



## Scooter Crashes in the Province of Barcelona (Spain) From 2006 to 2011: A Descriptive Study

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**Abstract:** The aim of this study was to determine the characteristics of the scooter-motorcycle drivers involved in an accident in Barcelona, Spain, from 2006 to 2011. This study included the data from 22,349 scooter-motorcycle drivers involved in a crash from 2006 to 2011 in the province of Barcelona. The data source was the DGT (General Traffic Directorate). The wide use of motorcycles as a private vehicle to the detriment of cars in the province of Barcelona is a way to diminish the effects that traffic congestion has on public health. However, there is need to introduce measures in order to reduce crashes of these types of vehicles and its consequences to their occupants. Due to the absence of researches about crashes of scooters and to the significant increase of scooter-motorcycles within the motorcycle fleet of many countries, further investigation about the characteristics of the crashes of this type of vehicles would be advisable.

**Keywords:** road safety, traffic crash, risk factor, motorcycle, crash data

### I. INTRODUCTION

Traffic congestion is one of the great problems faced by urban areas in developed countries, not only because of its economic costs, but also and particularly for public health issues related to premature mortality caused by this phenomenon.

A number of economic and social changes such as the rising price of fuels, parking problems in city centres or the development of a lifestyle more oriented towards sustainability have resulted in substantial increase in motorcycles.<sup>1</sup>

The increase in motorcycle fleet in a such a congested traffic as the European offers, among other advantages, shorter time than a car to cover the same journey, less space on the road -which contributes to reduce congestion- and a lower fuel consumption. On the contrary, in the event of a

crash, drivers and passengers of motorcycles are more vulnerable than those of other type of vehicle due to the lack of protection in case of a crash, even at relatively low speeds.

Spain currently leads the world by having the lowest mortality rate due to road traffic crashes, with 3.7 deaths per 100,000 inhabitants.<sup>2</sup>

Over recent decades, the efforts made by Spain, by both the General Traffic Directorate (DGT) and from other entities working to reduce road crashes, have been successful and Spain has become one of the countries of the Organisation for economic Cooperation and Development (OECD) that most improved its road safety indicators. It has reduced the mortality rate, due to road traffic crashes, by more than 75% in the last 20 years.<sup>3</sup>



Nevertheless, during more recent years, the reduction in the severity of the road crashes in Spain has been unequal among the occupants of the different vehicle types that make up the national car fleet. From 2000 to 2014, whereas car drivers and passengers have reduced their mortality rate by more than 75% and moped drivers by almost 90%, motorcycle drivers and passengers have only reduced the number of road fatalities by 26.79%, which represent the lowest reduction in this period within motor vehicles.<sup>4</sup> Furthermore, the number of hospitalized cases due to a road traffic crash has grown by 20% in this period, whereas the rest of motor vehicles posted significant reductions.

In recent years, the use of scooters has increased significantly in some developed countries in both absolute and relative terms, compared to the number of motorcycles.<sup>5</sup> An important percentage of motorcycles in the developed countries are scooters, especially in urban areas of some European countries like Spain, France or Italy.<sup>6</sup> Nevertheless, due to the absence of a precise definition of this type of motorcycle and to the circumstance that generally in the crash's databases the type of the motorcycle involved is not registered (scooters are only classified within the category of moped or motorcycle, depending on its cylinder-capacity), no many comparative studies of the risk between moped and/or motorcycle and scooters have been carried out.<sup>5</sup>

This paper presents the outcome of a descriptive study about the data of crashes suffered by scooter-motorcycle drivers in Barcelona, the province with the higher number of motorcycles in Spain.

## II. METHODOLOGY

The data used comes from the DGT traffic crashes with casualties database for the period 2006 –

2011, both inclusive. The data were obtained from the Statistics Service of the DGT.

The information registered in this database was directly collected by the law enforcement officials in charge of the road traffic control and surveillance at the time of the crash by means of a statistical questionnaire in which the crash data are recorded (vehicles and persons involved).

After the filtering and encoding of the variables the definitive database consist of 22,349 scooter-motorcycle drivers involved in a crash from 2006 to 2011 in the province of Barcelona.

The studied variables concerning the scooter drivers involved in a traffic crash were age, gender, reason of the displacement, severity, mental and physical conditions, violations at the time of the crash and helmet use.

## III. RESULTS

Most scooter-motorcycle drivers involved in a crash in the province of Barcelona over the studied period were men (77.4%). The most represented age group within the drivers involved in a crash was from 30 to 34 years (19.6%), followed by the group of 25 – 29 (17%). 80.3% of the registered scooter-motorcycle crashes were crashes work-related, either on the way to or from work or during the working day.

93.2% of the drivers were slightly injured, 4.7% severely injured and 0.4% died. The most frequently injured body part was the lower (47%) and upper (18.8%) extremities.

98.6% of the drivers involved in a crash were in good psycho-physical conditions, whereas 1.3% tested positive in alcohol tests. The rate of helmet use within the drivers involved in a crash was 99.4%, whereas only 0.3% of the drivers involved in a crash committed any violation related with the speed (speeding or inappropriate speed), 64.9% committed at least one driving violation.



**Table 1.** Features of scooter-motorcycle drivers involved in crashes in the province of Barcelona (Spain) between 2006 and 2001.

		Frequency	Percent	Valid Percent
<b>Gender</b>	Male	17174	76,8	77,4
	Female	5008	22,4	22,6
	Unkown	167	,7	
<b>Age groups (years)</b>	<18	77	,3	,3
	18-20	691	3,1	3,2
	21-24	1475	6,6	6,8
	25-29	3683	16,5	17,0
	30-34	4233	18,9	19,6
	35-39	3529	15,8	16,3
	40-44	2710	12,1	12,5
	45-49	2089	9,3	9,7
	50-54	1462	6,5	6,8
	55-59	897	4,0	4,2
	60-64	457	2,0	2,1
	65-69	187	,8	,9
	70-74	55	,2	,3
	≥75	67	,3	,3
Unkown	737	3,3		
<b>Reason for travel</b>	During the working day	1244	5,6	70,4
	On the way to or from work	175	,8	9,9
	Exit or return from holiday	6	,0	,3
	Emergencies	10	,0	,6
	Leisure	285	1,3	16,1
	Other	48	,2	2,7
	Unkown	20581	92,1	
<b>Harmfulness</b>	Fatalities	77	,3	,4
	Serious injured	968	4,3	4,7
	Slight injured	19121	85,6	93,2
	Unharmmed	360	1,6	1,8
	Unkown	1823	8,2	
<b>Helmet</b>	Yes	19633	87,8	99,4
	No	123	,6	,6
	Unkown	2593	11,6	

#### IV. CONCLUSION

The fact that a very substantial percentage of the scooter-motorcycle drivers involved in crashes are men under 34 is consistent with the study of Lin, Chang, Pai and Keyl (2003),<sup>7</sup> according to which

young male motorcycle drivers show a greater propensity towards engaging risky behaviour and this is associated with a greater likelihood of getting involved in a crash.

Road crashes are often closely linked to alcohol consumption or other intoxicating agents.<sup>8</sup> In the period analysed, 1.3% of the scooter-motorcycle



drivers involved in crashes tested positive in alcohol tests. This could be due to that 8 out of 10 analysed crashes took place in work-related displacements, where it is less likely that the driver drinks alcoholic beverages or other substances.

Speeding is one of the most common risk behaviours in the crashes of two-wheeled vehicles.<sup>9</sup> Nevertheless, in our analysis the percentage of offences related to speeding was minimum, which could be explained by the type of crash (work-related) and by its location (mainly urban).

The high use of wearing a helmet, among drivers involved in a road crash, could explain the low percentage of head injuries, which combined with the absence of speeding offences could contribute to the low mortality rate of this type of crash.

The wide use of motorcycles as a private vehicle to the detriment of cars in the province of Barcelona is a way to diminish the effects that traffic congestion has on public health. Due to this, the urban mobility plan of Barcelona advocates a greater use of motorcycles as a private vehicle while taking steps to reduce their crash rate.

Further investigation about the crashes involving this type of vehicle would be advisable in order to identify its differentiating features and provide the decision-makers with the information needed for planning, implementation and development of the necessary measures to reduce its crashes, as motorcycle users are a group with special risk, due to its probability of suffering a crash as well as to the greater consequences that crashes cause on victims health.

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