OBSERVATORIO de la Movilidad Metropolitana

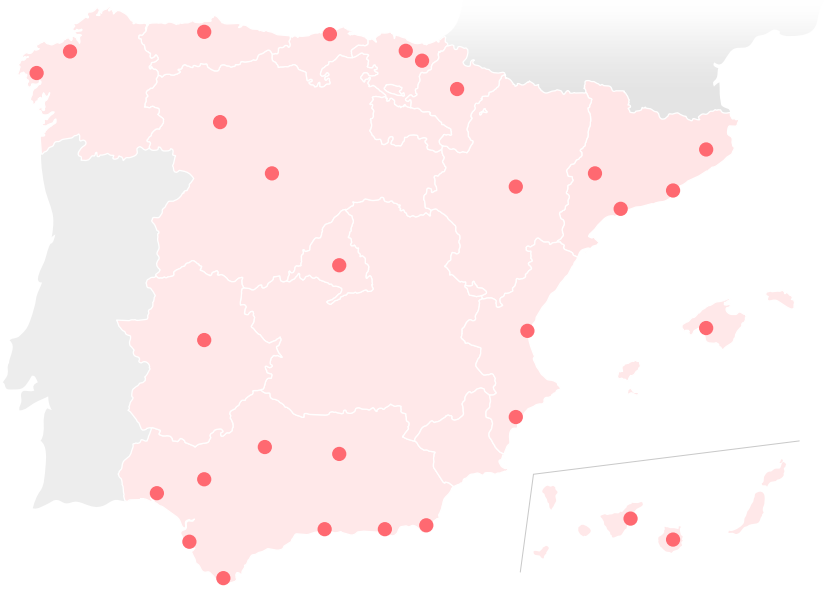
METROPOLITAN MOBILITY OBSERVATORY 2024

Summary Report 2022 and Advance 2023

The **MMO** is a forum of analysis and discussion formed by the public transport authorities (PTAs) of the main Spanish metropolitan areas. Its activities are supported by the Ministry of Transport and Sustainable Mobility, with the collaboration of the Ministry for Ecological Transition and Demographic Challenge, the General Directorate of Traffic (DGT), the National Railway Operator (RENFE) and other institutions, such as the Association of Urban and Metropolitan Public Transport Companies (ATUC), the Spanish Federation of Municipalities and Provinces (FEMP), INECO Consultancy, the Institute for Energy Diversification and Savings (IDAE), the Spanish Railway Foundation and the Trade Union Federation CCOO.

This report includes information from **27 PTAs***. These metropolitan areas represent some **59.2%** of the country´s p**opulation**. Other regular sources, such as RENFE, the Directorate General of Traffic (DGT), and the National Institute of Statistics (INE), provide the rest of the information.

This report contains the complete information for 2022 and an advance of some data available for 2023 at the time of publication. In this way, the report reflects the last urban and metropolitan mobility data set at the national level.



*Madrid, Barcelona, Valencia, Seville, Bizkaia, Asturias, Malaga, Majorca, Saragossa, Cadiz Bay, Gipuzkoa, Tarragona MA, Alicante, Granada, Almeria, Pamplona, Gibraltar MA, Corunna, Lleida, Jaen, Leon, Caceres, Valladolid, Huelva, Santander, Cordoba and Tenerife Island.

Main Figures 2022-2023

- In **2022,** a total of **3,226 million trips were made by public transport modes:** 1,544.2 million by bus and 1,681.8 million by rail modes. The lengths of the corresponding networks are 128,384 km of bus lines and 3,589 km of rail network. In **2023, 3,393.8 million trips1 were made by PT:** 1,579 million by bus and 1,813 million by rail modes.

- The annual public transport length of journeys in 2022 was 21,948 million passenger-km (36% for bus and 64% for rail modes) and 23,208 million passenger-km in 2023, 32% more than in 2022.

- In 2022, the **public transport supply was 663 million vehicles-km for bus services and 366 million vehicle-km for rail modes. In 2023, 419 million vehicles-km** were offered for bus services and 281 million vehicle-km for rail modes (excluding Cercanías RENFE).

- Out of the **913.4 million euros1 invested in public transport in 2022,** 66.9% were dedicated to the maintenance or purchase of infrastructure, and 33.1% were used to renovate rolling stock. A share of 80.3% was invested in rail modes.

- The number of public transport trips per inhabitant per year differs according to the size of the metropolitan area. In 2022, the average was 113 trips per inhabitant in large metropolitan areas, 54 in medium-sized ones, and 59 in small areas.

- **The average cost coverage ratio[2] was 43%.** Transport systems in metropolitan areas that include rail modes have a lower coverage ratio than those with only bus supply.

1 The data corresponds to 14 Metropolitan Areas: Madrid, Barcelona, Valencia, Seville, Asturias, Saragossa, Cadiz Bay, Gipuzkoa, Tarragona Camp, Granada, Valladolid, Pamplona, Corunna, and Leon.

2 The coverage ratio can only be calculated for areas where revenue and cost data were available. Therefore, it was calculated for the following 19 MA: Madrid, Barcelona, Valencia, Seville, Asturias, Malaga, Cadiz Bay, Saragossa, Gipuzkoa, Tarragona Camp, Granada, Alicante, Corunna, Valladolid, Pamplona and Leon.

General Characteristics of the Metropolitan Areas by January 1st, 2022

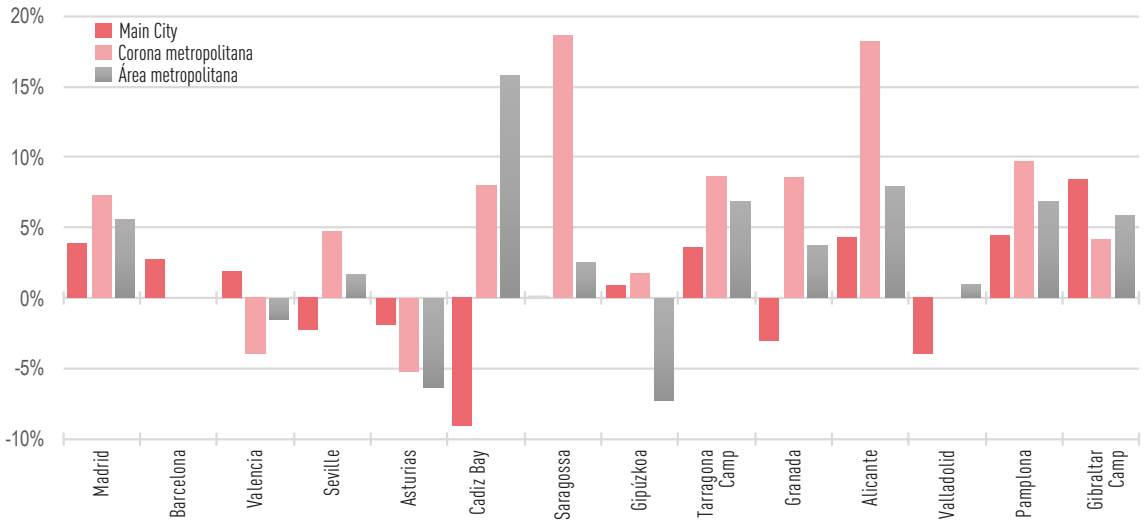
	Metropolitan Area							Main City			Population concentration ratio**
	Surface (km²)	Population	Density (inhab/km²)	Number of municipalities	Built up area (km²)	Surface Ratio *	Urban density (inhab/km²)	Surface (km²)	Population	Density (inhab/km²)	
Madrid	8,028	6,750,336	841	179	928	12%	7,274	605	3,280,782	5,423	49
Barcelona[1]	3,239	5,184,110	1,601	36	634	20%	8,177	101	1,636,193	16,200	32
Valencia	1,479	1,848,515	1,250	60	306	21%	6,041	139	792,492	5,701	43
Seville	4,221	1,496,238	354	45	229	5%	6,534	141	681,998	4,837	46
Bizkaia[2]	2,217	1,154,334	521	112	n.d.	n.d.	n.d.	41	346,405	8,449	30
Malaga	1,432	1,076,010	751	15	70	5%	15,372	395	579,076	1,466	54
Asturias	10,604	1,004,686	95	78	1,697	16%	592	187	215,167	1,151	21
Majorca	3636	914,564	252	53	n.d.	n.d.	n.d.	209	415,940	1,990	45
Cadiz Bay	3,312	823,806	249	12	n.d.	n.d.	n.d.	14	113,066	8,076	14
Saragossa	3,258	791,946	243	32	2,873	88%	276	938	673,010	717	85
Gipuzkoa[2]	1,980	725,000	366	89	n.d.	n.d.	n.d.	73	188,000	2,575	26
Tarragona Camp	2,999	644,038	215	132	191	6%	3,372	65	134,883	2,075	21
Granada	861	541,815	629	33	n.d.	n.d.	n.d.	88	228,682	2,599	42
Almeria[3]	2,127	522,687	246	18	n.d.	n.d.	n.d.	296	196,851	665	38
Alicante	354	477,766	1,350	5	74	21%	6,456	201	338,577	1,684	71
Córdoba	3,972	432,554	109	21	85	2%	5,089	1,255	319,515	255	74
Corunna	494	419,110	848	10	57	12%	7353	38	244,700	6,439	58
Huelva	3256	410,375	126	21	n.d.	n.d.	n.d.	151	141,854	939	35
Valladolid	955	410,287	430	25	125	13%	3282	198	297,775	1,504	73
Lleida[4]	5,586	361,911	65	149	182	3%	1989	212	140,403	662	39
Pamplona	92	357,018	3,881	18	50	54%	7140	25	203,418	8,137	57
Gibraltar Camp[5]	1,530	273,811	179	8	432	28%	634	88	122,368	1,391	45
Jaen	3,488	273,286	78	27	n.d.	n.d.	n.d.	424	111,669	263	41
Leon	913	200,144	219	16	21	2%	9531	39	120,961	3,102	60
Santander[7]	268	272,325	1,016	8	-	-	-	36	172,606	4,795	63
Caceres[6]	n.d.	95,418	n.d.	20	n.d.	n.d.	n.d.	1,760	95,418	54	100
Tenerife[8]	2,034	931,466	1,012	4	n.d.	n.d.	n.d.	150	208,563	4,770	63

** Built-up surface/ total surface of the metropolitan area.*
*** Population of the capital city/ population of the metropolitan area.*
1: The 36 municipalities belong to the metropolitan area of Barcelona (AMB), while the other data come from a more extensive area. The surface and the population of the AMB are: 636 km² and 3,2Mhab. Built-up Surface: data from 2020.
2: Surface data and main city data are from 2021.
3: 2018 data.
4: 2020 data.
5: Built-up surface data from 2007.
6: Main city data from 2017. Other data from 2021.
7: MA surface: data from Region of Santander.

Source: compiled by authors based on data provided by PTAs.

Population trends and other socio-economic indicators

Population variation in metropolitan areas (2013-2023)



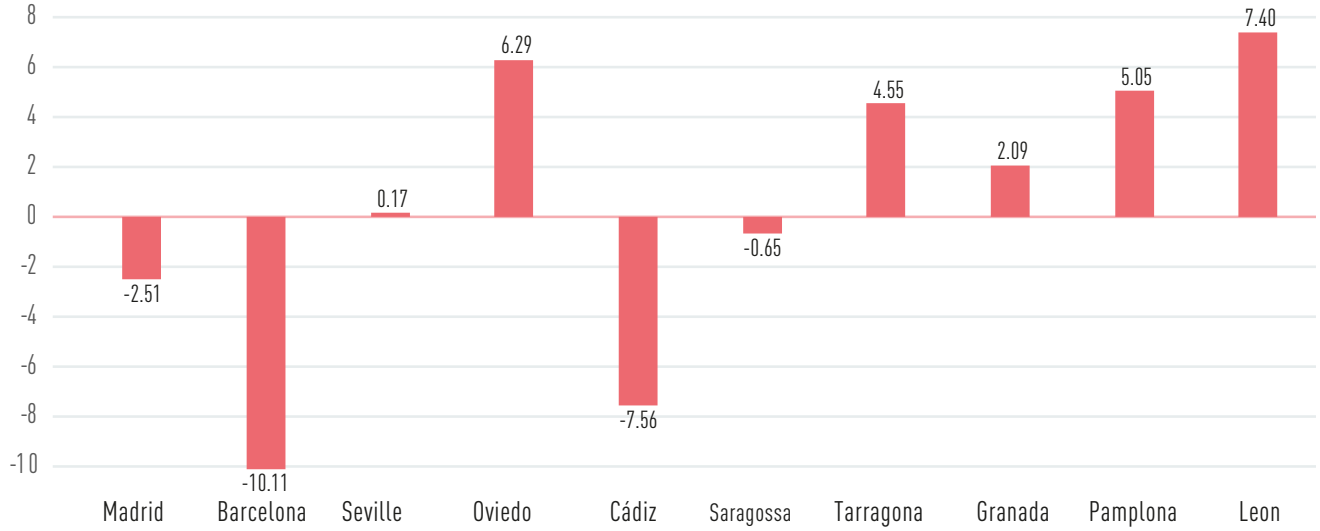
Cadiz Bay and Saragossa have incorporated new municipalities into their areas over the years, hence with significant variations.
Source: compiled by authors based on data provided by PTAs.

The population in most Metropolitan Areas grew between 2013 and 2022, an average **of 3.2%**, most of which occurred in the peripheries (+3.4%). The population of the main cities has remained almost the same (+0.2%). The areas of Cadiz Bay and Jaen have had the highest population growth in the period, with increases of 15.7% and 12.7%, respectively. As for the cities, Cadiz and Leon have seen the sharpest declines in population during this period, with values of around -8.1% and -7.4% respectively.

In 2023, the positive trend of job creation from previous years continued: the **unemployment rate was reduced to 12.9%.** This same year, the unemployment rate in the analysed areas decreased by 2.5% compared to the previous year and by 41.8% compared to 2013 rates. Cadiz Bay (41.5) and Asturias (18.1) are the areas with the largest unemployment decreases in the last year.

The **motorization rate in 2023 was 0.29% lower than previous year.** The motorization rate evolution from 2013 to 2022 was very uneven, depending on the area. Leon and Oviedo have significantly increased their motorization rate (7.4 and 7.1%, respectively), whilst Barcelona and Cadiz have decreased their rates (-10.1% and -7.6% respectively).

Variation of the motorization rate (nºvehicles/1000 inhabitants) (2013-2023)

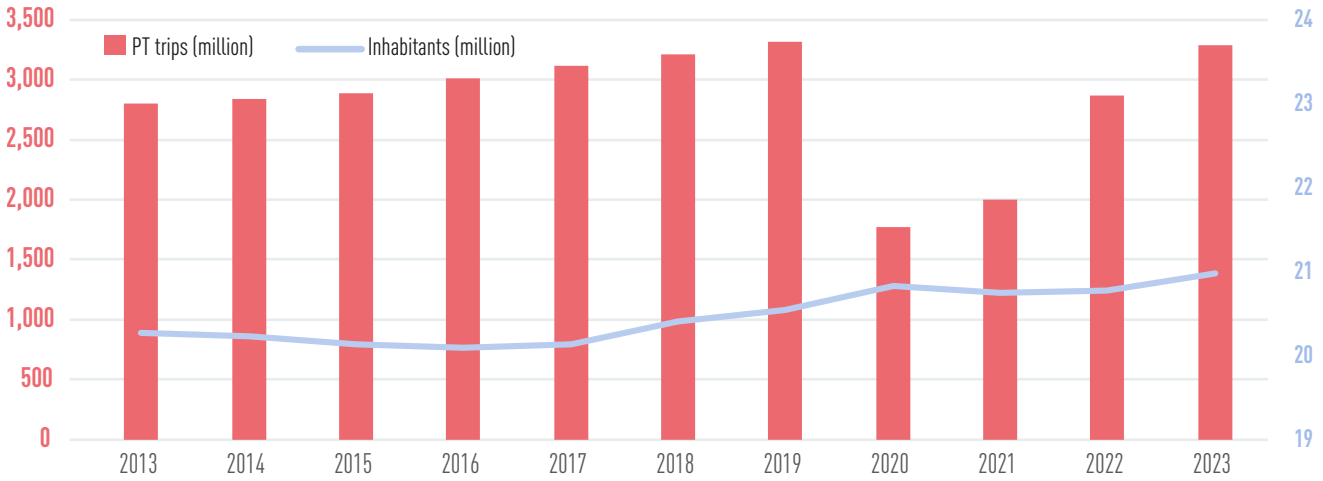


Source: compiled by authors based on data provided by PTAs.

Demand for public transport

In 2023, travel demand increased by 14.4% compared to 2022: bus travel increased by 10.6%, and rail travel increased by 39.1%. The demand for travel continues to show a gradual recovery, although pre-pandemic figures have not yet been reached.

Evolution of public transport trips vs population (2013-2023)



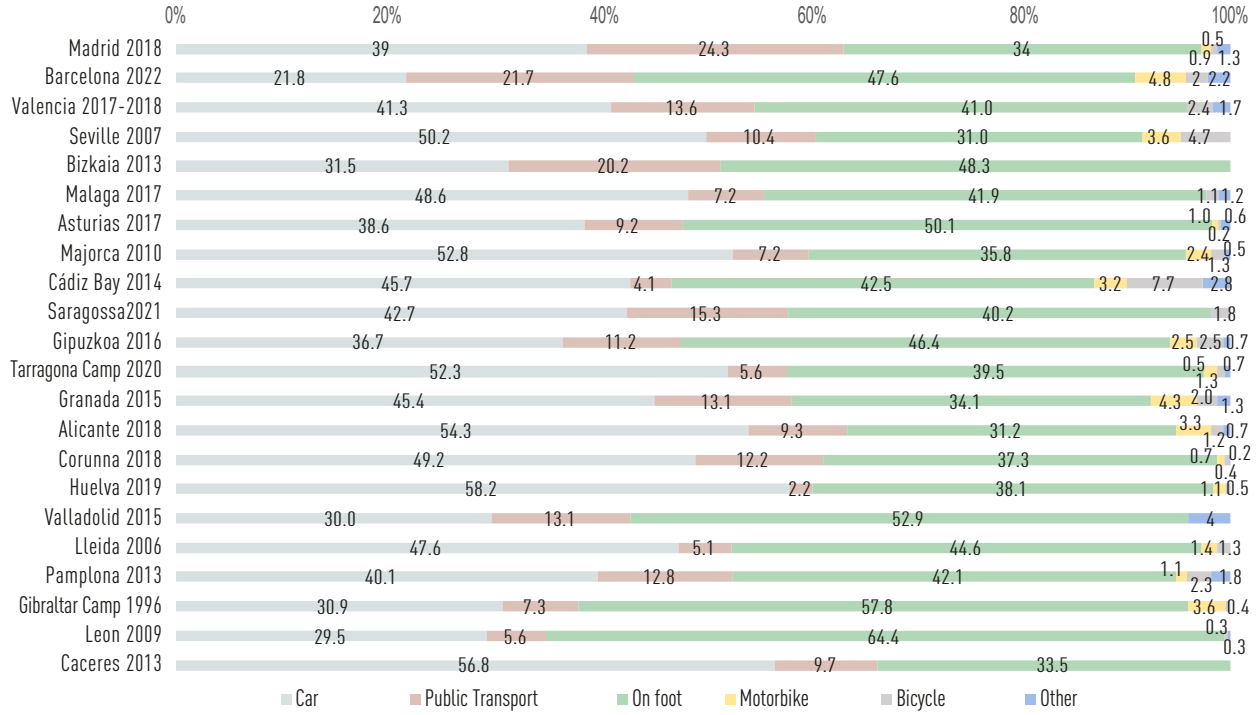
Data from Madrid, Barcelona, Valencia, Seville, Asturias, Malaga, Cadiz Bay, Saragossa, Gipuzkoa, Tarragona Camp, Granada, Alicante, Pamplona, Gibraltar Camp and Leon.
No 2013 data from Alicante and Caceres.
No 2021 data from Alicante.
No 2023 data from Malaga city bus.
Source: compiled by authors based on data provided by PTAs.

Modal split

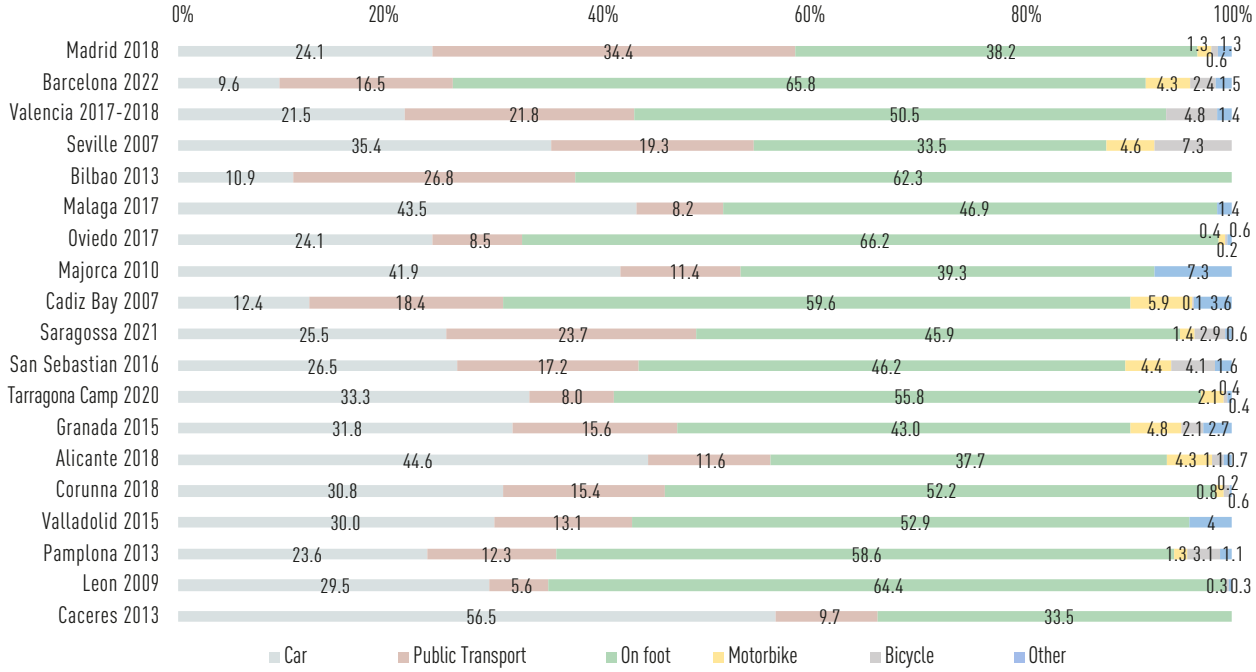
The public transport share on metropolitan areas trips **is 10.9%**. This figure varies greatly from area to area: in Madrid, it is 24.3%, while in Huelva, it is 2.2%. Bigger conurbations account for higher shares of PT patronage. Related to other modes of transport, non-motorized travel (walking and cycling) accounts for **44.0%** of total trips, while motorized travel (private cars and motorbikes) has a **45.9%** share of total trips in the metropolitan areas reported.

The two main cities, Barcelona and Madrid, show quite sustainable mobility patterns. Barcelona has a non-motorized trip rate of 66.4%, while in Madrid, 34.4% of trips are made by public transport. These two cities have different characteristics: Barcelona is denser with a rooted habit of walking or cycling, while Madrid is bigger because it includes all of the Madrid Region, therefore longer trips, but has a very well-integrated multimodal PT network attracting one-third of daily trips.

Modal share for all trip purposes



Modal share in the Capital City



Source: compiled by authors based on data provided by PTAs.

Public transport supply

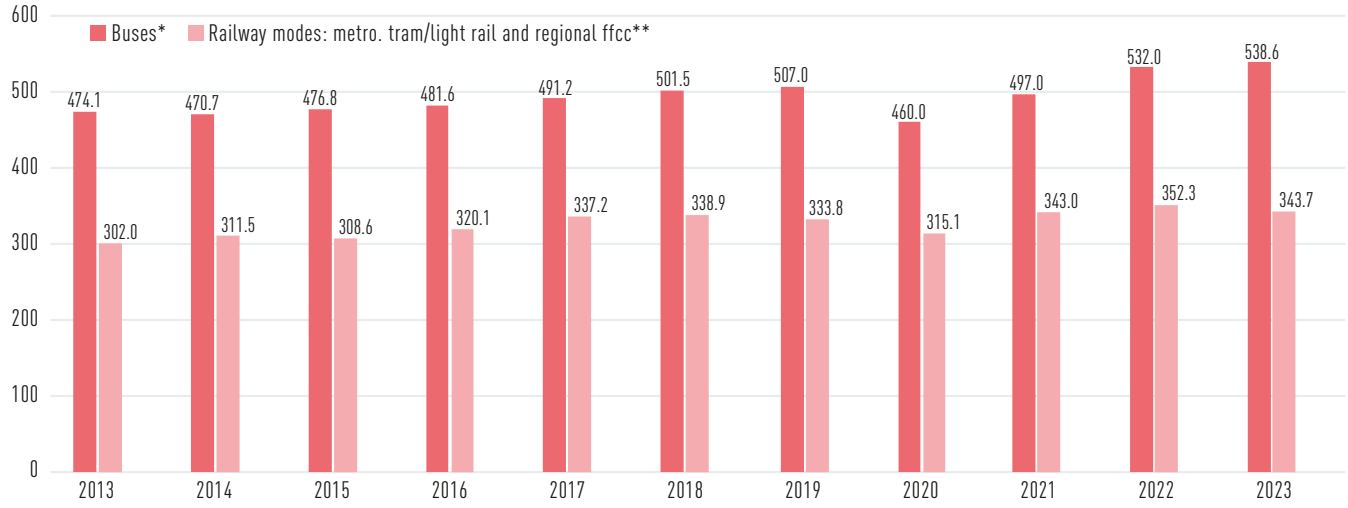
The **supply of bus services** (in vehicle-km) **has increased by 1.3% from 2013 to 2023.** The increase over the previous year, 2022, was 0.6%. The average density of the bus network **was 4.8 km per 1,000 inhabitants.** Asturias and Huelva are well above this value, with more than 10 km per 1,000 inhabitants. The highest density of the PT network by area corresponds to Barcelona with 8.5 km/km², Pamplona and Malaga with 4.1 km/km², and the global average is **1.8 km/km².**

Commuter rail delivers services on longer distances. The density of the rail network is higher in the most populated areas. The average **density of the rail network** in Spain **is 209 km per million inhabitants and 127 km per 1,000 km².** Santander, Leon and Asturias have a significantly higher figure due to the length of the narrow-gauge commuter rail lines.

In 2022, the **length of bus lines decreased on average by 1.5%** respectively compared to 2021, although the number of routes slightly increased. On the other hand, the size of rail networks has also decreased by 6.34% compared to the previous year, with those of Madrid (718 km) and Barcelona (762 km) being the largest. Between 2013 and 2023, the length of the bus lines in the studied areas increased by 7.8%, and the length of the railway network grew by 32.8%.

Passenger capacity offered by public transport is measured by the number of seat-km offered by each mode. **In 2022, 49,416 million seat-km were offered in bus services and 89,553 million in rail modes, 4.7% and 2.9 more than in 2021,** respectively.

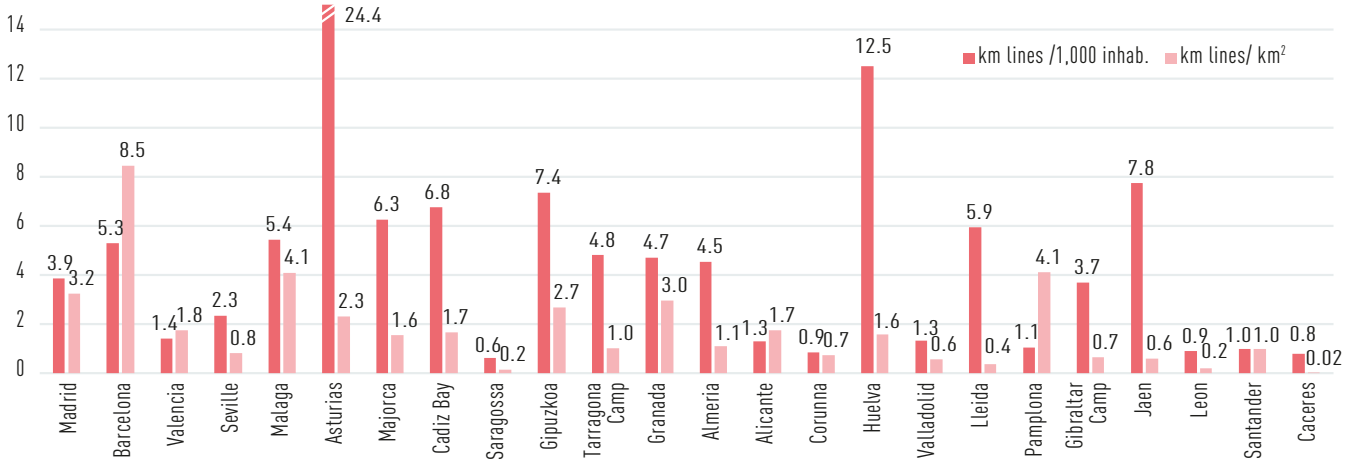
Public Transport Supply of bus and rail services services (million vehicles-km)



**Made with Madrid, Barcelona, Seville, Asturias, Cadiz Bay, Tarragona Camp, Granada, Alicante, Corunna, Pamplona, Gibraltar Camp and Leon data. In Asturias only Oviedo city bus is considered. In Cadiz Bay and in Gibraltar Camp only metropolitan bus is considered. In 2019, only data from the metropolitan bus is available for Granada. **Made with Madrid, Barcelona, Seville and Valencia data.*

Source: compiled by authors based on data provided by the PTAs.

Bus network density (2022)

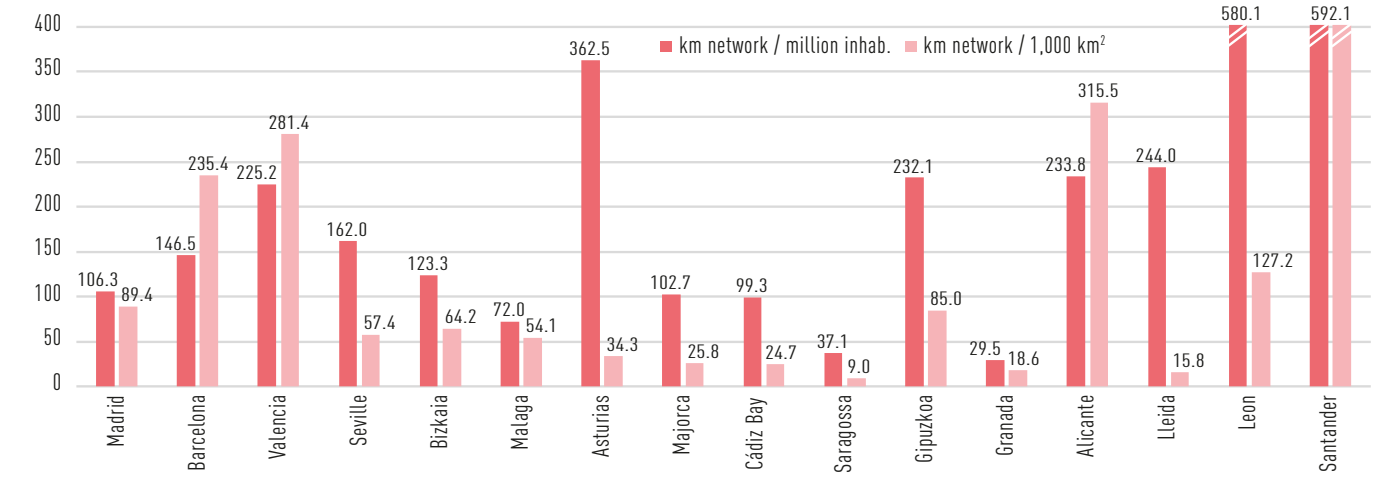


Cadiz Bay, Gibraltar camp and Huelva only metropolitan bus. Huelva and Lleida: 2020 report data.

Granada: 2019 report data. Almeria: 2018 report data.

Source: compiled by authors based on data provided by the PTAs.

Rail network density (2022)

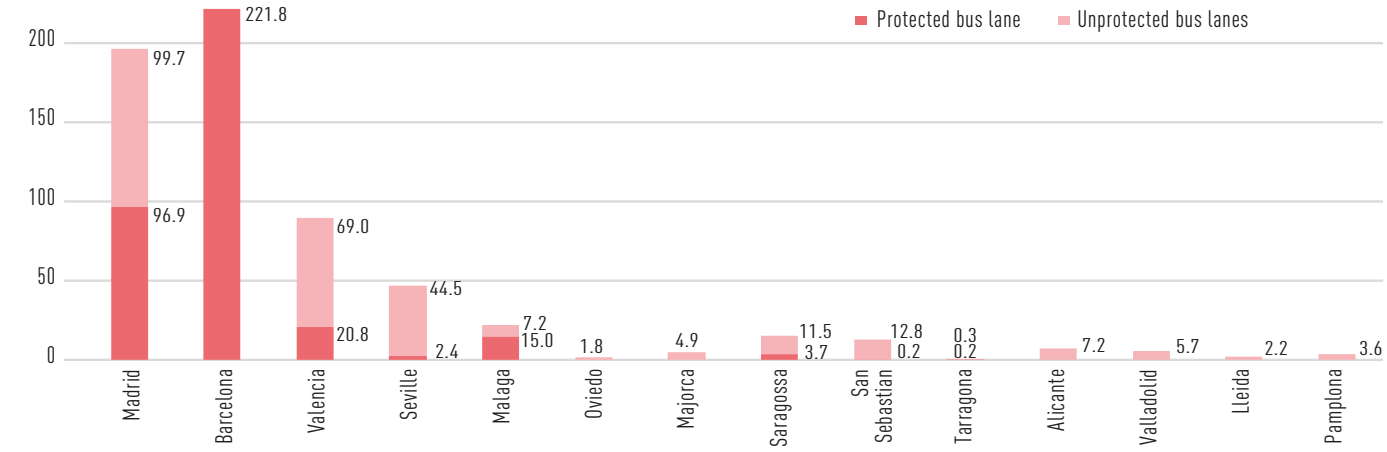


Lleida: 2020 report data.
Source: compiled by authors based on data provided by the PTAs and the RENFE Directorate General of Passengers.

Dedicated bus lanes

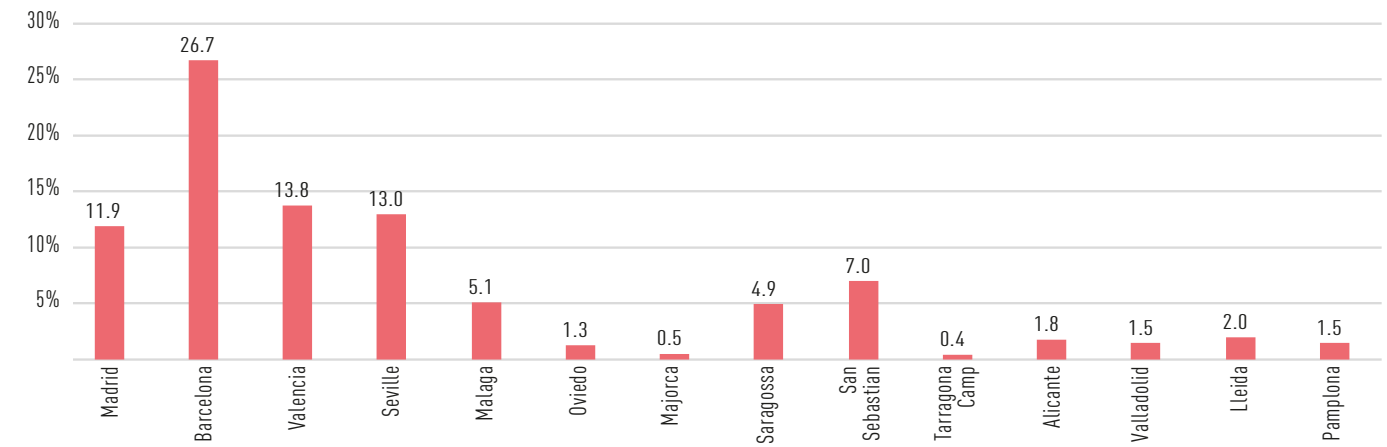
Dedicated and priority lanes for buses are essential to foster competition with private vehicles. Bus lanes are more effective if they are protected from car invasion. As for 2022, Barcelona had the longest length of bus lanes network (221.8 km), as well as the highest percentage of bus lanes with respect to the total network within the capital city (26.7%), followed by Valencia (13.8%) and Seville (13.0%).

Length of bus lanes in main city (2022)



Barcelona data: no distinction between with and without protection lanes.
Source: compiled by authors based on data provided by the PTAs.

Percentage of bus network with bus lanes in main city (2022)



Source: compiled by authors based on data provided by the PTAs.

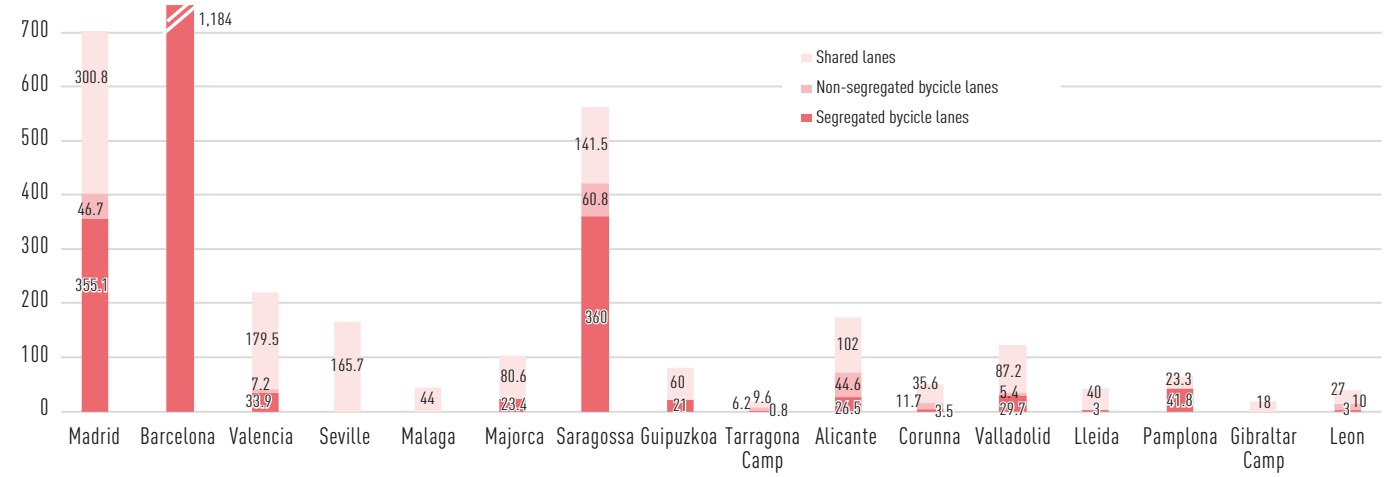
Dedicated bike lanes

Since 2019, there has been an **increase of 40.7% in the use of bicycles in Spanish cities:** their users have increased from 8.1 million to 11.4 million. Bicycles are mainly used for commuting trips.

The support of local authorities for cycling is growing, given the multiple benefits of cycling for users (improved quality of life and health, lower economic costs) and the city (less road occupation and reduction of air and noise pollution). Promoting cycling in cities starts by having adequate, safe, and efficient spaces for cyclists to cycle and park.

The figure below shows the length of three different types of cycle lanes in Spanish cities: segregated or protected cycle lanes (cycle lanes with lateral physical separation from the rest of the road traffic), non-segregated (cycle lanes that run alongside the road, one-way or two-way), and cycle lanes (one-way streets with priority for cyclists). Barcelona and Madrid are the cities with the most extended network of bike lanes.

Length of bicycle lanes in the main city in 2022 (km)

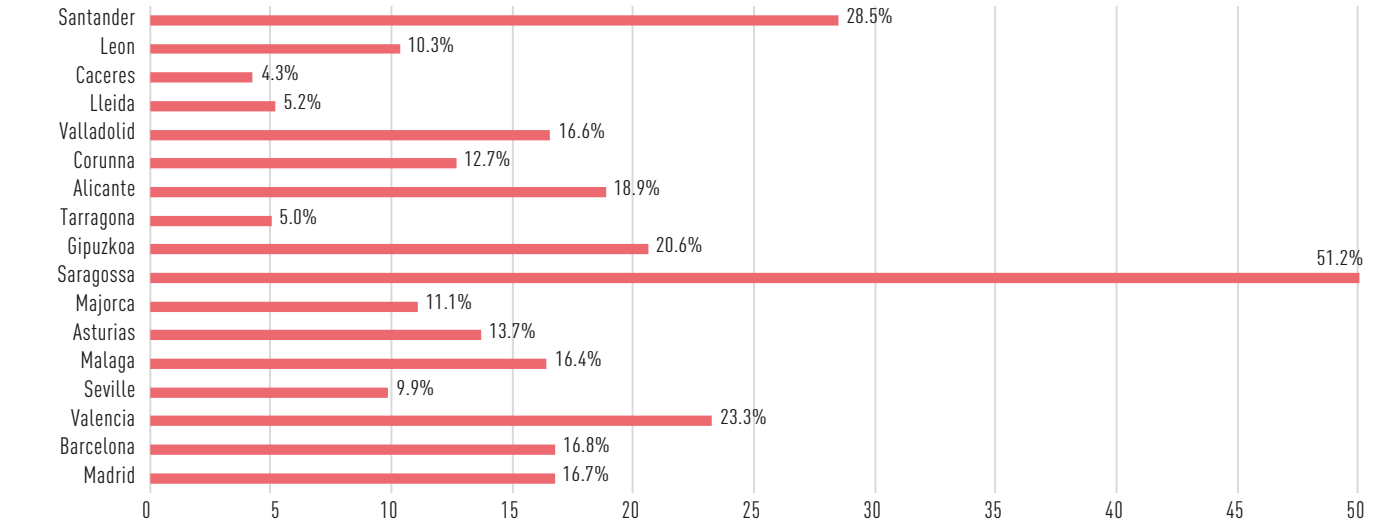


Source: compiled by authors based on data provided by the PTAs.

ITS and information

Intelligent Transport Systems (ITS) increase public transport's efficiency, reliability, sustainability, and safety. They enable public transport operators to collect and share a large amount of data on the different services. Among the most important ITS are the **OSS (Operational Support Systems),** which monitor vehicles in real-time to facilitate the daily operation of public transport services, or **e-ticketing,** which improves and makes ticket purchases and payments more flexible and agile.

% bus stops with real-time information screens (2022)



Source: compiled by authors based on data provided by PTAs.

Another key aspect for improving PT service satisfaction is the real-time information provided on the vehicle, stop, or station screens or through the various mobile applications (apps), available in all areas and for most modes of transport. These apps have different functionalities (display of maps and routes, journey planning, real-time waiting time, and disruption information), allowing users to choose both the route and mode of transport that suits them best and reducing waiting times and uncertainty on the journey.

The social networks of PTAs and operators are real-time, two-way communication channels with users. The Spanish population regularly uses social media when travelling by public transport, improving their travel experience. These communication channels provide real-time public transport service information at a minimum cost.

Public shared bicycle services

Public shared bicycle systems allow citizens to use bikes, which are available in several spots located in the central areas, where they can collect and return. They have been implemented in many cities as a sustainable mobility alternative for urban travel and are usually managed by city councils. Users need to be registered to have access to public bicycle services. According to the Public Bicycle Observatory, several public bicycle systems exist in Spain. Management and technology of the system and the type of bicycle offered (conventional or pedelec) differ from one city to another.

Since 2010, many public bicycle-sharing services have been implemented. However, their number has decreased significantly: there are currently around 53 systems, 60% less than in 2010. Most of these systems closed due to a lack of economic viability.

The following table shows the supply and demand data for public bicycle services in the capital cities. Barcelona stands out as the city with the highest number of bicycles available and the highest number of registered users in the year 2022.

Offer and demand for public bicycles in the main city (2022)

	Lending points (no.)	Total number of anchorages	Available bicycles	Service area/ main city area ratio (%)	Operating hours	Registered users	Regular users	No. of loans per year	Average travel distance (km)	Bicycle rotation* (daily use)
Madrid (BiciMad)	264	6,318	2,964	n.d.	24	58,397	54,302	2,954	4.0	n.d.
Barcelona[1] (Bicing)	519	15,000	7,000	73.6	24	136,587	n.d.	16,299	3.4	6.3
Valencia (Valenbisi)	277	5,502	2750	96.6	24	37,560	37,170	3,509[4]	n.d.	n.d.
Seville (Sevici)	257	2,570	2,466	99.8	24	20,867	n.d.	2,468	n.d.	n.d.
Saragossa (Bizi Zaragoza)	130	2,778	1,300	4.5	18	12,785	1,097	1,065	1.8	2.6
Gipuzkoa[2,4] (Dbizi)	46	799	511	100[4]	18[4]	5,716[5]	n.d.	488	n.d.	3.3[6]
Corunna[3] (Bici Coruña)	32	551	230	100	18	7,589	5,914	329.5	4.5	4.8
Valladolid (Vallabici)	34	424	174	n.d.	24	773	n.d.	54	n.d.	148
Leon (ALSA-Next Bike)	27	243	300	100	24	2,894	870	49	n.d.	n.d.
Pamplona (Ride On)	42	834	400	99.6	24	43,307	n.d.	503	2.5	3.4

1: Operating hours: 21 hours on weekdays and 24 hours on public holidays.

2: Available bicycles: 120 electric +291 mechanical). Operating hours: 18 hours on weekdays and 24 hours on public holidays

3: Time slot: weekdays from 9:00 to 21:00.

4: Time slot: weekdays from 7:00 to 01:00

5: 2021 data.

**Annual average considering the number of uses and bicycles available.*

6: Registered users: 5,320 (annual users) + 396 (occasional users December).

7: Bicycle rotation: 6.81 uses/electric bike per day and 1.79 uses/mechanical bike per day.

Source: compiled by authors based on data provided by PTAs.

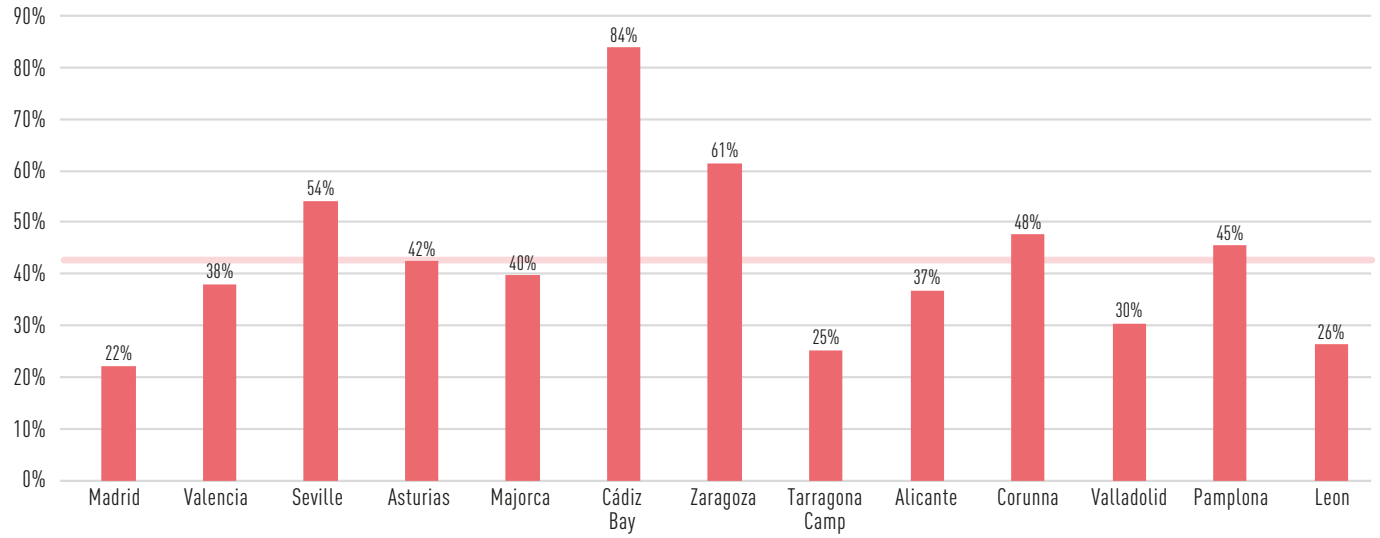
Types of tickets and fares

There is **great heterogeneity in the fare systems of the different urban areas,** meaning there are many types of transport tickets according to different territorial and demographic contexts. The only common ticket in all areas is the **single ticket,** although the coexistence of different modes of transport means that fares differ within the same city. In Madrid, the monthly pass is the most widely used ticket (77.5% of users). In Bizkaia, Malaga, Corunna, Jaen, and Gipuzkoa, wallet cards are the preferred transport pass used by more than 70% of travellers. Barcelona has the highest fare for a single ticket (€2.40).

Coverage ratio

The percentage of operating costs covered by fare revenues (coverage ratio) averaged 43% in 2022[3]. In general, metropolitan areas with rail modes have lower coverage ratios than those with only bus services. Outstanding cases are, on the one hand, Cadiz Bay and Corunna, with ratios of 84% and 61%, respectively, and, on the other hand, Madrid, Camp de Tarragona and Leon, with a ratio of 22%, 25% and 26%, respectively.

Coverage ratio for PT systems in the metropolitan area (2022)



Data from Cercanias Renfe is not included. Seville does not include tram or metropolitan bus but does include metro. Bahía de Cádiz does not include urban bus. Source: compiled by authors based on data provided by PTAs.

Urban accident rates

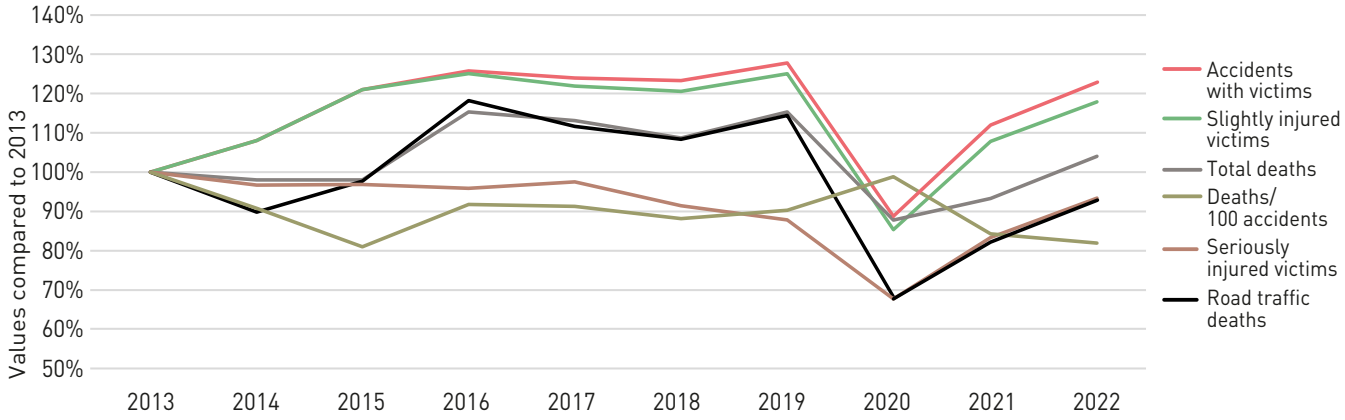
The urban accidentality rate followed a downward trend from 2000 until 2013 when there was a significant increase in the number of accidents with casualties. In the **2013-2022** period, the **number of accidents with casualties increased by 24%.** However, the **other accident indicators** (number of people hospitalized, number of road traffic fatalities, and fatalities per 100 accidents) **decreased** by an average of **-9%.** Therefore, there are more accidents but less serious.

The graph below shows a rather irregular evolution of urban accident indicators from 2013 to 2019: the number of seriously injured or fatalities per 100 accidents follow a negative trend, while others, such as the number of road traffic fatalities or the total number of fatalities, vary considerably from one year to the next. In 2020, all indicators -except the number of fatalities per 100 accidents- decreased considerably due to the drastic reduction of trips during the pandemic lock-out. In 2021, mobility increased compared to the previous year and, consequently, accidents. In 2022, the tendency remained rising for all indexes. However, they are still lower than the values of the pre-pandemic years.

.

3 This data corresponds to 13 areas: Madrid, Valencia, Sevilla, Asturias, Majorca, Cadiz Bay, Saragossa, Tarragona Camp, Alicante, Corunna, Valladolid, Pamplona and Leon.

Traffic accidents data evolution (2013-2022)



Shared mobility services

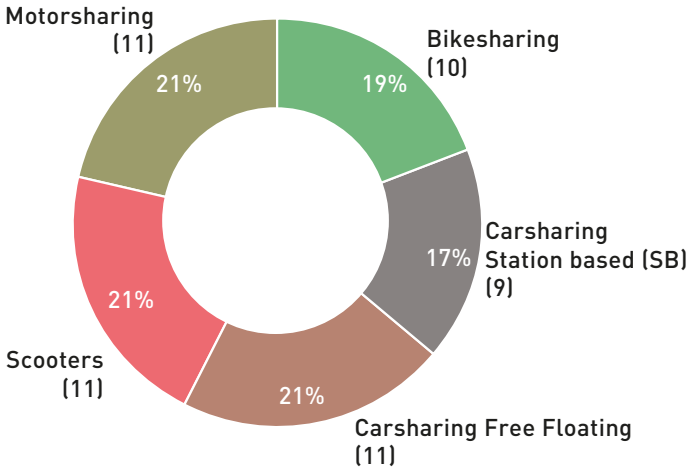
Shared mobility has become one of the essential elements of the new mobility services. They emerged as a **response to the problems of modern cities,** which are increasingly affected by pollution, climate change, congestion, and lack of physical space. It allows citizens to make their journeys by combining traditional sustainable urban transport modes (walking or public transport) with shared mobility modes (car-sharing, moto-sharing, bike-sharing), **increasing the efficiency of the transport system,** improving accessibility, reducing car dependency and, therefore, the emission of polluting gases.

Sharing services offer users a fleet of shared vehicles for individual use that can be rented through mobile applications. Users do not pay for the ownership of the vehicle, but for the minutes they use it. These vehicles are equipped with sensors and tracking systems that allow providers to share information in real-time about their location and status, as well as to calculate the approximate amount that the user must pay at the end of the journey (depending on the time of use, distance, type of vehicle, time of the day, location, among other factors), guaranteeing the efficiency and transparency of the service.

In Spain, larger cities have a greater variety of services, while medium-sized and smaller cities lack many. It is worth noting that in 2023, there has been a considerable increase in shared mobility companies operating in smaller cities. The spread of this type of mobility and plans to adapt to lower demands have allowed some of these services to be received with great success in these localities.

The following graph shows the percentage of companies offering vehicles for each sharing service type.

Companies providing new mobility services (2023)



OBSERVATORIO de la Movilidad Metropolitana

METROPOLITAN MOBILITY OBSERVATORY MEMBERS

Public transport authorities*

Autoritat de Transport Metropolità de València

Autoritat del Transport Metropolità de Barcelona

Autoritat Territorial de la Mobilitat Àrea de Lleida

Autoridad Territorial del Transporte de Gipuzkoa

Autoritat Territorial de la Mobilitat Camp de Tarragona

Autoritat Territorial de la Mobilitat Girona

Ayuntamiento de A Coruña

Ayuntamiento de Cáceres

Ayuntamiento de León

Ayuntamiento de Santander

Ayuntamiento de Valladolid

Cabildo de Tenerife

Concello de Vigo

Consorci de Transports de Mallorca

Consorcios de Transporte de Andalucía

Consorcio de Transportes de Asturias

Consorcio de Transportes de Bizkaia

Consorcio de Transportes del Área de Zaragoza

Consorcio Regional de Transportes de Madrid

Mancomunidad de la Comarca de Pamplona

Transporte Alicante Metropolitano

Transporte de Gran Canaria

* Alphabetical order

Other permanent members

Dirección General de Tráfico

Asociación de Transportes Públicos Urbanos y Metropolitanos

Federación Española de Municipios y Provincias

Dirección General de Viajeros de Renfe

Instituto para la Diversificación y Ahorro de la Energía

Ingeniería y Economía del Transporte

Sindicato de Comisiones Obreras

Fundación de los Ferrocarriles Españoles

transyt Centro de Investigación del Transporte

Drafting and writing:
TRANSyT, Centre for Transport Research - Polytechnic University of Madrid