OBSERVATORIO de la Movilidad Metropolitana

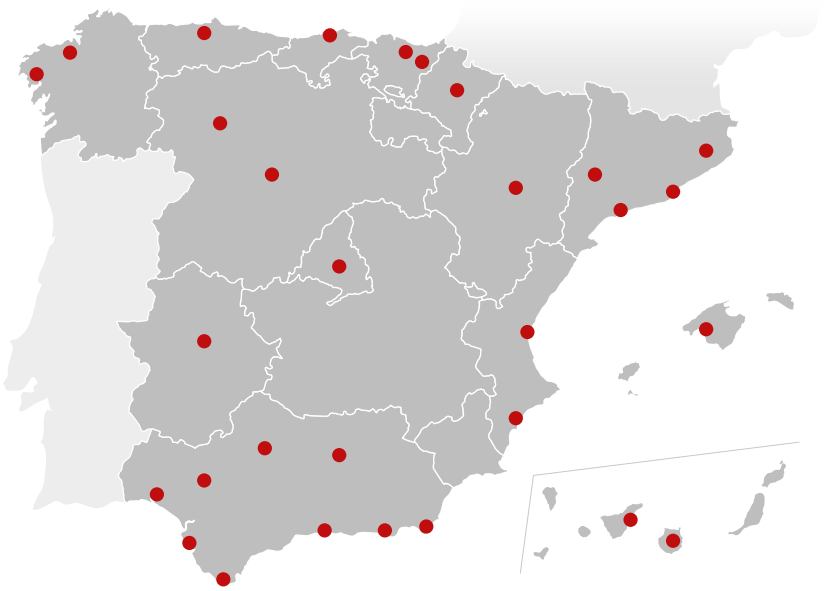
Metropolitan Mobility Observatory of Spain (MMO)

Summary for the 2021 Report with 2022 Advance

The MMO is a forum of analysis and discussion formed by 30 Public Transport Authorities (PTAs) of the main Spanish metropolitan areas. Its activities are supported by the Ministry of Transport, Mobility and Urban Agenda, 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, the Institute for Energy Diversification and Savings (IDAE), the Spanish Railway Foundation and the Trade Union Federation CCOO.

This report includes information from 24 PTAs*. The population in these metropolitan areas represents some 55.23% of the country´s population. 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 the year 2021 and an advance of some data available for the year 2022. In this way, the report reflects to a greater extent the current situation of urban mobility at the national level and its recovery process after the major restrictions imposed by the Covid-19 pandemic.



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

Main Figures 2021-2022

- In **2021**, a total of **2,419 million public transport journeys were made:** 1,206 million by bus and 1,213 million by rail modes. The lengths of both networks are 130,338 km of bus lines and 3,841 km of rail network. In **2022, 3,055 million public transport journeys1 were made:** 1,406 million by bus and 1,649 million by rail modes.
- The annual **public transport demand** for the 24 areas **in 2021 was 16,552 million travelers-km** (36% for bus and 64% for rail modes) and **21,858 million travelers-km in 2022**, 32% more than in 2021.
- In 2021, the **public transport supply was 613 million vehicles-km for bus services and 361 million vehicle-km for rail modes.** In **2022, 591.5 million vehicles-km**[1] were offered for **bus** services and **356.8 million vehicle-km for rail modes** (excluding Cercanías RENFE).
- Out of the **648.6 million euros**[2] **invested in public transport in 2021**, 59.2% were dedicated to the maintenance or purchase of infrastructure, and 40.8% were used to acquire rolling stock. A share of 70.4% was invested in rail modes.
- The number of public transport journeys per inhabitant per year differs according to the size of the metropolitan area. In 2021, the average was 81.6 trips per inhabitant in large metropolitan areas, 48.3 in medium-sized ones, and 42.3 in small areas.
- The **average cost coverage ratio**[3] **was 39%.** Transport systems in metropolitan areas that include rail modes have a lower coverage ratio than those that are only bus-based

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1 The data corresponds to 18 Metropolitan Areas: Madrid, Barcelona, Valencia, Sevilla, Asturias, Malaga, Cadiz Bay, Saragossa, Tarragona Camp, Granada, Valladolid, Pamplona, Corunna, Malaga and Leon.

2 The data corresponds to 15 Metropolitan Areas: Madrid, Barcelona, Valencia, Seville, Asturias, Malaga, Saragossa, Cadiz Bay, Gipuzkoa, Tarragona Camp, Granada, Valladolid, Pamplona, Corunna, and Leon.

3 The coverage ratio can only be calculated for areas where revenue and cost data were available. Therefore, it was calculated for the following 16 MA: Madrid, Valencia, Sevilla, Asturias, Malaga, Cadiz Bay, Saragossa, Gipuzkoa, Tarragona Camp, Granada, Alicante, Corunna, Valladolid, Pamplona and Leon.

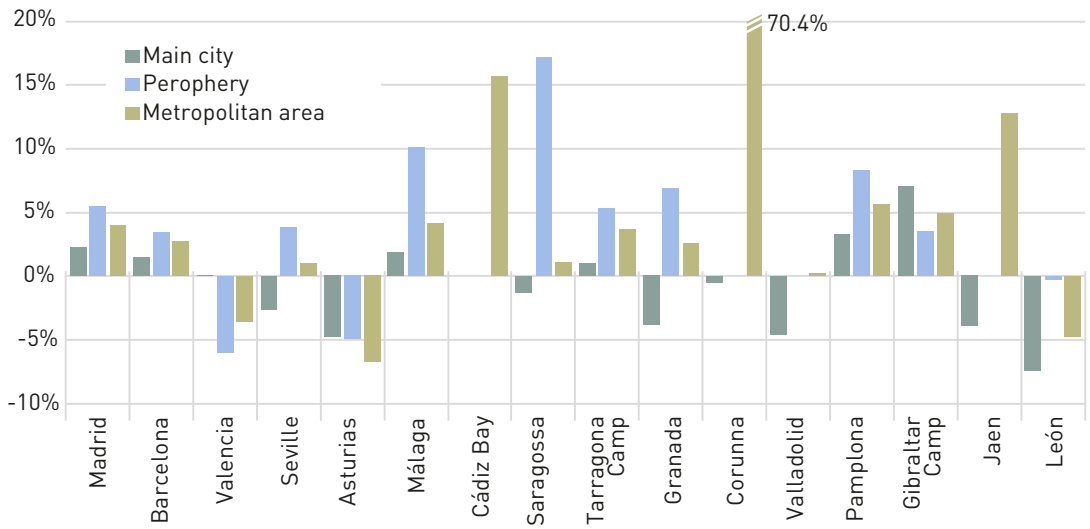
General Characteristics of the Metropolitan Areas on January 1st, 2021

	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	6,751,251	841	179	917	11%	7,361	605	3,305,408	5,463	49%
Barcelona	3,239	5,184,110	1,601	164	634	20%	8,177	101	1,636,732	16,149	32%
Valencia	1,479	1,836,959	1,242	60	306	21%	6,003	139	789,744	5,669	43%
Sevilla	4,221	1,494,733	354	45	228	5%	6,550	141	684,234	4,842	46%
Bizkaia	2,217	1,154,334	521	112	n.d.	n.d.	n.d.	41	346,405	8,449	30%
Asturias[1]	10,604	1,011,792	95	78	1,463	14%	692	187	217,552	1,166	22%
Malaga	1,432	1,064,837	744	15	75	5%	14,236	395	577,405	1,463	54%
Majorca[2]	3,623	880,113	243	53	212	6%	4,151	214	409,661	1,918	47%
Cadiz Bay	3,312	823,147	249	12	n.d.	n.d.	n.d.	1,202	114,244	272	40%
Saragossa	3,258	792,716	243	32	2,873	88%	276	938	675,301	720	85%
Gipuzkoa	1,980	726,033	367	89	n.d.	n.d.	n.d.	73	188,102	2,577	26%
Tarragona Camp	2,999	641,926	214	132	191	6%	3,355	65	135,436	2,077	21%
Granada	861	542,518	630	33	n.d.	n.d.	n.d.	88	231,775	2,633	43%
Almeria[3]	2,127	522,687	246	18	n.d.	n.d.	n.d.	296	196,851	666	38%
Alicante[4]	354	475,402	1,342	5	74	21%	6,424	201	337,482	1,677	71%
Corunna	494	418,955	848	10	57	11%	7,403	38	245,468	6,489	59%
Huelva	n.d.	407,238	121	21	n.d.	n.d.	n.d.	151	142,538	944	35%
Valladolid	955	411,222	544	25	125	13%	4,154	198	297,775	1,505	57%
Lleida	5,586	361,911	65	149	182	3%	1,992	212	140,403	662	39%
Pamplona	92	355,654	3,881	18	50	55%	7,062	25	203,081	8,094	57%
Gibraltar Camp[5]	1,530	273,530	179	8	432	28%	633	88	122,982	1,402	45%
Jaen	3,489	271,384	78	15	n.d.	n.d.	n.d.	424	111,932	264	41%
Leon	913	198,170	217	16	21	23%	9,437	39	122,051	3,094	62%
Caceres	19,868	389,558	20	223	n.d.	n.d.	n.d.	1,750	95,456	54	25%
Cordoba	13,771	805,108	58	77	n.d.	n.d.	n.d.	1,253	322,071	257	40%
Tenerife	2,034	931,646	458	31	n.d.	n.d.	n.d.	150	208,563	1,390	22%
Santander[6]	268	271,248	1,012	8	n.d.	n.d.	n.d.	36	171,693	4,770	63%

** Built-up surface/ total surface of the metropolitan area.*
*** Population of the capital city/ population of the metropolitan area.*
1: Built-up Surface: data from 2020.
2: 2018 data. Built up Surface: data from 2009.
3: 2018 data.
4: 2020 data.
5: MA surface: data from 2015. Built up surface: data from 2007. Main city surface: data from 2015.
6: 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 (2013-2022)



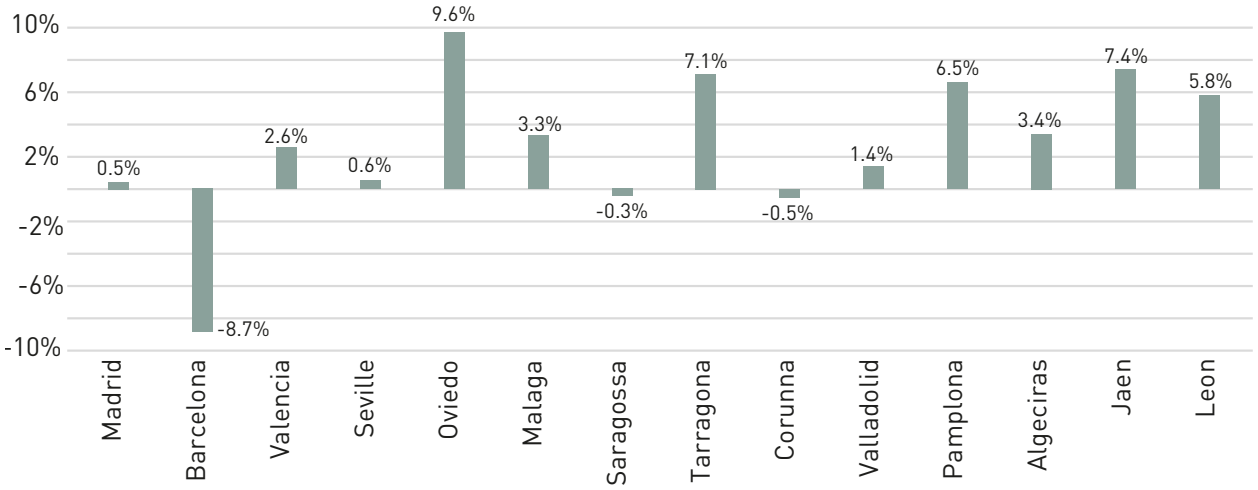
Cadiz Bay and Saragossa have incorporated new municipalities into their areas over the years, hence with significant variations. Source: compiled by authors based on data provided by PTAs

Between 2013 and 2022, the population in the Metropolitan Areas had **a slight growth of 3.2%,** most of which has taken place in the periphery (+3.4%). The population of the main cities has remained almost the same (+0.4%). 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.

The positive trend of job creation, interrupted in 2020 by the pandemic, was recovered in 2021: the **national unemployment rate was reduced to 15.2%.** This same year, the unemployment rate in the analysed areas decreased by 4.4% compared to the previous year and by 39.7% compared to 2013 rates. The areas with the largest decreases in unemployment in the last year are León (34.1%), Seville (28.3%), and Mallorca (26.8%).

The **motorization rate in 2022 was 2.59% higher than in 2013 and 1.81% with respect to 2021.** The evolution motorization rate in the period 2013 to 2022 had a very uneven distribution, depending on the area. Oviedo, Jaen, and Tarragona have significantly increased their motorization rate (9.6%, 7.4%, and 7.1%, respectively), whilst Barcelona has decreased (-8.7%).

Variation of the motorization rate (nºvehicles/1000 inhabitants) (2013-2022)

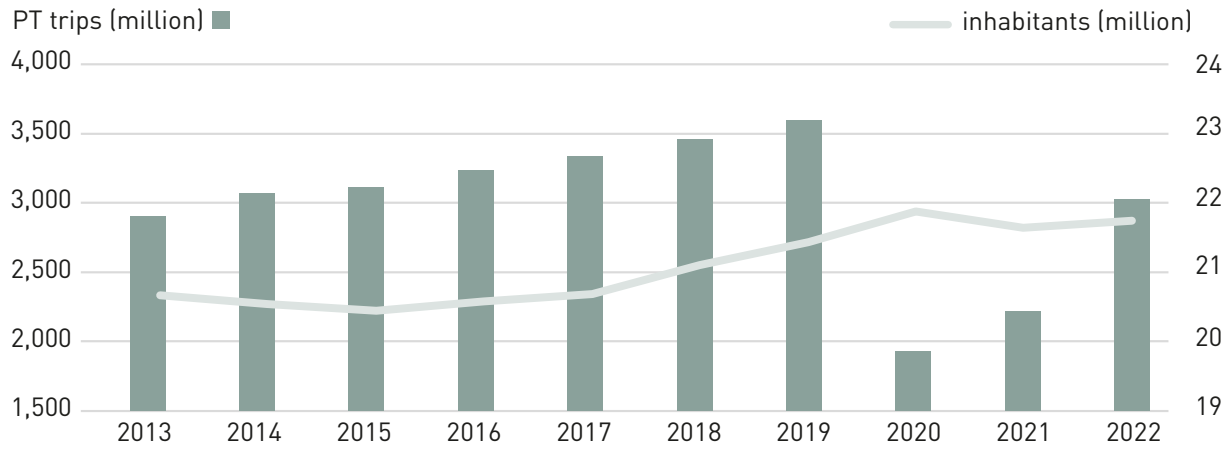


**Valencia: data since 2014. Valladolid: data since 2018. Jaen: data since 2016.*
Source: compiled by authors based on data provided by PTAs.

Demand for public transport

In 2022, travel demand increased by 37.5% compared to 2021: bus travel increased by 33.8% and rail travel increased by 32.7%. Although 2022 has been a year of recovery, it is still far from the 2019 figures. PT demand dropped in 2020% with respect to the previous year. **The global demand in 2022 is still only 84% with respect to 2019.** All those figures indicate a rapid recovery trend.

Evolution of public transport trips vs population (2013-2022)



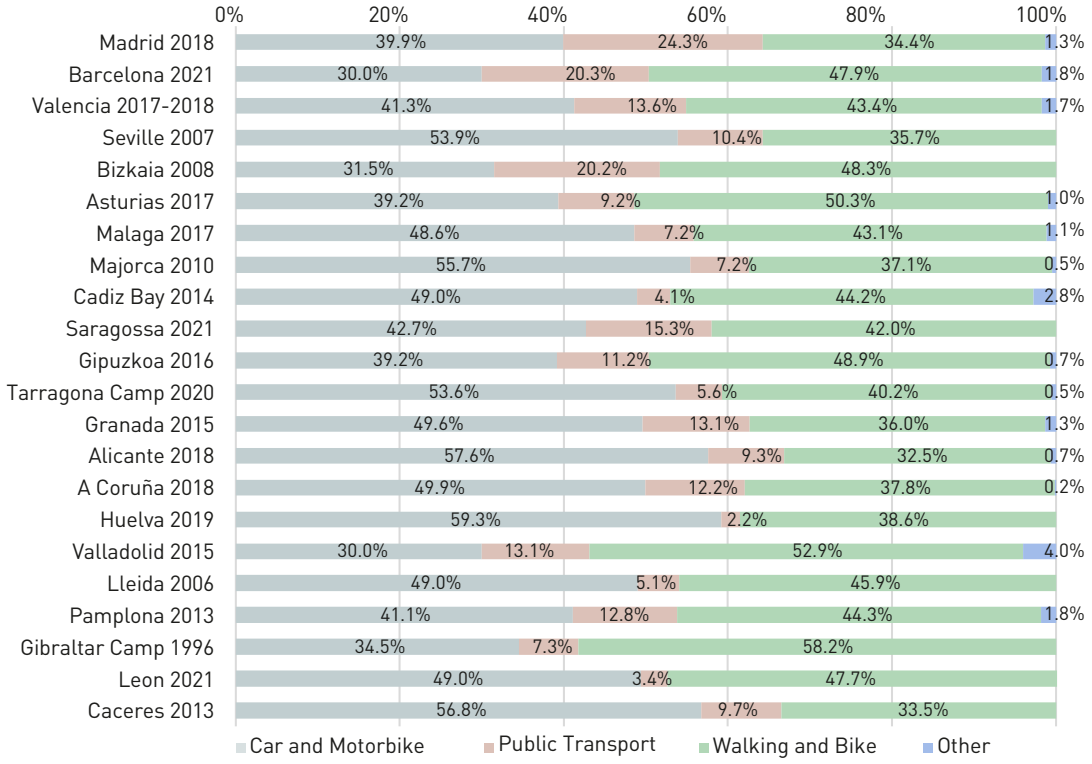
Data from Madrid, Barcelona, Valencia, Seville, Asturias, Malaga, Cadiz Bay, Saragossa, Gipuzcoa, Tarragona Camp, Granada, Corunna, Pamplona, Gibraltar Camp and Leon.

Modal split

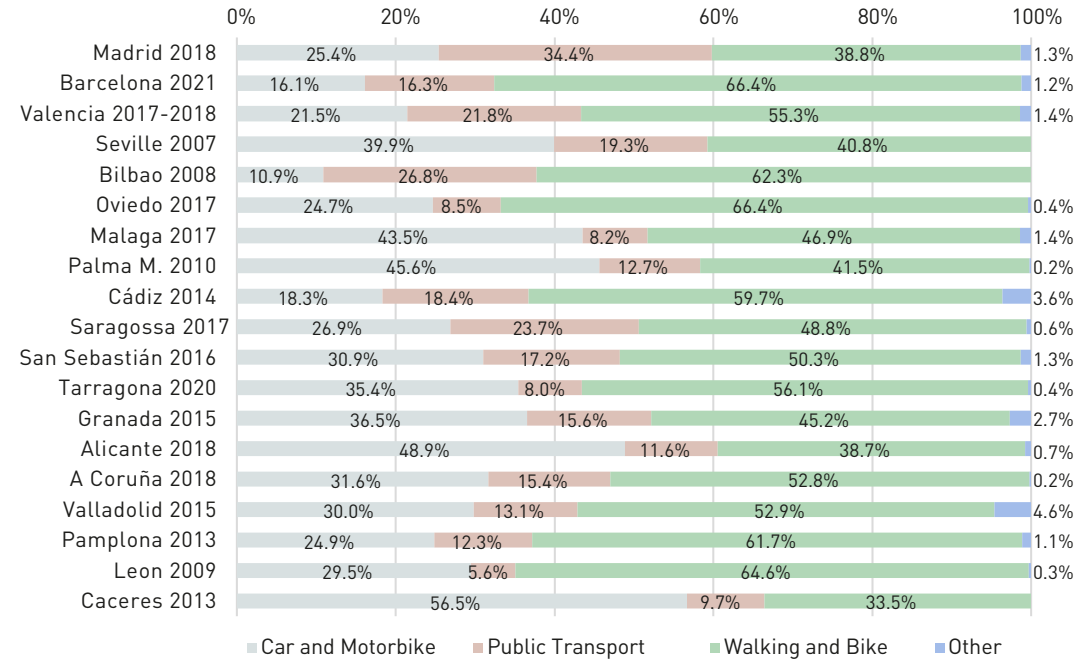
The **average modal share** of public transport in metropolitan areas **is 10.8%.** This figure varies greatly from one area to another: in Barcelona it is 20.3%, while in León it is 3.4%. On average, non-motorized travel (walking and cycling) accounts for 42.9% of total trips, while motorized travel (private cars and motorbikes) accounts for 45.5% of journeys.

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, therefore longer trips, but has a very complete 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 the PTAs.

Public transport supply

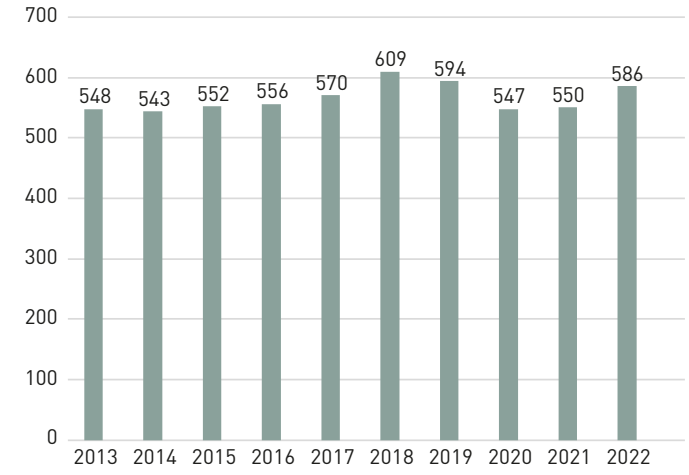
The **supply of bus services** (in vehicle-km) **has increased by 7.6% from 2013 to 2022.** The increase with respect to 2012 was 9.6%. The average density of the bus network **was 4.84 km per 1,000 inhabitants.** Asturias and Huelva are well above this value, with more than 10 km per 1,000 inhabitants. The highest density of PT network by area corresponds to Barcelona and Malaga, with 8.51 km/km² and 4.09 km/km² respectively, being the global 1.83 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 183.30 km per million inhabitants and 94 km per 1,000 km².** Asturias has a significantly higher figure due to the length of the narrow-gauge commuter rail lines, with a density of 396.03 km per million inhabitants.

In 2021, the **number and length of bus lines decreased on average by 2.23% and 7.7%** respectively compared to 2020. On the other hand, the size of rail networks has increased by 1.2% compared to the previous year, with those of Madrid (718 km) and Barcelona (760 km) being the largest.

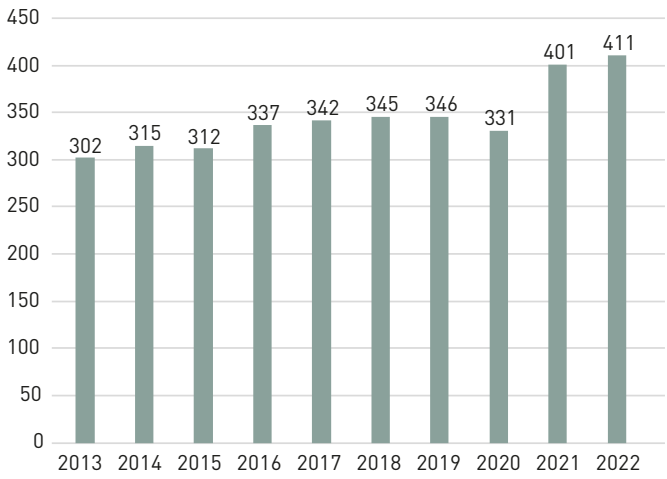
Passenger capacity offered by public transport is measured by the number of seat-km offered by each mode. **In 2021, 46,671.6 million seat-km were offered in bus services and 87,840.2 million seat-km in rail modes, 14.3% and 6.3% more than in 2020,** respectively. Between 2013 and 2022, the length of bus lines in the areas studied increased by 8.94% and the length of the rail network grew by 16.4%.

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



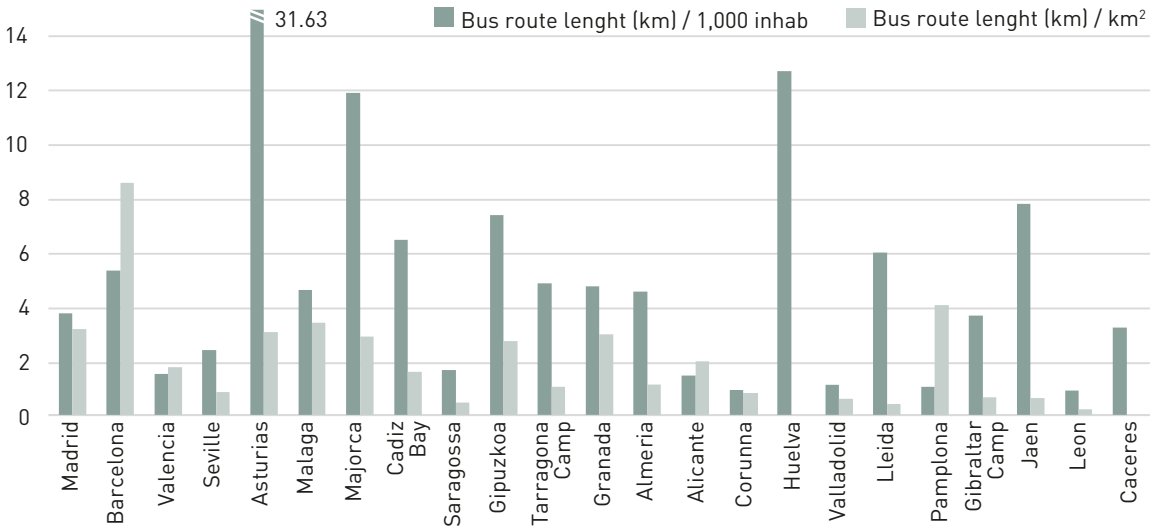
**Bizkaia, Majorca, Granada, Almeria, Huelva and Valladolid are not included.*
***2022 data of Lleida and Gipuzcoa is missing.*

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



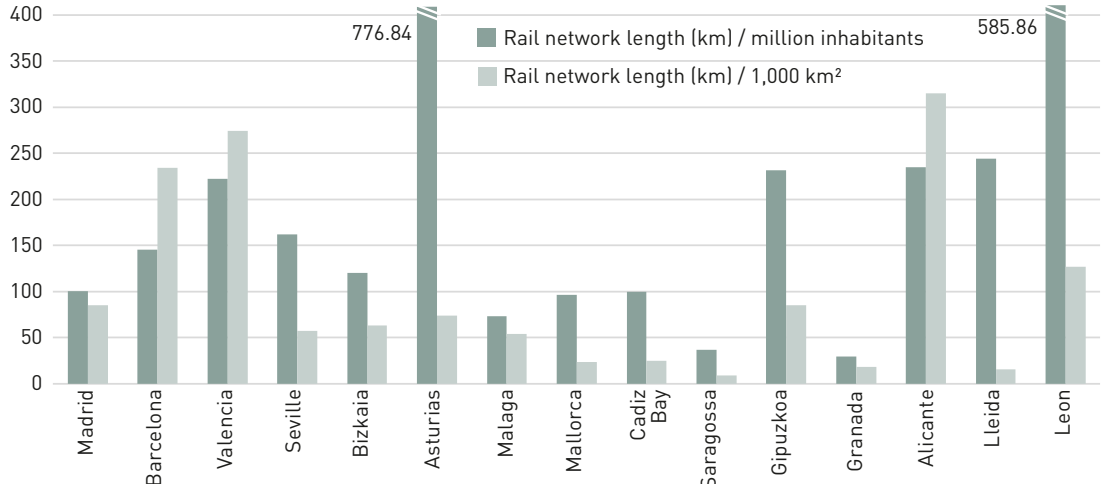
*** Majorca, Tarragona Camp, Granada, Almeria, Alicante, Corunna, Huelva, Valladolid, Lleida, Pamplona, Gibraltar Camp, Jaen, Leon y Caceres are not included.*

Bus network density (2021)



Huelva and Lleida: 2020 report data. Granada: 2019 report data. Majorca and Almeria: 2018 report data. Source: compiled by authors based on data provided by the PTAs.

Rail network density (2021)

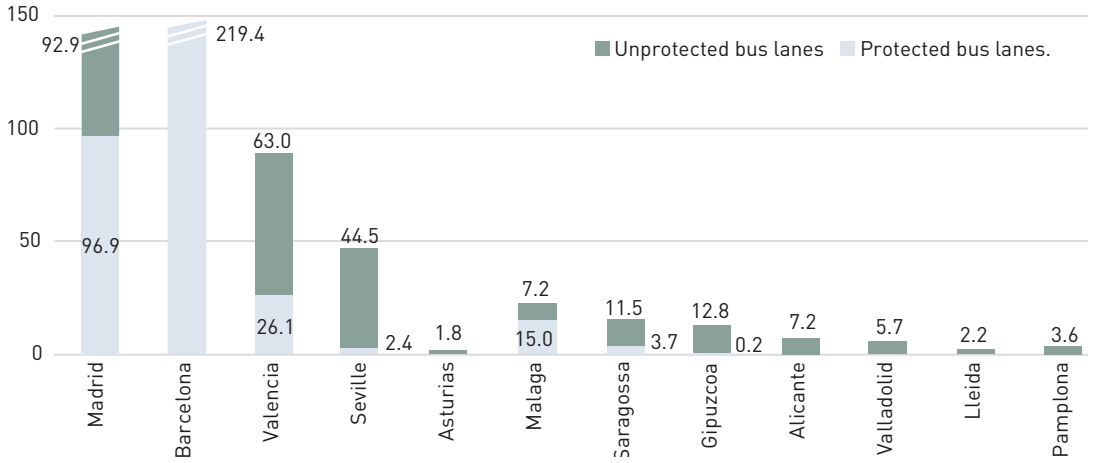


Lleida: 2020 report data. Granada: 2019 report data. Mallorca: 2018 report data. Source: compiled by authors based on data provided by the PTAs and the RENFE Directorate General of Passengers..

Dedicated bus lanes

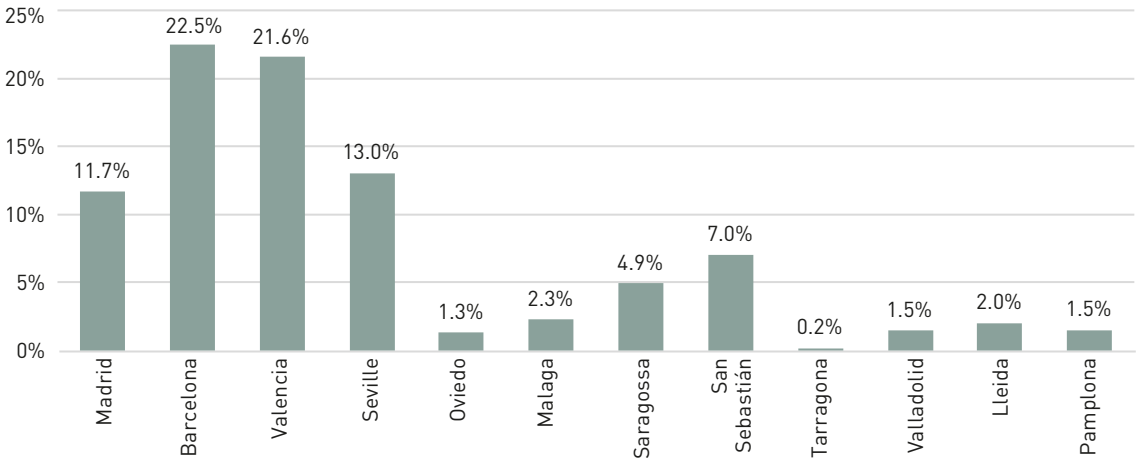
Dedicated and priority lanes for buses are essential to foster competition with private road vehicles. Bus lanes are more effective if they are protected from car invasion. As for 2021, Barcelona had the longest length of bus lanes network (219.4 km), as well as the highest percentage of bus lanes with respect to the total network within the capital city (22.5%), followed by Valencia (21.6%) and Seville (13%).

Length of bus lanes in main city (2020)



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

Percentage of bus network with bus lanes in main city (2021)



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

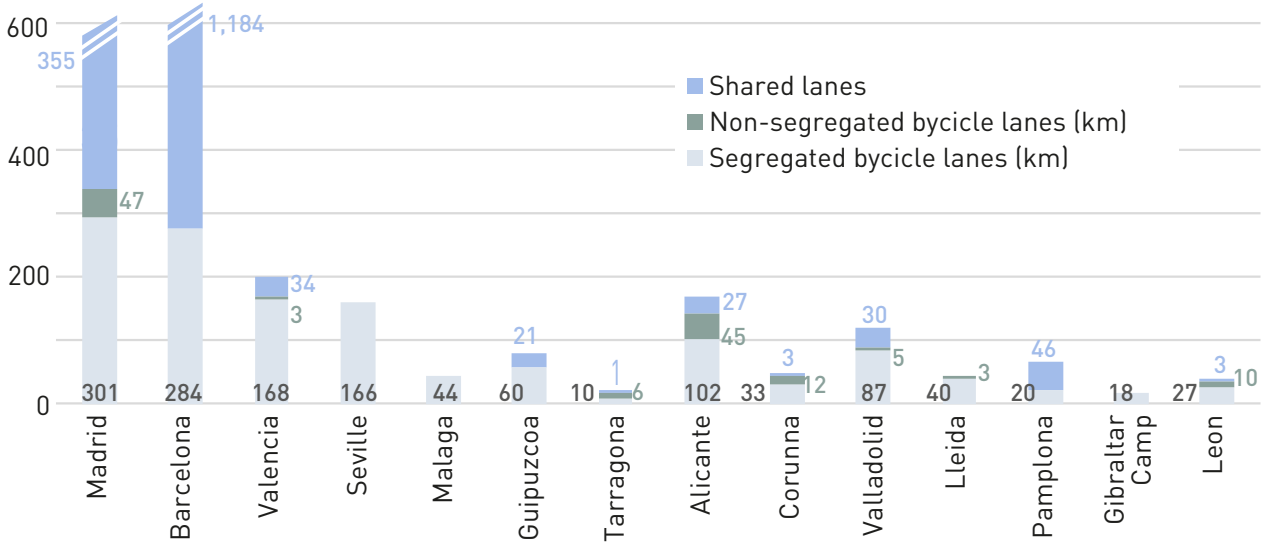
Dedicated bike lanes

Since 2019, there has been an **increase of 40.7% in the use of bicycles in Spanish cities**: nowadays, 11.4 million people use bicycles to travel around the city, 3.3 million more than in 2019. The bicycle is mainly used to go to work.

The support of local authorities on cycling is growing, given the multiple benefits of cycling both 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 elements that physically separate them from the rest of the road), 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.

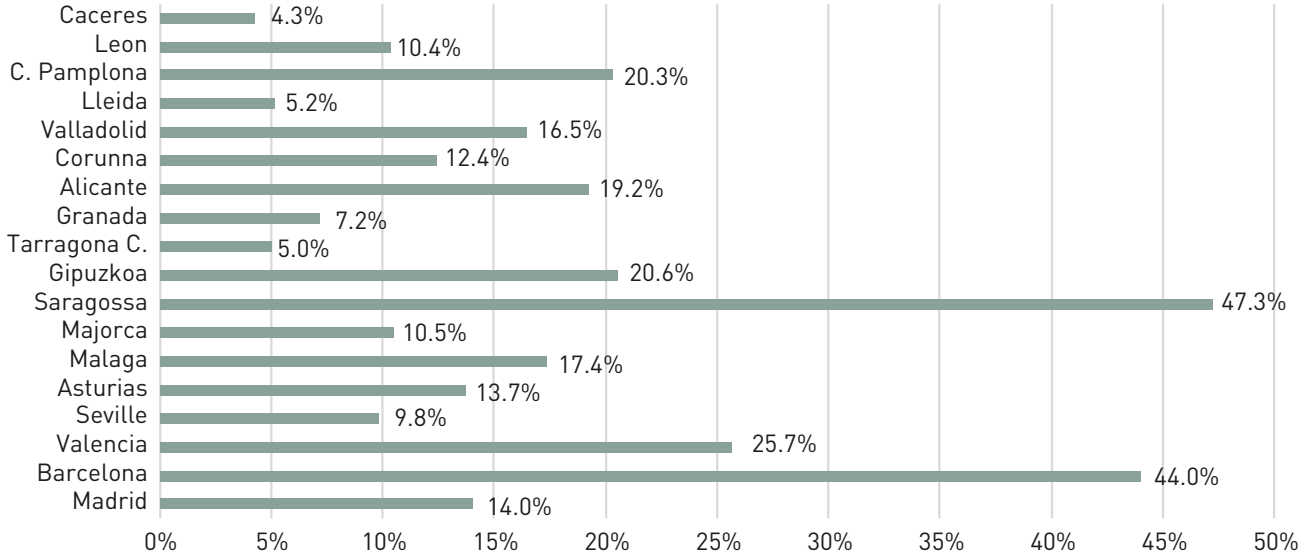
Length of bicycle lanes in the main city in 2021 (km)



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

ITS and information

% bus stops with real-time information screens (2021)



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

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 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 purchase and payment more flexible and agile.

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, as well as 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 traveling 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 that they can collect and return to specific spots located in different city points. 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 in Spain, there aseveral public bicycle systems existanagement and technology of the system and the type of bicycle offered (conventional or pedelec) differ from one city to another.

From 2010, many public bicycle-sharing services were 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. In 2021, 21 Spanish cities applied for EU funds to build a bike-sharing system.

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 2021.

Offer and demand for public bicycles in the main city (2021)

	Lending points (no.)	Total number of anchorages	Available bicycles	Service area/ main city área ratio (%)	Operating hours	Registered users	Regular users	No. of loans per year	Average travel distance	Bicycle rotation** (daily use)
Madrid [1] (BiciMad)	210	5,166	3,362		24	68,002	52,002	3,445	4	
Madrid (BiciMadGO)			483							
Barcelona[2] (Bicing)	519	15,000	7,000	74.0	24	129,911	34,930	12,105	3.4	5.54
Valencia (Valenbisi)	277	5,502	2,750[6]	86.7	24	30,053	29,926	3,509		
Seville (Sevici)	260	2,600	2,591	100	24	19,227		2,109		2.23
Saragossa (Bizi)	130	2,781	1,300	4.5	18	14,223	2,897	1,055	1.97	3.15
Gipuzkoa[3] (Dbizi)	46	799	411	100	18	5,716		488		3.25
Granada[4] (+Bici)	1	10	15	100	12					
Corunna[5] (Bicicoruña)	23	356	180	100	15	3,025	2,876	172	4.5	2.79
Valladolid (Vallabici)	34	424	174		24	854		53		1.47
Leon (León te presta la bici)	20	200	65	100	24					
Pamplona (Ride On)	42	834	400	100	24	*	*	*	*	*

1: Service area / main city area ratio: 14 out of 21 districts of Madrid.
2: Operating hours: 21 hours on weekdays and 24 hours on public holidays.
3: Available bicycles: 120 electric +291 mechanical. Operating hours: 18 hours on weekdays on 24 hours on public holidays. Registered users: 5320 annual users + 396 occasional users. Bicycle rotation: 6.81 uses/electric bike per day and 1.79 uses/mechanical bike per day.
4: Time slot: weekdays from 9:00 to 21:00.
5: Time slot: 7:30 to 22:30.
6: 2020 data.

**Non-available information as the service was recently implemented (end of 2021).*
***Annual average considering the number of uses and bicycles available.*
Source: compiled by authors based on data provided by PTAs.

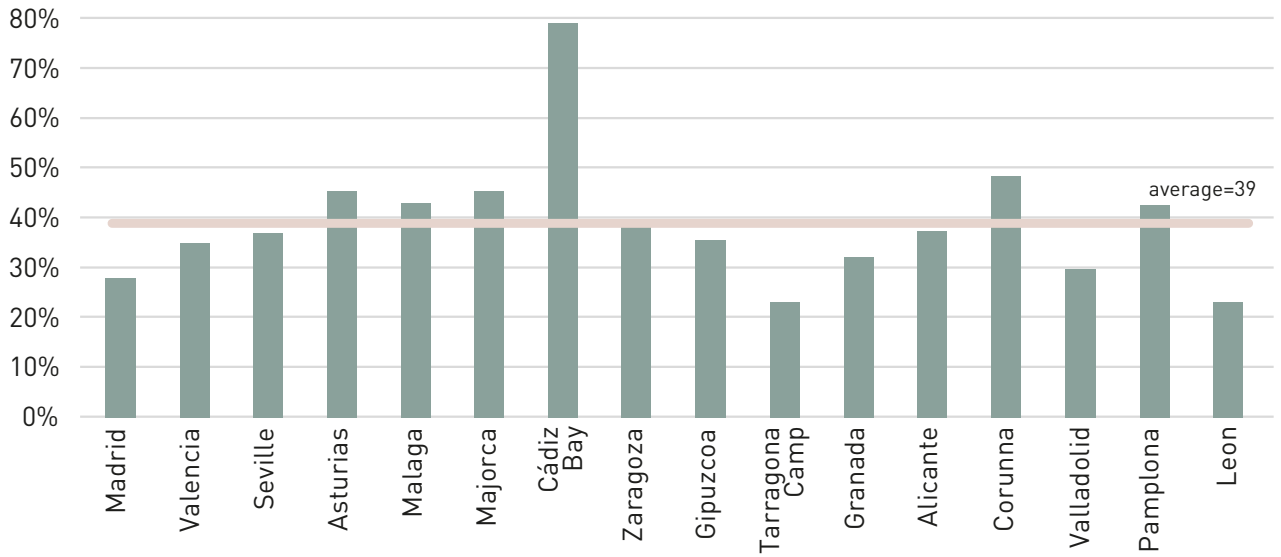
Types of tickets and fares

There is **great heterogeneity in the fare systems of the different urban areas,** which means that 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 (used in the main city), 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 (74% of users). In Bizkaia, Corunna, Jaen, and Gipuzkoa, wallet cards are the preferred transport pass, used by more than 70% of users. Barcelona is the city with the highest fare for a single ticket (€2.40).

Coverage ratio

The percentage of operating costs covered by fare revenues (coverage ratio) averaged 39% in 20211. In general, metropolitan areas with rail modes have lower coverage ratios than those with only bus services. Outstanding cases are, on one hand, Cadiz Bay and Corunna, with ratios of 79% and 49% respectively, and, on the other hand, Camp de Tarragona and Leon, with a ratio of 23%.

Coverage ratio for PT systems in the metropolitan area (2021)

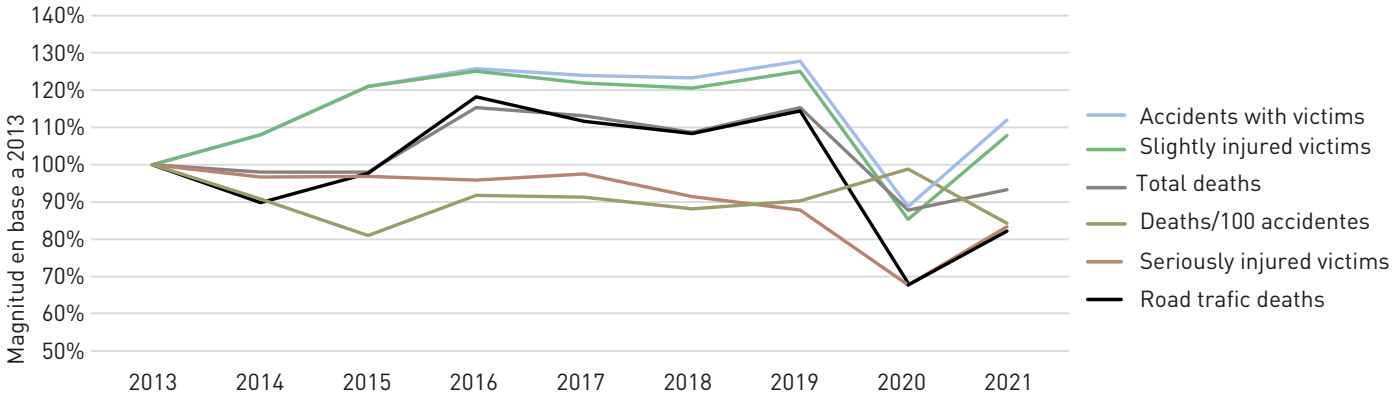


Data from Cercanias Renfe is not included. Seville does not include tram or metropolitan bus but does include metro. Bahía de Cádiz does not include urban bus. Source: compiled by authors based on data provided by PTAs.

Urban accident

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 period **2013-2021, the number of accidents with casualties increased by 11%.** However, **the other accident indicators** (total number of fatalities, number of people hospitalized, number of road traffic fatalities, and fatalities per 100 accidents) **decreased** an average by 14%.

Traffic accidents data evolution (2013-2021)



Source: "Main Figures of Road Accidents. Spain 2021.". General Directorate of Traffic, 2021.

The graph 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 lock-out pandemic period. In 2021, mobility increases compared to the previous year, and, consequently, accidents. However, they are still lower than the values of the pre-pandemic years, and an improvement in urban road safety cannot be assured until the full recovery of mobility levels.

Shared mobility services

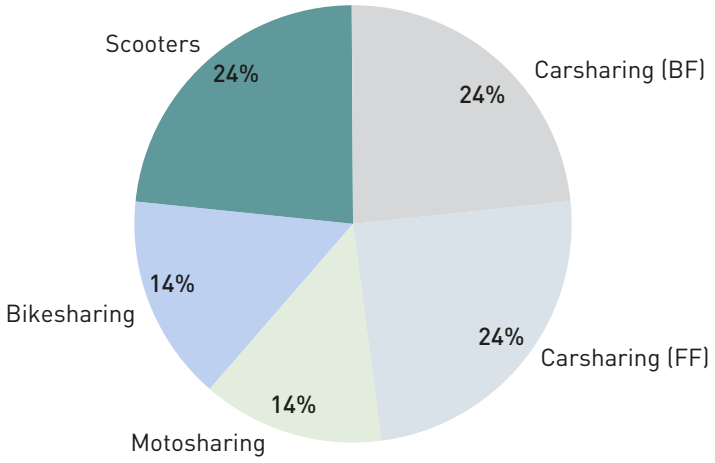
Shared mobility is one of the essential elements of the new mobility services. They emerged as a **response to the problems of modern cities,** which are increasingly affected by pollution, climate change, congestion, and lack of physical space. It allows citizens to make their journeys by combining 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 provide users with 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 2022, there has been a considerable reduction in shared mobility companies operating in smaller cities. The lower demand for these types of services in smaller municipalities may be due to factors such as a lack of information about this type of mobility, an efficient public transport system, or shorter travel distances, among others.

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

% of companies providing new mobility services (2021)



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