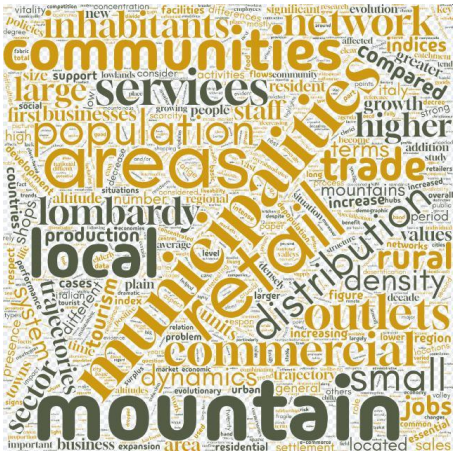
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MOUNTAIN AREAS AND THE GROWING SCARCITY OF ESSENTIAL SERVICES: THE EVOLUTION OF RETAIL BUSINESS DENSITY IN MOUNTAIN MUNICIPALITIES IN LOMBARDY (ITALY), 2001–2021

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Abstract: In small mountain villages, the presence of commercial businesses plays a crucial role in the liveability of the areas and the wellbeing of inhabitants. However, these businesses – much like other services of general interest – tend to decrease in number, contributing to marginalisation of the local communities they serve and widening the gaps with more densely urbanised areas. This paper analyses the process behind the growing scarcity of retail businesses in the 509 mountain municipalities in Lombardy between 2001 and 2021. It considers the dynamics of retail density indices in terms of local units and employees in relation to the resident population, as well as outlining the different evolutionary trajectories of these mountain municipalities based on altitude, population size, and specialisation. The paper highlights how over the twenty years in question, the vast mountain area of Lombardy has seen its distribution network dwindle significantly and the number of available jobs increase modestly compared to regional trends. In addition, incidents of commercial desertification have increased, and the distribution system has often become more concentrated in the 23 mountain communities. The municipalities that have shown strong performance and growth in terms of business density are largely located in the valley, have more than 5,000 inhabitants, and have a local economy geared towards production and tourism.

Keywords: retail trade, business density indices, mountain areas, settlement networks, Lombardy

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Riassunto: Nei piccoli centri abitati di montagna la presenza di attività commerciali svolge un ruolo importante per il benessere e l'abitabilità dei luoghi. Tuttavia, queste attività, al pari di altri servizi di generale interesse, tendono a diradarsi, un fatto che contribuisce a marginalizzare le comunità locali e che alimenta i divari rispetto alle aree più densamente urbanizzate. Questo lavoro analizza il processo di rarefazione del commercio al dettaglio nei 509 comuni montani della Lombardia fra 2001 e 2021. Viene considerata la dinamica degli indici di densità commerciale in termini di unità locali e addetti rispetto alla popolazione residente e vengono delineate le differenti traiettorie evolutive dei comuni montani in base all'altimetria, alla taglia demografica e al profilo di specializzazione. Il lavoro evidenzia come nel vasto quadrante montano lombardo, nel ventennio in esame, si sia registrato un forte diradamento della rete distributiva e un modesto aumento dei posti di lavoro rispetto al trend regionale. Sono aumentati, inoltre, i casi desertificazione commerciale e nelle 23 Comunità Montane spesso il sistema distributivo è diventato più concentrato. I comuni caratterizzati da buone performance e da traiettorie di crescita della densità commerciale sono soprattutto quelli di fondovalle, quelli con più di 5.000 abitanti e con una vocazione produttiva e turistica.

Parole chiave: commercio al dettaglio, indici di densità commerciale, aree montane, reti insediative, Lombardia

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Highlights

- Retail trade activities are essential services for the well-being in mountain areas.
- Growing disparities between mountain areas and the rest of the Lombardy region linked to the dynamics of local units and employees in retail trade.
- Trajectories of evolution of commercial density differentiated between mountain municipalities.
- Greater difficulties in intermediate mountain areas, small municipalities and those with a residential profile.
- Polarisation of local units and employees in retail has increased in many mountain communities.

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1. Introduction

As Jane Jacobs (1961) observed, a dense and varied system of small businesses lining streets and squares is a fundamental element in maintaining the vitality of a place. However, in parallel with the development of mass-market retail and e-commerce, many countries have lost a significant number of retail outlets, with a gradual reduction in their density compared to the population size. This trend has mainly penalised small independent business owners, who are less equipped to face the competition and intercept new approaches to consumption (Coca-Stefaniak et al., 2005; Clarke & Banga, 2010). The dwindling of the distribution network has shown no signs of slowing in recent years, although during the first waves of the COVID-19 pandemic in 2020 and 2021, restrictions on individual travel led not only to a jump in online shopping, but also to a temporary rediscovery of shops 'down on the street' and their crucial role in the '15-minute city' (Moreno et al., 2021).

In many countries today, Italy included, supporting small businesses in a market that has placed large retailers in a strong position, has become a key challenge for policymakers (Barata-Salgueiro & Erkip, 2014; Fernandes & Chamusca, 2014; Barata-Salgueiro & Cachinho, 2021; Cirelli et al., 2021; Sommella & D'Alessandro, 2021; Pozzer, 2023). However, attention has largely focused on densely urbanised areas, where there is strong competition between companies and the conflict unfolding between historical centres and new consumption hubs located in suburban areas is more evident. This paper shifts this focus onto areas that are more sparsely populated, specifically those in the mountains. In these areas, much as in rural areas as a whole, the presence of even a minimal network of shops and other services of general interest – little 'everyday amenities' – has long been recognised as a key factor in the vitality and viability of a place (CEC, 1996; Woods, 2005; Karlsson, 2012; Fertner et al., 2015). However, it is not easy to maintain an adequate network of retail businesses and other essential services in rural and mountain areas at risk of depopulation (OECD, 2020). This problem also occurs across Italy, where about 350 municipalities – mostly located in the mountains – have no shops whatsoever. This is an alarming fact that prompted UNCEM (National Organization of Mountain Municipalities) to ask the government in 2023 to establish special mountain economic areas where companies can benefit from particular tax and regulatory conditions to compensate for the disadvantages of operating there instead of in more densely urbanised areas.

Within this general framework, we address the process behind the growing scarcity of retail businesses in the mountain areas of Lombardy between 2001 and 2021. In this region, which has a high level of economic development, 509 out of 1,506 municipalities are located in the mountains. Furthermore, there is also a significant number of large retail outlets, whose proliferation in the 2000s followed the liberalisation of the commercial sector under the 'Bersani Decree' (Italian Legislative Decree 114/1998). As such, Lombardy stands out from the national landscape in terms of its highly concentrated distribution network. There are currently 8.2 sales outlets per 1,000 inhabitants (ISTAT data, Italian Statistics Yearbook 2023), which is the lowest value of any Italian region. Shopping centres and other large retail facilities are largely concentrated in major urban lowland areas, particularly around Milan. However, there is no lack of retail facilities along the foothills and within the mountain valleys, and these pose a more direct threat to the survival of small local shops. In addition to the onslaught of mass-market retail, the commercial system in mountain areas also suffers due to the ailing socioeconomic vitality of these areas, a fact that became more evident following the 2008–2011 economic crisis.

In advanced countries, the contraction of retail trade in rural areas has long been a known problem. However, as Ramos-Truchero (2024) pointed out, more detailed studies on this process are needed. We hypothesise that it does not proceed homogeneously, but involves rural municipalities differently, changing relationships in local settlement networks.

We investigated the changes seen in the mountain municipalities of Lombardy in terms of the density of local retail units and the number of people working in the retail sector compared to the resident population. The research has two main objectives: 1) analyse the dynamics of mountain areas with respect to the region, highlighting whether the disparities in retail densities widened or narrowed over the 2001–2021 period; and 2) outline the different performance levels and evolutionary trajectories of the 509 mountain municipalities with respect to altitude, population size, and specialisation. The latter

objective is important because the retail sector, with its related dynamics, contributes to reorganising relationships in settlement networks. Specifically, we assess whether the 23 Mountain Communities show evidence of bursts of concentration/deconcentration in the distribution system that benefit certain types of municipalities to the detriment of others.

The paper is organised as follows. The next section reflects briefly on how commercial businesses fit into a broader set of services that are essential for the liveability of mountain areas and rural areas in general. We then present the methodological aspects of the research and address the case study with respect to the issues mentioned above.

2. Commercial businesses and other essential services in rural and mountain areas

In many countries, ensuring an adequate mix of services of general interest (SGIs) in rural areas has long been a major challenge for policymakers, who are concerned with guaranteeing equal rights and opportunities for people living everywhere, no matter how remote the location is (Fassmann et al., 2015; Stielike, 2024; Lorenzetti & Leggero, 2024). This issue carries considerable weight in the EU's Territorial Agenda 2030 (EC, 2020); a 'just' Europe is one of the two pillars of this document, which is intended as a guide for the 2021–2027 cohesion policies. The EU Rural Vision, approved by the European Commission in 2021, also reiterates the importance of actions to support SGIs, which are the cornerstones for the development and well-being of local communities: «retail, doctors, pharmacies, banks, post offices, public transport, childcare facilities and schools are essential to rural life and jobs, as well as to ensure no-one and no place is left behind» (EC 2021: 6).

Despite this, rural areas suffer from the progressive dwindling of essential services, a trend that has only intensified with the austerity policies instituted in many countries (including Italy) to recover from the Great Recession (Escalona Orcao & Díez Cornago, 2007; ESPON, 2017; Kostanjšek & Marot, 2021; Vaishar & Šťastná, 2021; Ortega-Reig et al. 2023; Sikorski et al., 2023). As such, people living in rural areas have to deal with more difficult access to essential services than for those in intermediate and urban areas, although there are significant differences among countries (Kompil et al., 2019).

The low population density and more scattered structure of these settlements – typical features of rural areas, especially mountainous ones – make it more difficult to generate the economies of scale needed to efficiently provide many public and private services (OECD, 2020). Alternative solutions are sought, many of which rely on mobilising local communities and the service sector, forms of social innovation that leverage new technologies (such as the smart villages approach), and collaborative networks among municipal administrations (Karlsson, 2012; SARURE, 2021).

These problems are exacerbated in mountain areas, where orographic constraints only accentuate disparities in the settlement network (Gløersen et al., 2016; ESPON, 2019; Laner et al., 2019). Indeed, few small or medium-sized towns – mostly located in the valley – serve as points of reference for vast areas, to the point where they often have a more complex functional profile than municipalities of a similar size located within the 'shadow cone' of metropolises (Pumain, 1999; Di Gioia, 2010; ESPON, 2014). Proximity to the plain, ease of connection with large urban areas, and an ability to attract flows of people for work and tourism are the main factors driving a positive transition in small mountain municipalities, with effects on the dynamics of the local business network (ESPON, 2018; Bański, 2022; Chilla et al., 2022).

Whereas the relationship between the availability of SGIs and demographic dynamics is not entirely clear (Amcoff et al., 2011), it is often claimed that in more sparsely populated areas, the scarcity of locally available services limits quality of life and contributes to depopulation. This in turn compromises the sustainability of the services that are still present, in a vicious cycle that is difficult to break (ESPON, 2017). Such dynamics also affect commercial businesses, and are a greater problem in terms of the supply of staple foods and basic necessities, which are indispensable for 'living well'. In the mountains of Lombardy – the subject of our case study – it has also become clear that the presence of commercial activities and other basic services is commonly considered by local communities as «the iron rod of population sustainability in mountain areas» (ERSAF, 2011: 33).

In small rural communities, local commercial activities are loaded with social and symbolic significance. Shops are important for the local economy and employment, but above all, they are valuable hubs for the community – 'third spaces', as Oldenburg and Brissett (1982) would say – where social bonds are bolstered. In addition, they attest to the vitality of these places, the rural idyll, and the potential to enjoy a good level of well-being, even far from the big city (Crowley & Stainback, 2019). All this means that losing shops is hard on rural communities, especially those that are more isolated. Residents react by seeking alternative places to shop, but a deep, social and symbolic wound remains (Christiaanse & Haartsen, 2017; Haartsen & Gieling, 2021).

Concern for the resilience of the network of 'physical' shops in rural areas is also important because they compensate for a persistent digital divide (first- and second-level) with respect to urban areas, thus limiting the penetration of e-commerce (Feurich et al., 2024).

It is difficult for retailers to operate profitably in areas with a low population density due to both contextual factors and the internal dynamics of the distribution sector. In terms of the first aspect, the small markets being served, depopulation, and logistical difficulties all constrain the profit margins of these businesses (Paddison & Calderwood, 2007; Sadílek et al., 2023). Tourist flows can help, but these are often concentrated in a few locations and are seasonal rather than year-round. The new forms of slow, experiential tourism that are breathing new life into many small villages in the mountains and plain could also have a positive impact on the commercial fabric, encouraging outshopping, by which people go from urban to rural areas to purchase typical local products, but for the time being, these mainly benefit towns that are better publicised or easy to access from big cities (Ahlmeyer & Volgmann, 2023; Hrivnák et al., 2023). In addition, we must also consider the impact generated by the advance of mass-market retail. Due to their fragile distribution network, settlements with a lower population density are worse off and more exposed to the risk of becoming food deserts (Twardzik & Heffner, 2019; Christiaanse, 2020; Neumeier & Kokorsch, 2021; Hernández, 2023; Trembošová et al., 2023). However, not the entire population is equally affected by the erosion of commercial services; the problem is worse for elderly people and those with limited mobility, who are less able to rely on outshopping (Milbourne & Kitchen, 2014; Verma & Taegen, 2019).

In Italy, awareness of the erosion of SGIs has grown considerably since the introduction of the National Strategy for Inner Areas (*Strategia Nazionale per le Aree interne*, SNAI), which was launched in 2014 and refinanced for the 2021–2027 period, along with an increase in the target areas. Investments are planned to improve the provision of public services (healthcare, education, mobility) in remote areas – many of which are in the mountains – as a first step towards slowing depopulation and activating new trajectories of place-based development (Lucatelli et al., 2022). A specific fund was also set up under SNAI to support the establishment of new commercial activities in the areas that are worst affected in terms of per-capita income, depopulation trends, and social and material vulnerability. Support for commercial activities as cornerstones for a location's liveability is also accounted for in the National Mountain Strategy (*Strategia Nazionale per la Montagna*), which is currently being drafted to bolster plans for *specific* policies for this vast swathe of the Italian territory. It is also worth bearing in mind that under the current legislation on trade (Italian Legislative Decree 114/1998), regional governments must formulate policies that support the distribution system in less densely populated locations (mountain, rural, and island areas). Lombardy has been very active on this front, especially by financing the so-called 'widespread commercial districts' (*Distretti diffusi del commercio*): groups of small municipalities which have developed a medium- to long-term programme to support the local distribution network (Clerici, 2019).

3. Materials and methods

The field of research of this study comprises the fully mountain municipalities in Lombardy, as identified under Italian Law 991/1952 on the basis of criteria relating to altitude, the elevation change within the municipality, and the economic and agrarian structure. Following a series of administrative rearrangements (incorporations and mergers of municipalities), the number of municipalities considered

fully mountainous in Lombardy fell to 509 in 2021[2]. These are all located in the Alpine region, except for a small strip in the Apennines (Oltrepò Pavese), and are currently divided into 23 Mountain Communities (Figure 1). Although these units were consolidated in 2008 (there were previously 30 of them), they continue to perform crucial functions, particularly with regard to the provision of services for the associated municipalities, which are often incapable of independently providing efficient services due to their small size and lack of technical and financial resources. Some Mountain Communities are also leaders of the (intermunicipal) widespread commercial districts.

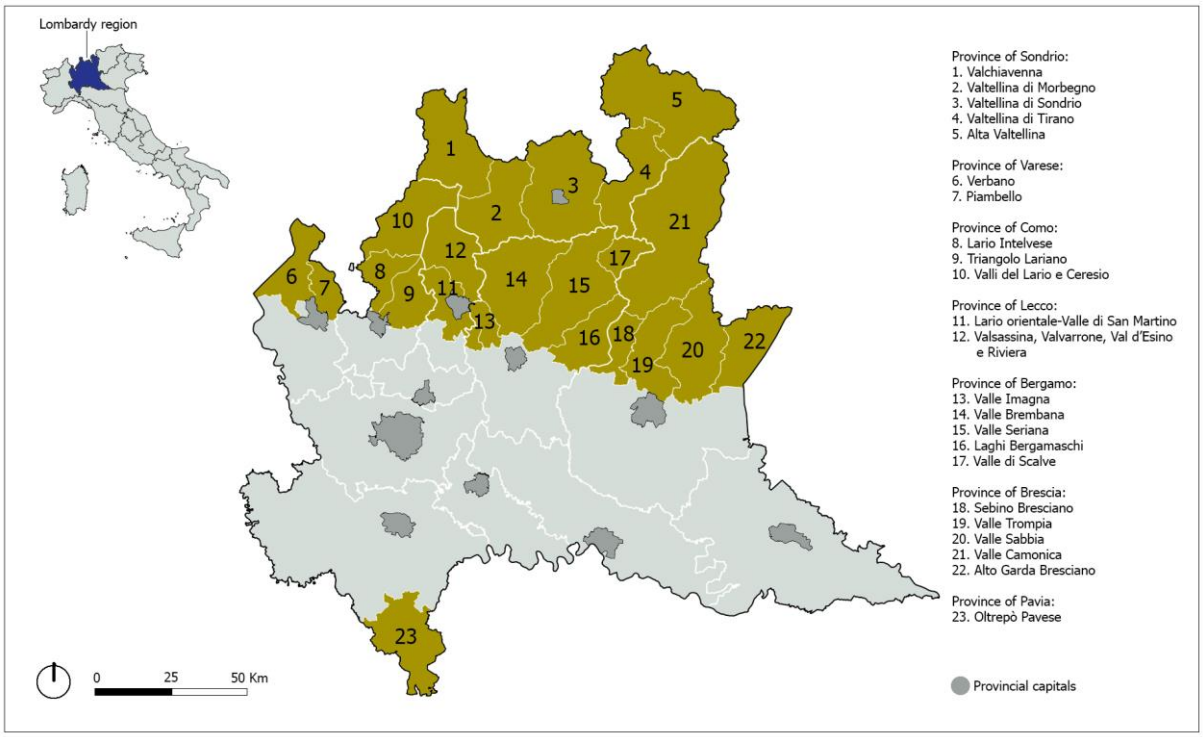


Fig 1. The 23 Mountain Communities of Lombardy. Source: own elaborations

Our paper includes the town of Sondrio, which, although it is fully mountainous, is formally excluded from the Mountain Community that bears its name due to its status as the provincial capital. The mountains enclosed within this perimeter cover an area of 10,214 km^2 (42.7% of the regional surface area) and are home to 1,241,106 inhabitants (12.4% of the total population of Lombardy as of 2021). Retail trade is an important part of the economy of these Mountain Communities, although there are different situations on the local level (Table 1).

[2] In the administrative hierarchy of Italy, municipalities (*comuni*) rank third, after regions and provinces. According to current legislation (Italian Legislative Decree 267/2000), municipalities «perform the administrative functions for citizens and the municipal territory, such community services, the general framework for land-use economic development, and any other responsibilities not assigned to other government bodies by State or regional law, according to their competences». The demographic size of the 7,896 municipalities currently existing in Italy is quite variable. In the study area, the smallest municipality is Morterone (33 inhabitants on 1 January 2024), while the largest municipalities are Sondrio (provincial capital) and Lumezzane, with 21,297 and 21,556 inhabitants respectively (ISTAT data).

Tab 1. The 23 Mountain Communities of Lombardy: general data (descending order by resident population), 2021. Source: our elaborations on ISTAT data (Population and households, Statistical archive of active companies)

Mountain Communities	*No. of municipalities*	*Surface area* Sq km	*Resident population*	*Retail trade sector*				
				Local units		*Enployees*		*Employees/ Local units*
				No.	*%*	*No.*	*%*	
Valle Seriana	38	657.9	133,675	1,251	11.1	3,416	8.7	2.7
Valle Trompia	18	381.3	109,214	784	9.7	2,437	7.1	3.1
Lario orientale–Valle di San Martino	24	224.1	96,241	541	7.8	1,891	7.1	3.5
Laghi Bergamaschi	38	314.4	96,082	735	9.0	2,165	7.0	2.9
Valle Camonica	40	1,272.2	90,700	1,012	12.0	2,952	10.1	2.9
Verbano	32	299.6	76,060	608	11.4	2,129	14.2	3.5
Triangolo Lariano	30	254.1	73,850	575	9.0	1,966	9.6	3.4
Piambello	20	141.4	70,171	425	11.8	1,768	15.5	4.2
Valle Sabbia	25	553.1	64,690	555	10.3	1,569	7.0	2.8
Valtellina di Sondrio[1]	22	777.3	54,389	555	11.6	1,826	10.5	3.3
Valtellina di Morbegno	25	495.8	46,959	462	12.3	2,036	13.2	4.4
Valle Brembana	37	646.8	40,390	418	14.2	885	8.0	2.1
Valli del Lario e Ceresio	30	433.6	36,162	332	12.7	997	13.5	3.0
Sebino Bresciano	9	181.6	35,621	334	10.1	893	7.8	2.7
Valsassina, Valvarrone, Val d'Esino e Riviera	25	371.9	33,226	301	10.1	665	6.1	2.2
Valle Imagna	15	100.7	30,079	217	9.9	506	8.3	2.3
Alto Garda Bresciano	9	375.4	28,200	365	11.3	1,081	11.5	3.0
Lario Intelvese	20	191.1	28,102	201	9.3	481	8.2	2.4
Valtellina di Tirano	12	451.8	28,011	278	13.1	966	12.3	3.5
Alta Valtellina	6	895.5	25,216	395	14.8	1,430	15.3	3.6
Valchiavenna	12	575.3	24,223	186	11.3	635	11.3	3.4
Oltrepò Pavese	18	477.7	15,778	141	12.3	289	10.4	2.0
Valle di Scalve	4	140.9	4,067	49	13.0	86	6.4	1.8
Total	509	10,213.5	1,241,106	10,720	10.8	33,067	9.4	3.1
Lombardy region	1,506	23,863.7	9,981,554	81,583	8.8	315,113	8.3	3.9

[1] Including the municipality of Sondrio.

As well as investigating the dynamics in the commercial sector between 2001 and 2021, we also consider two density indices (DIs) on the municipal level:

DI1 = no. of local retail trade units per 1,000 inhabitants

DI2 = no. of staff employed at local retail trade units per 1,000 inhabitants

The first index conveys the coverage of retail outlets (food and non-food goods) in relation to the resident population, which is the primary reference market for retailers, while the second index regards the number of jobs, which may be higher or lower depending on the extent to which the distribution network has been transformed (i.e., the ratio of small to large retail facilities). As we shall see, underlying the increase or decrease in these indices is a range of different evolutionary trajectories, each of which is defined by the combination of the retail and population dynamics. A distinctive feature of work is that we considered both the number of outlets (local units) and the number of staff employed[3]. The retail sector has a different capacity to create employment in mountainous municipalities; moreover, considering staff employed gives an idea of the local distribution structure (more or less large shops) and the type of service offered.

To calculate these density indices, we used ISTAT data on local units and the information contained in the industry and services census and the statistical archive of active companies, which were made

[3] According to the ISTAT glossary, the local unit is the physical place (identified by an address and a house number) where a legal-economic unit carries out one or more activities. In our case, local units coincide with food and non-food shops. The staff employed are the persons employed in the local units, i.e., the self-employed and those employed on a full-time, part-time or training-work contract basis.

comparable. Since we aim to study changes in the allocation of retail trade in relation to the resident population, we considered total sales activities (fixed location)[4].

To assess the concentration of retailers in the 23 Mountain Communities of Lombardy, we used the Hirschman-Herfindahl Index (HHI):

$$HHI = \Sigma (Qi)^2$$

where: Q = proportion of local units (staff) working in retail; i = the i-th municipality belonging to the Mountain Community.

This index is used extensively to measure the degree of concentration of a given market, but it is also useful for studying the geographical distribution of a business activity or other variables (Duranton & Puga, 2000). In our case, the closer HHI is to 0, the greater the degree of fragmentation of the retail outlets and their staff within the Mountain Communities. Conversely, values closer to 1 signify a polarised arrangement, in which the hegemonic role of a few municipalities (or at the limit only one) is imposed. Depending how the HHI varies, we observe more or less intense bursts of concentration/deconcentration.

Regarding classifying the municipalities, we divided them into bands by altitude, as this is a key factor in the socioeconomics governing mountain areas (Chilla et al., 2022). Except for tourist resorts, demographic performance is better in the valley bottom municipalities, which has an impact on the dynamics of the retail sector. In the valley bottoms, large sales facilities are also located. We also consider population size, separating the 57 municipalities with more than 5,000 inhabitants from the others. In Italy, Law 158/2017 establishes this as the threshold distinguishing 'large' municipalities from 'small' ones. In Italian mountain areas, municipalities with more than 5,000 inhabitants are often hubs for services and jobs (Bartaletti, 2011), a fact that multiplies opportunities for retailers. In terms of specialisation – which affects the demographic performance (ESPON, 2014) and the potential catchment area of shops – we distinguished between tourism-, production-, and residential-based municipalities. The first group is defined according to the density of beds in hotels and holiday rentals compared to the number of inhabitants; this serves as a proxy for the degree of tourism of any location from the supply side. The 141 municipalities with values higher than the average in the Lombardy mountains (12.4 beds/100 inhabitants in 2021) are classified as tourism municipalities. The remaining municipalities are split into production (119) or residential (249) if the index of total staff employed/100 inhabitants is higher or lower, respectively, than the overall figure for the Lombardy mountains (28.3 in 2021). Finally, we look at the 120 municipalities with an overabundance of retail trade in terms of retail units and staff (high DI1 and DI2 values) compared to their Mountain Community. We therefore consider the different retail situations in the Mountain Communities, which relate to local settlement characteristics and long-term dynamics.

4. Results

4.1 Dynamics of retail trade

Between 2001 and 2021, the vast mountain area of Lombardy recorded a concentration of the distribution network, with the closure of a good 3,400 retail outlets (Figure 2). The dynamics were worse than the regional average, especially after 2011, coinciding with the start of a downward trajectory in terms of population. Growing difficulties are also evident in staffing dynamics. Over the long term, the balance is positive (+2,074 employees) – an effect of the trade sector liberalisation in 1998 (Clerici, 2019) – but the expansion halted in the latter decade, even as it continued in the rest of the region. In the Mountain Communities, there was an overall drop in retail outlets, albeit to varying degrees (they only expanded in Alta Valtellina in the first decade). As to staff, however, the situation was the opposite, in that five

[4] Concerning the classification of economic activities adopted by ISTAT in force in 2021 (ATECO 2007), these are the activities included in code 47 (Retail trade excluding motor vehicles and motorbikes), except itinerant retail trade (code 47.8) and retail trade outside shops, stalls and markets (code 47.9).

Mountain Communities continued to experience growth over the 2011–2021 period, with high rates in Piambello and Valtellina di Morbegno (+12%).

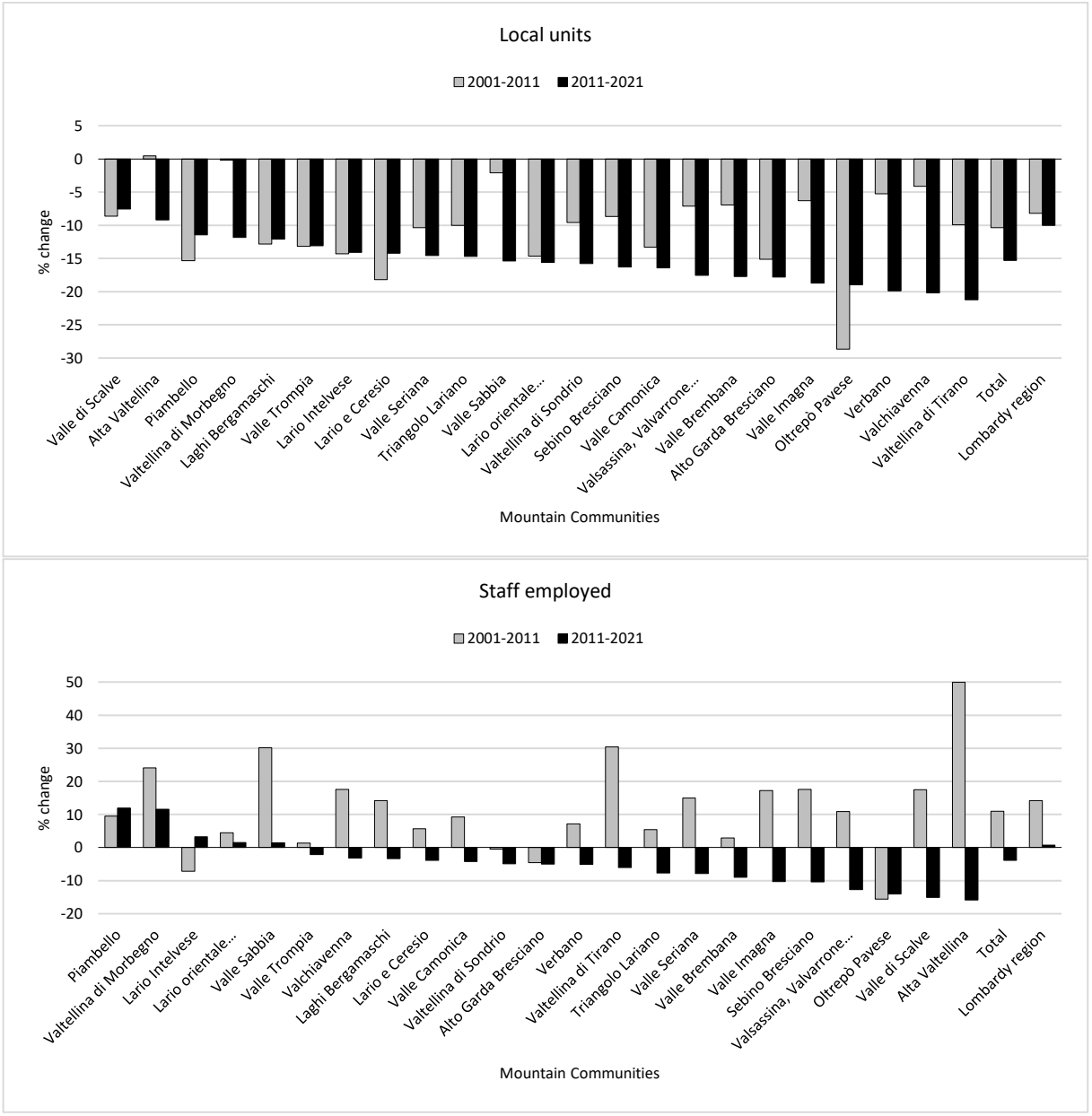


Fig 2. Retail trade dynamics in the Mountain Communities of Lombardy, 2001–2011 and 2011–2021. Source: our elaborations on ISTAT data (Census of industry and services, Statistical archive of active companies)

The reinforcement of the valleys – which is visible in many respects, is also evident in the evolution of the distribution system (Table 2). In 2021, the 'lowlands' (municipalities whose town hall is located at or below 300 m above sea level) accounted for 45.7% of all retail staff in mountain areas, with an increase of 2.4 percentage points over the 20-year period. This percentage, which is higher than the figure for both total jobs (44.5%) and resident population (41.4%), is influenced by the presence of retail facilities with a large catchment area due to their size and/or types of goods offered. In general, the 601–900 and 901–1,200 m altitude bands saw the largest drops, while retail trade at higher altitudes proved to be more resistant, although the dynamics were somewhat erratic over time and the values were relatively small.

Tab 2. Retail trade dynamics in Lombardy's mountain municipalities, 2001–2011 and 2011–2021. Source: our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies)

Municipalities	*Resident population 2021*	*Local units*			*Staff employed*		
		No. 2021	*Δ% 2001−2011*	*Δ% 2011−2021*	*No. 2021*	*Δ% 2001−2011*	*Δ% 2011−2021*
Altitude bands							
Up to 300 m asl	514,380	4,489	−10.5	−14.8	15,113	10.4	−1.3
301−600 m asl	542,143	4,245	−10.6	−15.5	12,908	8.1	−2.5
601−900 m asl	118,755	1,092	−11.2	−17.0	2,611	10.8	−9.4
901−1,200 m asl	44,043	454	−15.6	−17.8	990	5.5	−15.7
Over 1,200 m asl	21,785	440	−3.3	−12.4	1,446	51.8	−18.9
Specialisation profiles							
Tourism-based municipalities	236,414	2,730	−10.8	−15.5	7,546	14.8	−9.1
Production-based municipalities	503,330	4,617	8.3	−14.3	15,631	13.1	−1.2
Residential-based municipalities	501,162	3,373	−12.6	−16.5	9,890	5.0	−3.7
Demographic size							
Municipalities <5,000 inhab.	707,979	5,712	−10.8	−16.5	15,969	11.6	−4.5
Municipalities >5,000 inhab.	533,127	5,008	−9.8	−14.0	17,098	10.4	−3.2
Total	1,241,106	10,720	−10.4	−15.3	33,067	10.9	−3.8
Lombardy region	9,981,554	81,583	−8.2	−10.0	315,113	14.2	0.7

Dividing the municipalities by specialisation provides a clearer picture in tourism and especially production municipalities, two categories that benefit from greater flows of people than residential municipalities. Municipalities with more than 5,000 residents, which in a fragmented system of small villages, often become de facto hubs for services and jobs – also performed better than the others.

4.2 Business density indices and evolutionary trajectories

In the mountain area overall, the index of retail outlets per 1,000 inhabitants (DI1) remains higher than in the wider Lombardy region, but between 2001 and 2021, it fell by a greater degree (Table 3). The picture changes when we look at jobs. Due to the predominance of small retail outlets, the index of staff per 1,000 inhabitants (DI2) is lower than the regional average and has grown little over time. Municipalities with more than 5,000 inhabitants have a notably higher proportion of retail outlets and staff in relation to the population, confirming their central role in the wider area. However, these locations did record a modest increase in DI2, most likely due to the suburbanisation of commercial activities, which is very visible around Sondrio and Morbegno. Tourism municipalities also have high DI1 and DI2 values, though both indices were ultimately weaker over the long term than in production municipalities. Trailing behind are the residential municipalities, with indices that were significantly lower than the other two categories and fell sharply over time.

Tab 3. Retail density indices in mountain municipalities in Lombardy, 2001–2021. Source: our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies)

Municipalities	*DI1 Local retail trade units/1,000 inhab., 2021*	*Index number 2001–2021 (DI1 2001 = 100)*	*DI2 Staff employed at local retail trade units/1,000 inhab., 2021*	*Index number 2001–2021 (DI2 2001 = 100)*
Altitude bands				
Up to 300 m asl	8.7	71.6	29.4	102.4
301–600 m asl	7.8	73.7	23.8	102.7
601–900 m asl	9.2	74.7	22.0	101.8
901–1,200 m asl	10.3	75.6	22.5	96.8
Over 1,200 m asl	20.2	85.8	66.4	116.7
Specialisation profiles				
Tourism-based municipalities	11.5	74.8	31.9	103.5
Production-based municipalities	9.2	75.2	31.0	107.0
Residential-based municipalities	6.7	70.4	19.7	97.6
Demographic size				
Municipalities <5,000 inhab.	8.1	72.7	22.6	104.4
Municipalities >5,000 inhab.	9.4	73.8	32.1	101.5
Total	8.6	73.3	26.6	103.0
Lombardy region	8.2	74.8	31.6	104.4

DI1 increases progressively with altitude, whereas the values of DI2 are higher in the 'lowlands' and drop as the altitude approaches 1,200 m, at which point they increase again. There are marked differences between Mountain Communities in terms of retail availability. In 2021, DI1 ranged between 5.6 (Lario Orientale-Valle di San Martino) and 15.7 (Alta Valtellina), while DI2 varied between 16.8 (Valle Imagna) and 56.7 (Alta Valtellina). In smaller areas, as well as those in direct contact with the plain and/or within the catchment area of major cities and shopping centres, DI1 is generally low, and it dropped significantly over the twenty years in question (Figure 3). A similar pattern can be observed for DI2, although in this case, some larger and more remote Mountain Communities are also underserved.

The density indices considered here vary according to the combination of retail trade (sales outlets and staff) and resident population. Three evolutionary trajectories can be distinguished in municipalities with increasing density indices:

- increasing retail trade that outstrips population growth (T1);
- increasing retail trade despite a decrease in resident population (T2);
- stable or slightly decreasing retail trade compared to a more dramatic drop in resident population (T3).

In municipalities where the density indices have fallen, three different trajectories can also be identified:

- decreasing retail trade despite population growth (T4);
- decreasing retail trade that is more intense than the drop in population (T5);
- stable or slightly increasing retail trade compared to a more dramatic growth in resident population (T6).

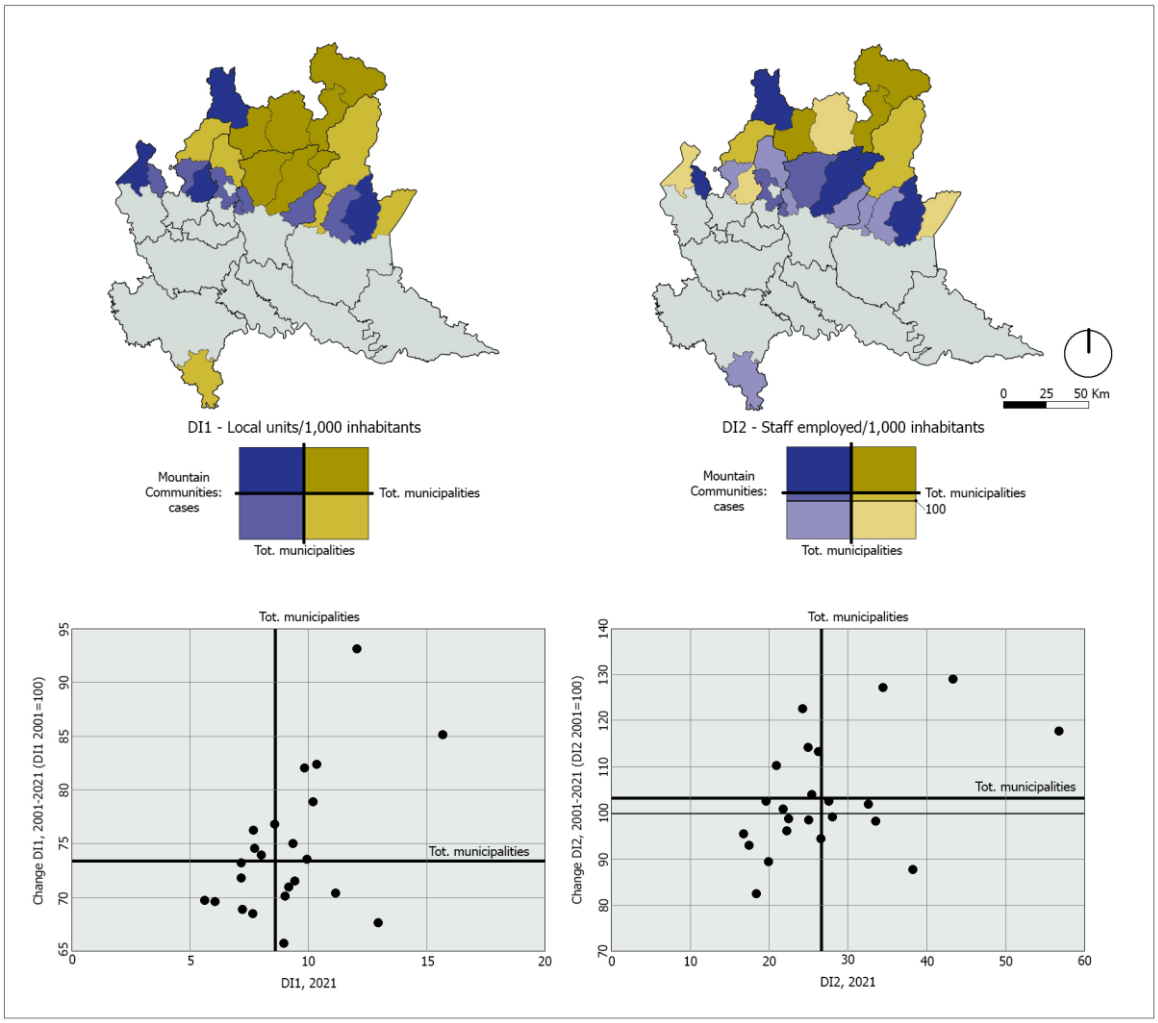


Fig 3. Municipalities with increasing DI1 and DI2 in the Lombardy Mountain Communities, 2001–2011 and 2011–2021. Source: our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies)

Relatively few mountain municipalities – 131 in the 2001–2011 period and 139 in the second decade – saw any increase in DI1 (Figure 4). This was initially tied to expansion of the commercial fabric, whether or not it coincided with population growth (trajectories T1 and T2). Then between 2011 and 2021, more resilience was seen where the population decreased (trajectory T3). The picture also changed in municipalities where DI1 fell, with a dramatic leap forward for trajectory T5, which indicates a retail sector in crisis due to population decline that offers unpromising market prospects.

Looking at DI2, we see growth in 240 municipalities in the first decade and in 210 in the next, which was mostly associated with an expansion in retail trade, although the relative weights of trajectories T1 and T2 changed over time (Figure 5). In municipalities with a decreasing DI2, the composition of the trajectories traces those described for DI1. In addition, there was a significant increase in the number of municipalities with no commercial activities (from 13 to 23), although the population affected is small (5,913 inhabitants).

Cases of growth in DI1 proved more common in the western mountain area of Lombardy and grew more established over time (Figure 6). For the other index, however, these are mainly concentrated in the intermediate band – among the provinces of Lecco, Sondrio, and Bergamo – although signs of a more fragmented pattern emerged over the latter decade. Overall, Oltrepò Pavese stands out due to the large number of municipalities affected by commercial desertification and the overabundance of trajectory T5 even in the 2001–2011 period, before other Mountain Communities.

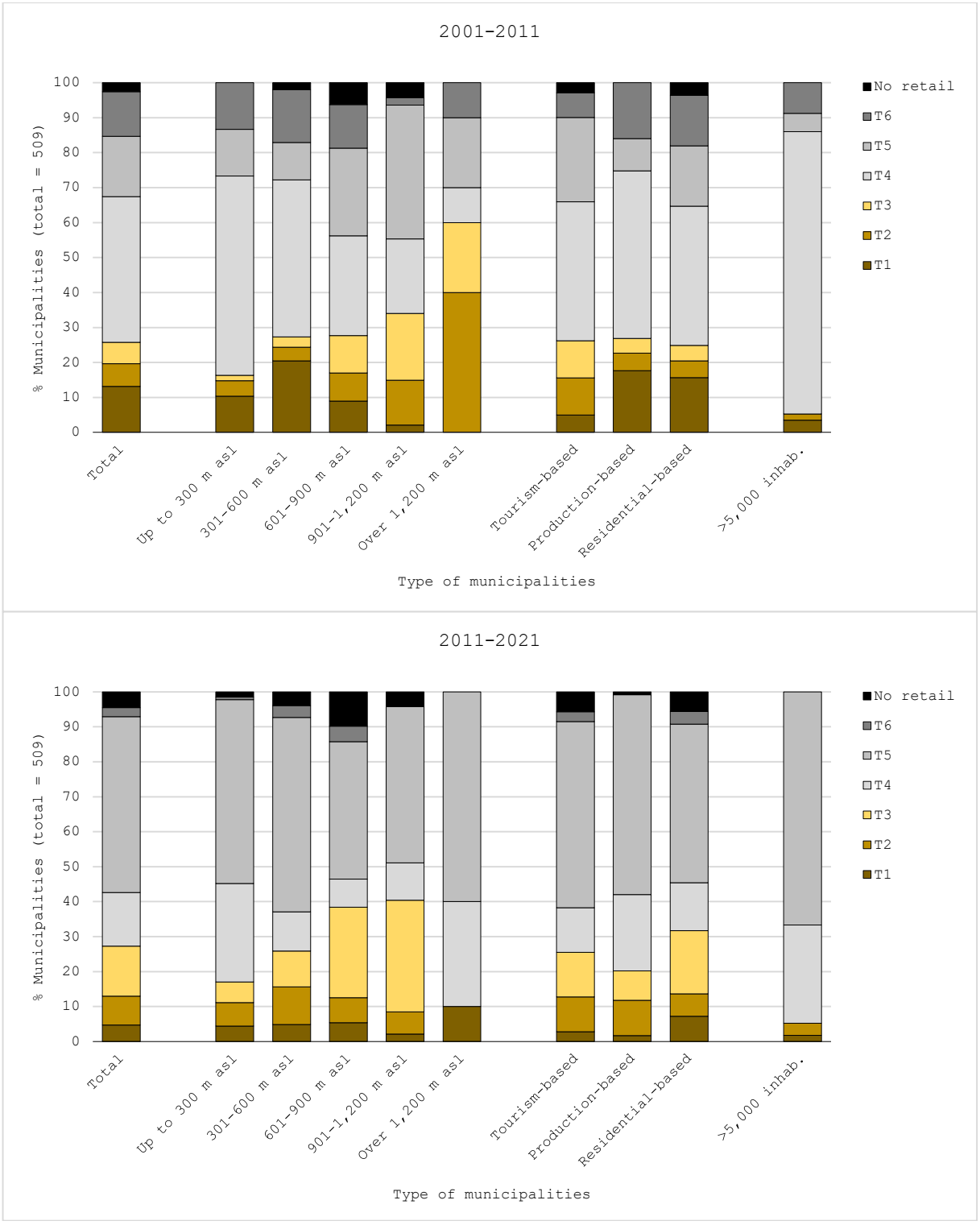


Fig 4. Evolutionary trajectories of Lombardy's mountain municipalities: DI1, 2001–2011 and 2011–2021. Source: Our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies

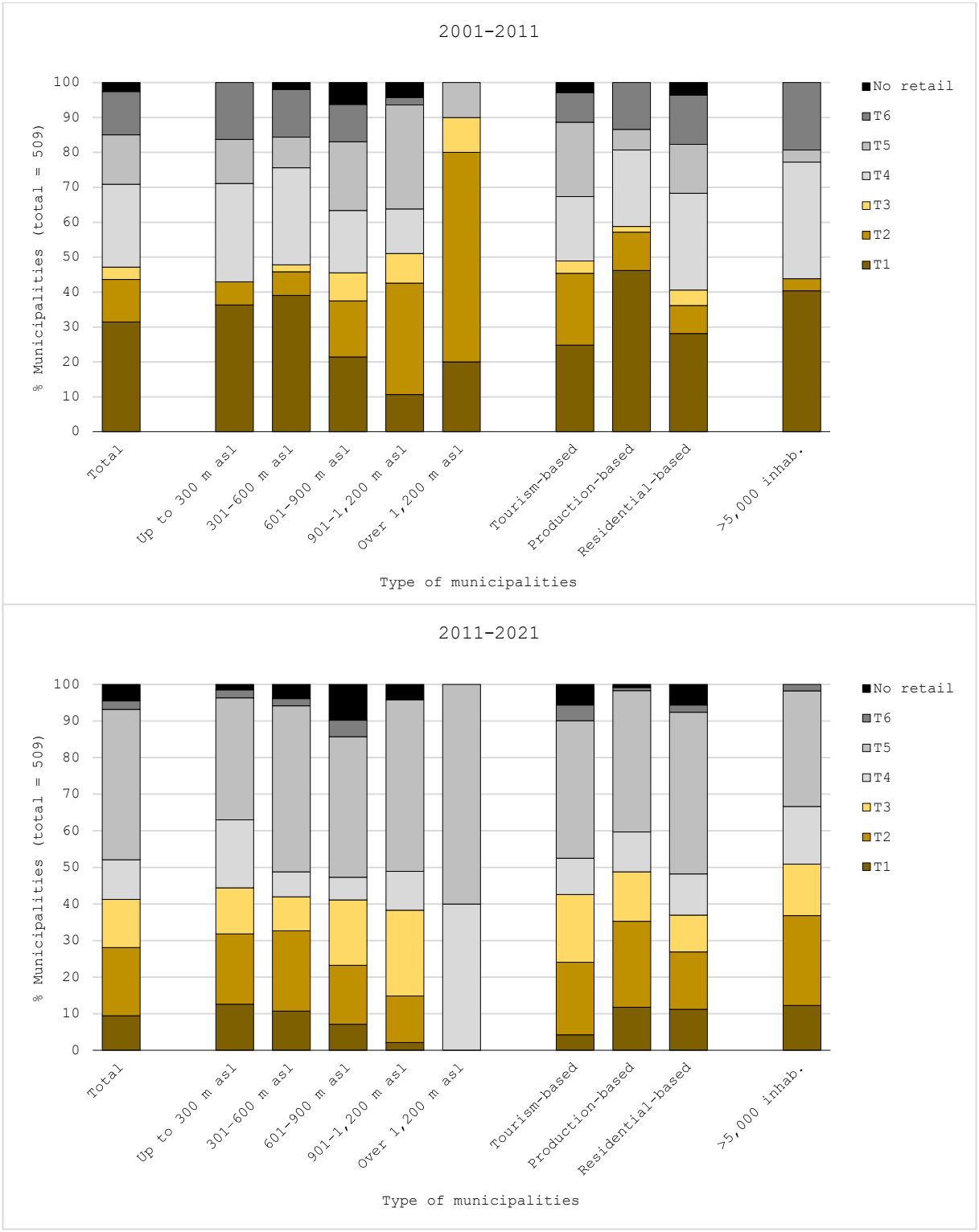


Fig 5. Evolution trajectories of Lombardy's mountain municipalities: DI2, 2001–2011 and 2011–2021. Source: our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies)

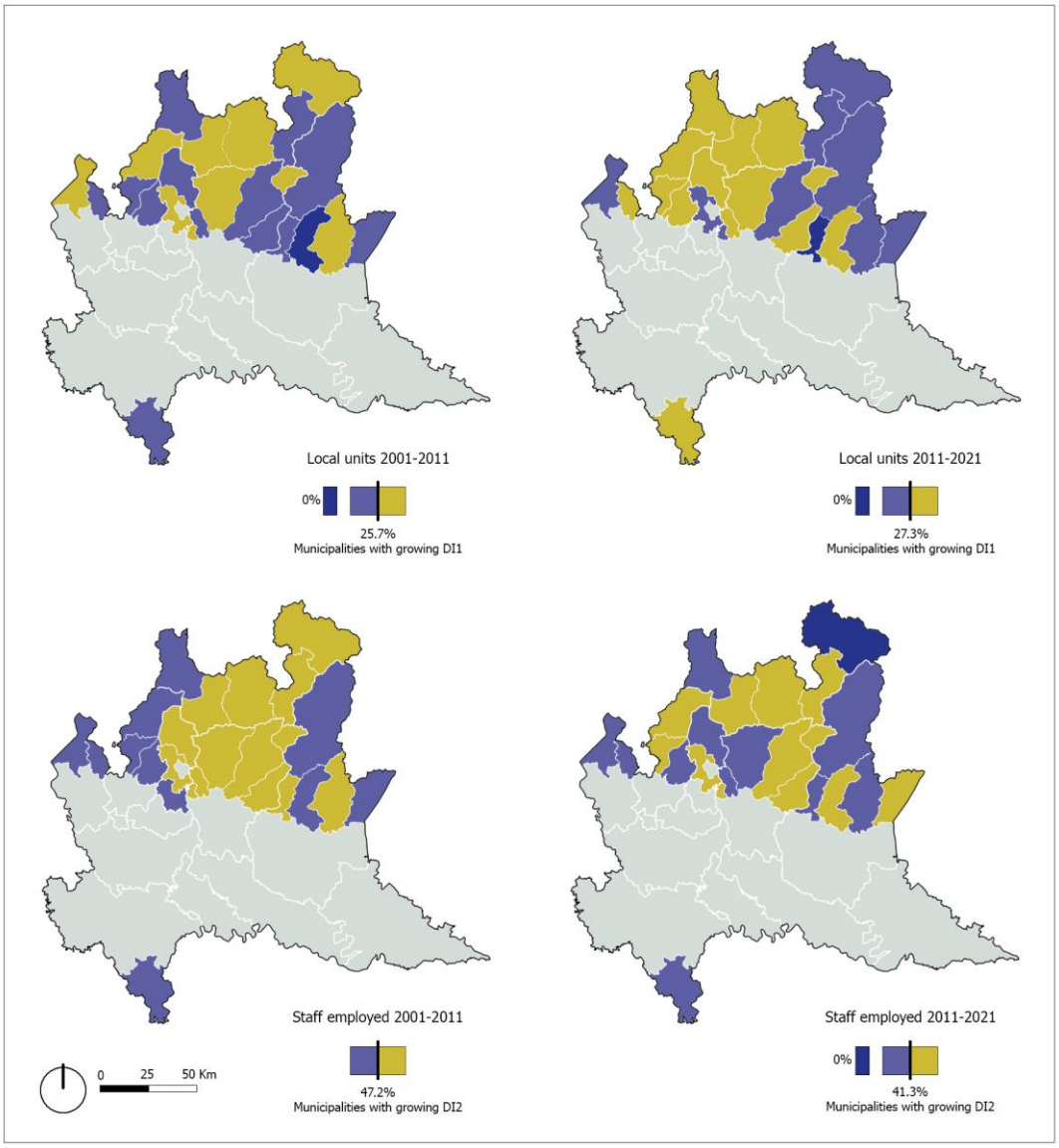


Fig 6. DI1 and DI2 in the Mountain Communities of Lombardy, 2001–2021. Source: our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies)

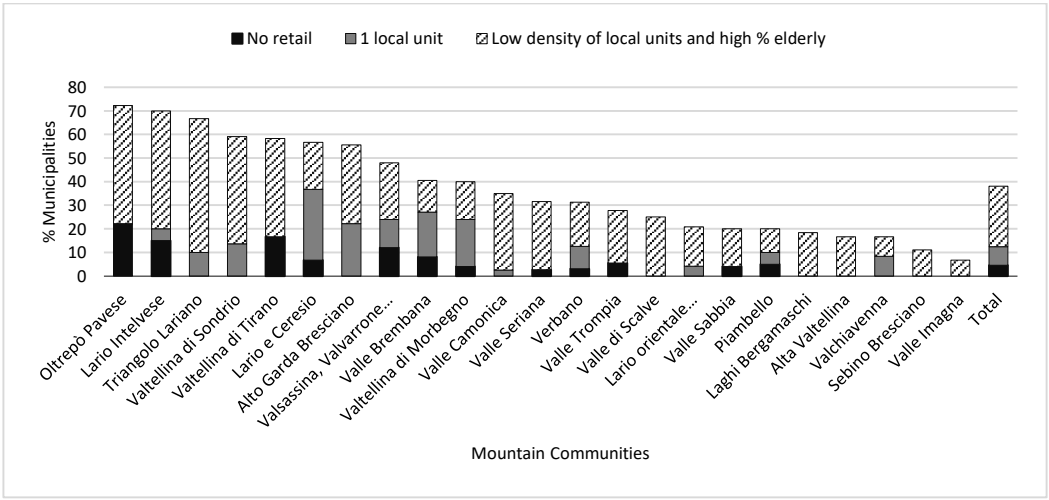


Fig 7. Problematic cases in the Lombardy Mountain Communities, 2021. Source: our elaborations on ISTAT data (Population and households, Census of industry and services, Statistical archive of active companies)

Situations of growth in DI1 are rare in the 'lowlands'. They gradually become more frequent with increasing altitude, although such cases were not detected between 2011 and 2021 above 1,200 m. The 'lowlands' have greater demographic vitality, but there is also strong market competition due to the presence of large retail facilities and/or the large catchment areas of retail facilities in the foothills (between the plains and mountain valleys). This restricts the cases of growth in DI1 and also explains the higher frequency of trajectory T4. On the other hand, greater isolation and tourism flows at higher altitudes support retail trade, offsetting (at least in part) the negative effects of population decline. This is reflected in the combination of growth trajectories. In the 601–1,200 m band, retail trade resilience is more common (trajectory T3), with increasing weight over time, whereas at lower altitudes – especially in the 301–600 m band – there is more room for trajectories related to commercial expansion (T1 and T2). These differences can be seen once again in DI2. In particular, it is worth noting that although trajectory T1 became rarer over the latter decade, it continued to be overrepresented at altitudes below 600 m. Municipalities with no commercial businesses are mainly located in the 'middle' altitudes (601–900 m), especially in Oltrepò Pavese.

In the 2001–2011 period, it was more common for DI1 to grow in production municipalities, albeit with a narrower gap compared to the others. Subsequently, the residential municipalities stood out with a highly varied value framework; these were mainly characterised by trajectory T3. This trajectory is also widespread in tourism municipalities, but remains underrepresented in production municipalities, where there is still strong business expansion, thus fuelling trajectories T1 and T2. Production municipalities also stand out due to the weight of trajectory T4 and the relative scarcity of commercial desertification, which is mainly an issue for residential municipalities and, surprisingly, even some small tourist resorts close to more popular destinations. Looking at DI2, production municipalities appear to differ from the others in terms of the consistently higher proportion of situations of growth, which are largely associated with trajectories T1 and T2. In the group of municipalities with more than 5,000 inhabitants, there are also many cases of growth in DI2, but there is less symmetry compared to the corresponding picture for DI1.

4.3 The concentration/deconcentration of retail trade and problem municipalities

From the data examined thus far, it is not clear whether there were any bursts of concentration/deconcentration in the distribution system in the Mountain Communities between 2001 and 2021. The HHI, calculated for retail outlets and staff, helps to answer this question. Despite the revolutions introduced by the development of mass-market retail and e-commerce, retail businesses still 'follow' the resident population. As such, we do not find high HHI values such as those applicable to services focusing on knowledge and innovation, for example, which mostly tend to cluster in larger cities to take advantage of economies of agglomeration. However, even for the commercial sector, different HHI values are found in the Mountain Communities, reflecting situations that are more or less polarised according to the settlement characteristics and local socioeconomics. For retail outlets, the HHI ranges between 0.077 and 0.591 for 2021, while it is between 0.091 and 0.626 for staff; in both cases, Val Seriana and Alta Valtellina occupy the ends of the scale. In general, the values are higher for small Mountain Communities – especially those in the Province of Sondrio – whereas they tend to fall in larger, more polycentric areas. In addition, the values pertaining to jobs are higher, as these tend to be more concentrated than retail outlets. Between 2001 and 2021, the HHI for sales outlets increased in 14 Mountain Communities, as well as in 15 Mountain Communities for jobs. Therefore, not only has the distribution system in the mountains weakened, as we saw above, but there is also evidence of bursts of concentration in many areas that have widened local gaps.

This trend is confirmed if we consider the 120 municipalities with higher density indices (DI1 and DI2) than those of their respective Mountain Communities. Over the twenty years in question, many of these have strengthened, which is more noticeable in terms of retail outlets (72 cases) and less so in terms of jobs (62 cases). With respect to the individual Mountain Communities, municipalities with a surplus of local units and retail staff grew stronger at the expense of others, with 20 such cases for sales outlets and 16 cases for staff.

Within the general progressive contraction of the distribution network, 23 municipalities (with 5,913 inhabitants) were affected by commercial desertification in 2021 and another 40 (with 11,672 inhabitants) were very close to it, given that they only had one shop. These are small municipalities (with an average population of 279), predominantly located in the 601–900 m altitude range and at an average distance of 9.2 km from the closest neighbour with a retail trade surplus (this is the distance between the main towns in the municipalities – where most of the population lives – calculated according to the road network). Many such 'problem' municipalities (42 of 63) share a border with others that have an overabundance of retail trade, a situation that seems to have helped weaken their local distribution networks (van Leeuwen & Rietveld, 2011; Nilsson, 2023).

Critical issues may occur not only in the municipalities referred to above, but also where the distribution network is very sparse and there is a high concentration of elderly people, who generally rely more heavily on the local supply system (Milbourne & Kitchen, 2014; Verma & Taegen, 2019). This combination is not uncommon in the mountain area of Lombardy. Of the 269 municipalities with a lower DI1 compared to the relevant Mountain Community, 131 have a larger elderly population than the average in the mountains overall (24.4% in 2021). Adding these cases to the previous ones, we see high values in many Mountain Communities (Figure 7), with a peak in Oltrepò Pavese (72.2%). This data suggests a 'potential' hardship: field research is needed to confirm whether this translates into 'actual' hardship – for whom and for which types of goods – where the availability of retail outlets has become excessively scarce or even disappeared entirely.

5. Discussion and conclusion

In mountain areas, and rural areas in general, protecting the network of services that support daily life is important for maintaining the liveability of the places, consolidating small proximity economies, limiting depopulation, and curbing residents' dependence on large urban centres. However, it is not easy to counteract the forces driving the increasing scarcity of basic public and private services. In Lombardy, this issue is the focus of the *Agenda del controesodo* (Anti-Depopulation Agenda), a document approved in 2022 as part of the 2021–2027 cohesion policies. It presents a broad plan of action to support marginal mountain and plain areas with a place-based approach.

The work presented here highlighted commercial activities as a key component of 'living well' in the mountain municipalities of Lombardy. An analysis of the evolution of the distribution network over the 2001–2021 period showed weakening in the vast mountain area, with a greater drop in the number of retail outlets than the rest of Lombardy. The number of municipalities affected by commercial desertification also increased. These municipalities are mostly located in the intermediate altitude range and in Oltrepò Pavese (in the Apennines), locations that are known to be more fragile (Fondazione Montagne Italia, 2016; Fuschi, 2019). The scarcity of sales outlets increased in the latter decade, although such signs were already visible before, when the mountain population was still growing. In line with Peiffer-Smadja and Torre (2018), we confirm that in Lombardy over a turbulent twenty-year period, the liberalisation of the commercial sector (instituted by Italian Legislative Decree 114/1998) benefited urban areas in the plain, which are more resilient and attractive in terms of property investments in the retail sector. There is also evidence of similar dynamics in other regions of Italy, particularly in Tuscany (Agnoletti & Patacchini, 2023).

If we consider DI1, the mountain areas do not initially appear to be problematic. Of course, the number of sales outlets dropped between 2001 and 2021, but their density compared to the resident population remained constant, above the regional values. The presence of tourism, which 'expands' local markets, explains this particular aspect. In reality, however, there are many critical issues, because the drop in DI1 over the long term was more dramatic than the regional trend. In addition, there are marked differences in the density indices, both among Mountain Communities and among individual municipalities, with higher values in areas farther from the plain, in the main towns, and in locations focused on tourism and production. Where DI1 is low (a sparse distribution network), there is often a large proportion of elderly people. This is a significant problem because this segment of the population, which is large in Italy,

especially in mountain areas, risks being 'trapped' in the local area (Milbourne & Kitchen, 2014) and forced to make do with the limited selection of local shops and perhaps even higher prices.

In mountain areas, the network of services – including the most common ones – is extremely unbalanced (Di Gioia, 2010; Chilla et al., 2022), and the situation in Lombardy is no exception. Moreover, between 2001 and 2021, most Mountain Communities recorded an increase in the polarisation of retail outlets and, to a lesser extent, the related jobs. The analysis of retail staff dynamics highlights another consideration: while the performance is not as good as on the regional level, the average size of local units increased. This is positive both due to the number of jobs, thus strengthening the local economic fabric, and due to the broader range of services available to consumers.

The ongoing reorganisation of the retail sector has helped to strengthen the valleys in a twofold process. On the one hand, it entails an intense urbanisation process following a distinctive ribbon-like structure, in which medium and large retail outlets are the focus. On the other hand, this strip of land in direct contact with the plain serves to regulate the complementary relationships (rediscovered) between the mountains and plain alluded to in the 'metro-mountain' paradigm (Dematteis & Corrado, 2021), which ties into the more general debate on rural/urban partnerships (OECD, 2013). These 'lowlands' contain many production municipalities with more than 5,000 inhabitants, thus serving as points of reference for larger areas. Strengthening these municipalities, preventing them from being 'overlooked' for shopping and work in favour of towns in the plain, can contribute to the vitality of the mountains.

There are significant differences between residential, production and tourism municipalities in terms of retail dynamics and density. The distribution network contracted the most in the first municipalities, which are smaller, more fragile (low DI1 and DI2), and often located in the shadow of larger municipalities and those with an overabundance of retail trade compared to the related Mountain Community. It should come as no surprise that tourism municipalities have a higher surplus of sales outlets and staff in relation to their population. However, between 2001 and 2021, the production municipalities performed best, especially in terms of jobs. This is probably due to the strong competition between tourist destinations and the types of adverse events (such as the COVID-19 pandemic) that cause tourist flows to fluctuate, but it may also be necessary to rethink local economies in light of climate change.

In this paper, we examined how the increase or decrease in retail trade density with respect to population relates to a range of evolutionary trajectories. Amid an overall situation that is gradually becoming more problematic, it is interesting to note that certain municipalities counter these trends, with increasing density indices. There are only a handful of situations, especially for DI1, which have moved in the opposite direction. An increase in density is more common in the 'lowlands', larger municipalities, and those focused on production, due to expanding trade, especially when jobs are considered. In residential and tourism municipalities, however, retail trade resilience is more common at medium and high altitudes.

The mountains present a multifaceted situation, and our research could be expanded in at least three different directions. First, it would be useful to examine other mountain areas to identify similarities and differences with Lombardy in terms of the evolution of the distribution system. In addition to the differences in Italy between the Alps and Apennines, there is also a historical divide between North and South, all of which is reflected in the evolution of the commercial sector. Second, it would be interesting to explore the reorganisation of distribution networks on a finer scale – i.e., within individual mountain valleys – to understand how anchorage in the settlement networks of the various towns conditions retail trade dynamics. This is an aspect that is not very clear in our paper, which pertains to administrative partitions (Mountain Communities), although it is a fairly crucial point (ESPON, 2014; Bański, 2022; Bertram et al., 2024). An initial exploration in this direction concerning the province of Sondrio showed that the municipalities with a rarefaction of commercial supply – increasing in the period 2010-2022 – are not only the smallest and most isolated ones (Clerici, 2024).

There are also differences in the dynamics of food and non-food retail trade that should be investigated in more detail, as Amcoff (2016) suggests in an interesting study on the reorganisation of the distribution network in Sweden. Finally, in light of the stratification of policies supporting mountain areas, it would be

useful to determine which measures have been instituted to support commercial businesses, their impacts, and how they are perceived by local communities.

The mountain 'outskirts' may not be as interesting as large urban areas – the epicentres of innovation in retail and many other fields – but they should not be neglected when promoting sustainable, cohesive development.

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