs to a group of specific areas with dispersed settlements. This type of settlement, typical in the mountains of Slovakia and on the border with the Czech Republic, can also be found around the town of Nová Baňa, located in the west of central Slovakia. This area consists of two towns and 12 municipalities and is referred to as the "Novobanská štálová oblasť ". The areas together do not form one interconnected functional territory; rather, the area covers regions that are situated in Nitra, Banská Bystrica and Trenčín (Fig 1). According to the districts, we can therefore divide them into three parts, which are well connected by transport, but their main transport corridors lead to the relevant district town, in the area covered by the towns of Zlaté Moravce, Partizánske and Žarnovica. Physical and geographical obstacles are also responsible for this division of the region. The village of Jedľové Kostoľany (Zlaté Moravce district) separates the Pohronský Inovec massif from the rest of the settlements. The same applies to the villages of Radobica, Čereňany, Oslany and Horná Ves (Partizánske district), which are cut off from other settlements by the high ridge of the Vtáčnik mountain range. We can observe only a single functional region around the town of Nová Baňa, which administratively belongs to the district of Žarnovica, namely the city of Žarnovica and the villages of Veľká Lehota, Malá Lehota, Horné Hámre, Župkov, Hrabičov, Píla, and Veľké Pole. The only parameter that unites our investigated territory is the characteristic scattered settlement, the so-called Slovak "štál", or collection of dwellings scattered over a rural environment.

According to internal information from the municipal and city authorities, 25,023 inhabitants lived in the study area in 2021 (December 31st) in an area of 339.09 km² (33,909 ha). The town of Nová Baňa is the largest settlement in terms of population (7,299) and area 61.26 km² (ŠÚ, SR, 2021). This formerly important free royal city had an important position in the Austro-Hungarian Empire thanks to its gold mining activities. Mining activity was also one of the reasons for the emergence of scattered settlements around the town. In the past, ores were smelted using charcoal, which was made from classic wood by a specific combustion process without access to oxygen. Therefore, coal mining settlements began to emerge in remote parts of the territory, in areas where people specialized in the production of charcoal. Examples of such former coal-mining settlements are the districts of Stará Huta and Bukovina. Today, however, Nová Baňa has declined in importance, and it is only a small regional town within the district of Žarnovica, although it is the biggest town in this area – bigger even that the district town of Žarnovica itself. Services and job opportunities are concentrated in Nová Baňa and are accessed by people from a wide area around the town.

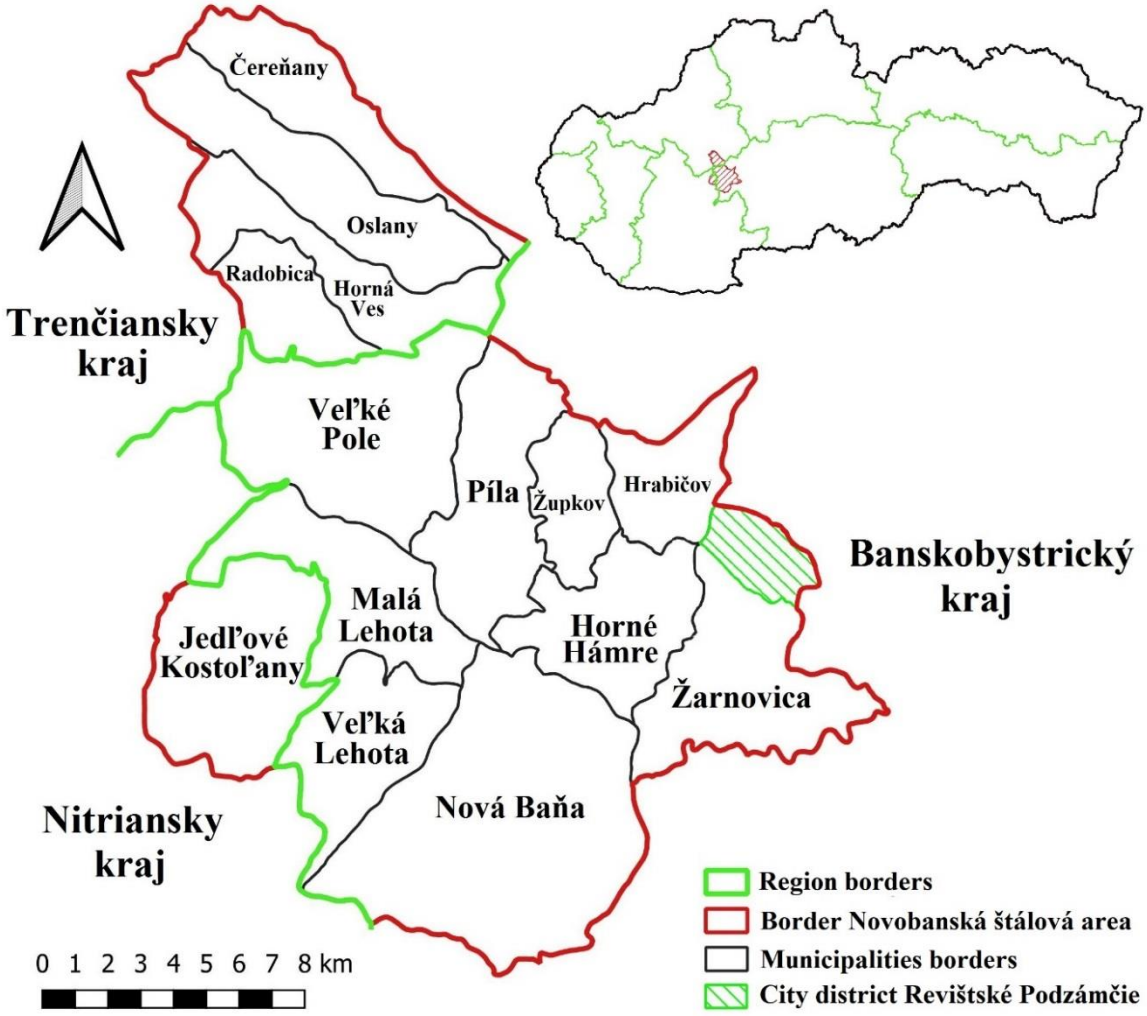


Fig 1. Study area. Source: QGIS 3.18.3

In terms of transport infrastructure, the cities of Nová Baňa and Žarnovica are ina particularly advantageous position, both being located on an important transport link between Bratislava and Banská Bystrica. Both cities have a connection to the R1 motorway and the first-class road I/65 also passes through them. However, this road is interrupted between the towns of Nová Baňa and Žarnovica. The railway lines Bratislava – Zvolen – Košice and Bratislava – Banská Bystrica run simultaneously in this corridor. Due to the bad technical condition of the railways at the moment of writing (2022) and the rather impractical timetable, it is not of such great importance for the region. From our point of view, its importance is also small because it does not connect the villages within the study area, but only the towns of Nová Baňa and Žarnovica. This is mainly due to the physical and geographical conditions of the territory.

The first-class road I/64 passes through the villages of Oslany and Čereňany, which connects the villages with the towns of Prievidza and Partizánske. This traffic link creates a north-south link between Komárno and Martin. It is also a road connection between Hungary and Poland. However, the road does not have great importance from the point of view of the area we are examining.

The most important transport connection in the area is created by the second-class road no. 512 (Fig. 2).

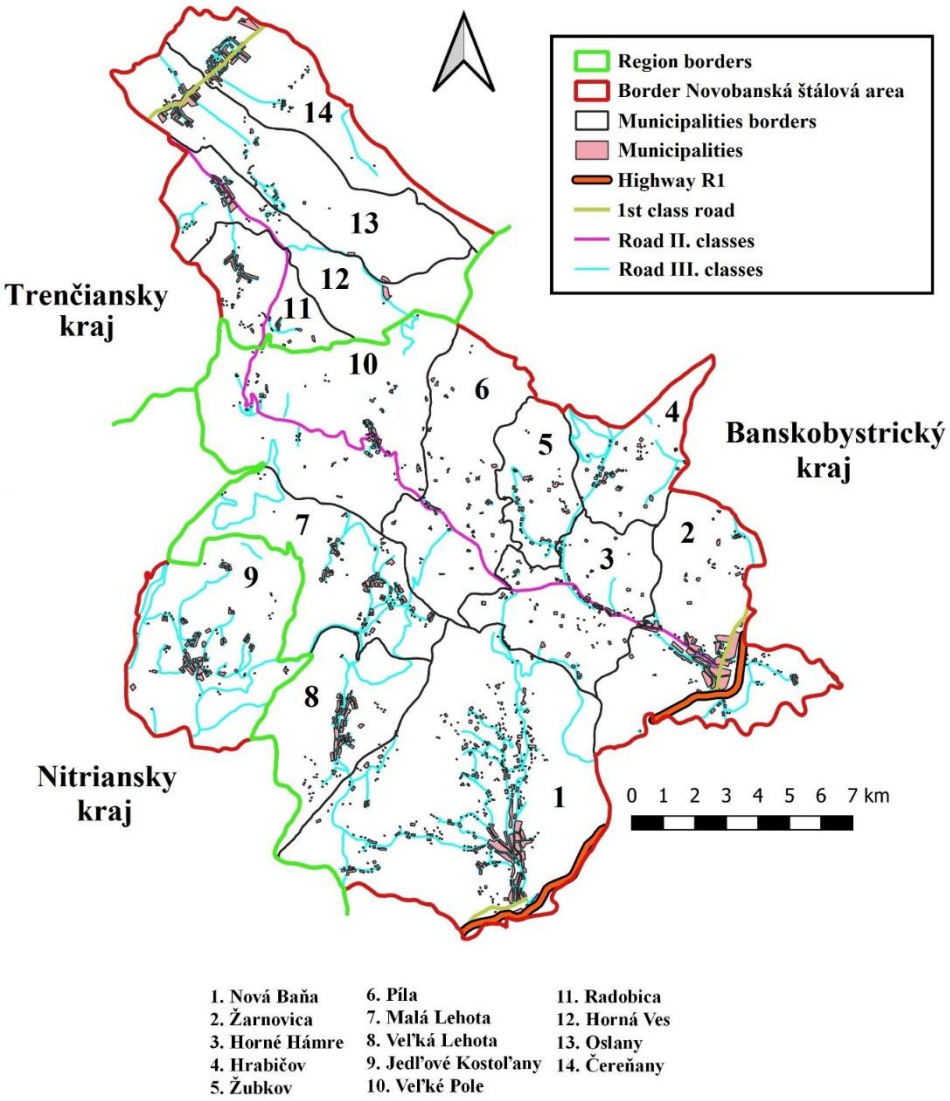


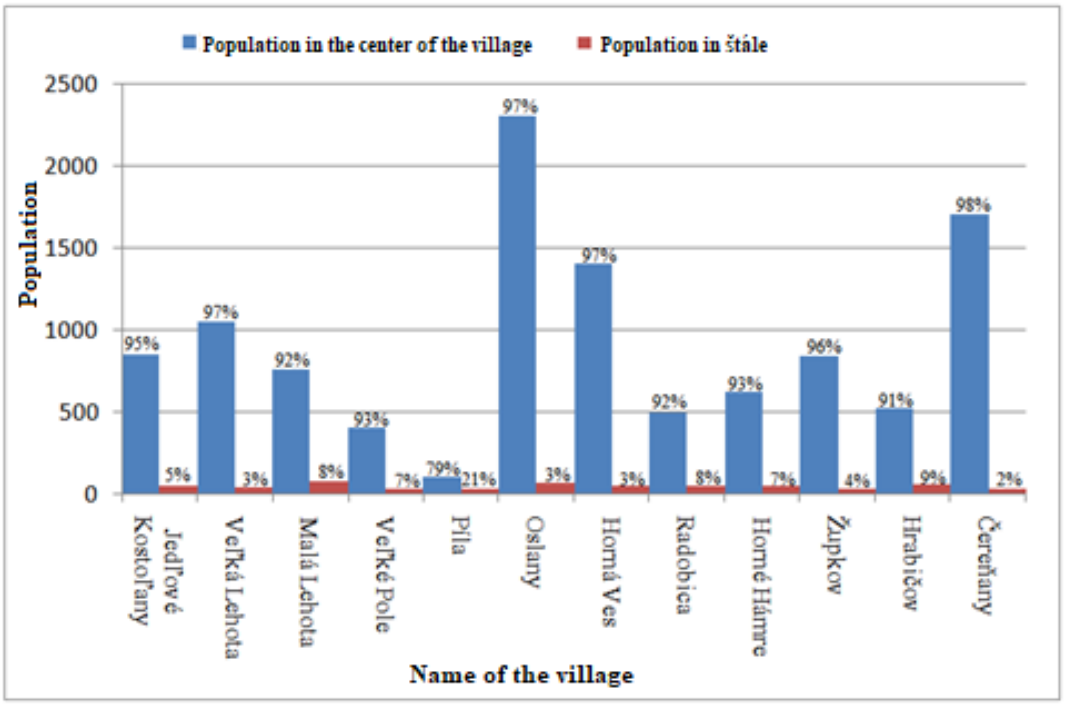
Fig 2. Transport system of studied area. Source: QGIS 3.18.3

The study area has experienced a population decline of 8.2% in the period 1993–2021, and the residents that remain are ageing; according to the age index (pre-reproductive and post-reproductive categories of the population), this figure stood at 71.35 in 2021, meaning that the area has a regressive type of population. They are still not managed as territorial technical units and therefore there are no statistics on how many inhabitants live in them, which entailed retrieving this information from the internal documents of the municipal and town authorities. The total number of permanently inhabited dispersed settlements in the study area is 136. Despite this, only 8% of the population live in them out of the total number of 25,023. According to Petrovič (2008), the number of inhabitants in dispersed settlements is still decreasing. Houses cease to fulfill a residential function and are more often used as cottages (temporary accommodation, often used for holidays and weekend breaks). We can also see this fact using the example of the village of Horné Hámre, which has 35 dispersed settlements, but only 11 of them are permanently inhabited. An opposite example is the town of Nová Baňa, where up to 31 dispersed settlements are permanently inhabited (Tab. 1, Graph 1). 1344 inhabitants live in them, which is 18% of the total number of inhabitants of Nová Baňa. We assume that this difference is significant due to better job opportunities in the town of Nová Baňa.

Tab 1. Number of inhabitants in dwellings in the dispersed settlements and in the centers of municipalities for 31.12.2021. Source: Internal documents of municipal authorities, 2021

Title	Population	Number of permanently inhabited stalls	Population in the centre of the village	Population in stalls
Nová Baňa	7299	31	5955	1344
Žarnovica	6150	5	6033	117
Jedľové Kostoľany	896	11	851	45
Veľká Lehota	1089	8	1051	38
Malá Lehota	828	16	759	69
Veľké Pole	430	7	402	28
Píla	128	9	101	27
Oslany	2375	1	2311	64
Horná Ves	1457	8	1407	50
Radobica	531	11	489	42
Horné Hámre	665	11	618	47
Župkov	871	8	840	31
Hrabičov	574	8	521	53
Čereňany	1730	2	1704	26
Summary	25023	136	23042	1981

In all the municipalities in our study, with the exception of Píla municipality, more than 90% of the population live in the center. This is due to the remoteness and poor transport accessibility of the individual dwellings in the dispersed settlements. Bus connections between the center of the village and the dwellings either do not exist at all, or they run only sporadically. In some areas, conventional roads with an asphalt surface are not available for vehicles going to the dwellings; there are only dirt roads with an unpaved surface. Therefore, living in these places is unattractive for young people today. On the other hand, houses in remote and quiet locations are becoming popular locations for people who want to take a break in their own cottage. The traditional rural way of life is gradually disappearing from these rural communities and is being replaced by the seasonal use of cottages by people from the city. The only municipality that has a high proportion (21%) of residents permanently living in dwellings in the dispersed settlements is the Píla municipality. This is due to the fact that this village is very small in terms of population, with only 128 residents, and nine of the houses are located in the area defined as the dispersed settlement. This fact significantly increases the share of residents in them, even though only 27 of them actually live there. The village of Malá Lehota is intriguing, where the center of the village has merged into one unit with the dispersed settlement known as ‘Blaškový štál’; we can consider this whole area as part of the center of the village.



Graph 1. Share of residents in the centers of settlements and dwellings in the dispersed settlements of the municipality (2021). Source: Internal documents of municipal authorities, 2021

Some of the larger individual collections of dwellings are named after their founders and families, e.g., Lukáčov štál, Poliačikovci, Tajchárovci, Gregorov, Valentovci, Boháčovci, Oparenovci, Lepnovci, or according to nearby hills and peaks, for example Frtálov vrch, Borisko, Kostivrch, Na Gremelci, as well as according to technical constructions, e.g., Hrádza, Nad Hrádzou.

4.2 Location of grocery stores

According to the SK-NACE classification of economic activities, grocery stores belong to the division group 47.21 to 47.29 – 'Retail sale of food, beverages and tobacco in specialized stores' (NACE, 2018). Based on the Food Code of the Slovak Republic (2003), grocery stores are defined as permanent establishments that are usually presented as department stores, self-service shopping centers, stores with various goods, and specialized stores such as meat stores, delicatessen stores, confectionery stores and others.

Based on field research carried out in the months of June, July and August 2021, 38 food outlets operated in the study area, equating to 1.51 food outlets per 1,000 people. Of this number, 18 stores were located in towns, and 20 stores were located in 12 villages within the area of dispersed settlements. There is at least one grocery store in each of the investigated municipalities (Fig 3).

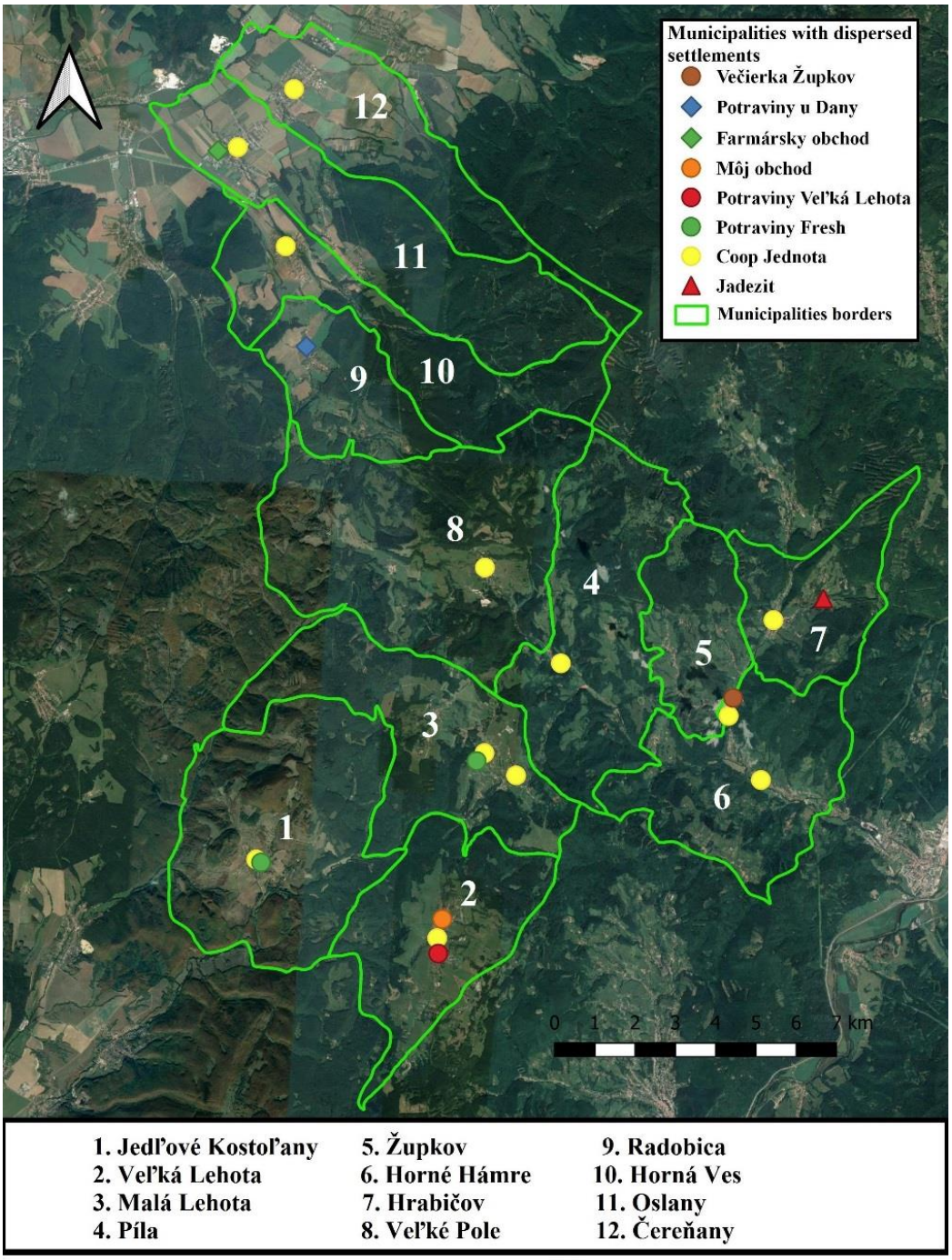


Fig 3. Location of grocery stores in the study area in 2021. Source: QGIS 3.18.3

There are 10 retail stores selling food in the town of Nová Baňa (Fig 4).

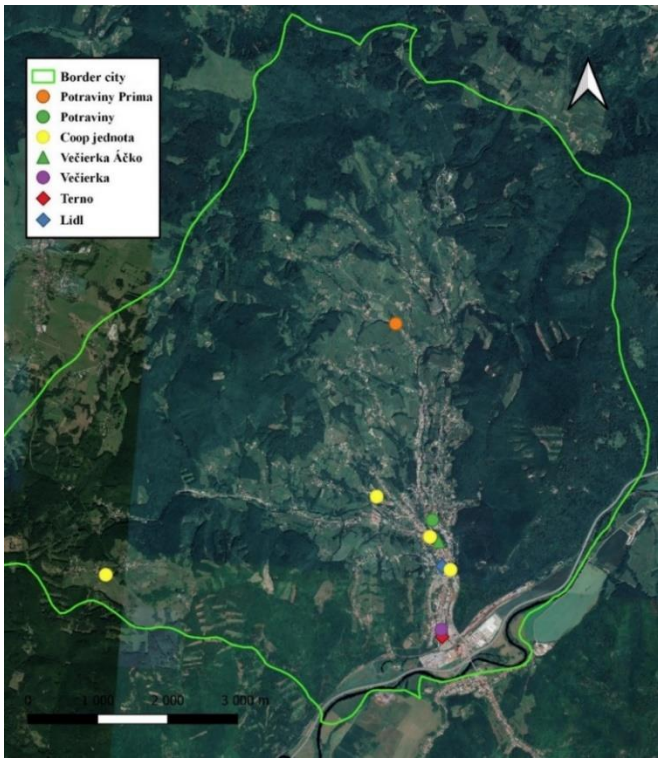


Fig 4. Localization of grocery stores in the town of Nová Baňa. Source: QGIS 3.18.3

In the town of Žarnovica, there are eight retail stores selling grocery items (Fig 5).

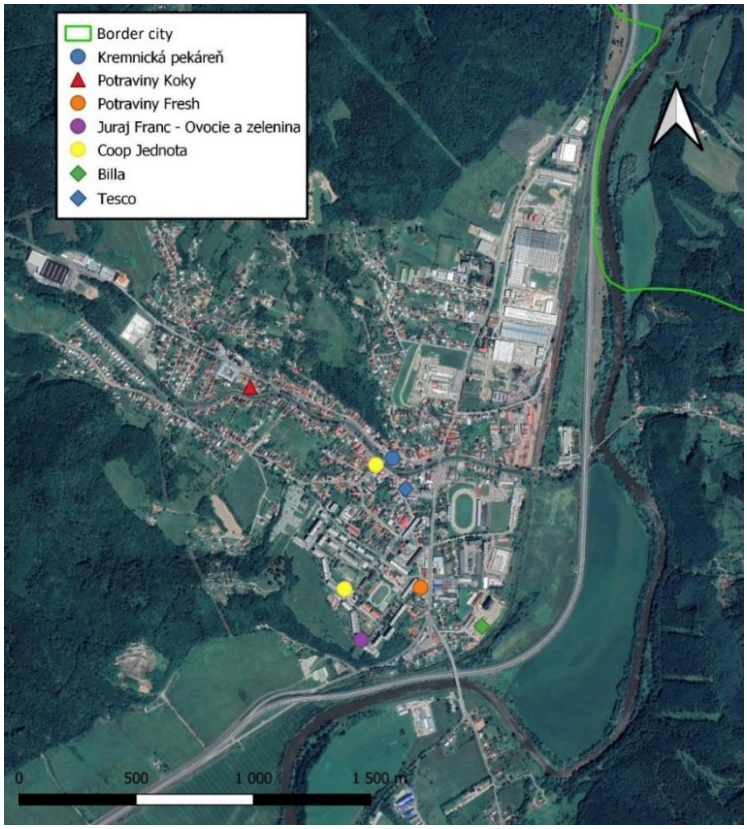


Fig 5. Location of food stores in the town of Žarnovica in 2021. Source: QGIS 3.18.3

Until recently, the alternative grocery system in the territory of Novobanská štálova area consisted of three (Boroš, Fajnovô and u Lietajov), of which Farma u Lietajov ended its operation in May 2022. The most famous is the small family farm Fajnovô (Fig 6), where customers can buy homemade products according to the current offer. Farma Boroš (Fig. 7) is a family farm engaged in cattle and sheep breeding and cheese production.



Fig 6. Farm Fajnovô, Foto: P.Forgáč, 2022



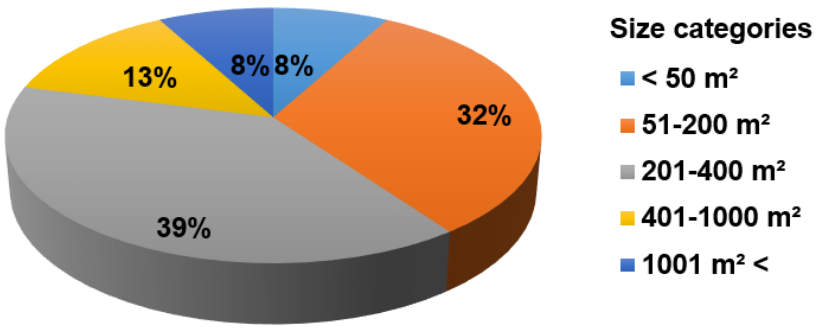
Fig 7. Farm Boroš Foto: P. Forgáč, 2022

Based on the size categories of the sales area according to Mulíček (2007), we divided food stores into five categories (Graph 2). The category of medium-sized stores from 201 to 400 m² has the largest share of the total number, where eight of the 15 stores are located in villages.

The second most numerous group from 51 to 200 m² includes 12 food stores, of which 10 are located in villages and two in towns. Food stores in villages have far fewer customers than those in towns and often do not function as self-services. In this way, the operators also reduce the costs of running the store, since a smaller unit does not consume as much energy as a larger one.

Stores from 401 to 1000 m² have the third largest share. This group includes five grocery stores, of which two are located in large villages (Oslany, Horná Ves) and three in towns (one in Žarnovica and two in Nová Baňa). Large-scale stores are created mainly where there is sufficient demand from the population, therefore, stores in this size category are located exclusively in towns and large villages.

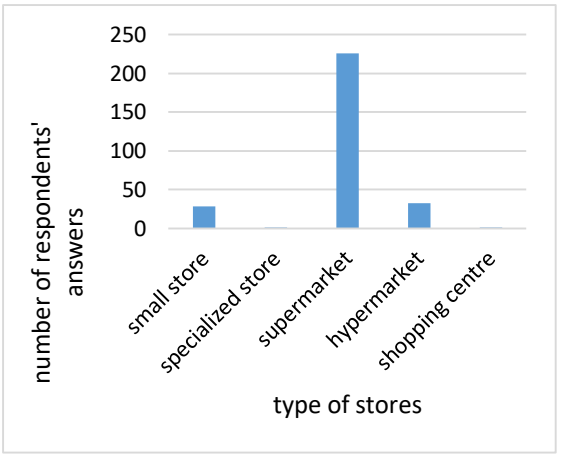
The three grocery stores with a sales area of more than 1001 m² are all located in towns. Two are located in the district town of Žarnovica (Tesco and Billa) and one is located in the town of Nová Baňa (Lidl). It is intriguing that all the small stores of up to 50 m² are also located exclusively in towns. Two of them are based in Nová Baňa and have found a niche in the market in the form of longer opening hours. These stores are specific in that they sell products mainly in the afternoon until late in the evening (often until 10:00 p.m.). At the same time, they have a narrow circle of loyal customers.



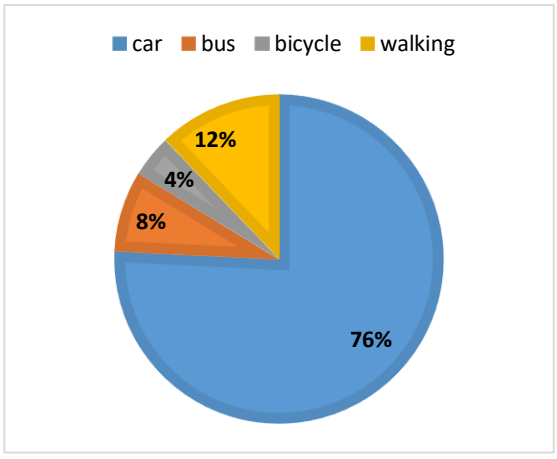
Graph 2. Share of grocery stores in size categories (2021). Source: own data elaboration

4.3 Shopping behavior surveys

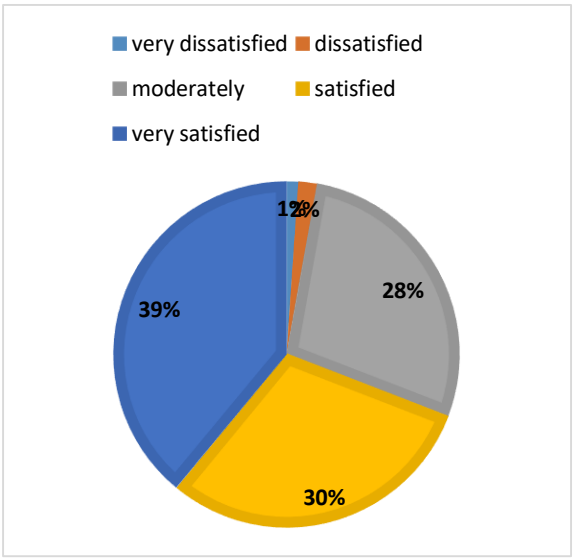
During the two-day weekend survey, we obtained a sample of 286 responses from residents of the research area, all of whom were over 18 years of age. According to the spatial distribution, we obtained answers from 87 of the 136 scattered settlements, representing almost 64% of the total number. Based on the 'good agreement test' (see the chapter 'Methods'), we can consider the sample to be representative. The responses to our questionnaire showed that 79.1% of the residents buy food in supermarkets and 11.2% in hypermarkets (Graph 3); 76% of the respondents use cars and only 12% preferred the method of traveling to the retail establishment on foot; 62.5% go shopping 1–2 times a week; distance and good accessibility were relevant for only 45.6% of respondents; and when self-declaring, the majority of respondents rated themselves as the 'mobile type' (28%), which belongs to the category of the modern way of shopping (Graphs 4, 5 and 6).



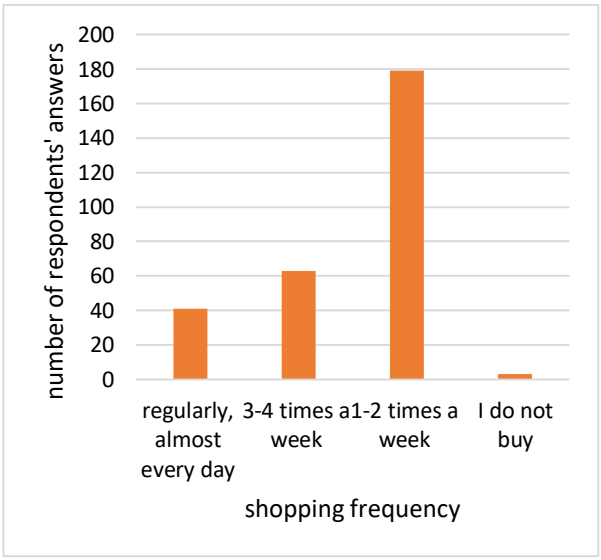
Graf 3. Indicate in which shop you most often buy foodstuffs



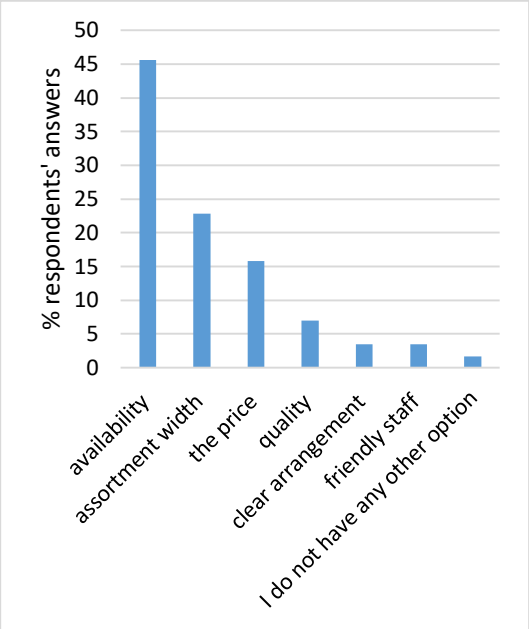
Graf 4. What mode of transport do you prefer to get to the grocery shop?



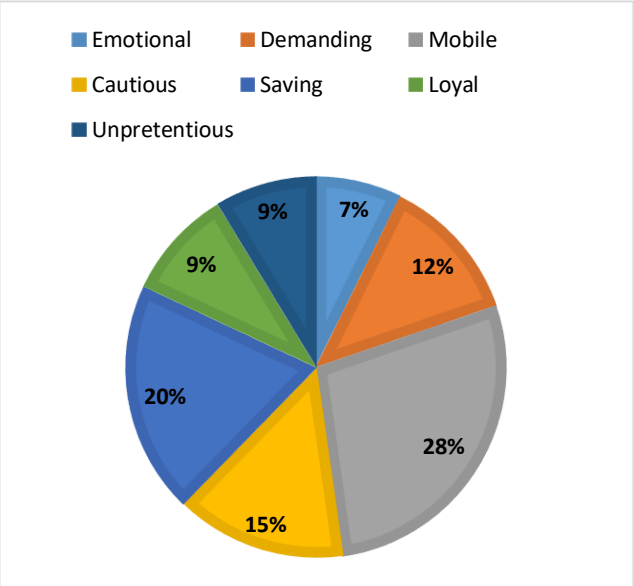
Graf 5. In what type of shops do you most often buy foodstuffs?



Graf 6. How often do you go shopping at a grocery store?



Graf 7. Which factor influences you the most when choosing a grocery store?



Graf 8. Which shopping behavior best describes you?

As many as 45.6% of the respondents stated that distance/availability are the factors relevant to deciding whether to visit a particular sales facility, and price and quality are of secondary importance. We can also consider the influence of the width of the product range to be more subjective and less frequent (Graph 7). This is also confirmed by the fact that only 15% of customers consider the width of the assortment to be decisive; it is surprising that all the respondents who think this way shop in the stores of foreign chains (Lidl, Kaufland and Tesco). The Slovak food chain COOP Jednota was chosen by the respondents based on distance, and customers of this chain from the area within the scattered settlements highlighted its good accessibility, pleasant staff, and the subjective factor "I have no other choice", although the quality factor is absent. The dual factors of price and assortment width were most common at the Lidl store, and the factor of assortment width most common at the Tesco and Billa stores. Only 7% of customers made decisions based on food quality, and a correlation with the demanding type (12%) where quality is decisive was not confirmed. The quality was taken into consideration according to the answers of the respondents who declared themselves as conservative, and the mobile type of shopper. Out of the 40% of frugal consumers, only 4% mention price as a decisive factor when choosing a place to shop for food. The results confirmed the importance of the social parameter as a reason for visiting a grocery store, as up to 12% of the respondents confirmed that they do their shopping on a daily basis.

Based on the answers in the spatial vision of the problem, the heterogeneity of the use of the local food system by the inhabitants of the study area is evident. According to the frequency of shopping, the largest number of residents of the area of dispersed settlements buy food 1–2 times a week (Fig. 8). These are the settlements near villages where at least one store is located, or where the residents shop in stores of the foreign chains of Lidl, Kaufland, Billa and Tesco. Conforming to the administrative division in the Trenčín region, residents of the villages and surrounding dispersed settlements of Čereňany, Oslany, Fančov and Radobica go shopping 1–2 times a week. In the Nitra region, the residents of Jedľové Kostoľany, Horné Lúčno, Lukáčov štál and Borisko also reported a low frequency of purchases, shopping for foodstuffs 1–2 times per week. Likewise, in the Banská Bystrica region, respondents from the villages and surrounding dispersed settlements of Veľké Pole, Veľká Lehota, Valentovci, Frtáľovci, Kútovec, Kolibská cesta, Lepnovci, Malé Podzámčie, Revišstské Podzámčie and Korimov responded that they go shopping 1–2 times per week. The most widespread mode of transport is the car, with the exception of the residents of Revišstké Podzámčie, who indicated the bicycle as the most popular means of transportation for food shopping. Residents of Žarnovica and Lukavica in the Banská Bystrica region buy food every day, and such habits of procuring fresh food are the most suitable and healthiest in the context

of human health. The correct approach of buying food 3–4 times a week was mentioned by the residents of Horná Ves and Cerova in the Trenčín region, and in Mašírov, Kazimírov and Bošiakov from the Nitra region. In the Banská Bystrica region, the inhabitants of the dispersed settlements of Hubačov, Gregorov, Francov, Štotíkov, Horný Štefankovci, Katranovci, Kostivrch and Smelákovci all responded that they bought food 3–4 times a week.

According to the lines orientation of movement of purchasing directions, the studied territory can be divided into three significant nodes, which, however, do not correspond to the administrational division of the entire territory. This anomaly is most obvious in the village of Veľké Pole, which belongs to the Banská Bystrica region, but due to the shape of the transport network, shopping is carried out in the Trenčín region in the town of Partizánske (Lidl). Clear catchment areas for food purchases were created in the hinterland of four municipalities (Jedľové Kostoľany, Oslany, Píla, Veľká Lehota) and two towns (Nová Baňa and Žarnovica). Based on the answers, two district towns outside the study area – Partizánske (Kaufland, Lidl, Billa) and Zlaté Moravce (Kaufland) appear to be the catchment centers for food purchases as well.

Of the factors affecting the choice of the place of food purchases there is no confirmed regularity in the territory, suggesting that, from this point of view, the territory is very diverse. We perceive the answers in the dispersed settlement of Cerová as the most negative of the factors, where the residents stated that they have no other option and only shop in the town of Partizánske (Billa). Spatial variability of the influencing factors of food purchases is found throughout the territory, which reflects the diverse setting of residents and their shopping stereotypes. In the answers, however, there is a clear sociological trace among older seniors, who often mentioned shops with pleasant staff as a factor in choosing a place of purchase, whereas the younger generations did not mention this, or this aspect was unknown to them.

Shopping behavior evaluated on the basis of the chosen methodology of GFk Praha (Stárová, 2003) divides people into two basic shopping orientations: modern (influenced, challenging and mobile) and traditional (conservative, sparing, loyal and undemanding). The results of the self-declaration of residents in the 57 localities of the stable area (Fig. 8) confirmed the predominance of the traditional shopping method of shopping (53%), but 28% of respondents identified themselves as a mobile shopping type of the modern shopping method (Graph 8). In the geospatial evaluation, the modern type of shopper was found in dispersed settlements near the towns of Nová Baňa, Žarnovica and in the village of Čereňany. In general, however, the inhabitants of dispersed settlements are the traditional, loyal and sparing customer type in their shopping habits.

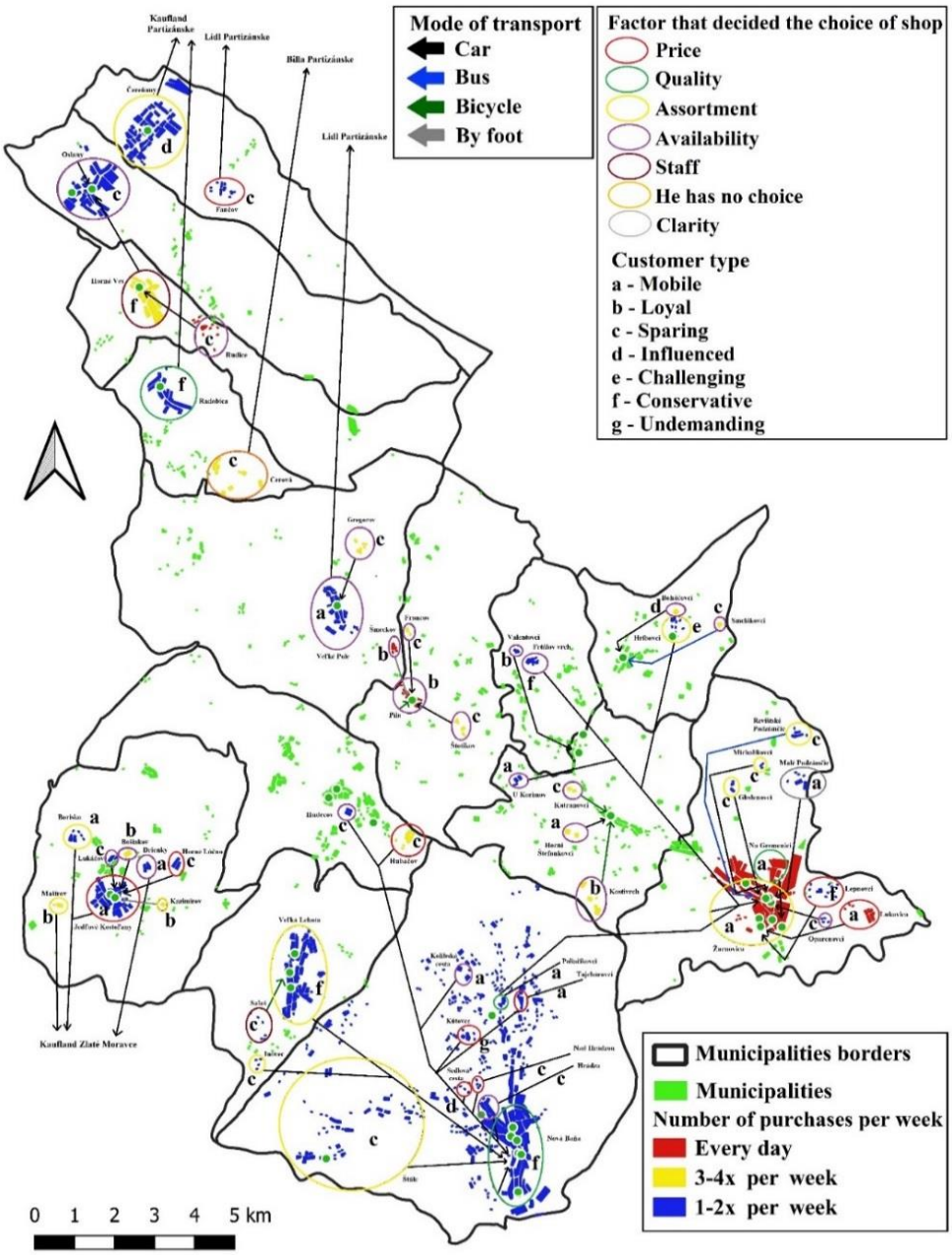


Fig 8. Spatial surveys questionnaire survey on shopping behavior. Source: own data elaboration, QGIS 3.18.3

4.4 Geospatial surveys

Based on the answers of the respondents, 78% of the residents of the entire study area use cars for food shopping, whereas only 12% use buses. Only 12% of the respondents preferred the method of buying groceries on foot, but all of them were from villages and towns where food can be reached within 10 minutes (Fig 9). 89% of the inhabitants of the dispersed settlements used cars, and only 11% of the respondents mentioned buses. The worst situation is in the dispersed settlements and, surprisingly, in the urban areas of the town of Žarnovica.

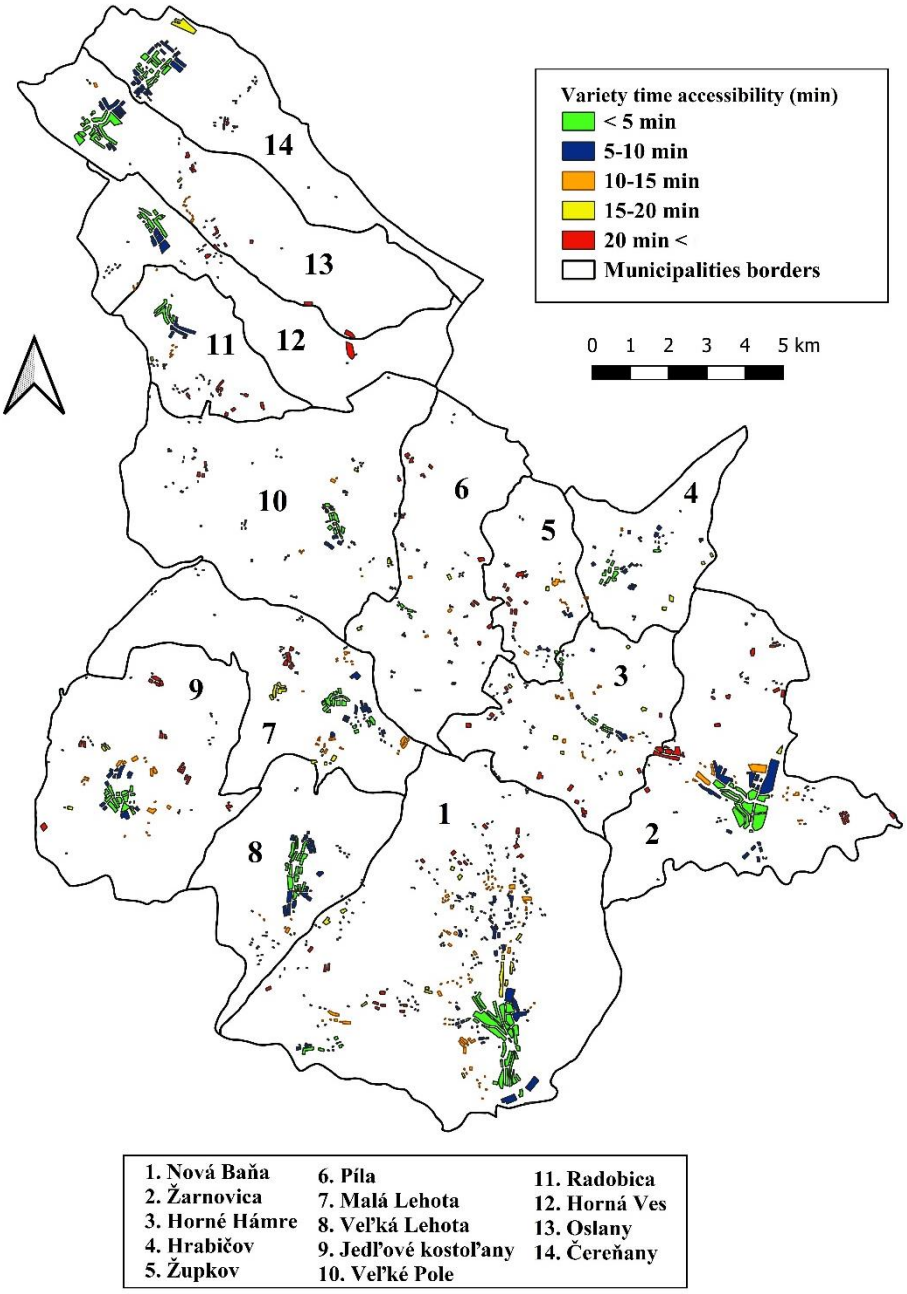


Fig 9. Accessibility to food stores on foot. Source: QGIS 3.18.3

4.4.1 Evaluation of food accessibility by car

The availability of food stores in the study area when accessed by car can be evaluated as very good. The nearest grocery store is accessible within five minutes in up to 89% of the territory. This testifies to a good road network within the region and a logical distribution of food stores so that they are available for every resident within a 10-minute drive. There were only two areas which were not served within this timeframe: the permanently inhabited Modoš dispersed settlement near the village of Jedľové Kostoľany, and the collection of dwellings called 'Pacov' (located between the villages of Horná Ves and Oslany), which is without permanent residents (Fig 10).

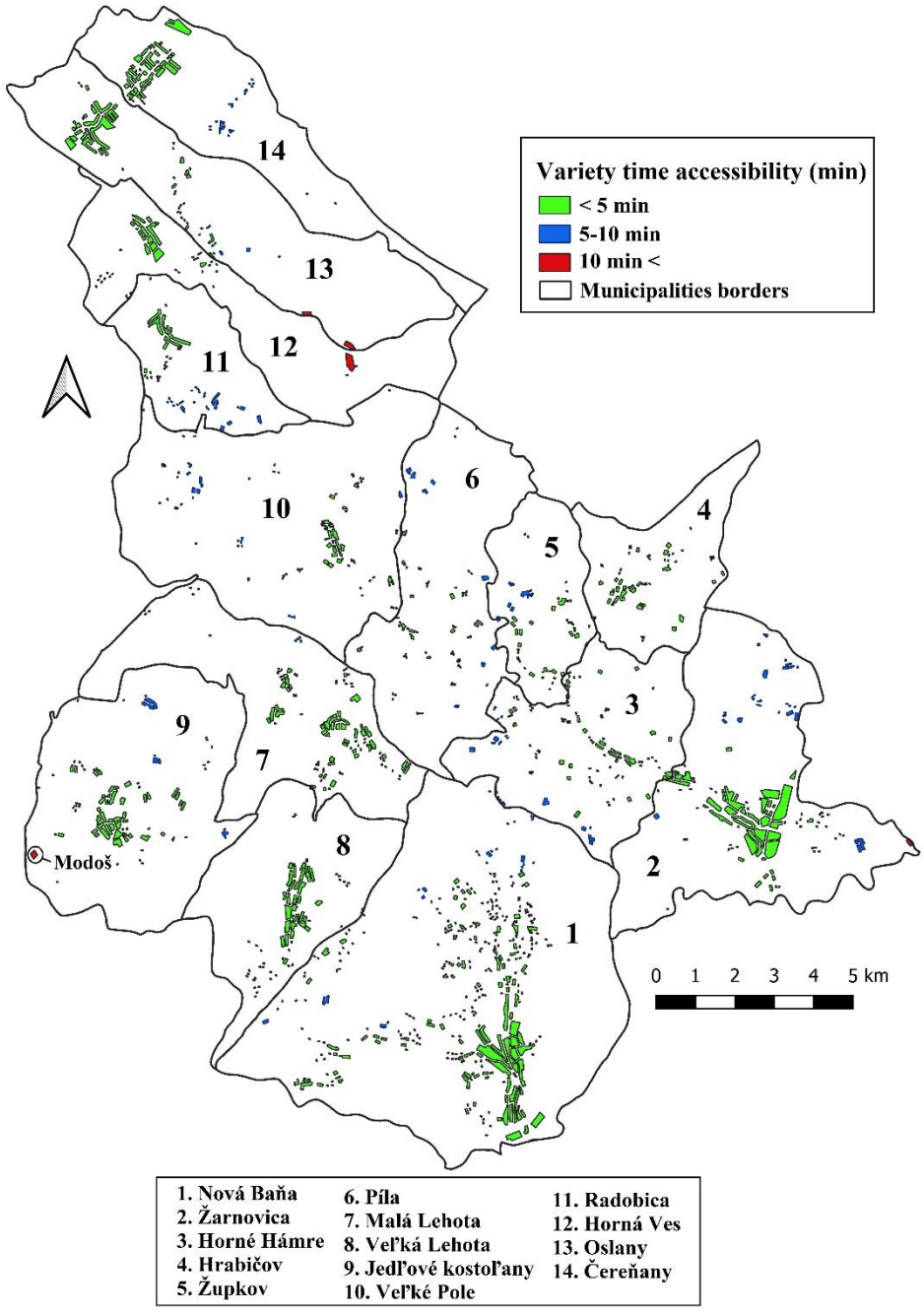


Fig 10. Accessibility to food stores by car. Source: QGIS 3.18.3

4.4.2 Evaluation of food accessibility when traveling by bus

Where food shopping is accessible via the bus network, it is necessary to include both the bus journey itself and the transport on foot from the house to the bus stop and from the bus stop to the shop in the total time. First of all, we mapped the bus stops within individual municipalities, and at the same time mapped the roads along which regular bus lines operate (Cestovný poriadok, 2022). There are 136 bus stops in the study area, of which up to 48 (35%) are in the territory of the city of Nová Baňa (Fig 11).

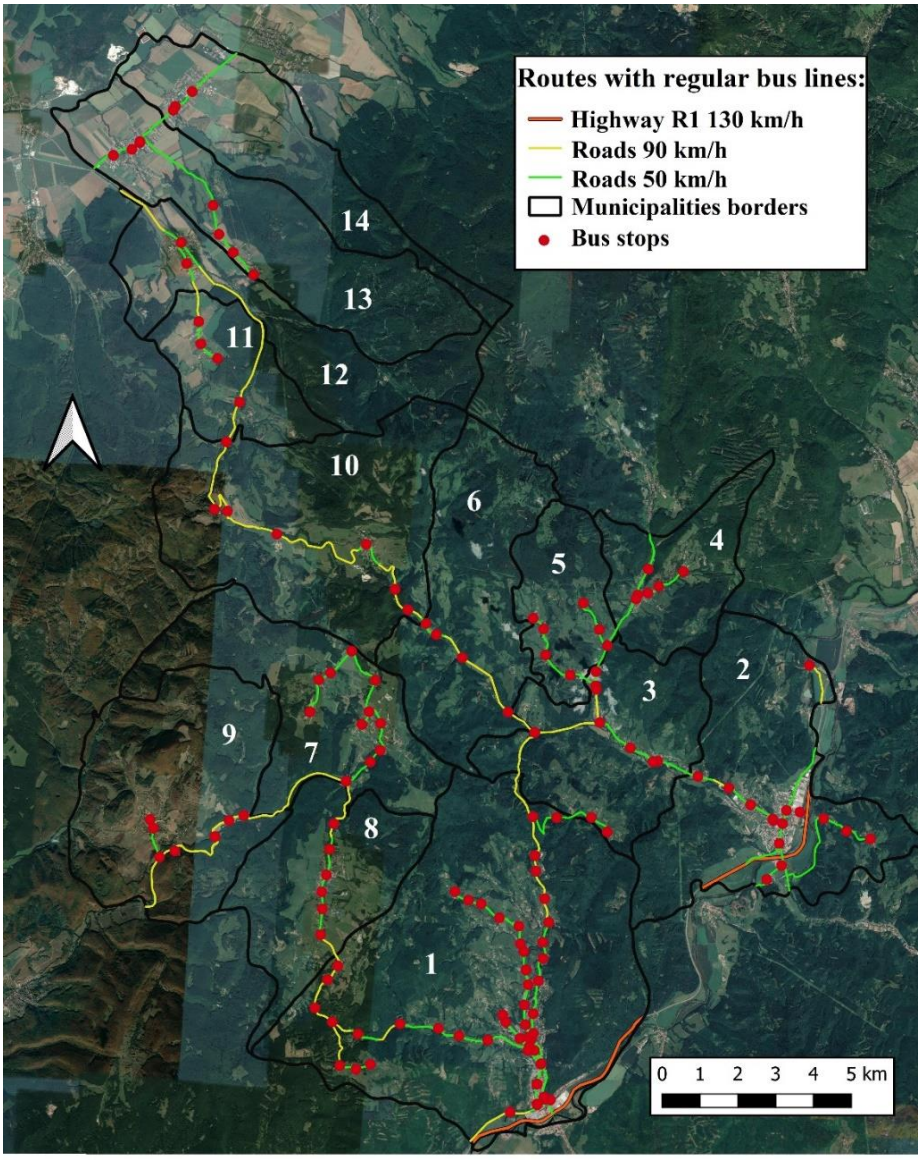


Fig 11. Connections and location of bus stops. Source: QGIS 3.18.3

This large number of bus stops is due to the large area of the town (61.25 km²) and the large number of scattered settlements. The second highest number of bus stops is in the second-biggest town in this district, Žarnovica. With a few exceptions, there are far fewer bus stops in the villages, although a higher number can be observed in the villages of Malá Lehota (11 stops) and Župkov (10 stops), due to their specific morphogenetic type. Since towns have several times more inhabitants than villages and smaller

settlements, they also have a denser network of bus stops (Tab. 2). Several larger dispersed settlements are concentrated around the main road, which is easily accessible for bus traffic and the reason for the location of the bus routes and bus stops. At the same time, these dwellings are further away from the center of the village (2–6 km). The fewest bus stops are in the municipalities of Horná Ves and Čereňany, influenced by the compactness of the core part of the municipality.

An important factor to consider is the number of bus connections within a twenty-four hour period (Cestovný poriadok, 2022). The largest number of connections, 87 during a twenty-four hour period, run through the village of Oslany (Tab. 3). This is influenced by the convenient location at an important junction linking roads to Prievidza, Partizánske and Žarnovica. Žarnovica, which also has a convenient traffic location at the intersection of the roads leading to Zvolen, Partizánske, Banská Štiavnica and Nová Baňa, has the second highest number of connections at 70 per twenty-four hours. A small number of connections run mainly through the small villages located in the peripheral parts of the region – the villages of Píla (11 connections), Veľké Pole (10 connections) and also Jedľové Kostoľany (19 connections).

Tab 2. Number of stops and bus connections in the settlements of the study area. Source: Cestovný poriadok, 2022

Municipalities	Population	Number of bus stops	Number of connections
Jedľové Kostoľany	896	7	19
Veľká Lehota	1089	6	30
Malá Lehota	828	11	24
Veľké Pole	430	7	10
Píla	128	4	11
Oslany	2375	7	87
Horná Ves	1457	2	42
Radobica	531	4	19
Horné Hámre	665	7	45
Župkov	871	10	48
Hrabičov	574	6	33
Čereňany	1730	3	59
Nová Baňa	7299	48	39
Žarnovica	6150	14	70
Spolu	25023	136	536

In order to evaluate this availability, it was necessary to select only those roadways on which a regular bus service operates. We then divided the road layer according to the speed at which the bus travels on any given section. To take account of the fact that the bus does not move along the road at an even speed (as it has to stop at bus stops) we recalculated the average speed of the bus from data that is freely accessible at https://cp.hnonline.sk/bus/spojenie, which allows for the time taken in consideration of boarding and alighting passengers (Fig 12).

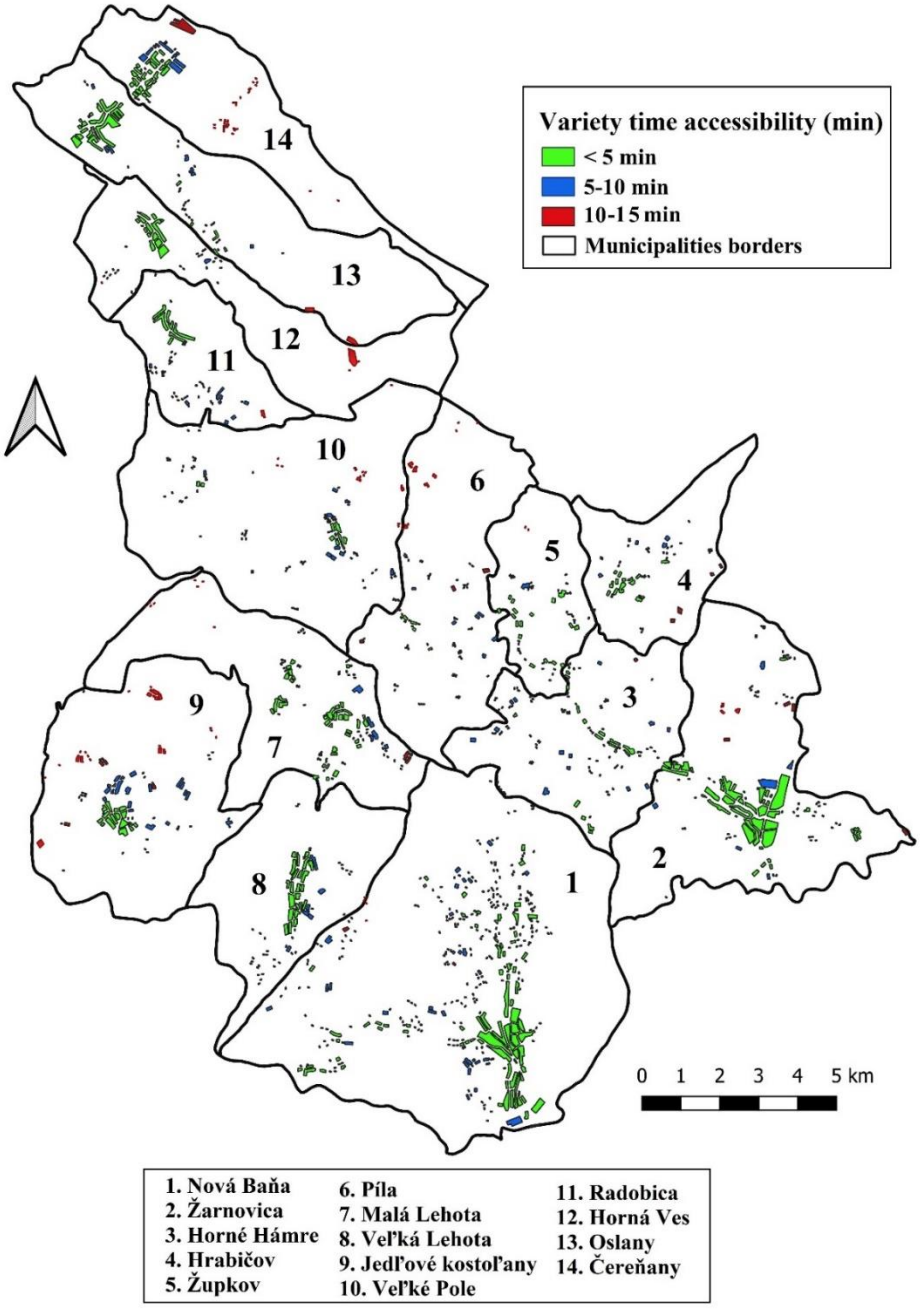
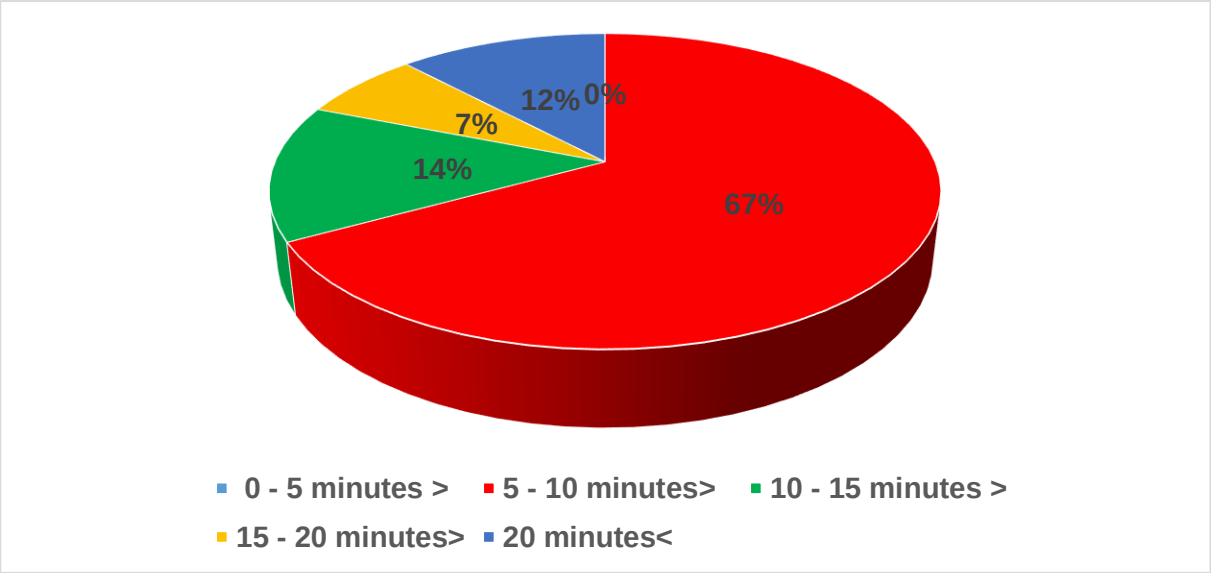


Fig 12. Time accessibility of bus stops Source: cp.sk, 2022, QGIS 3.18.3

The accessibility of bus stops in the area is very good. Up to 70% of the built-up area has the nearest bus stop within a five-minute walk. Another 15% of the inner areas in a town have availability within 10 minutes. The rest of the territory is within 15 minutes of availability (6%) and within 20 minutes of availability (5%). Part of the territory (4%) has an accessibility of more than 20 minutes. This also includes permanently inhabited dispersed settlements in the villages of Jedľové Kostoľany, Čereňany, Radobica, Píla, and in the town of Žarnovica (Fig 18).

In order to calculate the total accessibility by bus, it was also necessary to take into account the walking distance from the bus stop to the given grocery store; this concerned nine out of a total of 38 food stores. We solved this problem by connecting the grocery store with the shortest possible path to the road with the bus route. The greatest distance of the store from such a road was 200 meters. We created a slight deviation during the calculation.

Availability of a food store by bus within five minutes was not possible in all categories (Graph 9). This is due to the fact that the shortest time required for transportation by bus was five minutes, and also the shortest time required for walking to the bus stop was five minutes. Based on these parameters, the fastest possible transfer to the grocery store is within 10 minutes. The largest share of the urban areas of towns and villages is accessible within 10 minutes – 67% (592 ha) of the total built-up area. This accessibility category includes residential centers and dispersed settlements that are located near bus routes. The category of accessibility within 15 minutes has the second highest share of the total built-up area, namely 14% of the territory (118 ha), which is mostly peripheral parts of the centers of towns and villages. 7% of the built-up area (65 ha) is located in the category within 20 minutes of accessibility, and these are mainly peripheral settlements that have poor access to bus transport. Finally, 12% of the built-up area (106 ha) is in the last category of availability, over 20 minutes; we refer to these areas as areas with difficult accessibility to food stores. Similarly to the previous case, these include peripheral settlements without direct access to buses (Fig 13).



Graph 9. Share of individual types of availability for bus transportation

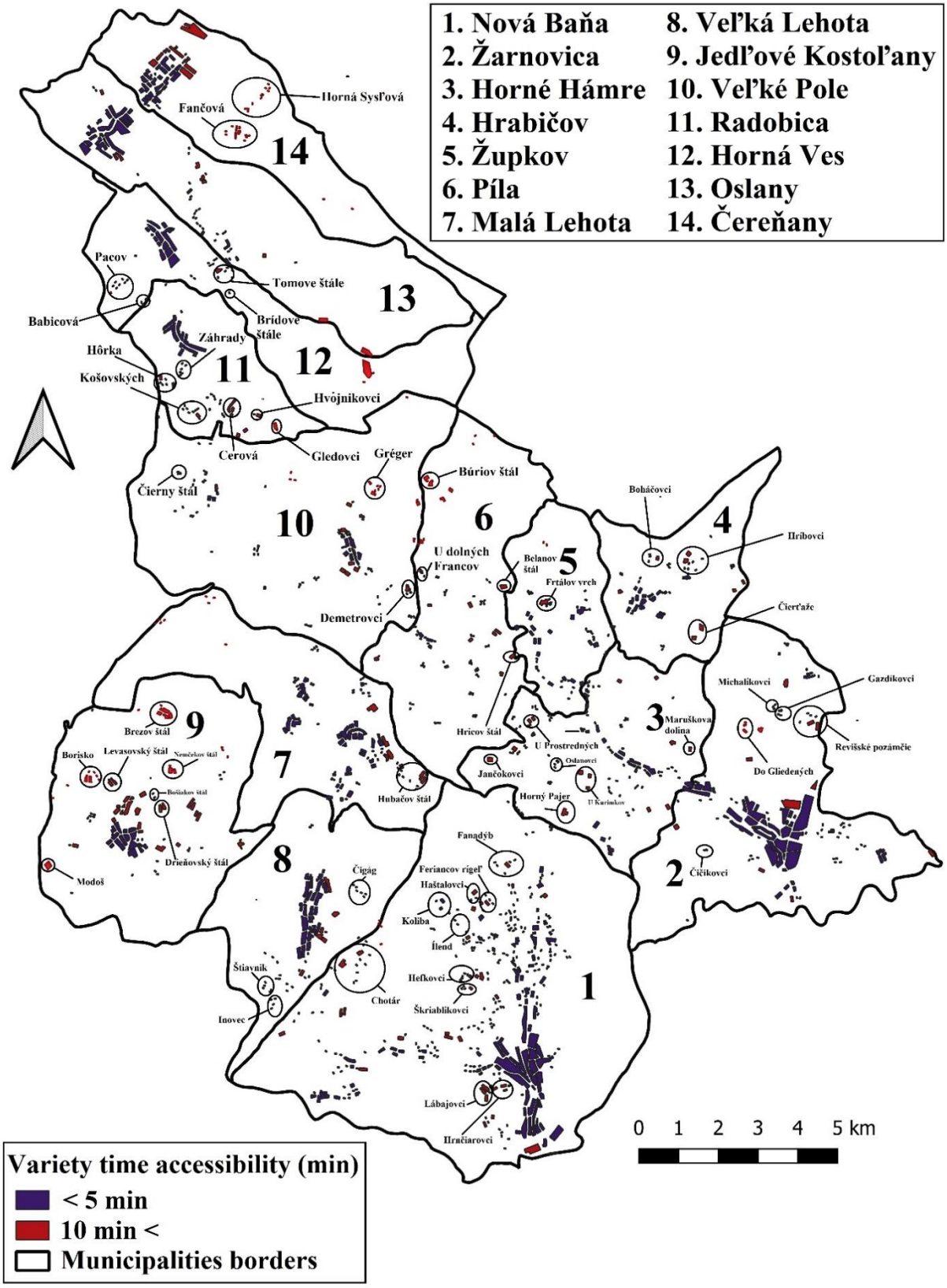


Fig 13. Accessibility to food stores by public bus transport. Source: QGIS 3.18.3

5. Discussion

Food markets are becoming increasingly globalized (Abatekassa and Peterson, 2011). Food retail trade is only one segment of the food system but it affects us, the end consumers, the most (Tolmáči and Tolmáči, 2020). The selection of stores and purchasing of food is carried out on an almost daily basis, while each consumer has certain preferences influenced by socio-economic, geographical and cultural factors.

Food availability is currently very topical. In many rural locations, food stores are disappearing due to population emigration and the influence of supermarkets in towns and cities. In the last two years during the COVID-19 pandemic, the movement of people was often restricted, so people were often permitted to only buy food in nearby stores.

Our evaluation of the retail network of food stores in the study area is that they are very logically distributed. There is at least one grocery store in every village. The largest sales network in the region is Coop Jednota, representing 20 stores out of the total number of 38. Thus, there are 1.51 food outlets per 1,000 people (in Dorset – Australia 1.3, Lê et al., 2015). This is slightly higher than the established threshold of one per 1,000 for adequate access to food (Lê et al., 2015). In terms of the size of the stores according to the selling area, small establishments of up to 400 m² predominate. This is due to the fact that most of the settlements in the region are small villages, where large-scale stores do not have enough customers to be economically viable.

In the rural part of the investigated areas, we can observe the process of concentration when locating food stores, namely, the creation of one centralized service location with the grocery stores serving as a "magnet" for the location of other businesses. In Slovak villages, there is often a pub next to a grocery store, which is also typical for this region. According to Šilhan and Kunc (2020), the consequences of the concentration process in rural areas include both the relocation of retail stores and a reduction in the number of some local stores. This process was also confirmed in our study area. However, this activity is also typical for the urban environment, where the process of concentration of other services to already existing food stores is often seen. Businesses can thus share, for example, parking places with each other.

Another observed process is chain-linking. In the study area, food stores of the Coop Jednota company (main office: Bratislava) are associated with this phenomenon. This Slovak company, founded in 1845, has a dominant position within the region and belongs among the most widespread retail stores in Slovakia (Trembošová and Vlačuhová, 2016). At least one store of this business chain is located in all the villages of our surveyed area.

Internationalization as a demonstration of globalization did not avoid this area; Nová Baňa was chosen as a source of business by the multinational chain Lidl (Germany), and its presence initiated a reduction of small food stores in the town. Two other multinational retail chains are located in the town of Žarnovica (Tesco and Billa) and, as in the case of Nová Baňa, they pushed several small local sellers out of the market by introducing cheaper products. In both places, we can identify the centralization of food stores to the core part of the town.

In the area of the dispersed settlements, motorized shopping prevails, which is an advantage for modern large-scale stores with parking options. Shoppers' consumption and behavior can also be evaluated according to personal characteristics in the sense of da Silva and Gouveia, (2020), who identify a hedonistic consumer (challenging and influenced) and a utilitarian consumer (mobile, conservative, sparing, loyal and undemanding). Hedonists look for pleasure, and shopping is a pleasurable pastime for them; utilitarian consumers try to fulfill a necessary task, and shopping is an unpleasant obligation for them. Križan et al. (2020), described the hedonistic approach as refering to the multi-sensory and emotional aspects of shopping, and the utilitarian approach as a more objective and rational consumption (Babin et al., 1994). According to the answers of the respondents from the dispersed settlements and in the countryside, utilitarian consumers prevail in the studied areas, while hedonistic customers were more easily identified in the urban environment. Overall, however, utilitarians prevailed; for this group, shopping is a regular duty, even considered an unpleasant task for utilitarian men. Hedonistic consumers consisted mainly of women living in urban environments aged between 18 and 49.

The results of the behavioral survey confirmed the importance of the social parameter as a reason for visiting a grocery store, as up to 12% of the respondents told us that they do their shopping daily. The frequency of visits decreases significantly if travel to the food stores is paired with going to work. Based on the answers in the spatial vision of the problem, the heterogeneity of the use of the local food system by the inhabitants of the study area is evident. According to the lines orientation of movement of purchasing directions, the studied territory can be divided into three significant nodes, which, however, do not correspond to the administrational division of the entire territory. This anomaly is most obvious in the village of Veľké Pole, which belongs to the Banská Bystrica region, but due to the shape of the transport network, shopping is carried out in the Trenčín region in the town of Partizánske (Lidl). Clear catchment areas for food purchases were created in the hinterland of four municipalities (Jedľové Kostoľany, Oslany, Píla, Veľká Lehota) and two towns (Nová Baňa and Žarnovica). Based on the answers, two district towns outside the study area – Partizánske (Kaufland, Lidl, Billa) and Zlaté Moravce (Kaufland) appear to be the catchment centers for food purchases as well. Of the factors affecting the choice of the place of food purchases, there is no confirmed regularity in the territory, suggesting that, from this point of view, the territory is very diverse. We perceive the answers in the Cerová dispersed settlement as the most negative of the factors, where the residents stated that they have no other option and only shop in the town of Partizánske (Billa). Spatial variability of the influencing factors of food purchases is found throughout the territory, which reflects the diverse setting of the residents and their shopping stereotypes. In the answers, however, there is a clear sociological trace among older seniors, who often mentioned shops with pleasant staff as a factor in choosing a place of purchase, whereas the younger generations did not mention this, or this aspect was unknown to them.The answers also revealed the nostalgic sentiment of older respondents for the sales bus, which operated in the more remote regions until the 1990s, and supplied the inhabitants of the study area with fresh baked goods, meat, dairy products and drugstore goods three times a week.

We investigated the availability of food stores based on three methods of transportation to the shops. The first way was walking; for our study region, this method of access is negligible since no-one mentioned this method in the dispersed settlements. In terms of the concept of areas with difficult access to food stores (a journey time of more than 20 minutes) there are 48 permanently inhabited dispersed settlements (35%) where 1038 inhabitants live, i.e., up to 52.4% of the population of these settlements. The biggest problems appeared in the towns of Nová Baňa and Žarnovica, where, in addition to remoter areas, the urban districts also found themselves in areas with limited access to food stores. On the other hand, 78% of all respondents and 95% of the residents of dispersed settlements stated that they carry out their food purchases by accessing the stores by car. Transport is therefore the pivotal factor in determining food outlet choice and access to food. The zone of the so-called areas with difficult accessibility to food stores, which had a limit of 10 minutes in the case of car use, are dwellings within dispersed settlements that are not permanently inhabited, with the exception of the village of Jedľové Kostoľany, where there is a permanently inhabited Modoš settlement. Most of the territory (98%) has accessibility within 5 to 10 minutes. We can therefore evaluate that the availability of food when accessed by car is very good. The third mode of transport investigated was the accessibility to grocery stores by bus combined with the accessibility of bus stops on foot. In this type of availability, the occurrence of vulnerable areas with difficult accessibility to food stores was also confirmed. With the exception of the village of Oslany, areas with difficult accessibility to food stores were found in all settlements. In this case, 55 permanently inhabited dispersed settlements, in which 557 inhabitants live, are located in the areas with difficult accessibility to food stores, representing 28.1% of the population of such settlements and 2.81% of the entire area.

The original self-sufficiency potential of the countryside, typical of the end of the 20th century, is gradually transforming and changing but still survives, and its activities are restructured into other qualitative forms, levels and proportions (Buchta, 2016). Based on the answers of the respondents, this method of food procurement was also identified in the researched area.

The results of our study, as well as the evidence from the study of Sushil et al., (2017), lead us to make the following policy recommendations: i) introduce legislation that allows for considerations such as health and well-being (not just safety) and the approval of retail building permits on consideration of food

security zones, and ii) engagement of communities and health promoters with convenience store owners to increase the healthiness of the in-store food availability.

6. Conclusion

This research has only covered a small slice of the role of retail networks in food safety. Due to the complicated access to data that cannot be obtained other than through field research, the results of this work can serve as a basis for processing other scattered regions of Slovakia and future development of the region's territory.

The creation of environments in which all communities have ready access to food outlets, providing a range of affordable and appropriate healthy food, requires action at strategic and policy levels (Lê et al., 2015). Discounters Lidl have become a key element of the regional food supply chains with their low product prices and relatively wide product range. It is not economically feasible to operate such a shop in the smallest settlements.

We can thus assess that areas with difficult accessibility to food stores do occur in the study area, although they are not a very serious problem of the region since the inhabitants of the dispersed settlements, who are hence vulnerable to the insufficiency of the food supply, indicated the mode of transportation as the automobile. In the investigated specific geographical area with scattered settlements, the availability of food stores will depend on the transport serviceability of the area (hypothesis 2).

The results of the study did not confirm hypothesis 1, since, in this case, 55 permanently inhabited dispersed settlements, in which 557 inhabitants live, are located in the areas with difficult accessibility to food stores, representing 28.1% of the population of such settlements and 2.81% of the entire area. The situation is more serious only in the case of accessibility on foot in the town of Žarnovica, where up to 531 residents live in areas with difficult accessibility to food stores, which is 8.63% of the city's population.

Within the study area, private cars are the most commonly used transport method to access food, and those without private transport have a limited choice of where to shop. It is important, therefore, that infrastructure development and regional planning work hand-in-hand with a food security policy at the outer regional and remote level (Lê et al., 2015)

For the further development of the topic of local food systems, it is necessary not to neglect the production of food by the inhabitants themselves, which is an important element of the local food system (Jehlička, 2021). Self-production takes on a particular importance in the areas with difficult access to grocery stores, where its own sources of food, especially vegetables, fruits and meat, can replace food supplies from the retail network and at the same time reduce food expenses in low-income households. Supermarkets, however, take a central position as a main access point for food. Regional policies may drive supermarkets to retail local foods. Nevertheless, in the absence of a centralized strategy, store managers may find themselves stuck between their regional context and their corporate retailing practices (Zwart and Wertheim-Heck, 2021).

The use of the results of our study is possible when processing analyses of areas with difficult access to food stores in other regions, and they provide important information on how to improve the shopping opportunities of residents or visitors in such regions of Slovakia. This study has achieved all of its objectives, including quantifying and visualizing geographic access to food and examining access to healthy food.

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