D2.1 eSUM DIAGNOSIS OF URBAN MOTORCYCLING SAFETY

Task: T2.1 Benchmarking PTW collisions in urban areas

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Report documentation

Title:	A comparative study of the development of motorcycling road safety in Barcelona, London, Paris and Rome
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Foreword

Over the last decade, there has been a downward trend in the number of road crashes in developed nations, with a 30% decrease in casualties across the 25 European Union countries.

Unfortunately the same cannot be said of collisions involving Powered Two-Wheelers (PTWs), in particular motorcycles. In urban areas this phenomenon mainly affects young people, even in countries where there is not a tradition of PTW use.

A similar trend can also be found in major European cities and generally in the urban environment, where around 80% of all EU citizens live, and in which about 2/3 of all road collisions occur.

The eSUM project adopts an innovative, integrated approach involving some of the principal European capitals, motorcycle manufacturers and medical and engineering academic communities. Cities with considerable experience of PTW use, like Rome and Barcelona, are cooperating with cities where the PTW use has increased due to limitations in the mobility of private cars, like Paris and London.

The commitment of the PTW manufacturers towards safety will be tailored to city needs and innovations are to be tested before being extensively applied.

The purpose of this document is to identify a methodology for a benchmarking the analysis of PTW collisions and to propose innovations to assist the development of policy and strategy in European cities.

This document is thus the basis for creating good practice for the appropriate design of the road network and infrastructure and for proposing new approaches to influencing driving behaviour. The outcome of this work package should be of interest to the European Commission, local authorities, rider groups and motorcycle manufacturers as well as to all citizens of the EU.

In particular this document aims to become the benchmark in analysing PTW collisions, giving the correct methodological approach, checking the participant city structure, trends in mobility, differences and similarities and providing the most suitable comparison among different mobility habits across Europe.

The cooperation established by the e-SUM project has provided an opportunity for all the involved Municipalities to compare and verify their actions and planned measures in the relatively under-developed field of PTW safety.

This document provides a model which other authorities can follow in order to identify their PTW safety problems, forming a base from which to develop a plan of action to reduce PTW casualties.

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Content

Executive summary

The scope of the eSUM project is to achieve a reduction of collisions involving PTWs in urban areas, through an integrated approach involving four European cities with large PTW populations, motorcycle manufacturers and the medical and engineering academic community.

This collaboration has the commitment to produce a series of activities aimed at achieving the following objectives:

- to monitor and report on collisions involving PTWs in urban areas, through an analysis of benchmarking between the cities involved, to identify causes and dynamics of the events, to implement developing technology systems and to ensure higher levels of vehicle safety;

- to identify best practice in terms of enforcement, the appropriate design of the road network and infrastructure, appropriate driving behaviour and the development of Action Plans for improving urban motorcycle safety;

- to promote the rapid adoption of good practice within mobility planning and policy instruments.

The good practice that will result from the eSUM project will then be disseminated to cities in Europe through the European Commission, municipal and rider associations, motorcycle manufacturers and to citizens through information campaigns.

This document summarises the EU context of road collisions through time series (Chapter 1) and supplies a methodology for comparing road safety in urban areas taking into account the availability, quality and comparability of data (Chapter 2).

Chapter 3 provides a background to the evolution of PTW collision trends in each of the four cities, describing the legal context and changes that may have influenced collision levels such as communication and enforcement campaigns.

Chapter 4 supplies an overview of main data for each city: the evolution in road space management, vehicle stock and mobility.

Chapter 5 compares the collisions involving PTW users in the four cities, using road collision data for 2000-2008.

Chapter 6 summarises the main findings and recommendations are made for other cities which may wish to collect and present PTW data in order to form a base for developing a road safety action plan for PTWs.

1. PTW collisions – the EU context

Among all modes of transport, road transport is the most dangerous, and Powered-Two Wheelers (PTWs) have the highest casualty rate of all modes.

In the year 2000, 1,300,000 collisions on EU 15 roads caused over 40,000 deaths and 1,700,000 injuries[1]. The direct and indirect cost, estimated at 160 billion euro, was equivalent to 2% of GNP of the European Union (EU 15)[2].

For this reason, the Third Road Safety Action Program has been launched by the European Commission, with the objective of reducing the number of deaths on the road by half by the year 2010.

Certain population groups and some specific user groups are particularly affected and thus considered as vulnerable road users. Key groups are; young people aged between 15 and 24 years (10,000 deaths a year), pedestrians (7,000 deaths), cyclists (1,800 deaths), and PTW users with 5,500 lives lost.

At the Pan-European level, PTW riders are twice as likely to be killed as the next most-vulnerable road-user (pedestrians), and their risk of being killed is twenty times that of car users. The overall conclusion is that a serious and growing problem exists, to which technology has yet to be adapted, and for which society needs urgent solutions.

EU DEATHS PER 100 MILLION PERSON KILOMETRES	
Ferry	0,250
Air (civil aviation)	0,035
Rail	0,035
Road (Total)	0,950
Motorcycle/moped	**13,80**
Foot	6,40
Cycle	5,40
Car	0,70
Bus and coach	0,07

Table 1.1 Number of deaths per 100 million person kilometres in the EU (Source: European Transport Safety Council Transport Safety Performance in the EU a statistical overview. 2003)

[1] European Commission/Directorate General Energy and Transport: "CARE - European Road Accident Database", (1991-2007);

[2] Report by Ewa Hedkvist Petersen on the Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Region on "Priorities road safety – Progress report and raking of actions" (COM(2000)125 – C5-0248/2000-2002/2136(COS)), adopted by Parliament on 18 January 2001.

The Program of Action for Road Safety 2003-2010, established by the European Commission, provides a series of measures aimed at achieving the ultimate goal of reducing the number of road deaths by at least 50% by 2010. It is one of the EU policy actions that has found greatest support, with national states, regional administrations and local authorities generally interpreting the objective for local conditions.

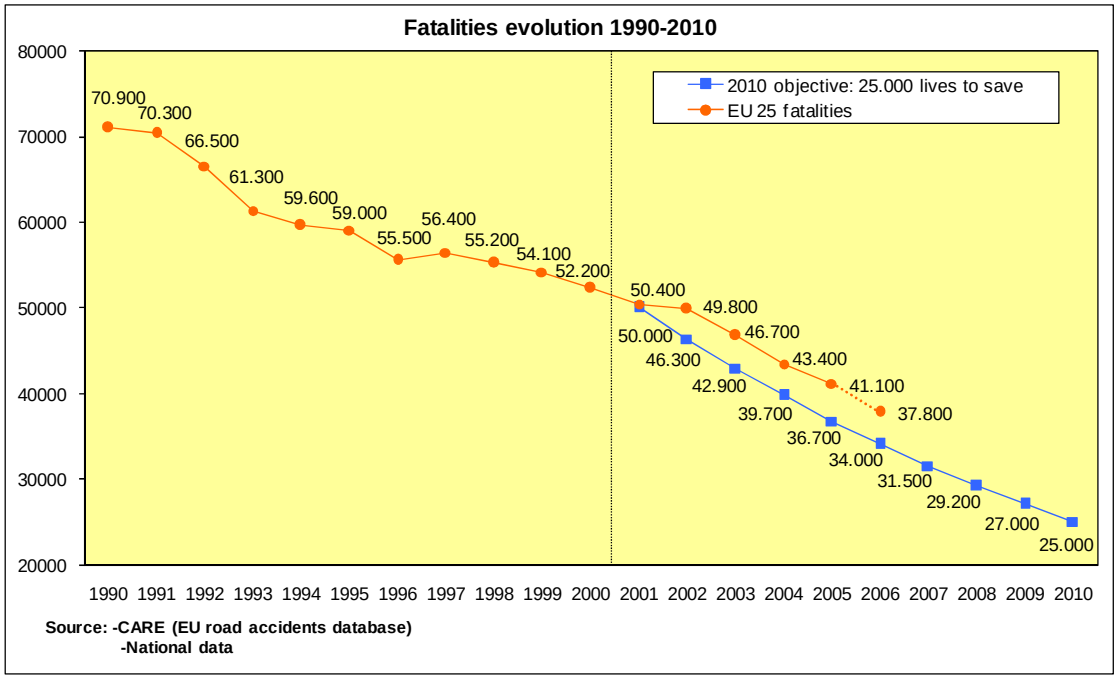
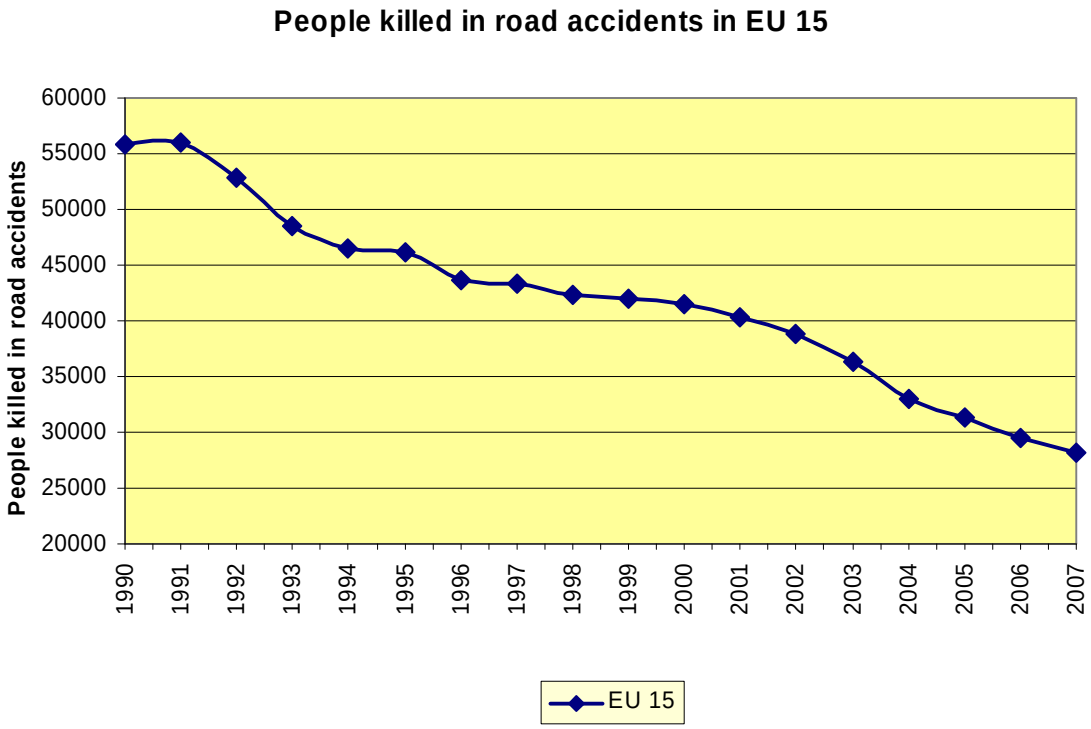


Figure 1.1 People killed in road collisions in EU 25 1990-2006 and EU road safety target (Source: ERSO-Traffic Safety Basic Facts 2007. Main Figures)

The number of people killed in road collisions (EU15) decreased significantly during the past 20 years, reducing from more than 55,000 killed in 1990, to less than 30,000 recorded deaths in 2007. The number of people injured in road collisions doesn't present the same trend; from 1990 to 2000 the trend was stable. After 2000 the number of casualties started to decrease to approximately 1,100,000 in 2007.



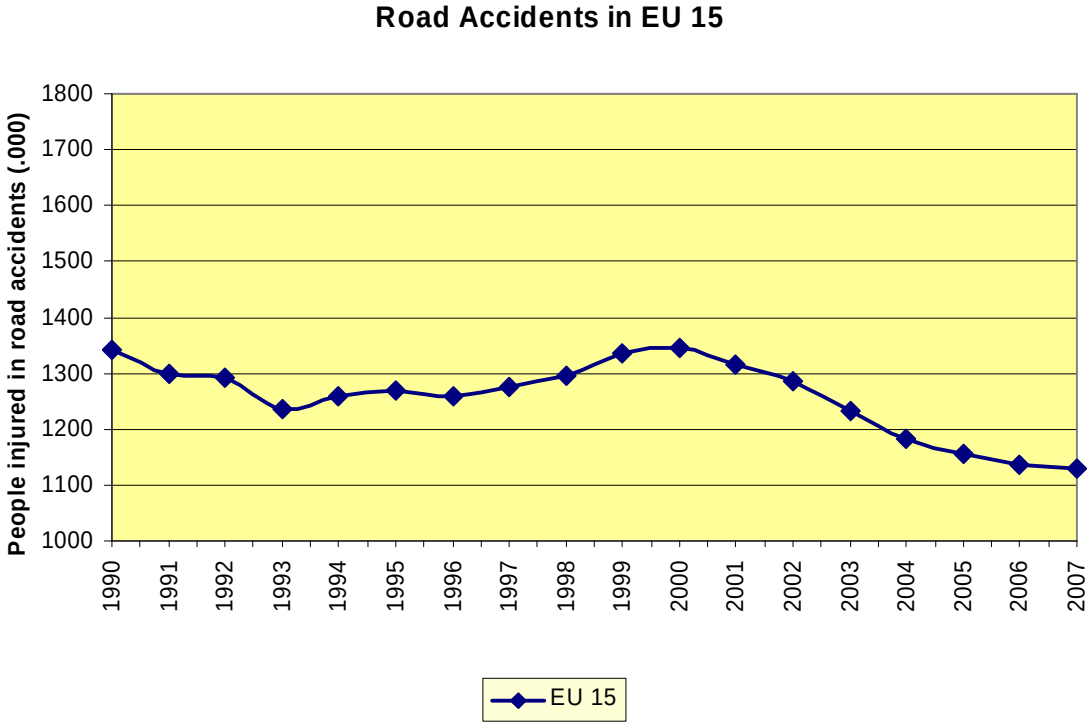
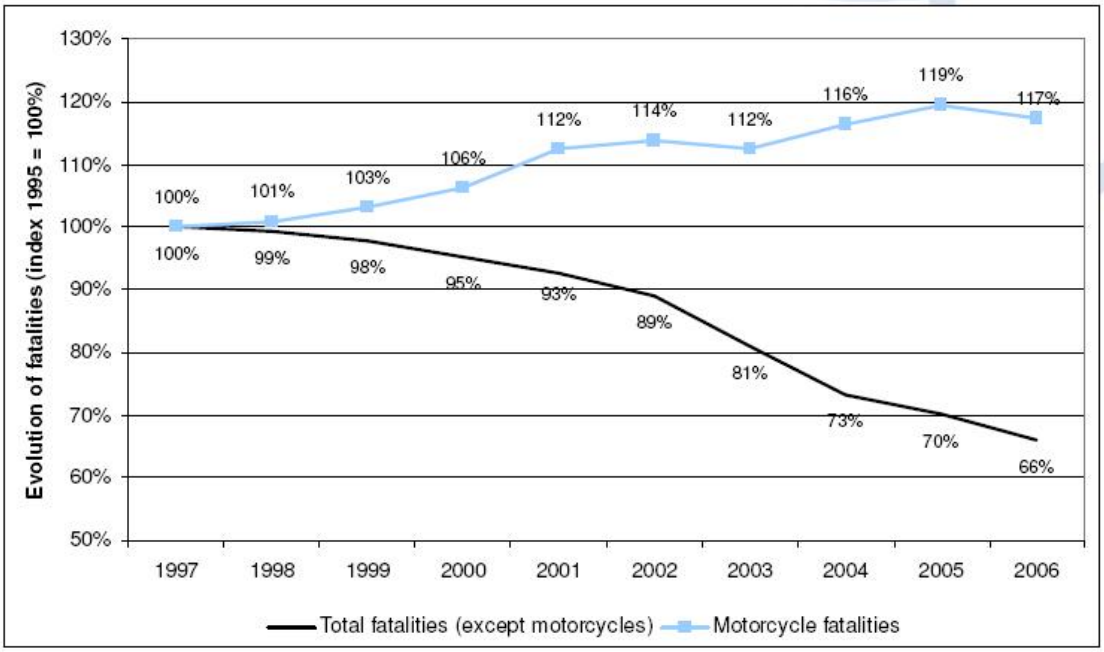


Figure 1.2 People killed and injured in road collisions in EU 15 1990-2007 (Source: EU)

Motorcycles are the only type of vehicle for which fatalities have consistently increased (Figure 1.3). In 2006, motorcycle and moped riders comprised 21% of the fatalities on urban roads (EU-19).



Source: CARE Database / EC
Date of query: July 2008

Figure 1.3 Evolution of total fatalities and of motorcycle fatalities in EU14, 1997-2006. (Source: ERSO. Traffic Safety Basic Facts 2008.Main Figures)

The following graphs represent the number of fatalities of vehicle occupants (excluding pedestrians) in the participating cities, in addition to the EU14 average. For all participating countries, the largest group of victims is the occupants of “car and taxi”. The second largest group is “motorcycle and moped” users. The EU 14 average is 28%, as shown, France and Italy are above the European average (29% and 35% respectively) whilst Spain (27%) and the UK (26%) are slightly lower than the average (% of road deaths using motorcycle or moped).

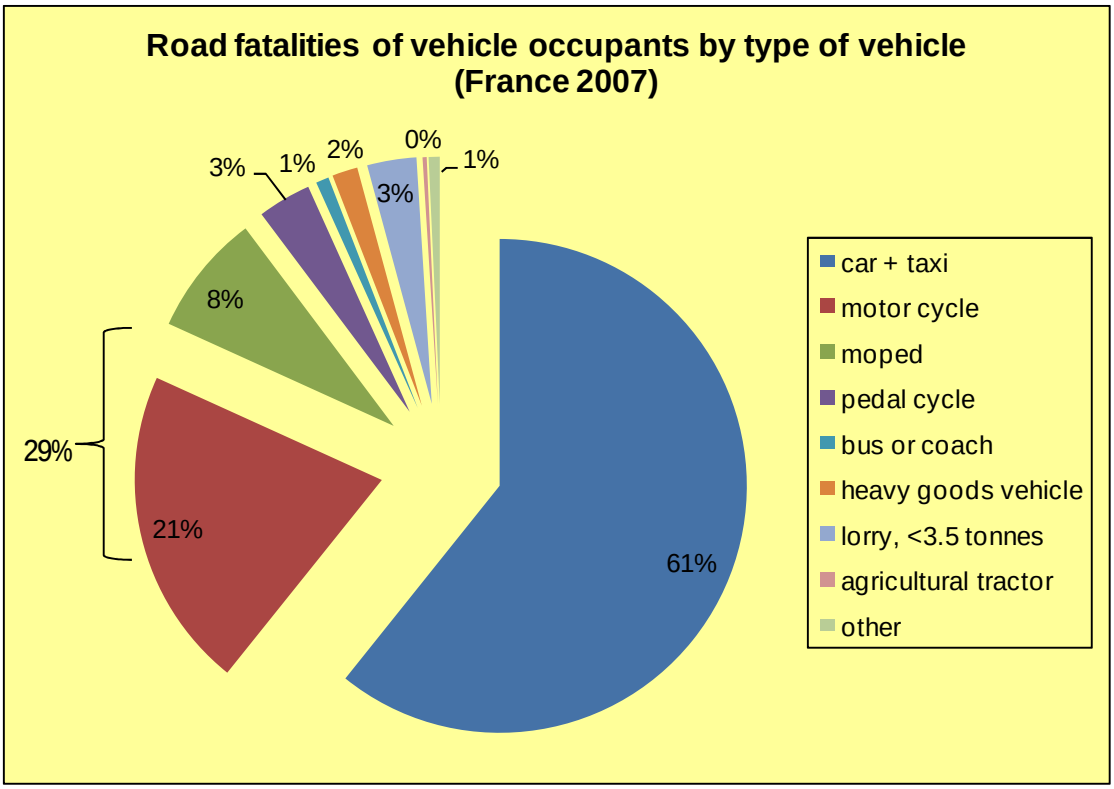


Figure 1.4 Fatalities by type of vehicle France 2007 (Source: CARE reports and graphics: Road fatalities by transport mode. 2007. Update: march 2009)

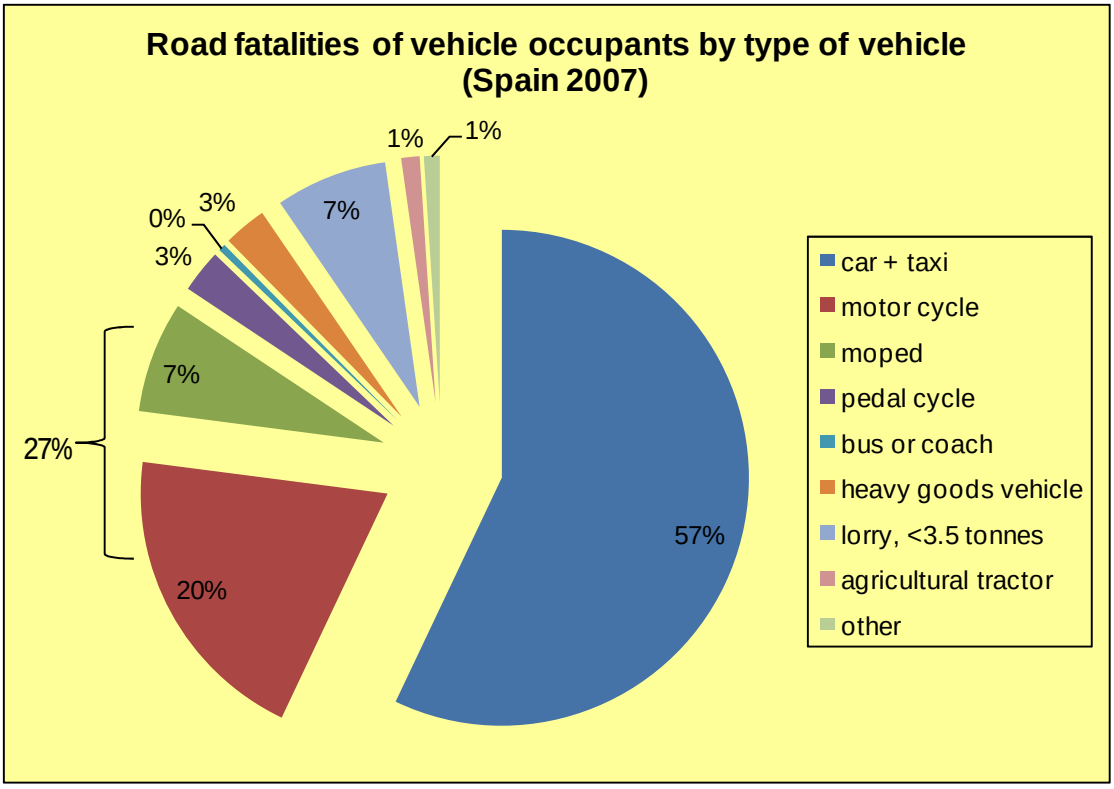


Figure 1.5 Fatalities by type of vehicle Spain 2007 (Source: CARE reports and graphics: Road fatalities by transport mode. 2007. Update: march 2009)

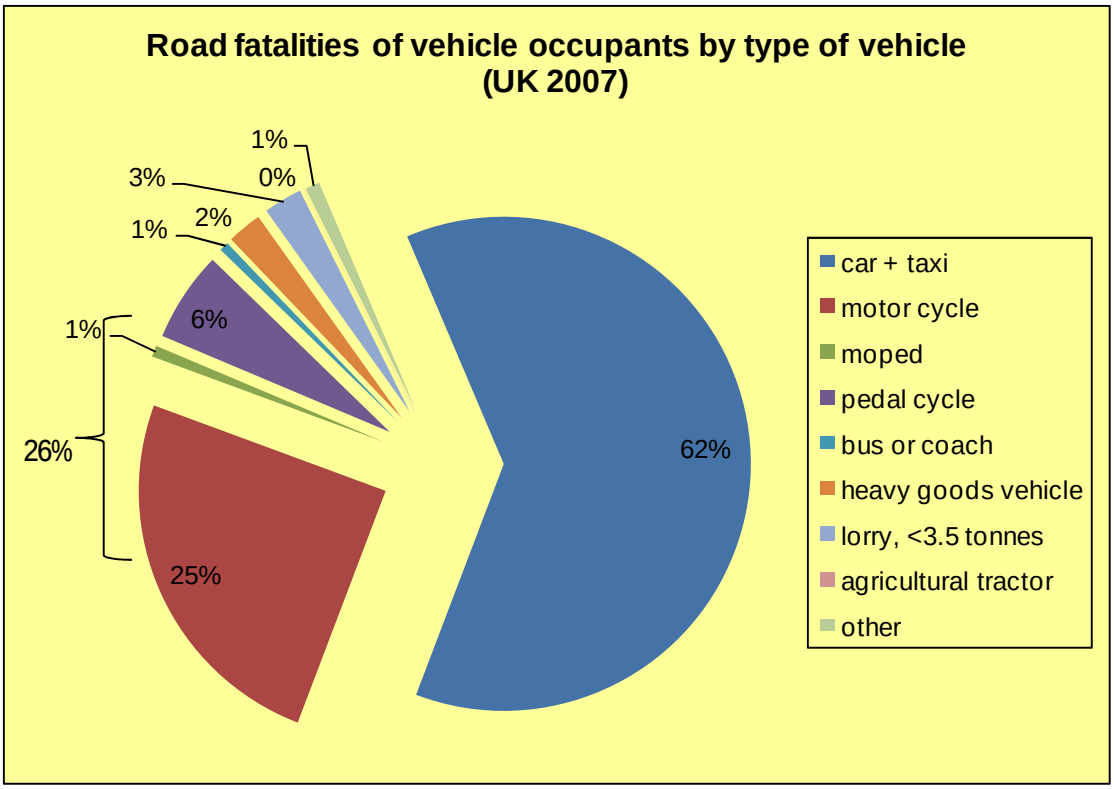


Figure 1.6 Fatalities by type of vehicle UK 2007 (Source: CARE reports and graphics: Road fatalities by transport mode. 2007. Update: march 2009)

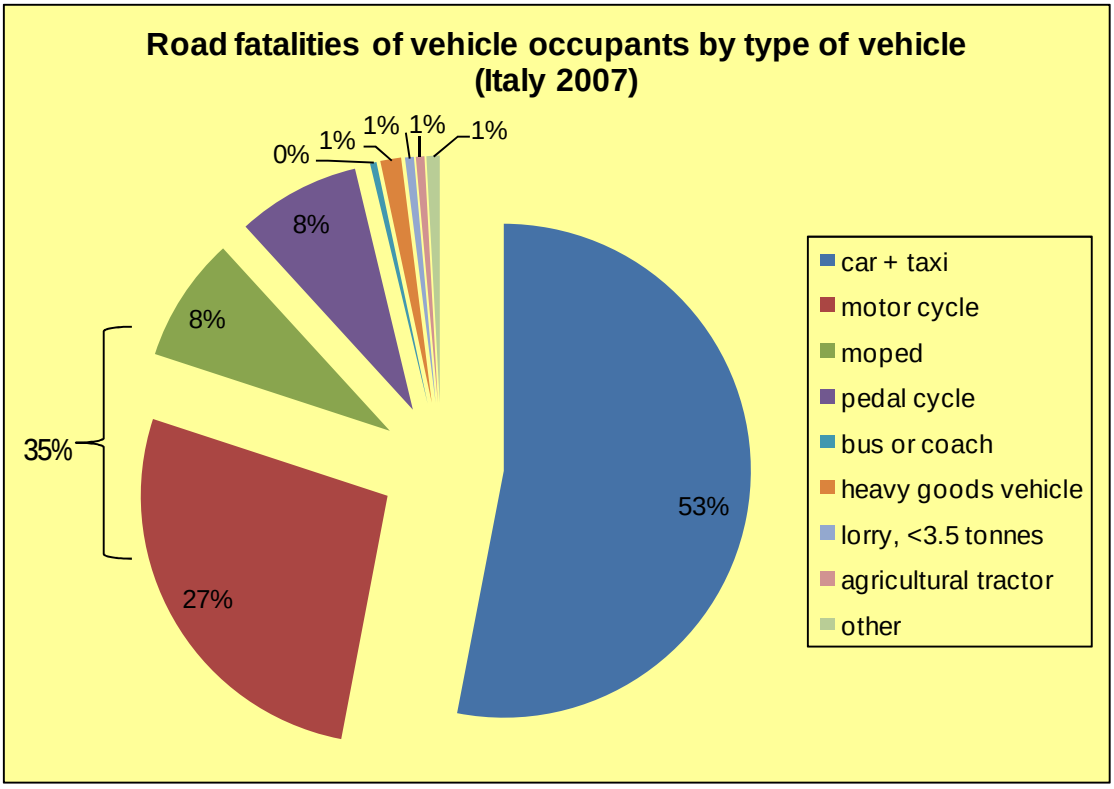


Figure 1.7 Fatalities by type of vehicle Italy 2004 (Source: CARE reports and graphics: Road fatalities by transport mode. 2007. Update: march 2009)

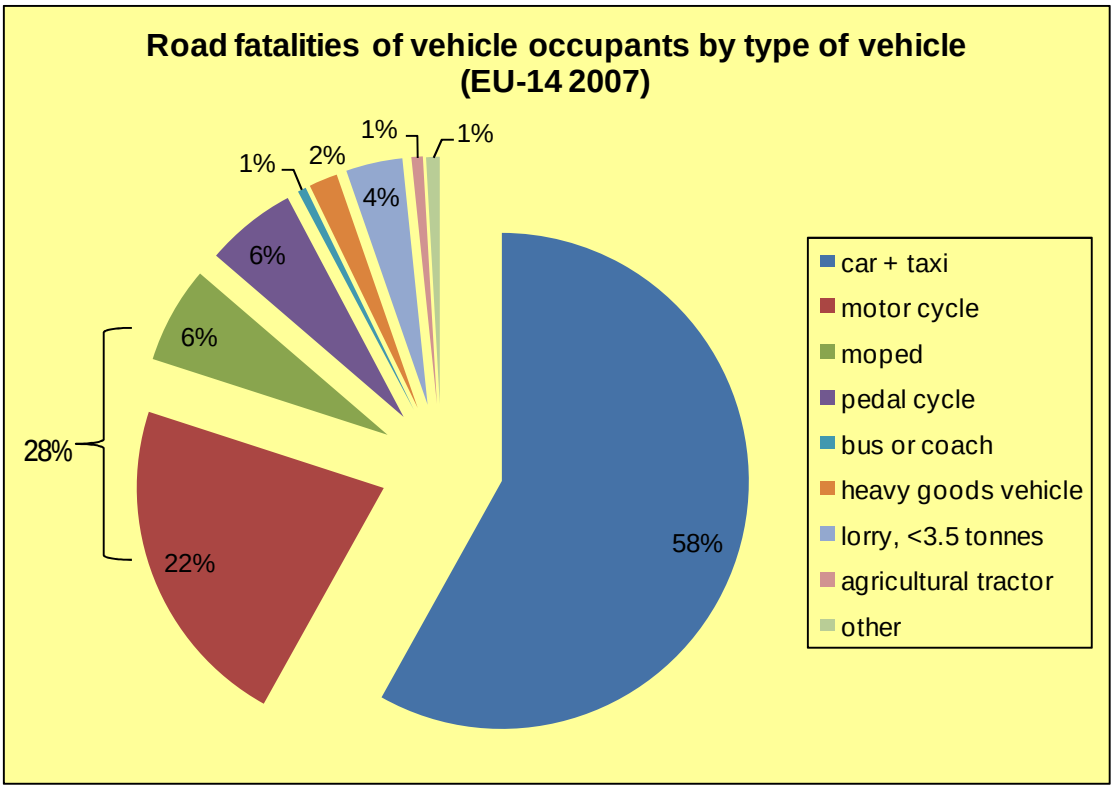


Figure 1.8 Fatalities by type of vehicle EU14 (Source: CARE reports and graphics: Road fatalities by transport mode. 2007. Update: march 2009)

For the EU14 countries, similar progressively downward trends in moped rider fatalities are observed for urban and interurban areas (Figure 1.9 and Figure 1.10[3]). The overall level is similar for the year 2000 (around 1,100 moped rider fatalities) with a more marked reduction for interurban areas by 2007 (where urban moped rider fatalities amount to some 700 lives). Looking more closely at the urban situation and particularly the time period 2000-2007, it is seen that moped rider fatalities are highest for Italy (around 250 lives in 2007) and are very low for the UK (around 10 lives). Spain and France have similar levels until 2004 but since then, the problem becomes greater for France (around 200 in 2007) and lesser for Spain (around 100 lives in 2007).

For the EU14 countries, the steady downward trend for moped rider fatalities is not reproduced for motorcyclist fatalities (Figure 1.11 and Figure 1.12[4]). For urban areas motorcyclist fatalities between 2000 and 2007 vary between 1,600 and 1,800 lives each year (the level exceeds 2,000 lives per year for interurban areas). Looking at the urban motorcyclist fatalities since 2000, the problem was of a similar magnitude for France and Italy (over 400 lives) with a very different evolution since. Fatalities in France have reduced to around 300, with Italy increasing to over 600. UK levels remain steady at over 200 lives per year. Spain shows the lowest level of urban motorcyclist fatalities of the four countries, with around 100 lives annually until 2005 and a worsening thereafter (still below 200 lives in 2007).

[3] In 1.9 and 1.10 figures left vertical axes is attribute to EU 14, while right is attribute to Countries.
[4] See previous note.

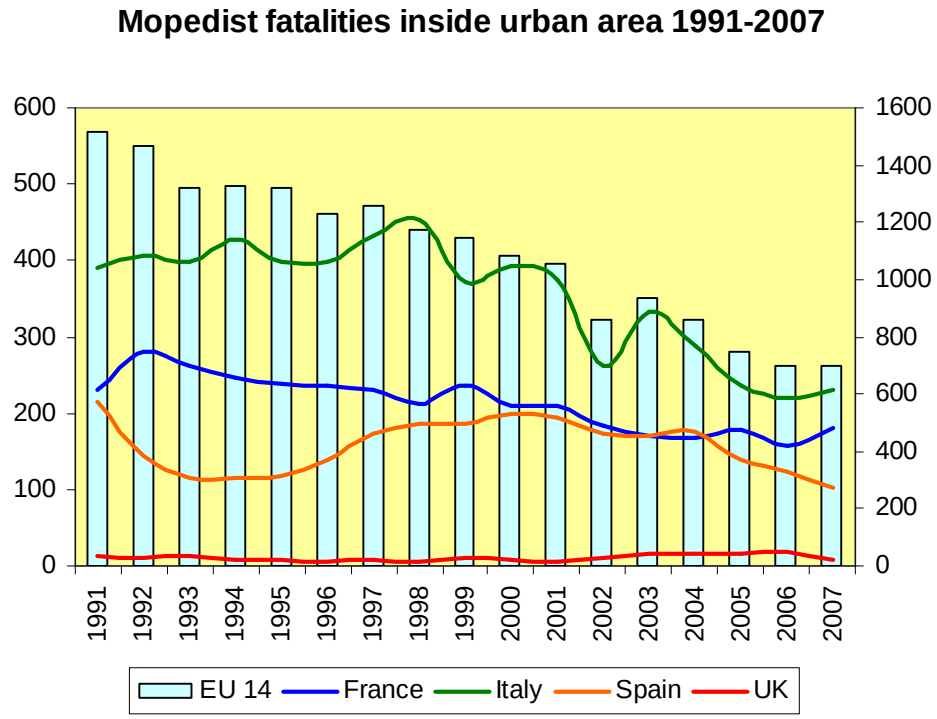


Figure 1.9 Moped rider fatalities inside urban area 1991-2007 (Source: CARE Jan'09)

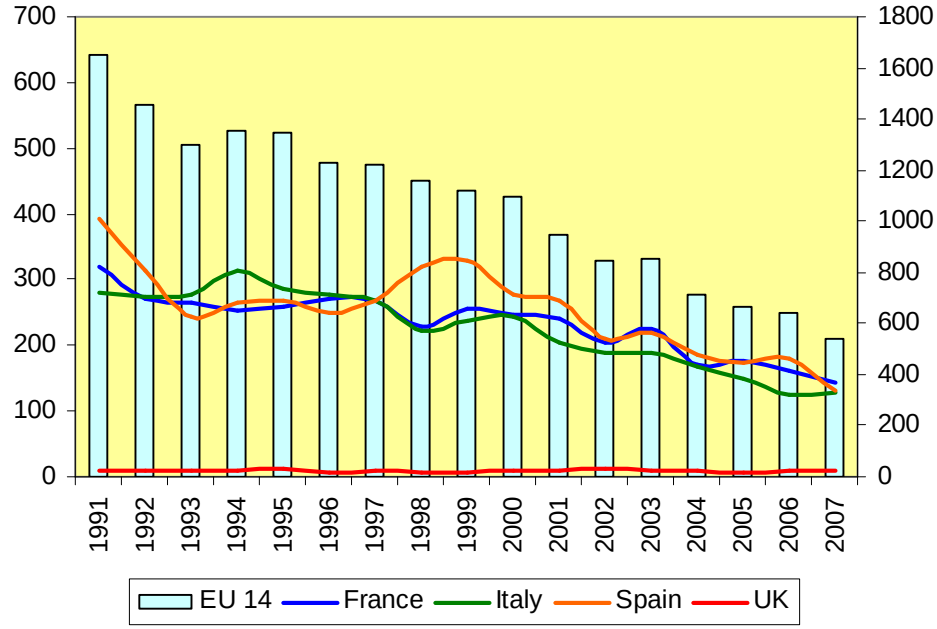


Figure 1.10 Moped rider fatalities outside urban area 1991-2007(Source:CARE Jan'09)

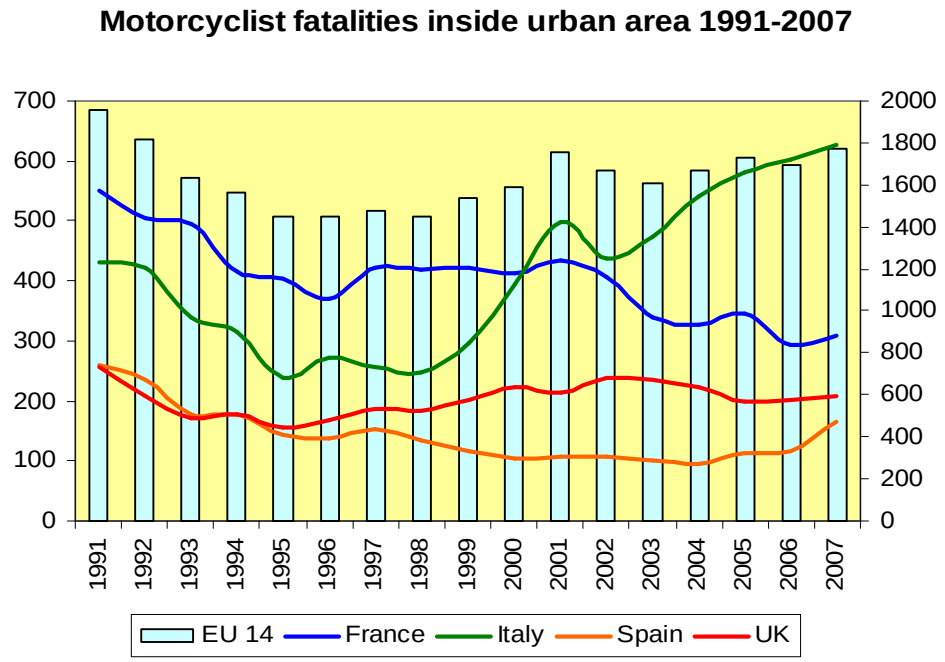


Figure 1.11 Motorcyclist fatalities inside urban area 1991-2007(Source: CARE Jan'09)

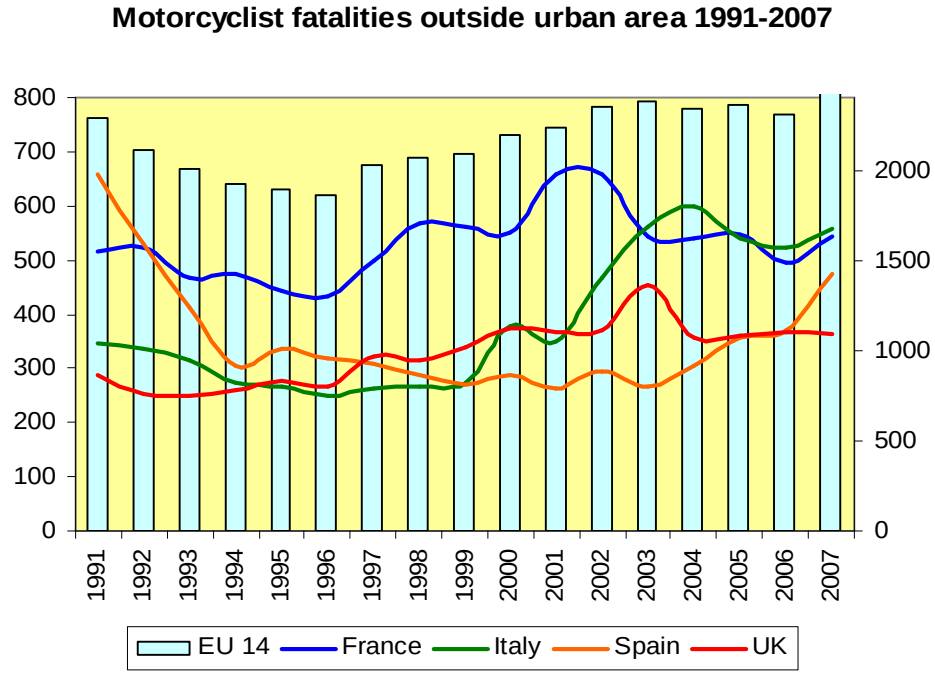


Figure 1.12 Motorcyclist fatalities outside urban area 1991-2007 (Source: CARE Jan'09)

2. Methodology

2.1. Comparing road safety in urban areas

The retrospective comparison of the evolution of road safety for different countries has been successfully realised by the SUNflower and SUNflower+6 projects. Initially the methodology compared 3 countries with good track records in road safety (Sweden, United Kingdom and the Netherlands) (SWOV, 2002). The basic concept of comparing trends for 3 different countries was then applied in the SUNflower+6 project that compared the original SUN countries (with extended topics – including motorcycles and mopeds) and other country groups for South and Central Europe (SWOV, 2005). The eSUM project adopts this basic approach of comparing trends for a limited number of areas or cases, applying it to compare data for four urban areas: Barcelona, London, Paris and Rome.

Some of the considerations regarding data are commented upon in section 2.2. One of the most important considerations concerns the limited number of collisions of different severity (compared to a comparison of the larger national data-sets). The spatial extension of the areas compared is discussed in Chapter 4. A second consideration is the role of other modes – especially the modal split (public transport, walking, etc.) in terms of the overall urban safety and in the relative conflicts that PTW users encounter. Chapter 4 presents the relative contexts of mode share relating to the time periods covered by the trends analysis.

eSUM has sought to compare those urban areas of Europe that have the largest concentrations of PTW usage (Barcelona and Rome) and those cities that have demonstrated experience in improving PTW road safety (Paris and London). In eSUM, diagnosis is one of the activities – others include identification and demonstration of good practice. This investigation is fundamentally linked to the areas over which the participating authorities have jurisdiction – having four sites enriches the comparison.

2.2. Availability, quality and comparability of data

Adopting the SUNflower approach as its starting point, eSUM focuses on a comparison of fatalities and fatal collisions (involving a PTW user), recognising that there are differences in the classification of collision severity and possible variations in reporting levels that can limit the comparability of non-fatal collisions. Indeed, the definition of fatal collisions in terms of the EU standard (registered dead within 30 days of the collision) limits the time series of data that can be compared.

There could be incomplete recording of the PTW collisions or the injuries from the PTW collisions. One reason could be that in some collisions (especially those with no or with slight injury) the people involved do not report the incident to the police.

Furthermore, slight injuries recorded at the scene of the collision, may turn into serious injury or even death at the hospital. There are financial reasons (for example

the insurance payment the injured people receive) which could lead to different records of the severity of the injuries received.

The initial recording of the severity of the injury is usually done by police offices who might under or over estimate the situation.

There also needs to be clarity over the recording of pedestrians injured in PTW collisions.

Finally there should be clarification as to whether the total number of PTW collisions and PTW casualties include those that resulted from causes other than the collision – e.g from falls, slippery road, natural cause of death etc. and a clear definition of the recording process for collisions involving more than 2 riders of a PTW or more than 2 vehicles.

The following issues should also be considered:

- Differentials in insurance cover and reimbursement schemes among the 4 EU cities that might lead to differential reporting of crashes by Police

- Population at risk might vary as individuals travel into the urban area from surrounding suburbs or even other cities

- Differential classification of vehicles (mopeds, etc)

- Differential availability of exposure data e.g. vehicle /kms, daily trips etc. It should be decided what type of population reference is more appropriate in order to compare the 4 cities

Fatal collisions in urban areas are, fortunately, relatively rare occurrences. This raises difficulties concerning the statistical significance of the comparisons and even the identification of patterns. Hence, although the diagnosis centres upon fatalities, comparisons of all collisions involving injury are also compared (for example to identify and compare safety levels by time of day or seasonal variations).

Furthermore, data analysis in time series originally scheduled for the last 12 years (1996 - 2007), were subsequently reduced to the last 8 years (2000 - 2007) due to problems of availability of disaggregated data for such a wide time horizon. For Barcelona, consistent disaggregated data is available from 2002 onwards.

In 1993 the European Commission decided to create a common database of road traffic casualties and funded the CARE (Community Database on Collisions on the Roads in Europe) project. The variation in injury classification criteria is shown in Section 1.4.13 in the CARE glossary (ERSO August 2006). CARE produces 'Traffic Safety Basic Facts' information sheets using the common database, including one on motorcycles. However, *"only data on fatalities and fatal collisions are used in the Traffic Safety Basic Facts, as data on other casualty types incorporated into the CARE database is not reliable due to different definitions and levels of underreporting and is also not comparable among different EU member states, due to different definitions used".*

There is a method of classifying injury severity which is used internationally. The Abbreviated Injury Scale (AIS) is an anatomical scoring system first introduced in 1969. Since this time it has been revised and updated against survival so that it now provides a reasonably accurate way of ranking the severity of injury. A casualty in a road traffic collision may have a range of injuries but the Maximum Abbreviated Injury Scale (MAIS) uses the highest of the AIS variables. CARE concluded that the variation in classification for slight injuries was extremely difficult to reconcile but that for serious injury *"the most robust definition internationally is of a non-fatal casualty with MAIS>=3" (inclusive)*.

Rome, with the largest PTW stock (and consequent exposure to risk) appears to have a possible under-reporting of PTW serious injury from a first consideration of the data for 2007.

2007	Barcelona	London	Paris	Rome
Total PTW vehicles	278,671	116,000	102,000	535,839
Total PTW Serious Injury	236	778	353	208

Table 2.1 Comparison of PTW stock against numbers of seriously injured persons, 2007

This may be a result of the variation in classification criteria described above or it could be a national issue with regards to road casualty under-reporting. Comparative data presented by the Transport Research Laboratory (TRL) in their comparison of UK Department for Transport's (DfT) OTS Motorcycle casualty study and MAIDS also highlights this (TRL PPR 168, 2008).

The revised AIS system of injury classification as developed by the Association for the Advancement of Automotive Medicine in 1998 is summarised in Table 2.2.

AIS value or severity code	AIS Code Description
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Maximum

Table 2.2 The AIS system of injury classification

The comparability of each city's collision data with this classification is not currently known.

Since 1993, in the case of Barcelona, serious injury is defined by the national definition of collision statistics as an injury requiring the person to be hospitalised for at least 24 hours. For some case studies, as early as 2000 PTW collisions have been studied on a case-steady basis re-classifying collisions according to MAIS (for example, helmet case study: Ferrando et al, 2000).

In the case of Paris, since the first of January 2005, the definition of the severity of road collisions has changed:

- Before 2005: a casualty was considered as slightly injured if the person was hospitalised for less than six days; seriously injured if the person was hospitalised for at least six days, and killed if the person died within six days of the collision.

- Since 1/01/2005: a casualty is considered as slightly injured if the person is not hospitalised or hospitalised for less than 24 hours; seriously injured if the person is hospitalised for at least 24 hours, and killed if the persons dies within thirty days of the collision.

In the UK, the following definitions are used to categorise casualties:

- Killed: Casualties who sustained injuries which caused death within 30 days of the collision;

- Serious Injury: Any injury for which a person is detained in hospital as an 'in-patient, or any of the following injuries whether or not they are detained in hospital:- fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the collision.

- Slight Injury: An injury of a minor character such as a sprain (including neck whiplash injury), bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. This definition includes injuries not requiring medical treatment.

In Italy, given the problems in defining impartial criteria concerning the seriousness of the injuries sustained, the Italian standard collision report format (ISTAT) does not separate the casualties between badly and lightly injured.

For the Municipality of Rome there is no distinction between slightly and seriously injured casualties. An estimate of severity is made from information recorded by the municipality's police. Serious injured persons are estimated from the injured danger list.

Fatalities are defined as people killed instantly or within thirty days of the collision, effectively the same as the UK and France. This definition was adopted with effect from the 1st of January 1999, while in the past (until December 31st, 1998) the recorded deaths included only the ones which occurred within seven days of the traffic collision.

Different national classifications of vehicles may also complicate the comparisons. In making assessments of comparative PTW safety in each city it is considered useful to focus on the total number of PTWs, including both 'motorcycle' and 'moped'. Data about mopeds is less available than motorcycles; where it is available it is analysed and presented as part of this exploratory investigation.

Concerning the calculation of the indicators that define the phenomena, Rome only has the number of motorcycles used in 2007, without the number of mopeds, for which an estimation will be provided.

London also estimates the number of mopeds, whilst Paris presents data that does not include mopeds. These variations in available data for the construction of indicators, result in the two vehicle categories being grouped together.

With regard to the temporal distribution of the data, no particular problems have been found. Only Barcelona provided the data reported in the year 2008, while the other partners have data including 2007. This limitation, however, has not affected the development of the analysis.

Collision exposure for private modes of transport is typically assessed in terms of veh-km travelled for the interurban situation. For the urban case – where most trips are for short distances - it is proposed to examine the situation in terms of the number of (daily or annual) trips by the mode concerned. Trip data comes from surveys of household activity, typically carried out every 5 or so years – providing data for all modes enabling transportation planning and strategic monitoring of policies to promote sustainable travel modes. By examining time series data for 8 years, it is expected that trip data will be available from at least two surveys – thus enabling the evolution in PTW mode share to be examined in conjunction with the evolution in collisions. As shown, the trip rates vary considerably. The definitions of trips, the way trips originating or terminating outside the study area are treated and other factors will complicate how cross-city comparisons of traffic safety indicators can be interpreted. Interestingly, the rates for the two central city areas (Barcelona and Paris) are similar – and those for the larger study areas are not so different. It is assumed that similar definitions and data elaboration are used for the different transport surveys made in each city and that the mode share evolution is thus consistent.

2007	Barcelona	London	Paris	Rome
Population (2007)	1,595,110	7,557,000	2,153,600	2,718,768
Trips per workday	7,850,974	23,800,000	10,503,000	6,142,016
Trip survey year	2008	2007	2001	2004
Daily trips / inhabitant	4.92	3.15	4.88	2.26

Table 2.3 Trip rates by city

Where data is available, the exposure in terms of veh-km will also be assessed.

3. Overview of City structure, Traffic Management & PTW Road Safety actions

This chapter provides a background to the evolution of PTW collision trends in each of the four cities, describing the legal context and changes that may have influenced collision levels. It also describes the road safety planning context, any specific targets for PTW collision reductions and relevant actions taken (main information campaigns and other major initiatives).

3.1. Barcelona

3.1.1. Legislation

In Spain there are two types of motorcycle licences: A1 and A. Type A1 allows a person to drive motorcycles of less than 125cc and less than 11KW. The minimum age is 16 years. Type A allows a person to drive any type of motorcycle and the minimum age is 18. For engines over 250cc, the driver needs to have at least two years of experience driving motorcycles of over 125cc.

The compulsory test is the same one for A1 and A. It involves a general theoretical test and a specific theoretical test. If the student then passes a practical test on a closed (off-road) circuit, he/she will obtain a learning license for a maximum of 6 months. During this period, the student takes practical lessons in a driving school. In the second practical test, the candidate rides alone followed by the examiner and the driving school teacher; the candidate receives instructions by radio. For the A1 license, it is mostly an urban route; for the A license, it is mostly a rural route.

		Engine size	Min. Age	Compulsory test		Compulsory documents
				Theoretical	Practical	
Motorcycle	A1	50 -125 cc	16	Yes	Yes	Licence
	A	125+cc	18	Yes	Yes	Licence
Moped		<50cc	14	Yes	Yes	Licence

Table 3.1 Motorcycle and moped legislation in Spain

Mopeds can be ridden by persons over 14 years old, while motorcycles can be driven by 16 and 18 year olds, depending on the engine size. To acquire a licence to drive mopeds, the person passes a theoretical and a practical test. Riders under 18 cannot carry a passenger. A passenger can be carried if they are above 7 years of age, provided that the driver is the passenger's parent, tutor or otherwise authorized to carry the passenger.

Helmet use is compulsory for driver and passenger, both on urban and rural roads.

3.1.2. Road safety policy

The Barcelona Traffic Council was created in 1983 to discuss and agree on different aspects of mobility in the city. With the support and drive of this group, in 1998 the Mobility Pact was initiated. The Mobility Pact is the place where experts, municipality technicians, social entities and politicians meet to discuss mobility. The Mobility Pact is a tool for working together to improve the mobility model of Barcelona. There are ten goals and one of them is to "Improve road safety and respect among users of the different modes of transport."

Five years before, in 1993, the first Barcelona Roadway Safety Forum took place. During the third forum, in 1995, the first "Barcelona Award for Road Safety. Mª Àngels Jiménez Memorial Award" was given. With this initiative, the Barcelona Municipality makes the award for work in urban collisions research, in urban safety research at the university and for general communications on urban road safety issues.

The first Road Safety Urban Plan 2000-2003 is one of the achievements of the Mobility Pact. The second plan (2003-2010) endorsed the EU objective of reducing fatalities by 50% between 2000 and 2010, and added a local target of reducing the number of injured persons by 45% in the same period. As a further example of the Barcelona Municipality's commitment for road safety, it signed the European Road Safety Charter in April 2004.

The third Road Safety Urban Plan has been published and it defines the objectives, the indicators and the measures for three years (2008-2010). It maintains the previous targets and adds an additional target of reducing the number of collisions by 25% between 2008 and 2010. None of Barcelona's plans have set specific targets for reducing PTW casualties.

The next figure presents the main road safety measures applied in Barcelona from 2002 to 2008 and the trend in killed and injured PTW riders. The following sub-sections discuss changes, and actions realised, that may help to explain the evolution in PTW safety in the city (certain aspects like the evolution in mobility levels are discussed in Chapter 4).

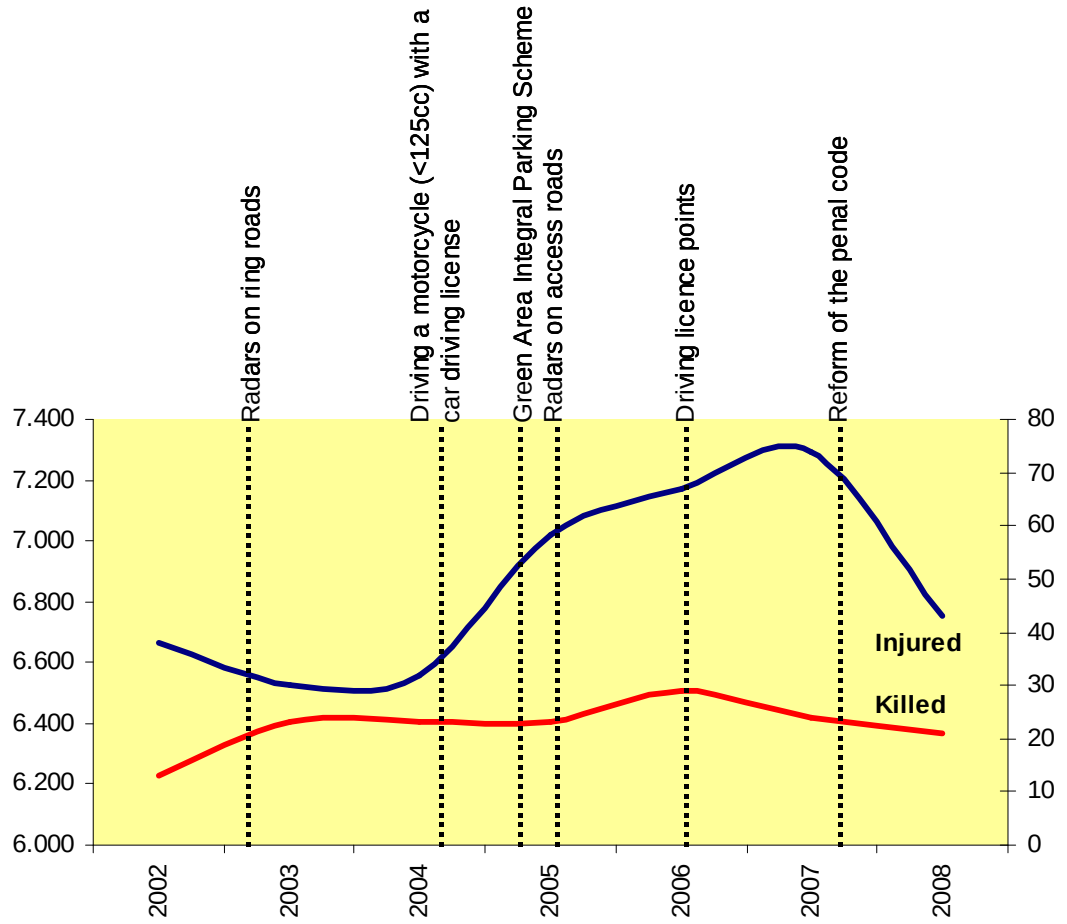


Figure 3.1 Development in the number of PTW casualties on traffic collisions and main road safety measures in Barcelona (number injured on left axis, killed on right)

3.1.3. Legal changes, other regulatory measures

From 2000 onwards, a small number of red-light enforcement cameras were implemented. At the beginning of 2003, the Municipality placed radar-triggered speed cameras on ring roads, extending the implementation to access roads in 2005. It is possible that the implementation of these systems had some short-term deterrent effect (decreasing injuries to drivers, stabilising PTW fatalities). The following table summarises the level of enforcement achieved by these automated camera systems. It is seen that the total number of penalty notices drops from a high level in 2005 to a lower one in 2007. This trend is the reverse of the increase in PTW injured persons between 2005 and 2007, presented in the summary figure.

	2005	2006	2007
Radar (speed cameras)	338,209	291,471	256,141
Red-light jumper cameras	13,014	13,177	10,165
Total penalty notices issued	**351,223**	**304,648**	**266,306**

Table 3.2 Penalty notices issued by automated enforcement cameras, Barcelona. Source: Report evaluating 2nd Road Safety Plan (Barcelona Municipality, 2008)

During the four-year period 2004 – 2007, a total of 250,000 driver checks for drink-driving were undertaken. 41,000 of these (16%) were positive.

During the last quarter of 2004, the law changed and allowed a person with a car driving licence for more than 3 years to drive motorcycles of less than 125cc. Following this, the figures of injured PTW riders rose sharply during 2005 and continued to rise (less sharply) until the end of 2007 (when the new penal code came into effect).

During 2005 the Green Area Integrated Parking Management scheme was implemented. This scheme has increased the percentage of controlled on-street parking spaces in the city (from 8% in 2000 to 31% of total on-street spaces, in 2006) - with very high levels of on-street regulation in the central part of the city. The use of motorcycles and scooters was favoured by this scheme since some 37,000 on-street spaces were assigned to PTWs, with no charge applied for parking a PTW (cars are charged according to time of stay, area, and residential status). The following figure summarises the trend in (marked) on-street spaces for PTW parking – clearly showing the improvement in on-street PTW parking associated with the Green Area scheme implementation. From less than 10,000 spaces in 2000 the number has increased fourfold, with over 42,000 spaces in 2008 – for which no charge is made and for which no time limit is imposed[5]. The number of off-street PTW parking spaces (charged at a tariff) is less than 2,000 units (2008).

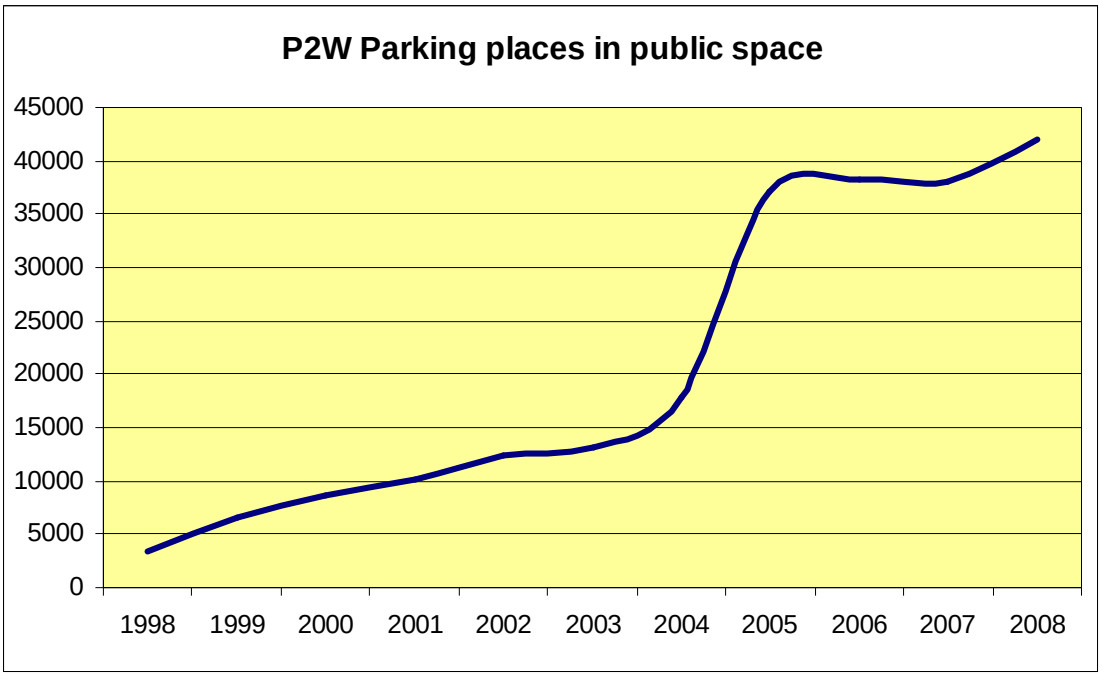


Figure 3.2 Trend in on-street PTW parking space provision in Barcelona

[5] Providing on-street spaces for P2Ws was also aimed at removing P2W conflicts with pedestrians on pavement areas.

The policy to restrict car parking (whilst favouring motorcycling) coincided with the legal changes (2004) facilitating access to PTWs by non-PTW-trained motorists, and with a reduction in the number of penalty notices issued by camera enforcement systems. The combination of these factors may help to account for the peak of PTW fatalities and injured persons between 2006 and 2007.

The driver license points system has had no influence on traffic patterns in urban areas, but the criminalising of serious traffic offences (2007), such as drink-driving, has probably served to strengthen the deterrence of some dangerous driving behaviours.

The annual number of PTW injured persons drops notably in 2008 – possibly to the increased experience of drivers, effects of the training / communication campaign "molt fragil" (see next section) and the strengthened legal framework but possibly also due to lower traffic levels and other factors.

The Risk-Zone tool for monitoring and managing collision counter measures (reported in WP3) was initiated in 2002 as a pilot project. In 2004 it started operating with a small budget, supporting 14 improvement actions. In 2007 it was generally applied across the city, realising 77 improvement actions with a budget of 280.000€.

3.1.4. Communication and training campaigns

From 2000, Barcelona Municipality has developed various communication campaigns, including:

- 2000 Helmet: Estalvia't mal de caps [Posa't el casc]
- 2001 Video training for professional users of PTW (like messengers). "Treballar amb moto"
- 2002 Red-light jumper campaign "Don't bet [With red light, stop]". "No te la jugis [en vermell, atura't]"
- 2002 IX Forum de Seguretat Viaria "Motorcycles. Light and shadows" "Les motos, llums I ombres"
- 2003 Motorcycles campaign to control exhaust pipe (noise)
- 2004 Red-light jumper campaign "What do traffic lights have to do for you to pay attention?" "Què han de fer els semàfors perquè els facis cas?"
- 2006 « Molt Fràgil » addressing PTW vulnerability.

In response to the rise in PTW collisions attributed to changes in the licensing regulating the driving of PTWs up to 125cc (October 2004, with sharpest rise in 2005), a collaboration agreement was established with Anesdor which comprised:

- The realization of training courses by rider training professionals and local police.

- Distribution of a leaflet & DVD

- Information campaign.

In 2006, the communication campaign “molt fràgil” (very fragile) DVD explaining the main types of collisions was distributed to 251,000 purchasers of new scooters via motorcycle dealers and was mailed to participants of training courses. The leaflet was distributed to 150,000 PTW riders and 50,000 car drivers and further dissemination was made via posters, lamp-posts and radio advertisements. A total of 17 training classes lasting 3 hours (1 of theory, 2 of practice at an off-road circuit, with numbers limited to 15 participants per class) were realized between June and December of 2006. 131 persons attended the training sessions.

The number of PTW fatalities dropped after 2006 and the trend in PTW injuries fell considerably towards the end of 2007 with fatalities returning to the levels recorded in 2004-2005. PTW injuries were around the yearly average for 2005.

3.2. London

3.2.1. Legislation

In the UK, Compulsory Basic Training (CBT) was introduced in 1990 to help reduce the very high collision rate among inexperienced motorcyclists. CBT must be completed before a learner moped or motorcycle rider is allowed to ride on the road with L-plates (or D-plates in Wales).

CBT will need to be completed if a rider wants to:

- ride a moped (a moped has an engine not over 50 cc with maximum design speed not exceeding 50 km/h); or

- ride a motorcycle

If a car licence was obtained before 1 February 2001, then there is not a requirement for CBT to be completed before you can ride a moped.

The CBT course involves five elements, namely:

- Element A: introduction;

- Element B: practical on-site training;

- Element C: practical on-site riding;

- Element D: practical on-road training; and

- Element E: practical on-road riding.

The five elements have to be completed in sequence[6], although the order of the exercises within the element can be varied. Riders can only move on to the next element, when their instructor is satisfied[7] that the necessary theory has been learnt and the student has demonstrated the practical skills to a safe basic level. Trainees must, by law, receive a minimum two hour on-road ride in Element E.

Once the CBT course has been successfully undertaken, a Completion of CBT Certificate (DL 196) will be issued; this will allow the rider to hold a provisional moped licence, if the rider is at least 16 years old. It entitles the licence holder to ride a moped on the road as a learner with L-plates (D-plates in Wales); the rider is not allowed to carry a pillion passenger or go on a motorway.

A CBT certificate obtained on a moped is also valid for motorcycles, once the rider has reached the age of 17 years and has the necessary licence.

Description	Category	Minimum age
Mopeds with an engine capacity not exceeding 50cc and a maximum design speed not exceeding 50km/h	Provisional	16
Light motorcycles with a cubic capacity not exceeding 125cc and a power output not exceeding 11kW (14.6bhp)	Full A1	17
Motorcycles up to 25kW (33bhp) and a power to weight ratio not exceeding 0.16kW/kg. Motorcycle combination with a power to weight ratio not exceeding 0.16kW/kg	Full A	17
Any size motorcycle with or without a sidecar	Full A	21*

Table 3.3 Motorcycle and moped legislation in the United Kingdom

Note: Age 21 if the rider passed the test for large motorcycles as part of the Direct Access scheme, or two years from the date of test pass if the rider passed the test on a standard A motorcycle (power output up to 25 kW (33 bhp) or a power to weight ratio not exceeding 0.16kW/kg.)

In the United Kingdom, there are two types of full motorcycle licence – A1 and A.

The light motorcycle licence (A1), restricts riders to any bike up to 125 cc and a power output of 11 kW. The practical test must be taken on a bike of between 75 cc and 125 cc, and riders must be a minimum of 17 years old.

The standard motorcycle licence (A), is obtained if the practical test is taken on a bike of over 120 cc but not more than 125 cc and capable of at least 100 km/h per hour; riders must be a minimum of 17 years old. After passing the standard motorcycle practical test, there is a restriction of two years to riding a bike of up to 25 kW and a power/weight ratio not exceeding 0.16 kW/kg. After this period, any size of bike may be ridden.

With effect from 27 April 2009, the single-event test was replaced by a new test, which is taken in two parts:

[6] There is no time limit for completing the 5 elements

[7] It is a subjective assessment by the instructor that the rider is ready to move on to the next level. There are no objective criteria

- Module 1 contains the specified manoeuvres element of the test including exercises designed to assess the rider's ability to control their machine safely, including avoidance and emergency stop exercises.

- Module 2 includes an eyesight test and at least 30 minutes of on-road riding, assessing the ability of the rider to safely interact with other road users.

After successfully obtaining a full licence, riders aged 21 or over - or those who reach 21 before their two year restriction ends - have other options:

1. Direct Access

After taking CBT and the theory test, the practical test may be taken on a motorcycle with a power output of at least 35kW. A pass allows a motorcycle of any size to be ridden. All or part of the CBT course may be taken on either a learner bike or a large bike. Practice for the practical test on bikes larger than the learner bike specification, may be undertaken, provided:

- the rider is accompanied at all times by an approved instructor on another bike and in radio contact; and

- the rider wears fluorescent or reflective clothing, and follows all other provisional licence restrictions.

2. Accelerated Access

Riders who reach the age of 21, while still within the two year period (where they are restricted to maximum 25 kW machines) but who wish to ride larger bikes, need to pass a further test on a motorcycle of at least 35 kW. They may practice on bikes over 25 kW under the same practice conditions for direct access riders. The rider will revert to learner status while practicing (on a motorcycle greater than 25 kW), although test failure will not affect an existing licence.

On all journeys, the rider and pillion passenger on a motorcycle, scooter or moped must wear a protective helmet. Helmets must comply with the Regulations and they must be fastened securely. This does not apply to a follower of the Sikh religion, while wearing a turban.

The rider must not carry more than one pillion passenger, who must sit astride the machine on a properly constructed seat, with both feet on the footrests. The rider must not carry a pillion passenger unless the motorcycle is designed to do so. Provisional licence holders must not carry a pillion passenger.

3.2.2. Road safety policy

When the Mayor of London’s Road Safety Plan was published in 2001, it laid out clear road casualty reduction targets. These were based on national targets produced by the Department of Transport, to be achieved by 2010:

- 40% reduction in the number of people killed or seriously injured in road collisions;

- 50% reduction in the number of children killed or seriously injured; and
- 10% reduction in the slight casualty rate.

A specific target for reducing pedestrian and cyclist KSIs by 40% to ensure that attention was directed specifically at these groups.

The London Road Safety Unit (LRSU) was set up in 2002, and is the centre for the majority of Transport for London's (TfL's) road safety activities to implement the Road Safety Plan.

By 2004 all of these targets, with the exception of PTWs, had been achieved. The Mayor therefore announced new, more challenging targets in March 2006, which needed to be met by 2010:

- 50% reduction in all road users killed or seriously injured;
- 60% reduction in the number of children killed or seriously injured;
- 50% reduction in pedestrians and cyclists killed or seriously injured;
- 40% reduction in the number of PTWs users killed or seriously injured; and
- 25% reduction in the slight casualty rate.

Progress towards these targets is measured against 1994-98 average casualty figures.

Additionally, the Greater London Authority (GLA) has signed up to a European target to support road safety activities and contribute to halving fatalities in the European Union by 2010.

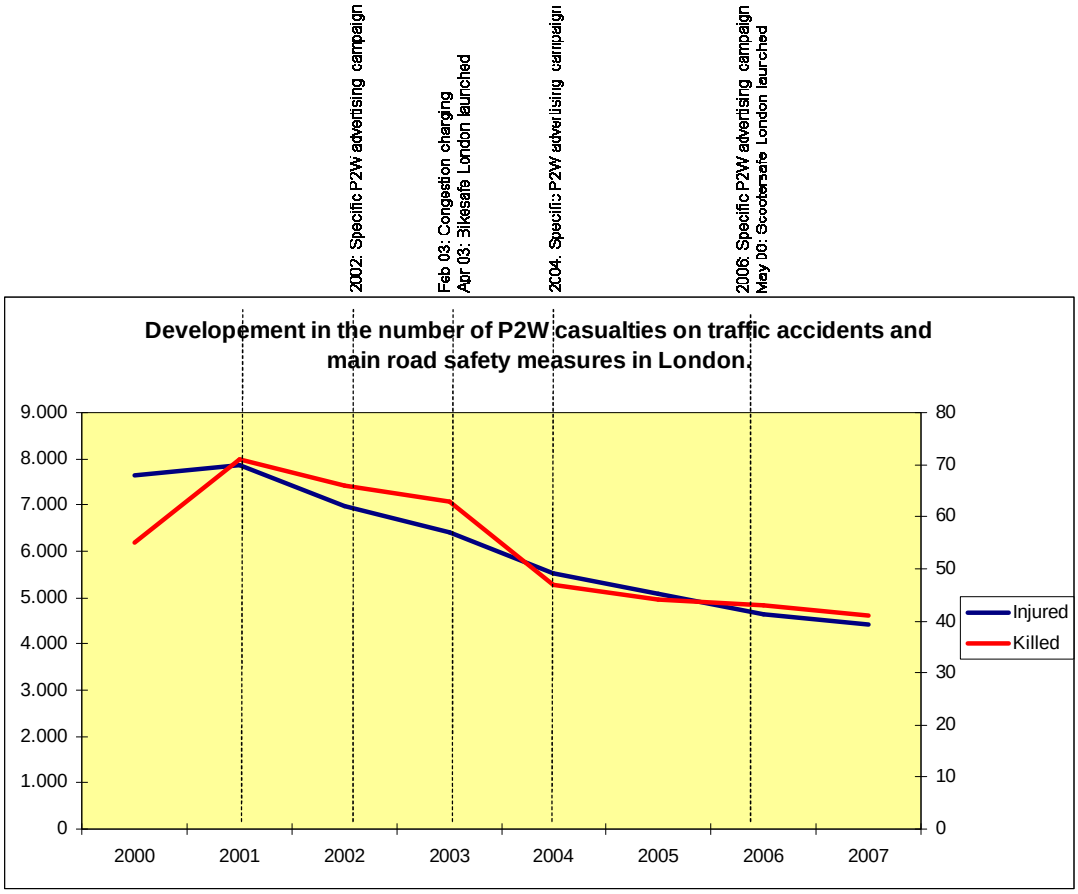
The Mayor's strategy for achieving the targets set out in the Road Safety Plan involves a combination of road safety Engineering, Education and Enforcement. These "three E's" mutually reinforce each other, and are all an integral part of road safety.

London is noteworthy as being the city that shows a progressive decline in all types of PTW casualties (fatal and injured persons), from 2001 onwards. Prior to the implementation of Congestion Charging (2003 and 2007) camera-based enforcement using Automatic Number Plate Recognition (ANPR) had been proven as a means of detecting vehicles for a variety of offences the central area of the City of London. The implementation of Congestion Charging coincided with a wider deployment of speed cameras. In total London has deployed over 300 cameras dedicated to red-light jumper enforcement (a type of collision that causes PTW fatalities). In addition, over 650 specialist speed cameras are in operation across the whole of Greater London.

Congestion charging exemptions apply to PTWs and also to electrically-powered 4-wheelers. Whilst some 18000 electric/hybrid cars have registered for exemption from the charge, the stable levels of PTW in the mode share evolution (2000-2008)

– see Chapter 4 – suggest that the measure has not had a big impact on PTW usage.

The next figure presents the main road safety measures applied in London from 1996 to 2007 and the trend in killed and injured PTW riders.



1 Unless they are on the road riding element of an approved CBT course

Sources: Bikesafe London, DfT, DSA, DVLA, Bikermag, BMF, Sportsbike.org, Scottish Executive

Figure 3.3 Development in the number of PTW casualties in traffic collisions and main road safety measures in London

The left-hand perpendicular axis relates to 'Injured', with 'Killed' shown on the right-hand axis. The 2001 perpendicular dotted line indicated when Compulsory Basic Training (CBT) was made mores stringent.

3.2.3. Communication campaigns

Since the turn of century, there have been a number of interventions which have impacted on the Killed and Seriously Injured statistics for PTWs in London, namely:

- February 2001: Compulsory Basic Training procedures made more stringent;
- Spring 2002: Specific media advertising campaign targeting PTWs;

- February 2003: Congestion Charging Scheme introduced, although there was not a charge for PTWs, the total number of vehicles driving in central London was reduced;

- April 2003: BikeSafe London launched;

- Spring 2004: Specific media advertising campaign targeting PTWs;

- April 2006: London Borough Road Safety Officer Group funded by Transport for London (TfL), designed and produced RightGear London campaign targeting inappropriately dressed moped and scooter riders.

- May 2006 BikeSafe London Partnership, TfL, the Metropolitan Police (MPS) and the City of London Police (CoLP) launch ScooterSafe London. Based on the successful BikeSafe London initiative, but has an emphasis on urban riding and targets riders of low powered bikes.

- October 2006: TfL create "The Day You Went To Work" advertisement aimed at reminding PTW riders of the need to keep a look out when riding on familiar roads.

- February 2007: Congestion Charge Scheme enlarged by Western Extension.

- April 2007: Department for Transport (DfT) announce continued sponsorship until 2010 of the British Superbike Series, via the THINK motorcycle academy.

- June 2007: London Borough of Islington launches Scootalive initiative for young moped riders.

- September 2007: Driving Standards Agency (DSA) introduce new theory test for learner riders, incorporating a hazard perception test and an increase in the number of multi choice questions.

- November 2007: Safety Helmet Assessment and Rating Programme (SHARP) testing scheme introduced by DfT, with aim of improving the quality of motorcycle helmets.

- February 2008: Ride Safe-Back Safe team produce 'First Date' DVD campaign, which compares first PTW with first date.

- March 2008: TfL Produce "Illusions" advert to address issues relating to drivers looking but failing to see PTW riders before turning across their path.

- April 2008: DSA launch the Better Biking DVD aim at motorcycle trainers.

- April 2008: Institute of Highways Incorporated Engineers (IHIE) Guidelines for improving motorcycling safety through engineering and integration website launched.

- January 2009: TfL begins 18-month trial allowing PTWs to use bus lanes on its road network.

- April 2009: DSA launch new two part PTW test - Module 1 off road, Module 2 on road.

3.3. Paris

3.3.1. Legislation

In France, there are two types of motorcycle licences (A1 and A) and one moped education course (BSR).

To ride a moped, people have to be 14 years old and, for people born after the 1st January 1998, they have to complete a road safety education course (BSR). This course was implemented in 1997 because the number of moped collisions involving teenagers continued to rise for various reasons. Technology is more complex, traffic more dense, use more varied. This course is a very important part of the French educational curriculum.

The BSR includes theoretical and practical training that allows the rider to get to know the general rules of movement and safety on the road, learning, in real traffic conditions, to share road space safely with others. The theoretical part is provided in secondary schools and validated by the issue of the certificate of school road safety first level (ASSR 1). ASSR1 takes place during the second year of secondary education. During the fourth year of secondary school, the certificate of school road safety second level (ASSR 2) is undertaken. These certificates allow the access to a practical training course of five hours duration, during which teenagers learn how to join and leave traffic, to choose the right position on the roadway, negotiate junctions and to change direction.

The type A1 licence allows riders to drive motorcycles of less than 125cc and less than 11KW. The minimum age is 16 years. People, who have held a car driving licence since the 1st January of 2007, are allowed to drive a light motorcycle on national territory once they have completed a 3 hour practical training course, carried out on a light motorcycle with a manual gearbox and issued by an approved organization. This training can be completed up to one month before the 2 year anniversary of obtaining a car driving licence. At the end of the training, a certificate is issued to the driver.

The candidate must first pass the theoretical test covering the highway rules, if they have held another permit (including theory and practical tests) for less than five years. Passing the theoretical test entitles an individual to five practical tests within a maximum period of three years. The practical test includes an off-road test with oral questions and an on-road driving test of approximately 30 minutes. The off-road test must be completed before the on-road section.

The type A licence allows a rider to drive any type of motorcycle under 100CV. The minimum age is 18. For engines over 34CV, riders need to have at least two years' experience of riding motorcycles of over 15CV. These limitations don't apply to drivers who are more than 21 years old or who have held a driving licence for a minimum of two years.

Since 2004 anyone who has held a car driving licence for more than 2 years can drive motorcycles of less than 125cc and 15CV, but only on the French national territory. Moreover, since the 1st January of 2007, new holders of a car driving licence are obliged to complete a three hour training course to ride a 125cc motorcycle.

The candidates have to pass a theoretical test to be allowed to sit the practical test. They have to be holders of the ASSR 2 and have to complete a minimum of 20 hours of driving lessons: 8 on track and 12 on road.

3.3.2. Road safety policy

The number of PTW users injured has increased less quickly than the volume of PTW traffic and this is due in great part to targeted police enforcement in Paris.

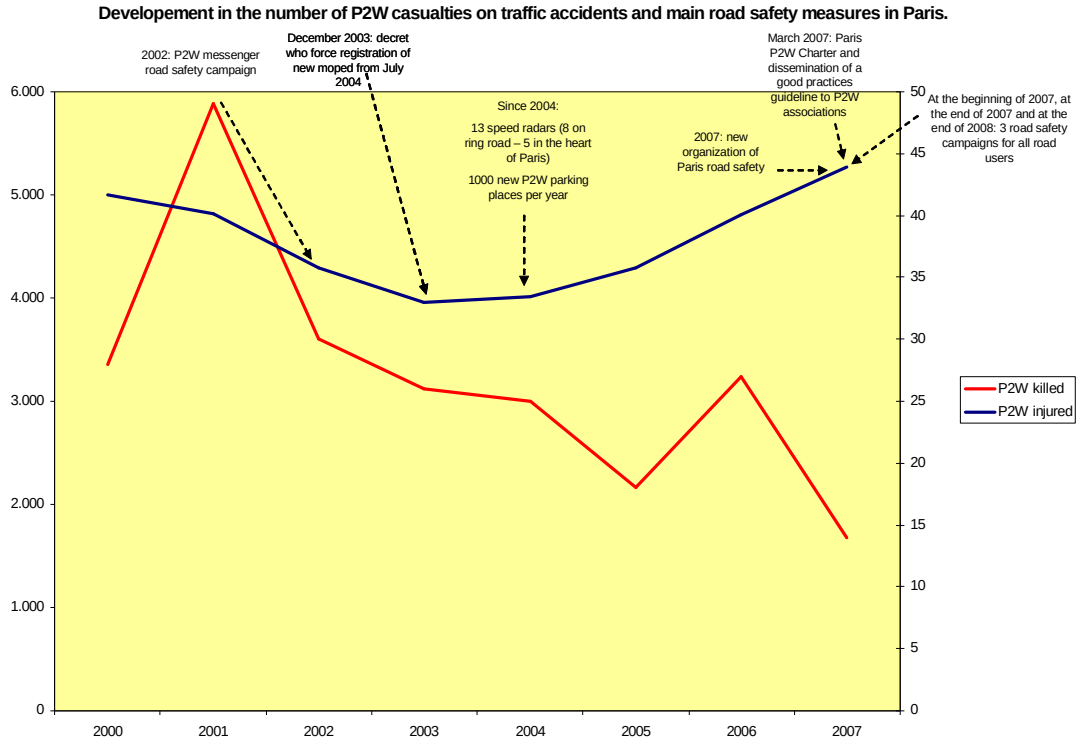


Figure 3.4 Development in the number of PTW casualties on traffic collisions and main road safety measures in Paris

Drink Driving Enforcement:

	2007	2008	Variation
Number of police operations for checking for alcohol in the blood	3,190	2,808	-11.97%
Number of Checks for alcohol in the blood (positive or negative)	79,870	80,109	+0.30%
Number of fine for alcohol in the blood (checking positive)	9,073	8,956	-1.29%

Table 3.4. Evolution of checking for alcohol in the blood between 2007 and 2008

The Police have developed their 'drink-driving' enforcement using data to target resources.

From August to December 2007, 593 drug testing kits used during the drink-drive campaign. Of 172 positive cases, 142 were confirmed by blood analysis.

Enforcing PTW and cyclist offences:

	2007	2008	Variation
PTW offences	77,442	95,061	+ 22.75%
cyclists offences	11,733	13,842	+ 17.97%

Table 3.5 Evolution of offences for 2-wheels users between 2007 and 2008

Cyclists and PTW riders are over-represented in Paris casualty data. (5844 from a total of 9579 in 2008). Hazardous behaviour, such as speeding for PTWs and jumping the lights for cyclists, were targeted by Police action.

Additional police activity

	2007	2008	Variation
Speeding • fixed automated enforcement • mobile automated enforcement • speeding more than 30 km/h	575,303 497,274 78,029 4,302	694,548 488,347 206,201 3,933	+ 20.7% - 1.8% + 164.2% - 8.57%
Driving without licence	7,102	7,760	+ 9.3%
Driving with drugs	496	661	+ 33.3%
Drunk driving with drugs	112	145	+ 29.4%
Fine without interception	721	670	- 7%
No seat belt	10,582	9,511	-10.1%
Jumping the lights	47,158	43,568	- 7.6%
Mobile phone	52,355	47,212	- 9.8%
refusal to give way to a pedestrian	928	1,215	+ 30.9%
Driving in bus lanes	32,383	24,934	- 23%

Table 3.6 Evolution of the most important traffic offences between 2007 and 2008

A study from 2008 by the Ministry of Transport shows that almost all moped users in Paris now wear a helmet.

In the urban area	Moped riders (%)				Motorcyclists (%)			
	2003	2004	2005	2006	2003	2004	2005	2006
National roads and crossing built-up areas	98	98	100	94	94	96	96	97
Group of provincial big built-up areas	95	94	94	94	96	95	97	95
Parisian built-up area Including Paris	100 98	100 100	99 99	87 100	99 99	99 98	99 99	99 98

Table 3.7 Evolution of the use of the helmet (Source: French Traffic and Road Safety Department (312 moped riders and 356 motorcyclists observed in 2006))

The rate of helmet use in central Paris was at its maximum in 2006. It decreased by 6 points in smaller urban areas and remained stable in larger built-up areas.

In 2008, the Police in Paris continued to combat speeding with the use of mobile radar speed checks. This effort lead to a slight decrease in the number of excessive speeding offences(- 8.57%). However, 278 additional offences of exceeding the 50 km/h limit were recorded.

The presence of 13 fixed radar speed checks has had a deterrent effect and the number of offences has slightly decreased.

The reduction in the number of killed and injured casualties on the ring road is due to a decrease in speed due to the fear of detection by the fixed radar speed checks.

To address the number of pedestrian injuries, the enforcement of the offence of refusal to give way to a pedestrian crossing correctly has significantly increased.

The number of fines for driving or riding in bus lanes has decreased, due to the installation of video detection devices in bus lanes. This decrease applies only to four-wheel vehicles and the number of prosecutions of PTW riders has increased..

Preventive measures:

As a supplement to the enforcement measures, Paris Police have undertaken preventative operations in 2008. These include preventive operations to contribute to education projects and to improve rider behaviour. The police employ specialists whose task is to intercede with various audiences:

35,481 Parisian pupils have taken part in a road safety working group.

9,110 workers were involved in occupational road risk events.

2,000 older road users have taken part in conferences on road risk in Paris and the consequences of aging (medicine, false perception of environment, etc.).

More than 18,000 users have taken part in road safety working groups during Mondial de l'Automobile, Foire de Paris or Senior Salon activities.

Educational alternatives to prosecution have been introduced and around 100 road users accepted training courses instead of fines during 2008.

Communication campaigns

On April 29th, 2004, with representatives of Barcelona, London, Rome and Athens, Paris organized the First National Technical day on the theme: "What role for PTWs in Town?". This day lead to development of a Charter for PTWs in Paris. The Charter was signed on March 19th, 2007 and has four objectives:

- to increase the awareness of other road users of PTW issues;
- to encourage other users to facilitate the inclusion of PTWs in the public space;
- to address PTW users' recommendations for better adaptation of the city infrastructure;
- to clarify the commitments of MdP towards PTWs.

Alongside the Charter, good practice guidelines were distributed to facilitate awareness and anticipation by PTWs riders of other road users' behaviour.

In 2007, the first phase of an awareness campaign on the theme of vehicle 'blind spots' was introduced aimed at commercial and goods vehicle drivers. The aim of the leaflet issued as part of the campaign was to make drivers aware of blind spots and the possibility that they could fail to see another road user. In a second phase, the leaflet was adapted to PTW users. Practical advice was added to encourage vulnerable users to ride in the safest possible manner. On the 2008 PTW day, MdP with Geodis, hosted an exhibition stand on this theme to explain to PTW users the dangers posed by heavy vehicles.

From 7th to 11th of July 2008, MdP and the Police undertook a campaign to educate all road users on the importance of respecting the rules of the road. As an alternative to punishment, users who commit certain offences will receive a yellow card bearing the words "Warning". The most dangerous crimes were enforced in the usual way. For PTW, offences the 'yellow card' offences were: riding in bus lanes, low excess speed and helmet incorrectly fastened.

3.4. Rome

3.4.1. Legislation

A Ministerial Decree relating to the "regulatory driving licences to ride motorcycles" in force in Italy, was introduced on the 29th March 1999.

According to the guidelines established by the European Community (91/439/CEE), the Ministerial Decree collects together all the rules needed to obtain a driving licence to drive PTW vehicles.

In Italy there are different kinds of PTW licence relating to different categories of vehicle.

A1 Licence: allows riders of at least 16 years old to drive any “light” PTW defeined as up to 125 cc with a maximum power output of 11 kW. To obtain the licence the practical test has to be taken on a PTW between 75 cc and 125 cc.

A Licence: includes two different types depending on the rider’s age and the PTW used during the practical test.

a) “Gradual access” (A2 licence or limited A) allows riders of at least 18 years old to ride a PTW with a power output of 25kW and a power/weight ratio up to 0,16 kW/Kg. Riders who are younger than 21 can obtain the A2 licence after passing the practical test using a bike that can reach 100 Km/h with a least 120 cc. After 2 years the limited A becomes A licence without any limits.

b) “Directed access” (A3 licence or A licence without any limits): permits a rider to ride any kind of PTW without any restrictions. The drivers have to be at least 21 years old and the PTW used for the test must have a power output of at least 35 kW.

Once a driver has the A licence he can ride any kind of PTW covered by the A1 licence.

Two different tests are needed to obtain A and A1 licences.

The theoretical test is the same for the different types of licence.

The type of practical test undertaken is always the same but the PTW used changes according to the kind of licence required.

- Any person who took licence A or licence B (also for driving a car) before the 1st January 1986 can drive any PTW.

- Riders who took licence A or licence B between the 1st January 1986 and 25th April 1988 can drive any PTW in Italy only.

- Riders who took licence B after the 25th April 1988 can drive any PTW up to 125 cc and 11Kw of power output, in Italy only.

- Riders who took licence A between the 26th April 1988 and the 30th September 1993 can drive any PTW both in Italy and abroad (Countries with a similar transposition of the EC directive). From the 1st of October 1993, if the licence was obtained with limitations the rider is restricted to a PTW with maximum power of 25 kW. This is valid for two years from the date of issue but up to 20 years of age, after which they can ride any motorcycle. If the licence is obtained without limitations, a rider of minimum 21 years old who has completed the practical test with the motorcycle at least 35 kW can ride any motorcycle. Outside of Italy they can drive the PTW in countries with the same EC standards.

From the 1st July 2004 all teenagers from 14 years old without a licence who want to ride a PTW (up to 50 cc and 45 Km/h speed) are obliged to have certification.

The qualification is called “Certificate of fitness to drive a moped” It is necessary to follow a course organized by high schools or driver training schools and then complete a theoretical exam. Parents’ authorization is needed.

From the 1st July 2005, eighteen-years-old riders who don’t have any kind of licence have to obtain the “certificate” if they want to ride a PTW.

Minimum Age	Category of Licence	PTW’s Description regarding different kind of licences
14	Certificate of Fitness to Drive a Moped	up to 50 cc and 45 Km/h speed
16	A1 licence	up to 125 cc and a power output of 11 kW
18	A2 licence	power output of 25kW or a power/weight ratio up to 0,16 kW/Kg
21	A3 licence	All kind of PTW without any restriction.

Table 3.8 Motorcycle and moped legislation in Italy

3.4.2. Road safety policy

The next figure displays the main policies regarding the safety of powered two-wheel vehicles in Italy, together with the evolution of the number of deaths and injured on PTWs from 2000 to 2007.

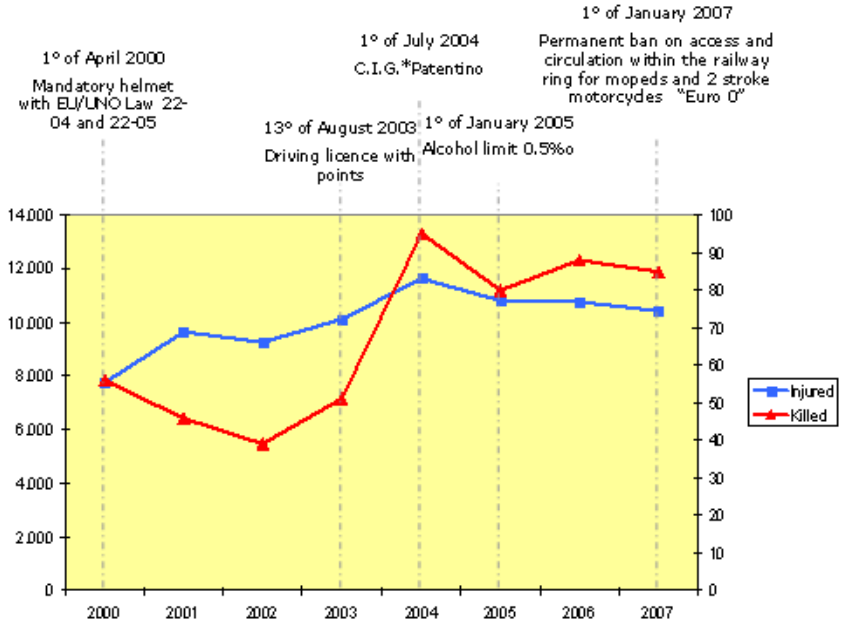
In general, injuries increased between 2000 and 2004 and then there is a slight decrease in subsequent years.

The number of deaths presents a different dynamic. The introduction of mandatory helmets approved in accordance with European standards on the 1st of April 2000, has had a great impact on the number of deaths. These decreased by about 3,000 from 2000 to 2001. Less effective has been the introduction of penalty points on the driving licence for offenders on the 13th August 2003. In the years following the number of deaths doubled.

On 1st July 2004 the “Certificate of Capability to Ride a Moped” was introduced. This appears to have contributed to a reduction in fatalities.

The ban on 2-stroke mopeds in central Rome (01/01/07) and the reduction in the maximum permitted blood/alcohol limit (01/01/05) appear less effective.

Development in the number of PTW casualties in traffic collisions and main road safety measures in Rome



*C.I.G.: the certificate of capability to drive the moped

Figure 3.5 Development in the number of PTW casualties on traffic collisions and main road safety measures in Rome

The following table displays the main violations recorded by the Municipal Police for the period 2004-2008. For this 2008 the figure refers to the first six months. A growth of parking offences has been observed, due to an increased number of PTWs. A decrease in the remaining offences is evident. The introduction of penalty points appears to have been particularly effective in encouraging the wearing of helmets.

	2004	2005	2006	2007	2008
Parking	47,155	43,247	54,209	56,708	23,923
Helmet	12,338	5,132	3,438	3.585	1,203
Noise	41	27	22	43	15
Speed	2,925	1,657	1,812	1,693	681

Table 3.9 PTW Offences, 2004-2008: Rome

3.4.3. Communication campaigns

The Lazio region has just promoted a "Regional Day for Road Safety", to inform citizens of safe driving behaviour. The objectives are to contribute to the reduction of the number of the road collisions and to reduce injuries and deaths recorded on the roads of the Lazio region every year. The project, which concluded on May 24th 2008, included a tour that brought two trucks equipped with simulators to 25 city

squares to demonstrate safe driving for both two and the four wheel vehicles. Supporting activities included:

- a creative contest with prizes among the schools of the Region;
- an internet site (www.sicurezzastradalelazio.it) from which it is possible to download all the campaign materials linked to speeding.

Road collisions represent a real emergency for the region. To address these complex issues, Lazio region is introducing a series of actions including:

- a mass communication campaign targeting the safety of regional, provincial and urban roads;
- the adoption of an 'infomobility' strategy for safe and efficient transport;
- the organization of a network of hospitals for the timely care of serious trauma;
- programs of road safety education and the co-ordination and sharing of information.

A leaflet/poster has also been widely distributed during the campaign with the 10 principal lifesaving rules for drivers and information on all the events in May.

The slogan of the campaign was: "SPEEDING SHORTENS YOUR LIFE AND THAT OF YOUR LOVED ONES. THINK ABOUT IT. DON'T SPEED." A 40 second radio advertisement was produced covering stories of young people tragically killed due to speeding.

A Creative Contest with prizes has been introduced for schools in the Lazio region. Students of primary and secondary schools have participated in a contest in which they were invited to conceive and to personalize an object on the theme of 'road safety'. They were asked to design a label, a key holder or a screen saver (software) for the computer. The closing date for the contest was May 20th 2009 and decided by on-line voting by visitors to the web-site. The vote will be added to that of a jury of experts to decide a final classification. The best 10 entries will be rewarded with a motorcycle outfit, bicycles, mountain bike, helmets and consoles for simulated safe driving. The winning projects for the categories 'label' and 'key holder' will be reproduced (12,000 copies each) and distributed by the Region Lazio. The prizes were awarded on May 23rd 2009 in Rome, on the occasion of one of the last stages of the campaign.

"Pilota per la Vita" (Driving for Life) is an initiative requested by the Administration, aimed at high school students who intend using (or are already using) motorcycles, scooters or mopeds.

ATAC (the Mobility Agency of the City of Rome) has been entrusted with the implementation of the project. They have held specific meetings in schools in the months of April and May 2009, attended by experts in road safety, health care, technicians and representatives of the world of Roman Politics.

The objective of the campaign is to raise awareness amongst students of issues related to road safety through information and testimonials covering knowledge of traffic rules, consequences, causes of collisions, and risk taking behaviour.

The initiatives (6 events) have been focused on young road users aged between 14 and 19 years (high school students, about 150 every meeting), confronting the risk factors to which young people and motorcyclists are exposed with the emphasis on prevention.

The campaign ended with a final event held on 26th May 2009, with the participation of representatives of the Municipality of Rome.

Key objectives were to raise awareness amongst students on the causes of collisions, the danger that can result from any kind of 'imprudence' and any superficial interpretation of the rules. They are invited to reflect, through distribution of a questionnaire, on their willingness to accept risk, the actual awareness of the consequences of a road collision and their perception of the use of public transport as a safer way to travel in the city.

At the conclusion of the meetings, some of the students who have completed the questionnaire were awarded with motorcycle helmets and public transport passes.

3.5. Conclusions

Casualty data from the partner cities (Chapter 3) tell us that, between 2000 and 2007:

The number of PTW users injured annually ranged between 6,500 and 7,500 in Barcelona, between 4,500 and 8,000 in London, between 4,000 and 5,000 in Paris and between 8,000 and 12,000 in Rome.

PTW annual fatalities range between 10 and 30 in Barcelona, between 40 and 70 in London, between 10 and 50 in Paris and between 40 and 100 in Rome.

All cities show considerable variations over the 7-year period. It is difficult to explain the trends in terms of specific policy interventions, but the cases could be summarised as follows:

- Barcelona's low PTW collision levels of 2003-2004 appear to have been adversely affected by the unfortunate coincidence of changes in driver licensing that allowed car drivers with no PTW training to drive PTWs together with parking management interventions that favoured PTWs instead of cars and a reduction in enforcement effort (number of issued penalty notices). Thereafter, the PTW collision levels have reduced – suggesting that actions such as changes in the penal code, training and communication campaigns and the generalised application of a collision management (Risk Zones) system have helped to improve PTW safety.

- London's PTW collision levels (fatalities and injured persons) have been reduced progressively since 2001 - a result primarily attributed to a sustained series of training and communications campaigns.

- PTW fatalities in Paris have declined progressively since 2001 – but not so the number of PTW injuries – even if the collision levels have increased at a slower rate than PTW usage. We are not currently able to interpret the diverging trend (fatalities v. injured persons).

- If the introduction of compulsory helmet use in 2000 had a positive effect in reducing fatalities in Rome during the first half of the decade. The levels since 2004 have exceeded 80 PTW fatalities annually. PTW injuries also rose to a peak in 2004 with no apparent counter measures. With the introduction of various laws, the level appears to have stabilised (at 10,000+ PTW injuries per annum).

London has a significantly larger number of cameras deployed for traffic enforcement than the other cities; for instance, even taking into account the eSUM camera demonstrations in Barcelona and Rome, London has 30 to 40 times more red-light cameras than these cities.

Another important difference would appear to be the organisation and level of definition of its Road Safety Plans. Both the 2001 and 2006 London plans contained specific targets for reducing PTW collision casualties. A specific unit was established (in 2002) to implement and monitor the plan. Within the London Road Safety Unit (LRSU) there is a sub-unit with staff and budget dedicated to developing safer motorcycling. The other cities have not made such a clear policy, nor such a clear resource provision for implementing it.

4. Overview of city structure, mobility trends and overall road safety levels

This chapter provides an overview of the four cities - Barcelona, London, Paris and Rome. It presents basic data for each city according to defined study areas. It goes on to present the developments in road space management, vehicle stock and mobility characteristics of each city. This presentation of the context (this Chapter plus Chapter 3) is important when interpreting the comparison of collisions (Chapter 5).

4.1. Cities typology – basic data

The comparison is made for the areas of jurisdiction of the authorities participating in the eSUM project. The areas compared are described and it is readily seen that the areas correspond to the central city areas for Barcelona and Paris (both of the order of 100 sq.km) and the larger urban areas of London and Rome (approximately 1,300 and 1,600 sq. km., respectively) – more than 10 times the areas of Barcelona and Paris.

The basic data of each city is compared. The population densities of the central city areas (Paris: 20,000+ and Barcelona 16,000+ persons/sq.km.) are much higher than the average values of the more-extended areas of London and Rome. It is seen that the population density of London is more than twice that of Rome (similar areas).

Conversely, the level of motorisation (all motor vehicles) for Rome is almost 1,000 vehicles per thousand inhabitants compared to values of 400 for London and (central) Paris or 600 for (central) Barcelona.

Analyzing the percentage composition of the vehicle stock, two-wheeled vehicles represent a relatively higher part of the vehicle stock of Barcelona (28%) and Rome (20%) compared to Paris (11%) and London (4%). In absolute numbers, Rome has around 550,000 PTWs followed by Barcelona (almost 200,000 for the central city area), with London and (central) Paris having just over 100,000 PTWs. The presented figures do not include mopeds for Paris. It is also important to remember that the numbers of PTW vehicle travelling in the study areas may be different than the stock proportions (particularly for central areas of Barcelona and Paris where the stock of the surrounding area could contribute additional traffic).

In the course of the study – particularly the comparisons presented in Chapter 5 - it is important to keep in mind these differences.

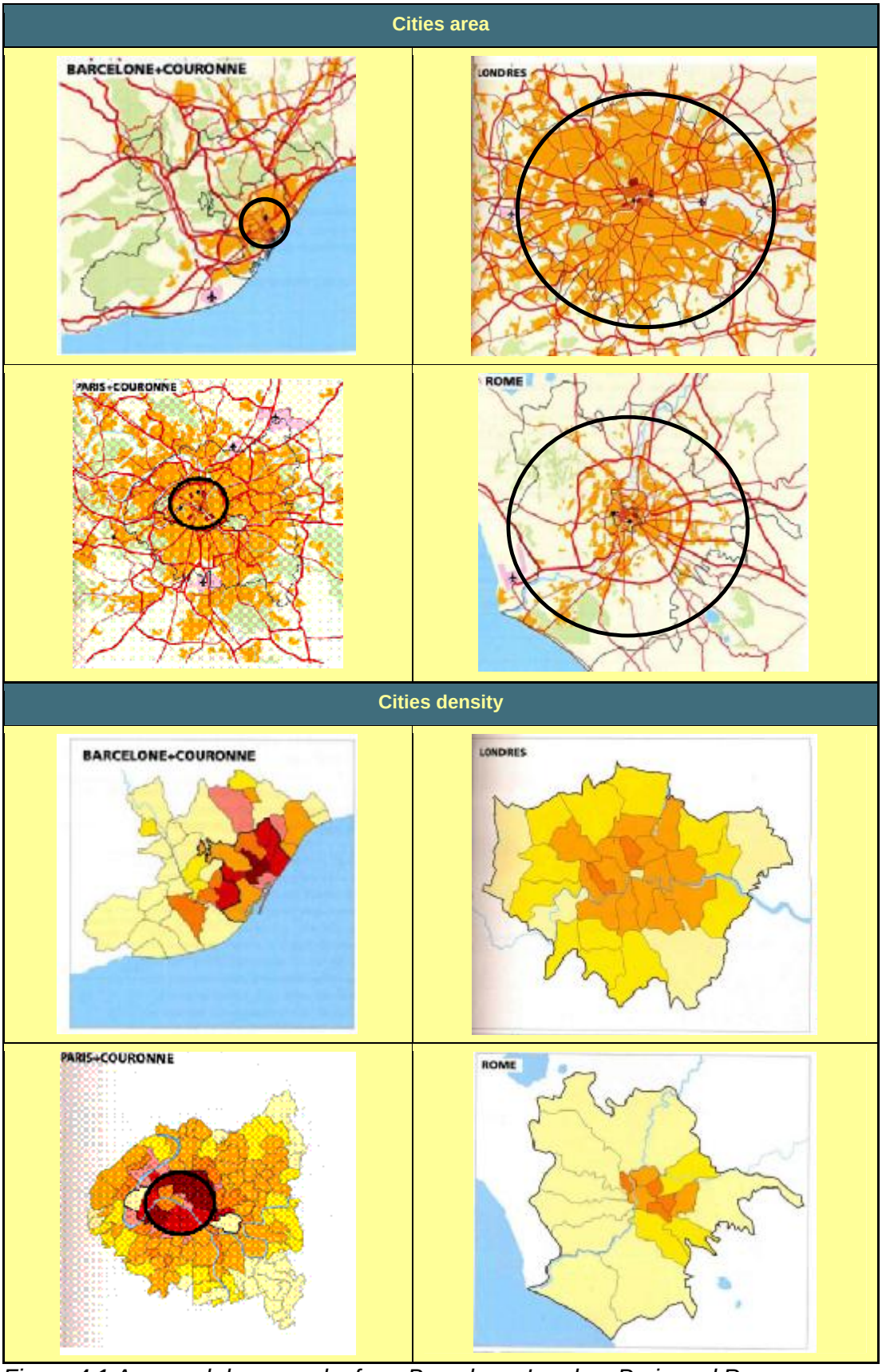


Figure 4.1 Area and demography from Barcelona, London, Paris and Rome

Background	Barcelona	London	Paris	Rome	Note
Year	2008	2007	2007	2007	
Population	1,628,090	7,557,000	2,153,600	2,718,768	
Area (SqKm)	101.0	1,579	105,4	1,285	
Density	20,433	4,813	20,433	2,115	
Road network length (Km)	1,328	14,926	1,644	6,100	
Primary roads (Km)	357.19	1,720		1,700	
Secondary roads (Km)	923.8	13,146		4,400	
Bus lanes (Km)	113.5	292	189.0	110	
Bicycle lanes (Km)	140.2	1,343	399.3	150	4
Zone 30 (Km) or 20mph Zones	53.4	2,000	302	19	
Number of motor vehicles	990,166	3,010,000	893,300	2,660,202	
Lorry / Van	69,099	265,000	117,700	182,397	
Cars	608,830	2,497,000	673,600	1,897,672	
Motorcycles	193,902	116,000	102,000	379,997	
Mopeds	93,382			155,842	3
Other vehicles	24,953	132,000		44,294	
Number of collisions with casualties	8,942	23,210	7,463	19,960	2
Number of fatalities	31	222	50	201	2
Number of injured	11,551	27,949	8,546	26,299	2
Motor vehicle km (million)	13.2	334.52		143.70	
Travels (internal+external) (million)	7.85	27.6		6.14	1
PTW travels (internal+external) (million)	0.36	0.2		0.49	
Population density per area (persons/SqKm)	16,119.70	4,813.38	20,432,64	2,115.26	
Kilometre road length per area (Km/SqKm)	13.15	9.51	15.60	3.89	
Kilometre bus lane per area (Km/SqKm)	1.12	0.19	1.79	0.08	
Motor vehicles per inhabitant ('000)	608.18	398.31	414,79	978.46	
Car per inhabitant (*1,000)	373.9	330.4	312.8	698.0	
Motor vehicle km per inhabitant (Km/person)	8.13	44.27		52.85	
Motor vehicle km per motor vehicle (veh-km/vehicle)	13.37	111.14		54.02	
Daily Trips per inhabitant (trips/person)	4.82	3.65			

Table 4.1 Basic data of the cities of Barcelona, London, Paris and Rome

1. Barcelona: Working day, London: 2006
2. Paris, London: 2008
3. Rome: Estimated data
4. Paris: 138.6 km of bicycle lanes coupled with bus lanes

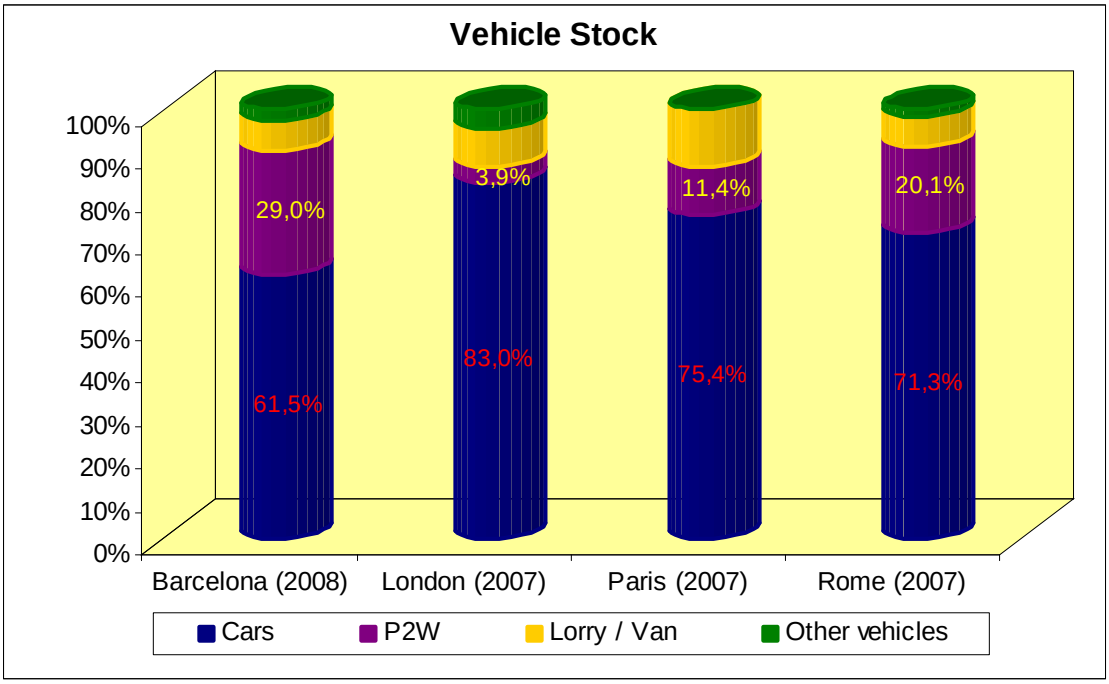


Figure 4.2 Percentage configuration of the vehicle stock (2007)

4.2. Barcelona city

Within the total space of 101.00 Km2, Only 6% of Barcelona is allocated to circulation /on-street parking of vehicles. The city is strongly orientated to walking and the needs of the pedestrian. Within the space given to vehicles it can be seen that almost one quarter is for streets controlled as local residential roads (limited speed zone) and to bus / cycle lanes.

From the trend in vehicle stock it can be seen that there is a substitution of cars by PTWs, whilst mopeds and goods vehicles maintain their shares of the total stock.

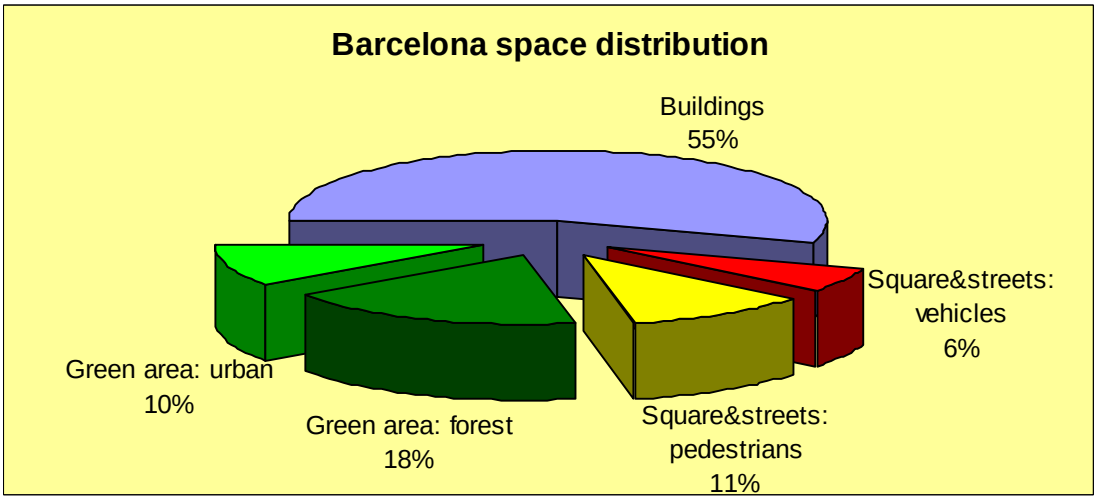


Figure 4.3 Barcelona space distribution

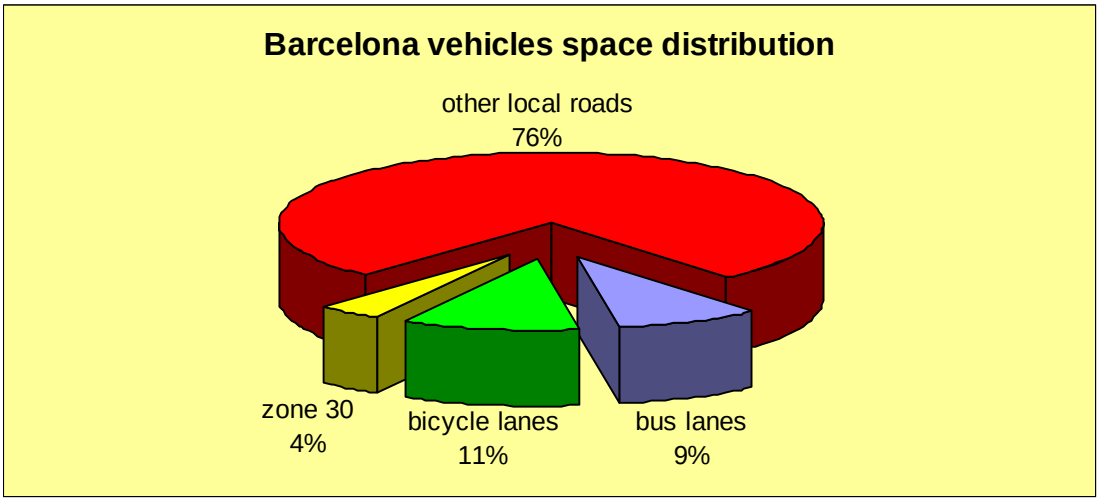


Figure 4.4 Barcelona vehicles space distribution

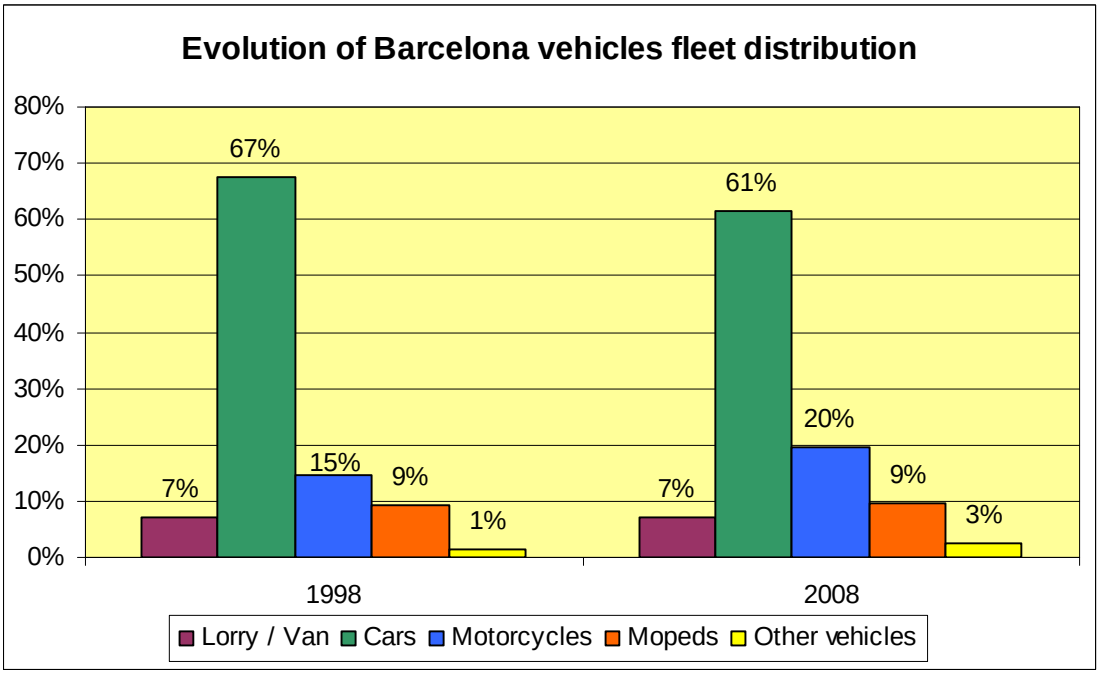


Figure 4.5 Evolution of Barcelona vehicle stock by vehicle type: 1988 - 2008

Collision exposure for private modes of transport is typically assessed in terms of veh-km travelled for the interurban situation. For the urban case it is preferred to represent the situation in terms of the number of (daily or annual) trips by the mode concerned.

Mobility in Barcelona has increased by 29% in the first years of this new century. The most sustainable modes - walking and cycling – have increased by 50% and 318% respectively. The number of trips by public transport has risen 45%.

Private transport in general has been reduced by 4%. It is worth noting that the drop in car trips is 16% whilst the PTW trips have increased by 80%.

		Internal trips		External trips		Total trips	
		2000	2008	2000	2008	2000	2008
Walking & cycling		1,530,089	2,226,268	74,860	251,217	1,604,949	2,477,485
Public transport		1,568,442	1,712,106	608,714	1,433,979	2,177,156	3,146,085
Private transport	Car	669,737	491,980	983,620	888,955	1,653,357	1.380.935
	PTW	156,000	299,466	45,551	63,159	201,551	362.625
	Lorry / Van	174,496	139,319	246,587	344,525	421,083	483.844
	Other	49,000	0	0	0	49,000	0
Total		**4,147,764**	**4,869,139**	**1,959,332**	**2,981,835**	**6,107,096**	**7,850,974**

Table 4.2 Barcelona mobility by transport mode (working day)

If we examine the distribution – leaving aside the increase in mobility, it is noticeable that walking, cycling and public transport have increased whilst there is a 10-point drop in private transport. Internal mobility shows a 6.2 point drop in private transport. Travel between the metropolitan area and the city by private transport has reduced 21.6 points with the main beneficiary being public transport (17 point increase). Within private transport, the trips by PTW increase, especially for internal journeys – possibly relate to the implementation of Green Area Integrated Parking – see section 3.1.3.

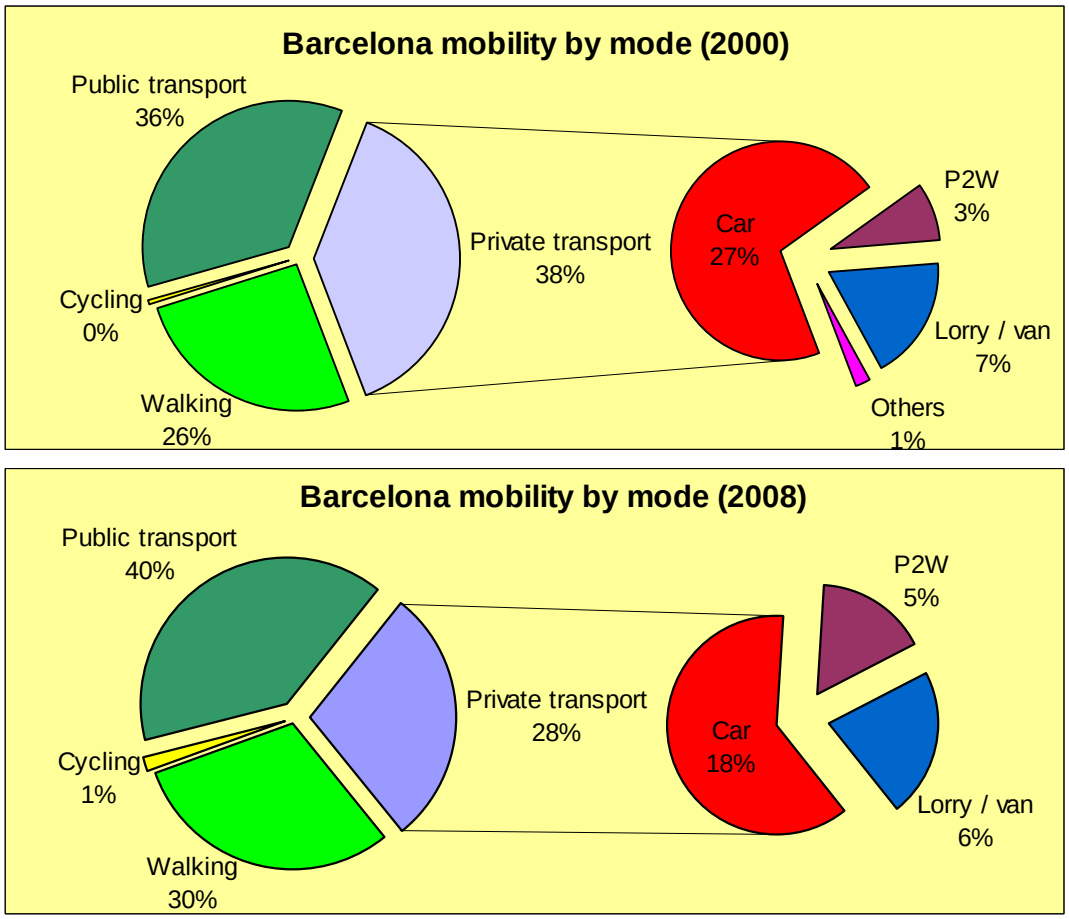


Figure 4.6 Evolution of Barcelona mobility by mode (working day)

The presented figures would suggest that the main traffic policies of promoting sustainable modes are being achieved. In Barcelona, the scooter is considered to be part of Barcelona's sustainable mobility package – as long as it is safe, and with preference being given to pedestrians. Additional studies are being made – for example the RACC Minitest on pedestrian-PTW interaction, where the issue of removing PTWs from parking on pavements is an important local issue.

4.3. London

In recent decades, London has established itself as one of the most successful cities in the world. It has overtaken New York as the world's most important financial centre and is a world leader in tackling climate change.

It is the first major city in the world to see a significant shift from the private car to public transport, walking and cycling.

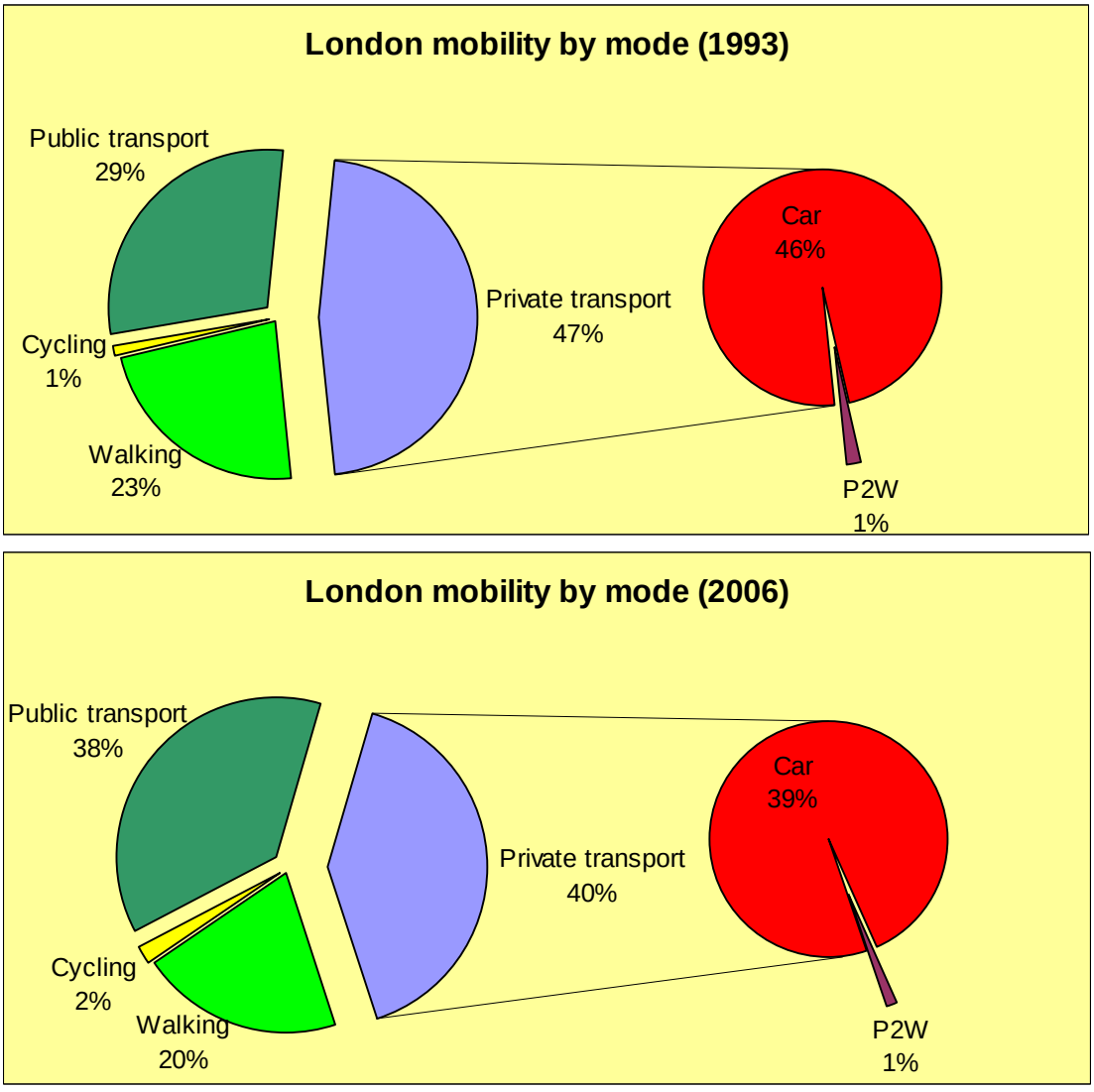


Figure 4.7 Evolution of London mobility by mode: 1993-2006

London is universally recognised as one of the most culturally dynamic and creative centres in the world and enjoys excellent community relations in a city of unparalleled diversity.

London's transport networks are developing and growing to match changing patterns of housing and employment, the developing leisure economy, and to improve accessibility. The transport infrastructure, services and fares are being developed with the aim of accommodating growth, while tackling social exclusion and allowing all to participate in the city's success.

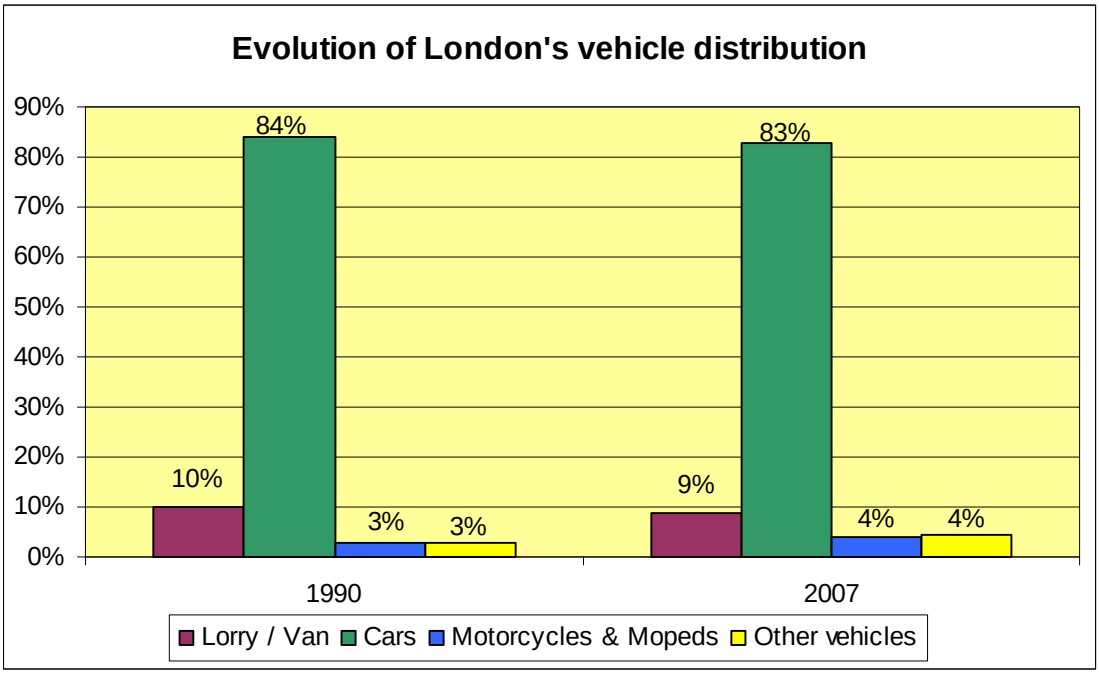


Figure 4.8 Evolution of London's vehicle distribution: 1990-2007

London's success and growth, however, was not a foregone conclusion. From 1986 to 2000, the capital was without a city-wide government and struggled to cope with out-dated infrastructure and insufficient investment, fragmented public services and an inability to speak with a single voice on the national and international stages.

The re-introduction of London government in 2000, in the form of a directly elected executive Mayor and a London Assembly, provided a strategic vision for London. The Mayor's overall aim has been to assist the most rapid, sustainable improvement in the quality of life for all Londoners.

To maintain and enhance its prosperity and accommodate its growth, London needs a world class transport system. Much of London's transport infrastructure dates back over a century and under-investment has meant a failure to renew, modernise and adapt to the changing needs of the city, including increased levels of commuting and employment growth across the city.

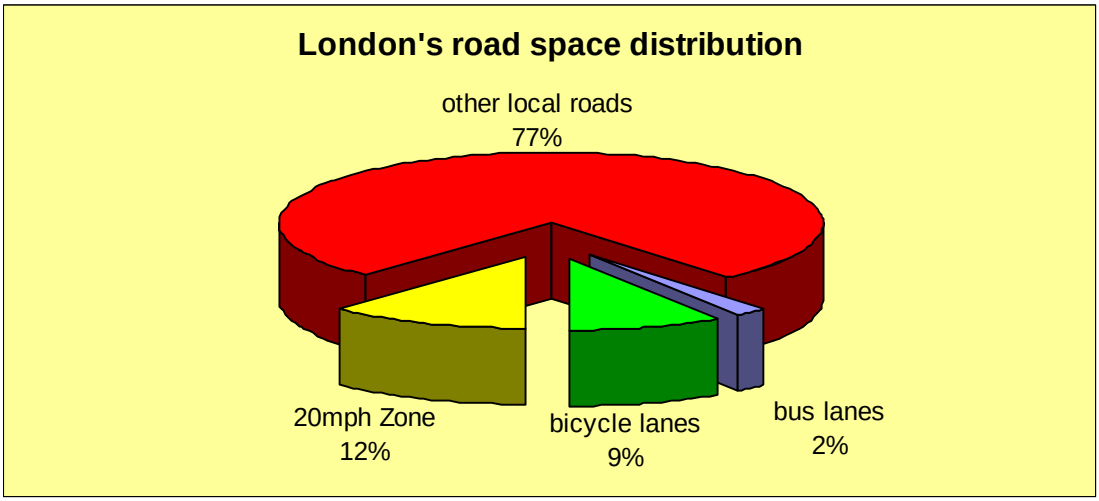


Figure 4.9 London's road space distribution

Since coming under the control of the Mayor of London, Transport for London (TfL) has undertaken significant investment in the capital's transport systems and delivered a number of major projects, along with a record increase in bus usage and the highest ever Underground passenger numbers. London is the only major city in the world experiencing a shift away from private car use.

Since 2000, TfL has overseen London's buses, trams, the Docklands Light Railway, strategic roads, taxis, Dial-a-Ride and River Services. From July 2003, London Underground operations also came under TfL's remit, with infrastructure maintenance and renewal provided under a Public Private Partnership

The Congestion Charging scheme was introduced in February 2003 and, the area of operation was increased with the addition of the Western Extension in 2007.

From February 2008, TfL introduced the London-wide Low Emission Zone which levies a charge on the most polluting vehicles, not conforming to specified Euro emissions targets, entering the Greater London area.

In November 2007, four over ground rail routes previously operated by Silverlink were transferred to TfL's control and have been re-branded as London Overground.

TfL also works with the London boroughs to support local schemes aimed at improving facilities for bus users, powered two wheelers, cyclists and pedestrians and to deliver schemes aimed at cutting the casualty rates on London' roads.

TfL has welcomed the introduction of the Traffic Management Act 2004, which provides local authorities with powers and responsibilities to coordinate plans, works and other activities that can impact on road travel.

TfL has appointed a Traffic Manager, whose responsibility is to secure expeditious movement for all road users and has developed an information system, allowing works to be plotted on a map based system; this way, their impact can be properly assessed and appropriate mitigation taken.

Increased walking and cycling are also important means in tackling congestion and transport-based exclusion. Reduction in traffic levels and investment in cycle infrastructure has assisted in producing an 83 per cent in numbers of cyclists using the TfL road network from 2000 to 2006, against a national trend of long term decline.

Work is ongoing on the London Cycle Network - 900km of routes designed to provide safer and faster facilities for cyclists - due for completion in 2010.

A 'Velib-style' cycle hire scheme, utilising some 6,000 bicycles, is due to be introduced in 2010.

It is important to recognise that public transport remains inaccessible to some, particularly those with serious mobility impairments and the very elderly or infirm and alternative arrangements are required in order to increase mobility and independence.

TfL provides funding, jointly with London boroughs, for the Taxicard scheme, which provides a heavily subsidised door-to-door taxi service for those with severe mobility problems. TfL also funds the Dial-a-Ride service, available to those unable to use public transport services, which is used by around 50,000 Londoners. The number of Dial-a-Ride buses has risen from 160 in 1990 to 342 in 2006, and in January 2008, all fares on Dial-a-Ride services were abolished.

		Total daily trips		Percentage change
		2000	2007	2007/2000
Walking & cycling		5,800,000	6,200,000	7%
Public transport		6,300,000	7,800,000	24%
Private transport	Car	10,500,000	9,600,000	-9%
	PTW	200,000	200,000	0%
Total		**22,800,000**	**23,800,000**	**4%**

Table 4.3 London mobility by transport mode (working day)

The Mayor of London has set out a vision of a transport system that is easier to use, while delivering safer, reliable and efficient movements for people and businesses. This vision includes six delivery priorities:-

- To expand public transport capacity – through delivering improvements to the Underground and Crossrail project;
- To smooth traffic flows – making best use of London's limited road space;
- To lead a revolution in cycling and walking – facilitating a step change increase in the numbers of people travelling by these modes;
- To deliver key 2012 transport infrastructure projects – completing the East London Line, extensions to the London Overground rail network and to the DLR, ensuring a lasting legacy from the 2012 Olympic and Paralympic Games;

- To improve further the safety and security of the travelling public;

- To dramatically improve the experience of travelling in London – through, for example, further expansion of the Oyster card, making buses safer, improving the public realm and introducing a 21st-century Routemaster bus.

During 2008, there were 23,116 reported road traffic collisions involving personal injury within Greater London. This represents a 0.4% decrease compared with 2007.

The 23,116 collisions resulted in 28,153 casualties; of these, 204 were fatally injured, 3,322 were seriously injured, and 24,627 were slightly injured.

Compared with the overall figures for 2007, fatalities in 2008 decreased by 8% from 222 to 204, serious injuries decreased by 7%, while slight injuries showed no change.

Overall, all categories of casualties in 2008 decreased by 1% compared with 2007.

The Killed and Seriously Injured (KSI) casualty figures for individual User Groups in 2008 compared to 2007, showed the following changes,:-

- Pedestrians: 7% reduction (1,208 from 1,292);

- Pedal Cyclists: 3% reduction (445 from 461);

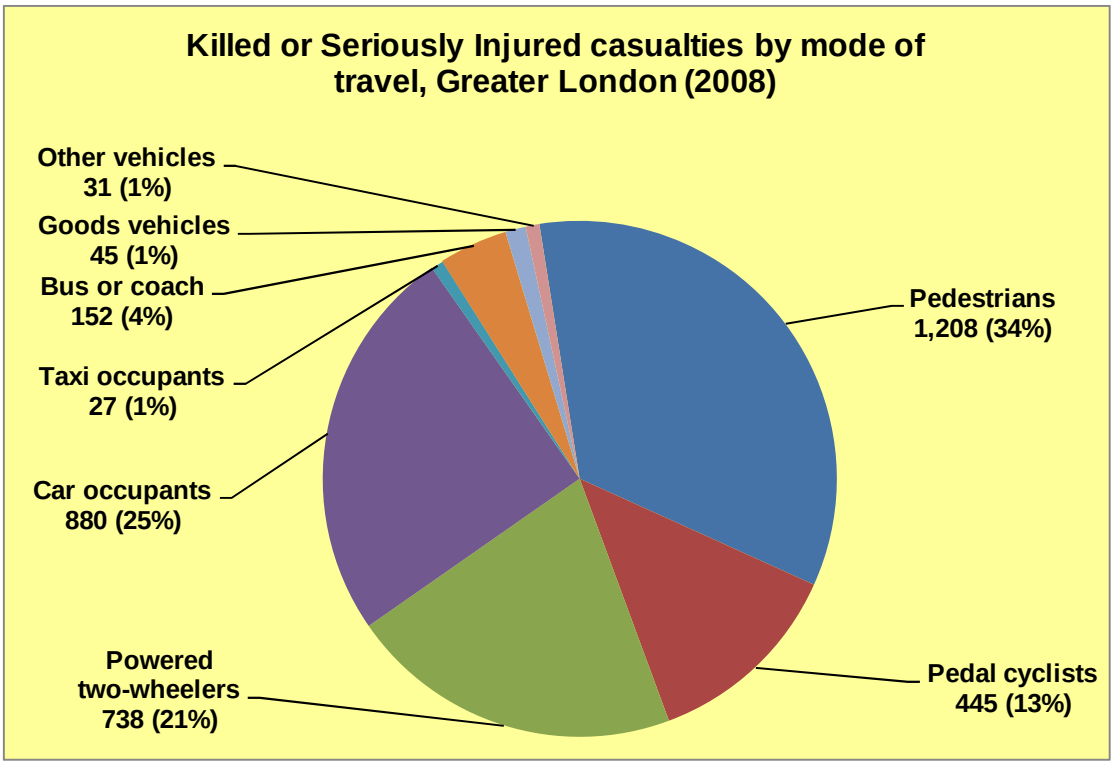
- Powered Two Wheelers: 10% reduction (738 from 819);

- Car Occupants: 8% reduction (880 from 952);

- Bus or Coach Occupants: 13% increase (152 from 134); and

- Other Vehicle Occupants: 18% reduction (103 from 126).

When compared to 2007, there is an overall reduction 7% (3,526 from 3,784) in the KSI casualty figures for 2008.



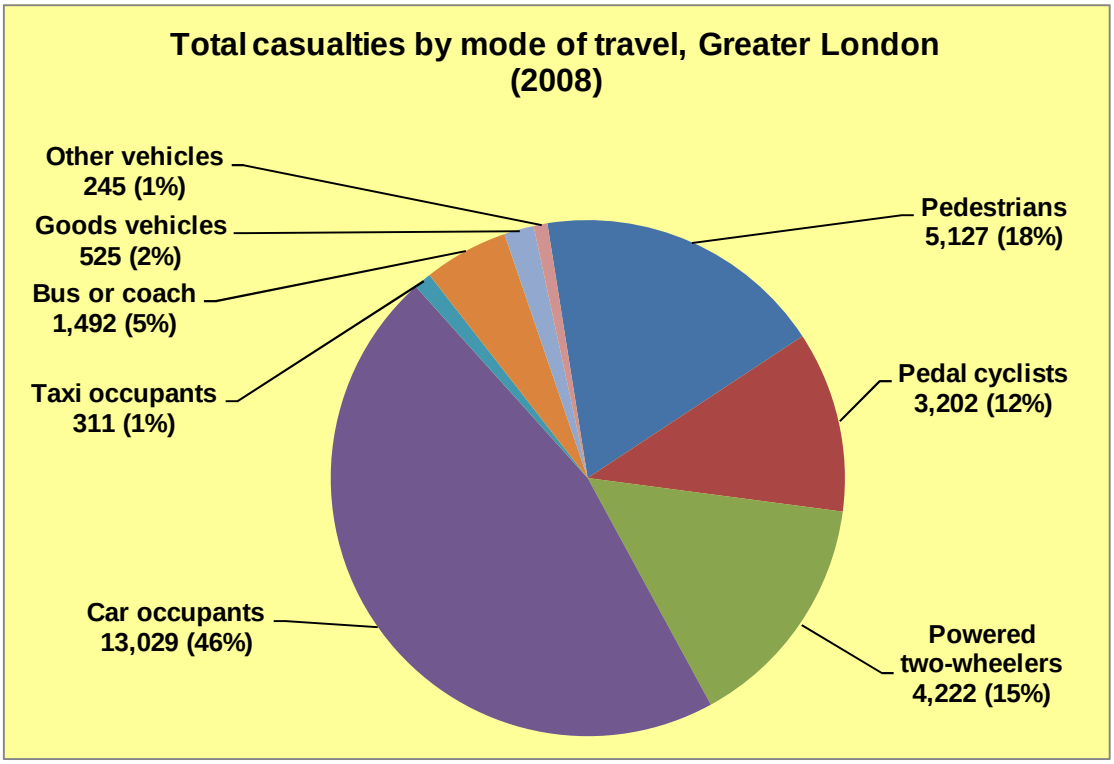


Figure 4.10 London's casualties by model of travel

4.4. Paris

Within the total space of 105.4 Km2, Only 13% of the city of Paris is allocated to circulation /on-street parking of vehicles. Within the space given to vehicles it can be seen that almost one third is for streets controlled as local residential roads and to bus / cycle lanes.

From the trend in vehicle stock it can be seen that the car maintains its share of the total stock, but there is a small increase in motorcycles. (Data include registered vehicles only, and do not include mopeds).

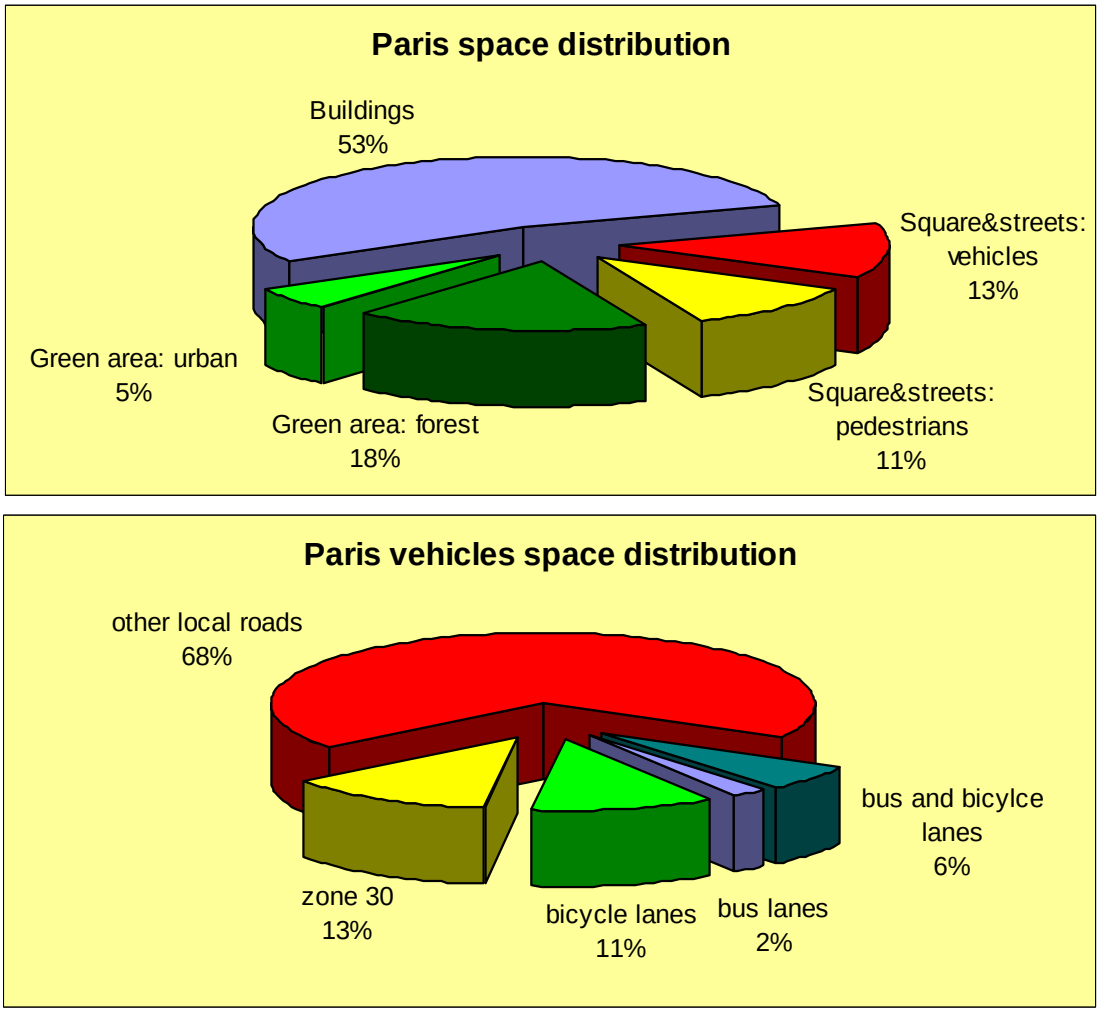


Figure 4.11 Paris space distribution and vehicles space distribution

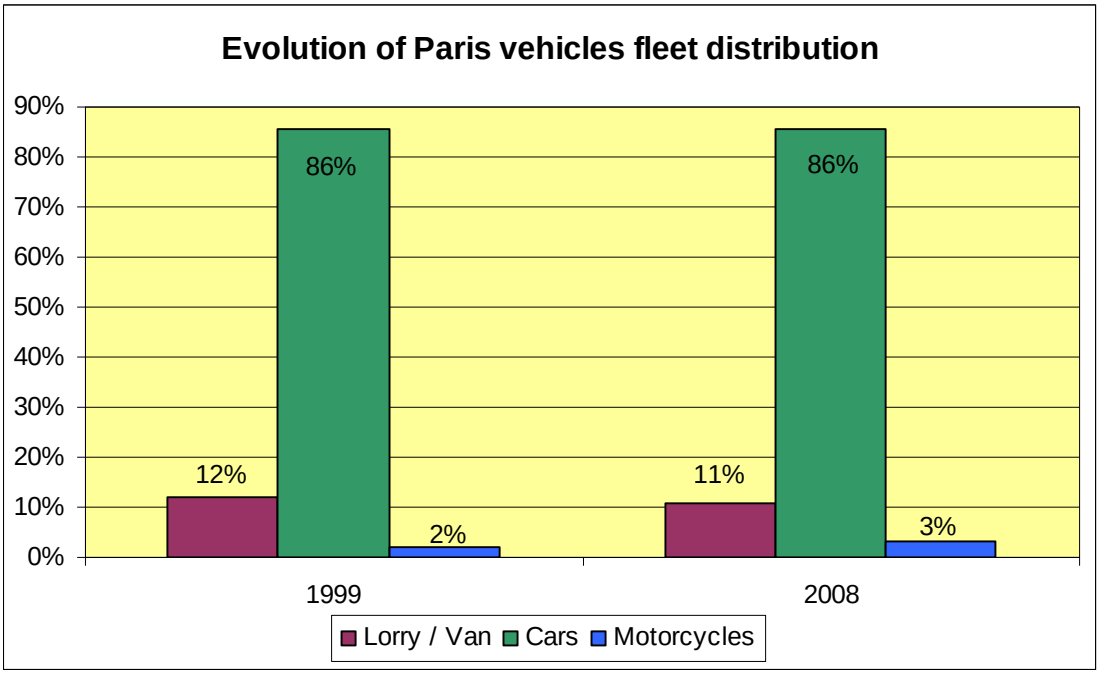


Figure 4.12 Evolution of Paris vehicle stock by vehicle type: 1999 - 2008

Mobility in Paris (number of trips/day/person)has decreased by 3% in the end of the 90's. The most sustainable modes - walking and cycling – have increased by 2% and 203% respectively. The number of trips by public transport has decreased by 3%.

Private transport in general has been reduced by 10%. It is worth noting that the drop in car trips is 9% whilst PTW trips have increased by 60%.

		Internal trips		External trips		Total trips	
		1991	2001	1991	2001	1991	2001
Walking		3,530,000	3,605,000	70,000	65,000	3,600,000	3,670,000
Cycling		25,000	84,000	6,000	10,000	31,000	94,000
Public transport		1,927,000	1,885,000	2,360,000	2,294,000	4,287,000	4,179,000
Private transport	Car	1,029,000	836,000	1,558,000	1,431,000	2,587,000	2,267,000
	PTW	72,000	108,000	52,000	90,000	124,000	198,000
	Other	79,000	57,000	66,000	38,000	145,000	95,000
Total		**6,662,000**	**6,575,000**	**4,112,000**	**3,928,000**	**10,774,000**	**10,503,000**

Table 4.4 Paris mobility by transport mode (working day)

Mobility in Paris (trips/day/person) has decreased by 1.6%. It was 3.67 in 1991 and 3.61 in 2001.

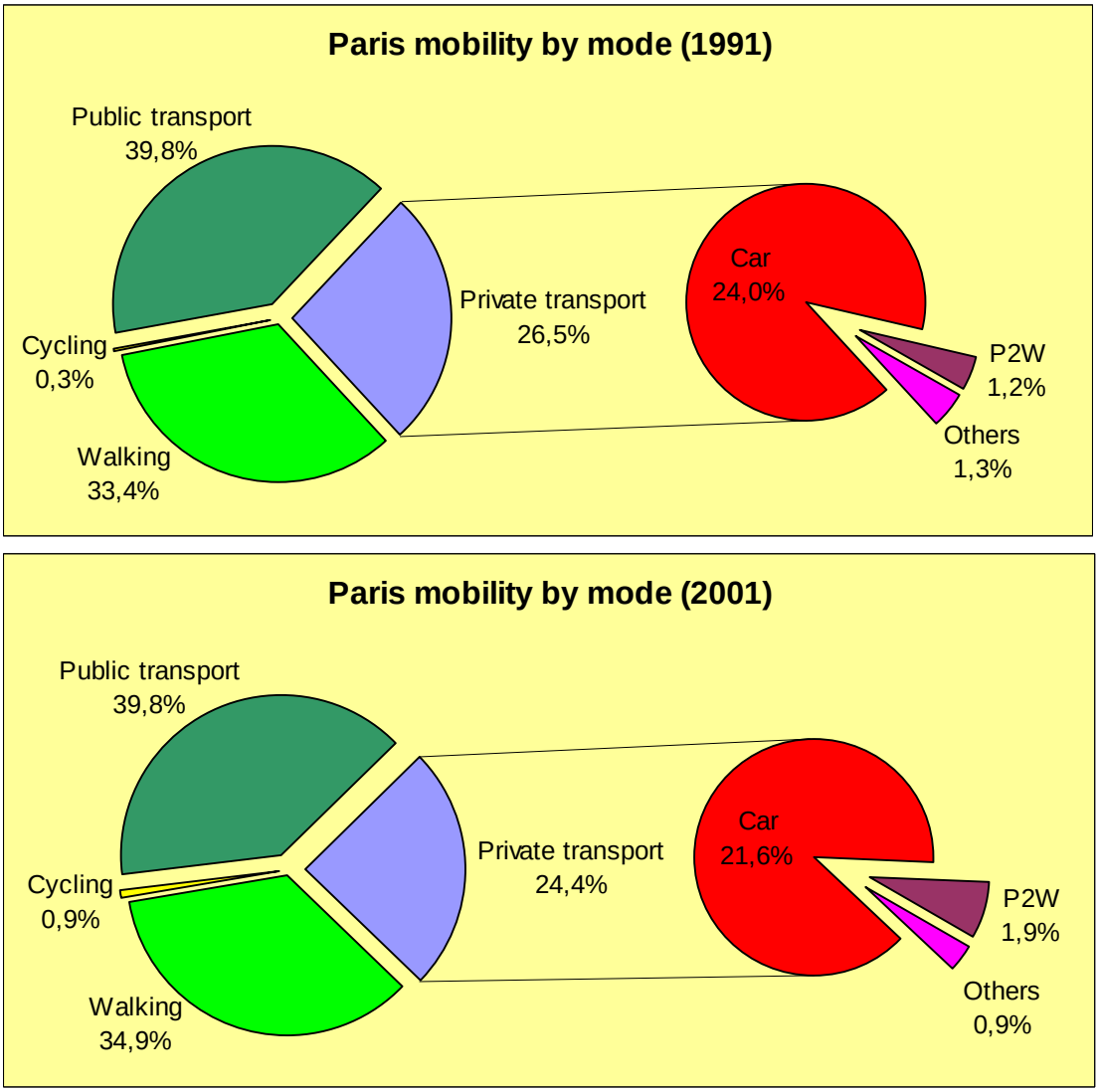


Figure 4.13 Evolution of Paris mobility by mode

4.5. Rome

Rome extends over 1,290 square km, with an area of green space equal to 69% of the territory. The area is composed of 19 municipalities, in which about 2.7 million people live. The following chart shows the distribution of the length of the infrastructure for different types of traffic management (1,203 kilometers in total).

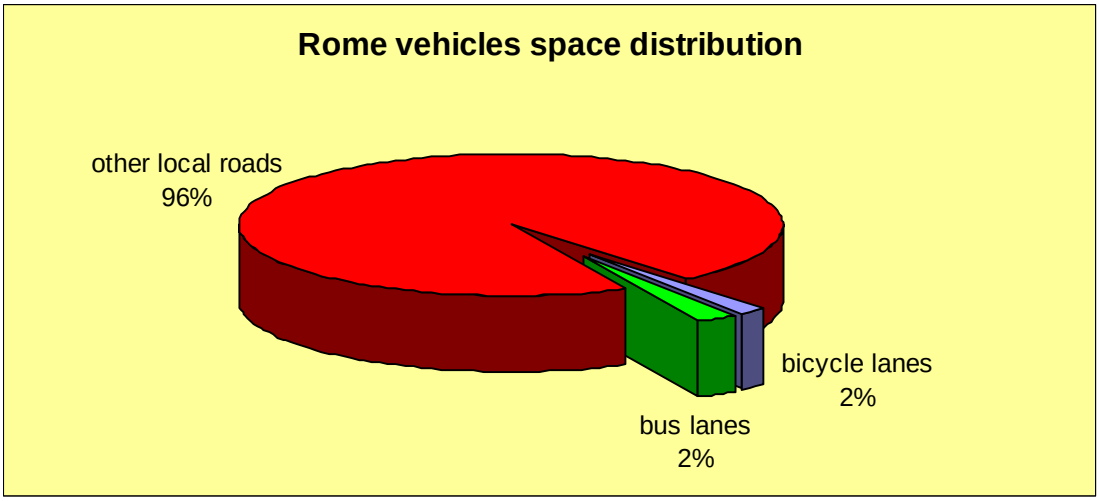


Figure 4.14 Rome vehicles space distribution

From the trend in vehicle stock it can be seen that there is a substitution of cars by motorcycles, whilst lorries and other vehicles maintain their shares of the total stock, as shown below.

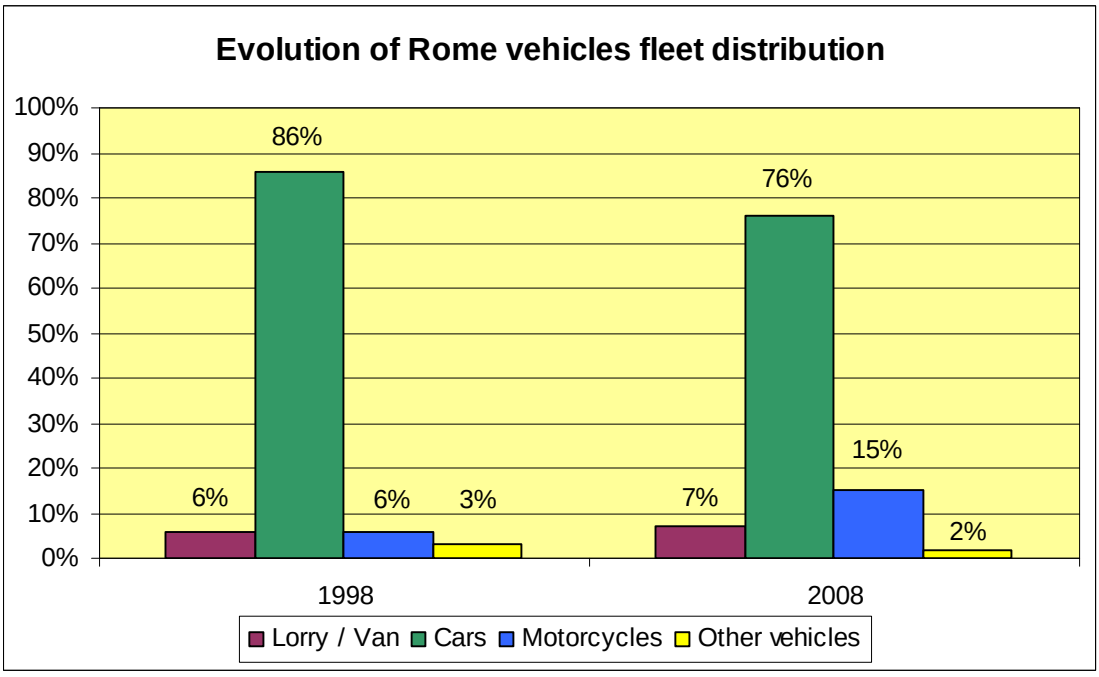


Figure 4.15 Evolution of Rome vehicle stock by vehicle type: 1998 - 2008

The evolution in mode share from 1996 to 2004 presents several changes:

“Public Transportation” has considerably decreased passing from 23% to 18%, on the other hand “walking” has improved by 4 percentage points. Private transportation has not changed, and the relative contribution of car and PTW also has not changed.

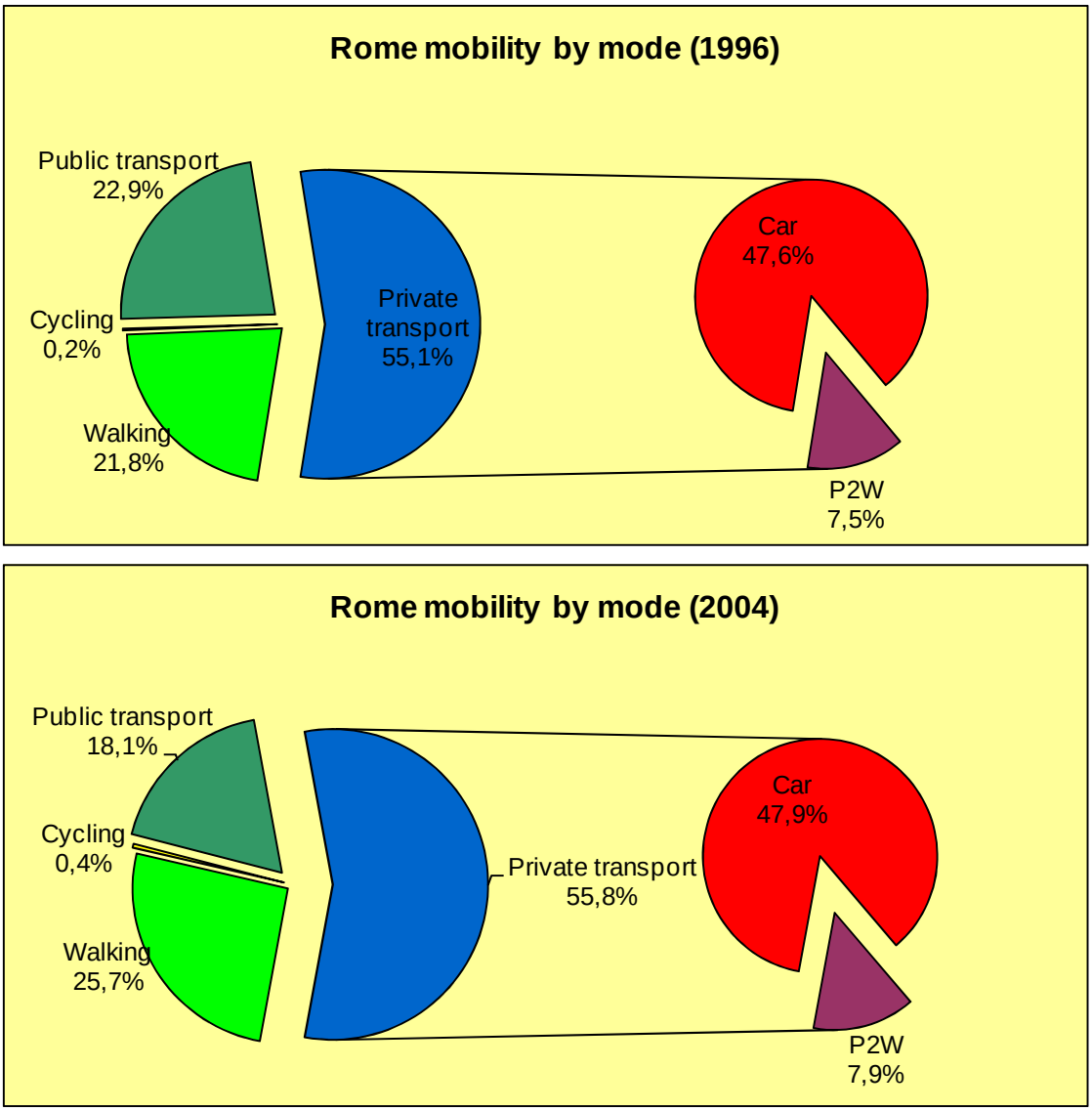


Figure 4.16 Evolution of Rome mobility by mode

Collision exposure for private modes of transport is typically assessed in terms of veh-km travelled for the interurban situation, for the urban case it is preferred to represent the situation in terms of the number of (daily or annual) trips by the mode concerned.

Mobility in Rome has decreased by 2% from 1996 to 2004. The most sustainable mode - walking – has increased in terms of percentage mode share by 4 points and in absolute trip numbers walking and cycling have increased by 26%.

Private transport in general maintains a mode share of 55%, with car trips reducing in absolute numbers by 5%. In terms of mode share, PTW usage increases from 6.9% to 7.9% i.e.: a 15% increase and in absolute numbers PTW trips have increased by 13%.

		Internal + External trips		Percentage change
		1996	2004	2004/1996
Walking & cycling		1,272,194	1,603,349	26%
Public transport		1,466,586	1,110,981	-24%
Private transport	Car	3,105,202	2,941,585	-5%
	PTW	430,943	486,102	13%
Total		**6,274,925**	**6,142,016**	**-2%**

Table 4.5 Rome mobility by transport mode (working day)

4.6. Overall road safety levels

The following rates are used to present the overall road safety levels:

- mortality rate: number of fatalities divided by the number of inhabitants also named personal safety;
- fatality rate: number of fatalities divided by the number of motorized vehicles also named traffic safety rates;
- fatality risk: number of fatalities divided by the number of motorized vehicles kilometers also named traffic safety risk;
- death rates: number of fatalities divided by the number of collisions with casualties.

Indicators	Barcelona 2007	London 2007	Paris 2007	Rome 2007
Mortality rate (*100,000)	2.7	2.9	1.6	7.4
Fatality rate (100,000)	4.3	7.4	3.9	8.0
Fatality risk (100,000)	3.1	0.7		1.4
Death rate (*1,000)	4.4	9.6	4.4	10.1

Table 4.6 Indicators of motorization, personal security and safety of traffic

For the defined study areas, there are 7 road collision fatalities per 100,000 inhabitants for Rome, followed by London and Barcelona with 3, Paris closes with 2.

Regarding traffic safety, Rome and London occupy the last two positions, respectively, 8 and 7 deaths from road collisions per 100,000 vehicles. The levels for Paris and Barcelona (the central areas, one tenth the areas of Rome and London) are around half (4 deaths per 100,000 vehicles) the levels of Rome and London.

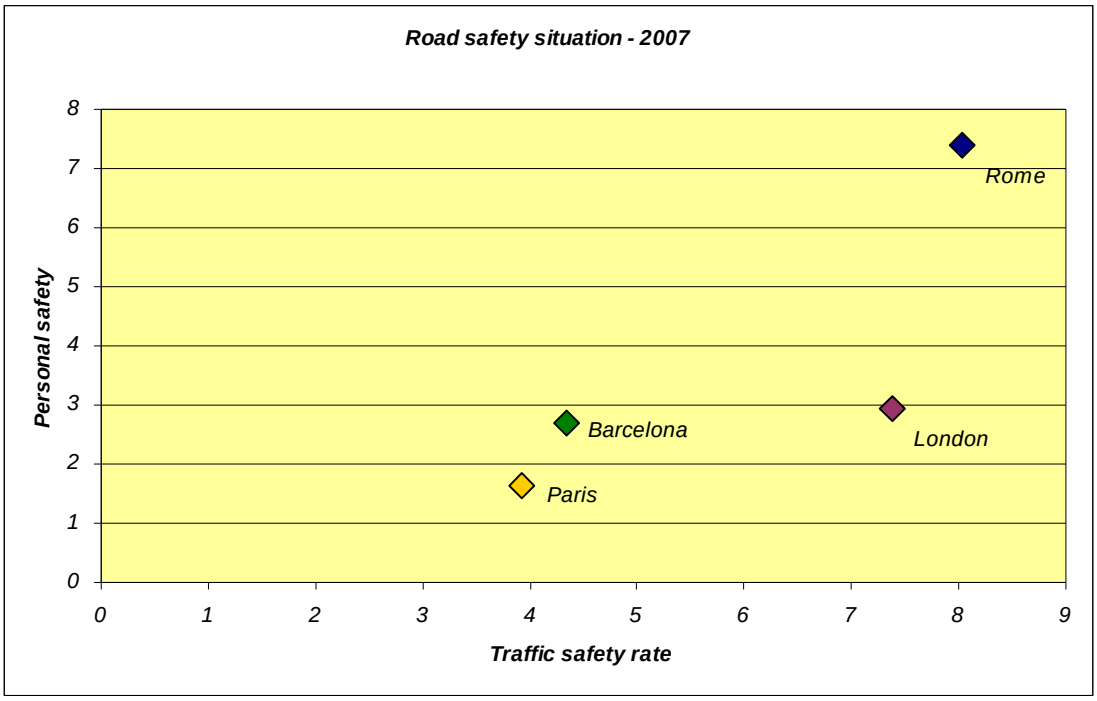


Figure 4.17 Road safety situation for 2007 as personal safety (fatalities per 100.000 inhabitants) versus traffic safety rate (fatalities per 100.000 vehicles)

Comparing that data with the level of motorization observed in several cities, it is the Romen situation that appears critical. Note the relationship between road safety and the level of traffic congestion. The fact that in a city as highly motorized as Rome the share of road users who choose to use the motorcycle is so high can only further increase the risk of collisions in the urban environment. Unlike the case of Barcelona, where the increased risk of traffic collision related to the conspicuous presence of people on two-wheel vehicles in the city traffic, is mitigated by the low level of motorization.

Continuing with the analysis of Paris and London, the situation improves considerably. Compared to the previous cases, the proportion of motorcycles of the total number of motorized vehicles is lower. In case of London the high level of motorization should be taken into account. The proportion of the two-wheel road users in Paris is not comparable to that observed for Rome and Barcelona but it is more than double of that circulating in London. One might expect a similar situation in Barcelona, Paris and London (due to different reasons) with regard to the problem of road collisions.

The considerations above naturally lead to the creation of two groups for the comparison of the intensity of the phenomenon of road collisions: London and Rome have similar values, with approximately 20,000 collisions, 200 deaths and 30,000 injuries each in 2007. For Paris and Barcelona in the same year there were about 10,000 collisions, 40 deaths and 10,000 injuries on the roads.

The trend in the number of casualties (deaths + injuries) involved in collisions for the period 2000-2007 shows a decrease of London (-38%) and Paris (-18%), whereas

for Rome there is an increase of 4%, despite the decrease in the number of deaths (-32%).

4.7. Conclusions

The studied areas correspond to the central city areas for Barcelona and Paris (both of the order of 100 sq.km.) and the larger urban areas of London and Rome (approximately 1,300 and 1,600 sq. km., respectively) – more than 10 times the areas of Barcelona and Paris.

With relatively high, not-dissimilar population densities, Barcelona and Paris present similar overall traffic safety levels, with Paris having better (lower) personal safety. These two cities also show similar changes in mobility (Barcelona: 2000-2008 and Paris: 1991 - 2001) – with increased use of walking and cycling, and a strong growth in PTW trips (Barcelona:+80%, Paris:+60%) within an overall reduction in the private car mode. The level of PTW trips in Barcelona (5% of 2008 mobility) is higher than Paris (2% in 2001).

Rome and London are study areas of similar spatial extension, with similar traffic safety rates (in 2007). However, London has more than twice the population of Rome and a much lower (better) personal safety rate. The trends in mobility suggest that PTW usage is stable for London but increasing for Rome and from a higher base share for PTW use (8% in 2004, up from 7% in 1996, a 15% increase in number of trips), compared with 1% in London (2006 showing same PTW mode share as 1993).

5. Comparison of PTW collisions in urban areas

This chapter compares the collisions involving PTW users in the cities of Barcelona, London, Paris and Rome using road collision data corresponding to the time period 2000-2008.

The context within which this comparison is made is presented in Chapters 3 (road safety policy and actions) and 4 (study area, mobility context, overall road safety levels), and the findings need to be interpreted taking into account the information contained in these chapters.

5.1. Data set by cities

Before making comparisons on a disaggregated level on the road safety situation of PTWs, some considerations on available data should be made.

Concerning the calculation of the indicators that define the phenomenon, Rome provides the number of motorcycles in 2007 but not the number of mopeds, for which an estimate will be provided. London also estimates the number of mopeds, whilst Paris presents data that does not include mopeds. Due to these constraints the indicators will focus on all PTWs without distinction.

Data analysis in time series originally scheduled for the last 12 years (1996 - 2007), was subsequently reduced to the last 8 years (2000 - 2007) due to problems of availability of data for such a wide time horizon. For Barcelona, data was available for 2002 onwards.

Barcelona provided the data reported in the year 2008, while the other partners provided up to 2007. This limitation, however, has not affected the development of the analysis.

5.2. Background

Background Year	Barcelona 2008	London 2007	Paris 2007	Rome 2007	Note
Population	1,628,090	7,557,000	2,153,600	2,718,768	
Number of motorcycles	193,902	116,000	102,000	379,997	
Number of mopeds	93,382			155,842	3
PTW fatalities	21	50	14	85	2
PTW injured	6,753	4,172	5,038	10,411	2
Motor vehicle km (million)	13.2	334.52		143.70	
PTW Motor vehicle km (million)		9.21			
PTW trips (internal+external) (million)	0.36	0.2			1
% PTW of motor vehicles	29.0%	3.9%	11.4%	20.1%	4
% PTW trips of all trips	4.6%	0.8%			
% PTW fatalities of all fatalities	67.7%	24.5%	28.0%	42.3%	2
% PTW injured of all injured	58.5%	14.9%	59.0%	39.6%	2
Rates					
PTW fatalities per million inhabitants	12.90	5.43	5.57	31.26	
PTW fatalities per 100,000 vehicles	7.31	43.10	13.73	15.86	
PTW fatalities per million veh-km		5.43			
PTW fatalities per million trips	57.91	205.00			

Table 5.1 PTWs basic data of the cities of Barcelona, London, Paris and Rome

1. Barcelona: Working day, London: 2006
2. Paris, London: 2008
3. Rome: Estimated data
4. Paris: excludes mopeds

The population, area and levels of motorisation are reviewed in Chapter 4. The relative importance of PTW casualties within the total road collision victims varies from 28% (Paris) to 68% (Barcelona) for fatalities, and between 14% (London) and 59% (Barcelona and Rome) for all injured persons.

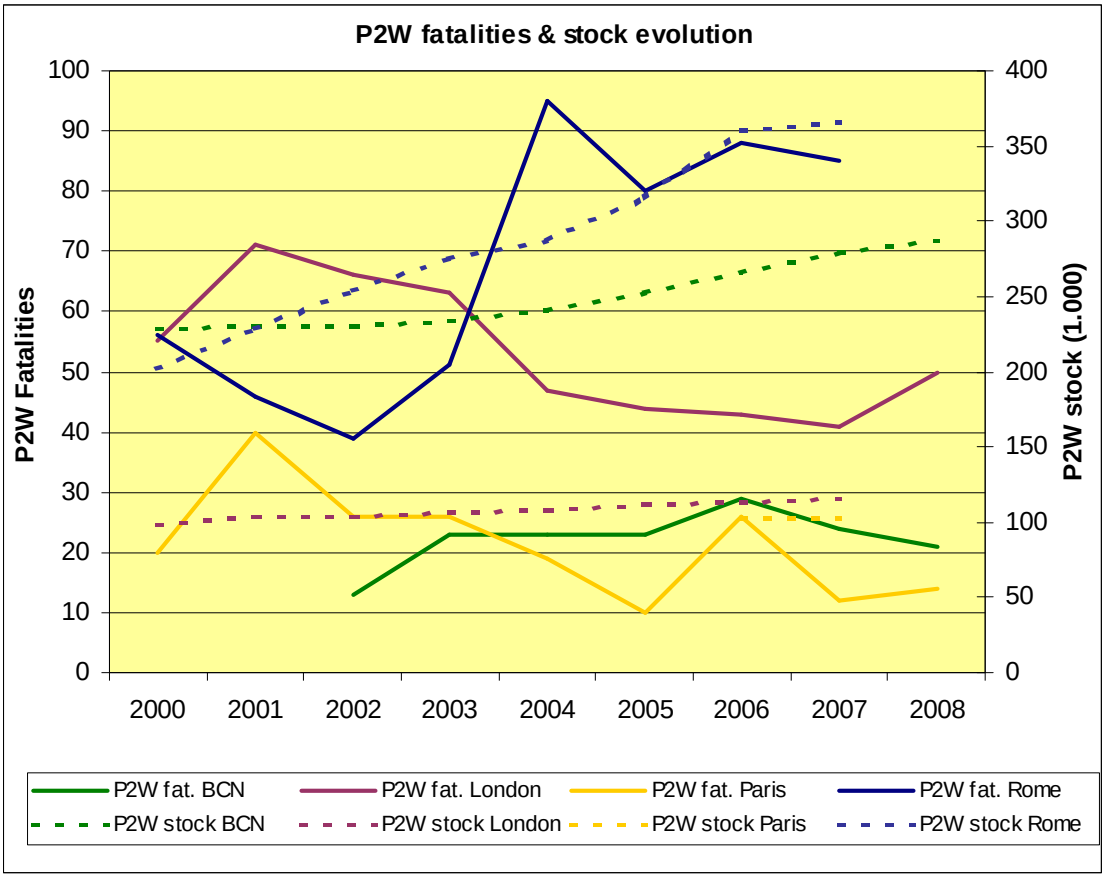
The PTW personal safety risk varies between 5 deaths per million inhabitants (London, Paris) and 31 (Rome). The PTW traffic safety rate varies between 7 deaths per 100,000 vehicles (Barcelona) and 43 (London).

		2000	2001	2002	2003	2004	2005	2006	2007	2008
Moped rider fatalities	Barcelona	-	-	7	7	11	6	8	7	6
	London	0	1	0	1	2	5	2	4	-
	Paris	1	6	3	6	3	1	5	3	5
	Rome	23	10	7	12	25	16	14	9	-
Motorcyclist fatalities	Barcelona	-	-	6	16	12	17	21	17	15
	London	55	70	66	62	45	39	41	37	50 (1)
	Paris	19	34	23	20	16	9	21	9	9
	Rome	33	36	32	39	70	64	74	76	-
PTW fatalities	Barcelona	-	-	13	23	23	23	29	24	21
	London	55	71	66	63	47	44	43	41	50
	Paris	20	40	26	26	19	10	26	12	14
	Rome	56	46	39	51	95	80	88	85	-
		2000	2001	2002	2003	2004	2005	2006	2007	2008
PTW Yearly change	Barcelona				76.9%	0.0%	0.0%	26.1%	-17.2%	-12.5%
	London		29.1%	-7.0%	-4.5%	-25.4%	-6.4%	-2.3%	-4.7%	22.0%
	Paris		100.0%	-35.0%	0.0%	-26.9%	-47.4%	160.0%	-53.8%	16.7%
	Rome		-17.9%	-15.2%	30.8%	86.3%	-15.8%	10.0%	-3.4%	
		2000	2001	2002	2003	2004	2005	2006	2007	2008
PTW stock (thousands)	Barcelona	228.5	230.2	230.4	234.2	240.1	252.0	266.3	278.7	287.3
	London	98.0	103.0	103.0	106.0	108.0	111.0	113.0	116.0	
	Paris								102.0	
	Rome	202.3	228.0	253.4	275.0	287.5	315.8	360.4	365.6	

Table 5.2 Motorcyclist and moped rider fatalities and PTW stock of the cities of Barcelona, London, Paris and Rome

1. London: Moped + Motorcycles
2. The changes concern PTW's fatalities

Figure 5.1 presents graphically the trends in PTW fatalities with the evolution of the PTW stock. It can be seen that Rome and Barcelona had similar PTW stocks in 2000 and that both have increased since then, with Rome showing the highest increase. The PTW fatality levels of Rome and London were similar in 2000, with Rome, after a small reduction, showing an increase and London showing a reduction in PTW fatalities over the last 8 years. The PTWs fatalities levels of Barcelona and Paris are comparatively stable, as shown in the diagram.



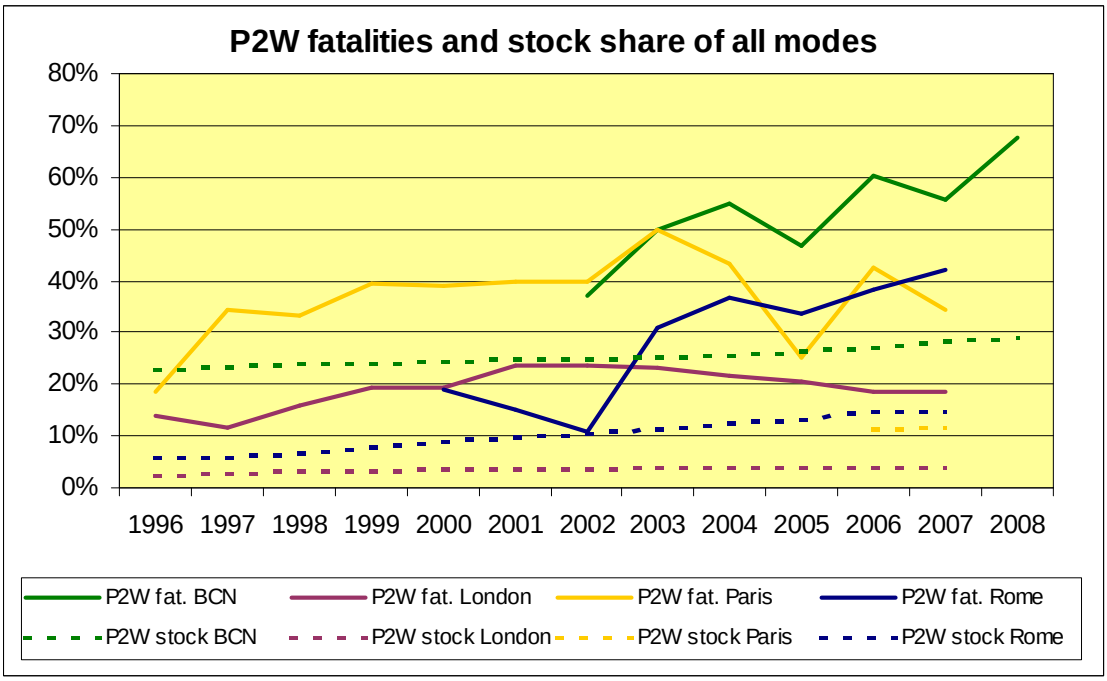


Figure 5.1 PTW fatalities & stock evolution

		2000	2001	2002	2003	2004	2005	2006	2007	2008
Moped rider injured	Barcelona			3,788	3,703	3,613	3,419	3,130	2,936	2,487
	London	684	1,031	1,215	839	889	1,255	871	554	
	Paris	1,442	1,379	1,175	1,151	1,101	1,295	1,558	1,699	1,869
	Rome	5,574	5,086	4,351	4,087	4,327	3,731	2,474	1,941	
Motorcyclist injured	Barcelona			2,878	2,820	2,942	3,599	4,044	4,358	4,266
	London	6,963	6,818	5,760	5,567	4,622	3,843	3,761	3,853	4,172 (1)
	Paris	3,027	2,942	2,629	2,310	2,490	2,535	2,741	2,997	3,169
	Rome	2,185	4,567	4,917	6,051	7,324	7,062	8,278	8,470	
PTW injured	Barcelona			6,666	6,523	6,555	7,018	7,174	7,294	6,753
	London	7,647	7,849	6,975	6,406	5,511	5,098	4,632	4,407	4,172
	Paris	4,469	4,321	3,804	3,461	3,591	3,830	4,299	4,696	5,038
	Rome	7,759	9,653	9,268	10,138	11,651	10,793	10,752	10,411	
		2000	2001	2002	2003	2004	2005	2006	2007	2008
PTW Yearly change	Barcelona				-2.1%	0.5%	7.1%	2.2%	1.7%	-7.4%
	London		2.6%	-11.1%	-8.2%	-14.0%	-7.5%	-9.1%	-4.9%	-5.3%
	Paris		-3.3%	-12.0%	-9.0%	3.8%	6.7%	12.2%	9.2%	7.3%
	Rome		24.4%	-4.0%	9.4%	14.9%	-7.4%	-0.4%	-3.2%	

Table 5.3 Motorcyclist and moped rider injured of the cities of Barcelona, London, Paris and Rome

1. London: Moped + Motorcycles

	Barcelona			London			Paris			Rome (1)		
	Seriously Injured	Slightly Injured	Total	Seriously Injured	Slightly Injured	Total	Seriously Injured	Slightly Injured	Total	Seriously Injured	Slightly Injured	Total
2000	-	-	-	1,140	6,507	7,647	330	4,139	4,469	155	7,604	7,759
2001	-	-	-	1,215	6,634	7,849	300	4,021	4,321	193	9,460	9,653
2002	160	6,506	6,666	1,156	5,819	6,975	240	3,564	3,804	185	9,083	9,268
2003	111	6,412	6,523	1,089	5,317	6,406	223	3,238	3,461	203	9,935	10,138
2004	312	6,243	6,555	848	4,663	5,511	252	3,339	3,591	233	11,418	11,651
2005	272	6,746	7,018	801	4,297	5,098	377	3,453	3,830	216	10,577	10,793
2006	268	6,906	7,174	805	3,827	4,632	314	3,985	4,299	215	10,537	10,752
2007	236	7,058	7,294	778	3,629	4,407	353	4,343	4,696	208	10,203	10,411
2008	178	6,575	6,753	688	3,484	3,890	454	4,584	5,038			

Table 5.4 Motorcyclist and moped rider injured of the cities of Barcelona, London, Paris and Rome

1. Estimated distinction

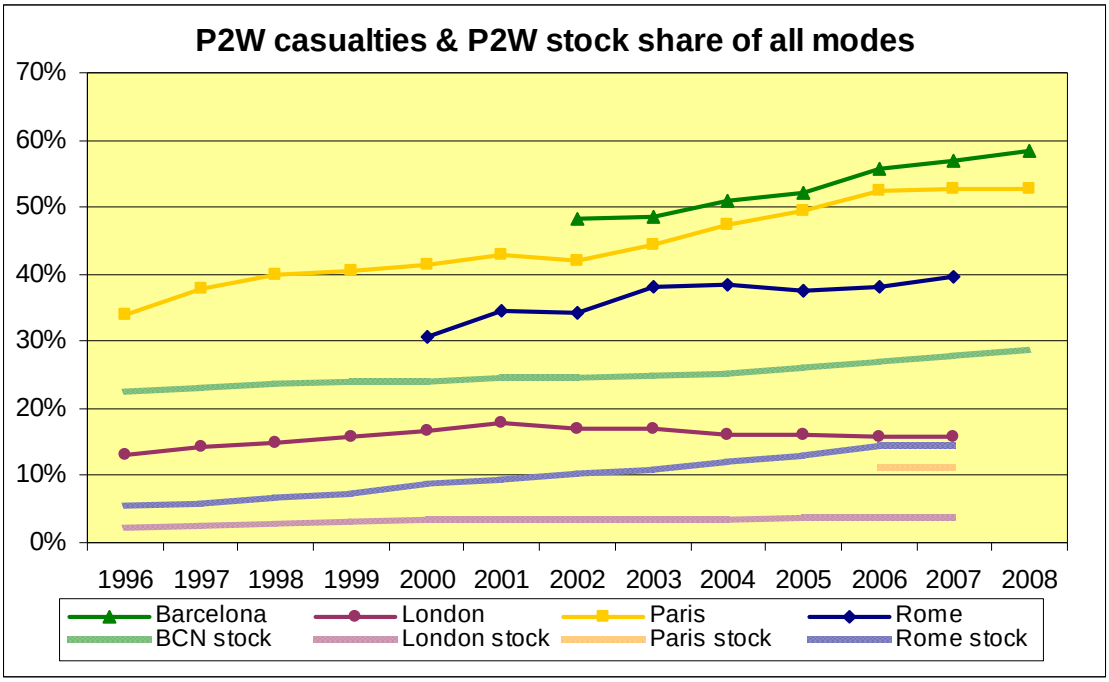


Figure 5.2 PTW casualties & PTW stock evolution

Figure 5.2 graphically presents the trends in PTW injuries with the changes in the PTW share in the total vehicle stock. Barcelona has the highest values and most marked increase in casualties, closely followed by Paris (stock figures exclude mopeds) and then Rome. London is the only city that shows, since 2001, a sustained reduction in PTW casualties and no increase in PTW stock share.

Year	Barcelona	London	Paris	Rome
2000	-	16.8%	41.4%	30.7%
2001	-	17.8%	43.0%	34.4%
2002	48.3%	17.0%	42.0%	34.4%
2003	48.6%	16.8%	44.3%	38.0%
2004	51.0%	16.1%	47.5%	38.5%
2005	52.2%	16.2%	49.6%	37.6%
2006	55.7%	15.7%	52.5%	38.1%
2007	57.0%	15.7%	52.8%	39.6%
2008	58.5%	-	58.8%	-

Table 5.5 Percentage of PTW victims as proportion of total victims, 2000 - 2007

The following graphs show respectively for the period 2000-2007 the percentage of PTW victims as proportion of total victims, the casualty rate for population and vehicle, divided by moped and motorcycles. In the first case there are constant increases for the cities Paris and Barcelona, a slight but steady decrease for London, while Rome registers an increase until 2003, followed by a decrease until 2006.

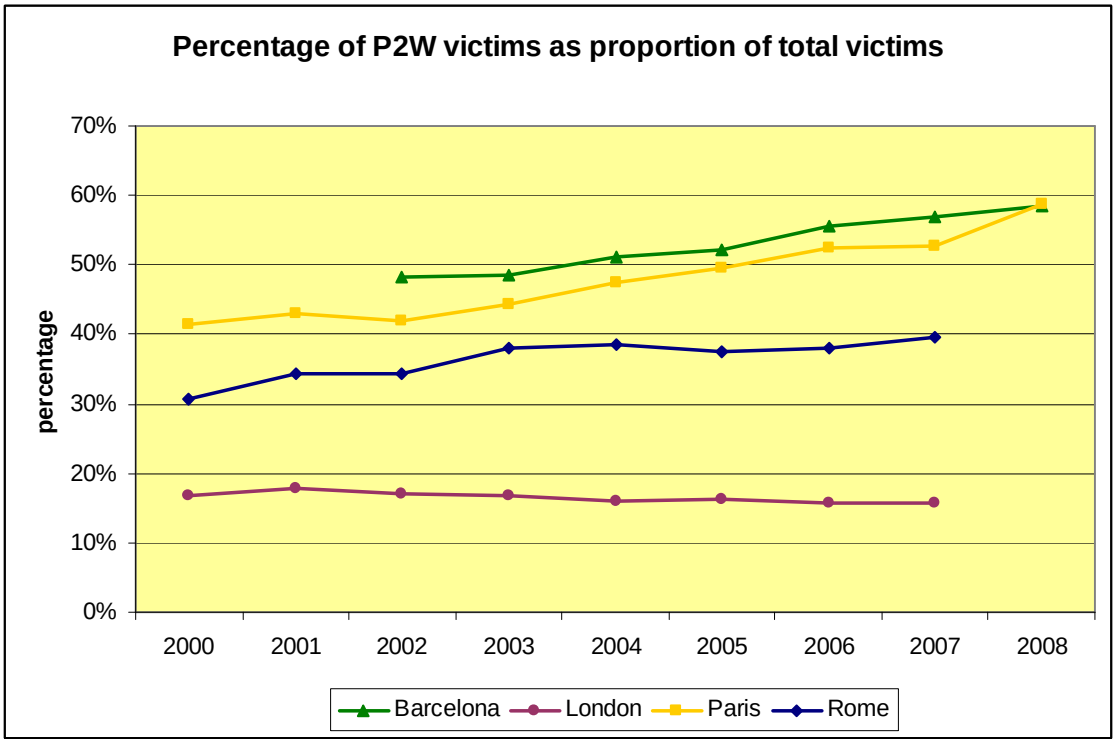


Figure 5.3 of PTW victims as proportion of total victims, 2000 – 2007

The casualty rate, which represents the number of victims involved in collisions in relation to the number of inhabitants, shows the largest values for the city of Barcelona (over 450) and a slight increase. London has the lowest values (59) and steady decline since 2000. Rome observes an increase until 2004, the year in which there was a decrease until 2006 (about 401 deaths every 100 thousand inhabitants). For Paris there were no significant variations between 2000 and 2007 (about 219 deaths every 100 thousand inhabitants).

Year	Barcelona	London	Paris	Rome
2000	-	104	211	305
2001	-	108	204	381
2002	437	96	179	366
2003	414	88	162	401
2004	417	75	168	460
2005	442	69	178	427
2006	449	62	199	401
2007	459	59	219	386

Table 5.6 Casualty rate, 2000 – 2007

5.3. Safety levels

In terms of the PTW personal safety indicator, comparing 2000 with 2007, Paris and London show reductions in line with the EU-14 general trend and in absolute terms are more than three times below the EU-14 2007 average. Rome and Barcelona show a worsening in PTW personal safety from 2000 to 2007. In absolute terms Rome is at twice the EU-14 2007 value whereas the value for Barcelona remains under the average of 17.1 fatalities per million inhabitants of the EU 14 (2007). The figures for 2008 show a positive shift. Since 2006 PTW fatalities per million inhabitants in Barcelona have been reduced by 30% with a 16% reduction for Rome in 2004-2007.

	Barcelona	London	Paris	Rome	EU14
2000		7.46	9.39	21.88	19.8
2001		9.70	18.71	18.07	19.9
2002	8.51	8.97	12.14	15.35	19.0
2003	14.53	8.56	12.11	20.06	18.8
2004	14.57	6.36	8.84	37.20	18.1
2005	14.44	5.90	4.64	31.40	18.0
2006	18.06	5.72	11.99	32.53	17.6
2007	15.05	5.43	5.57	31.26	17.1 (1)
2008	12.90				

Table 5.7 PTW mortality rate (fatalities per million inhabitants) by city

1. Estimated data

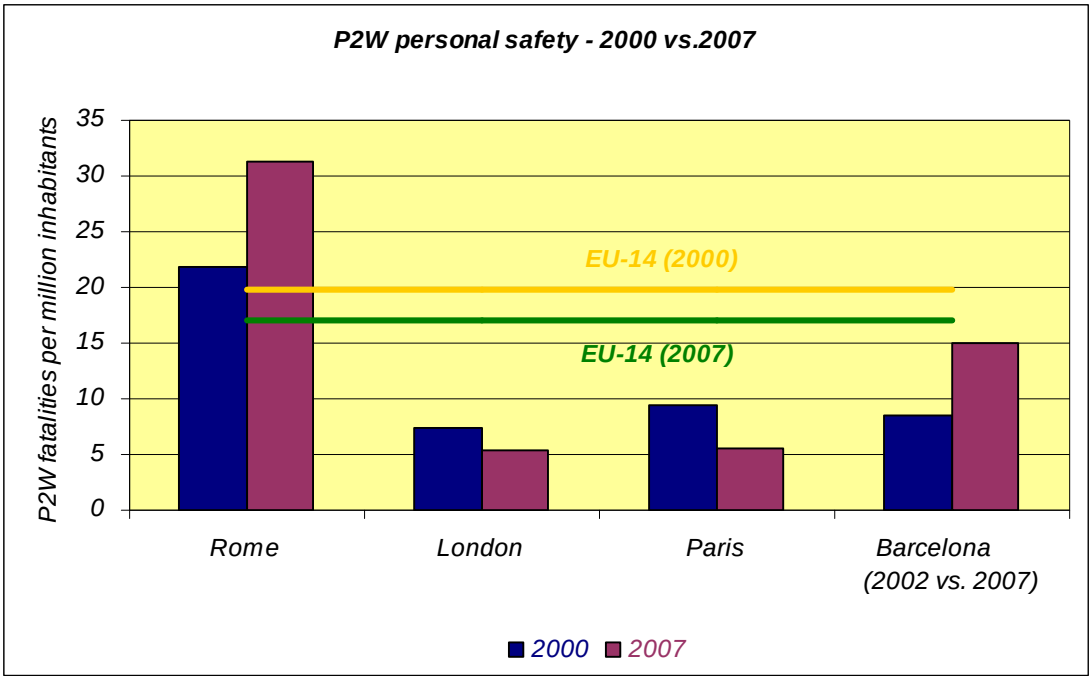


Figure 5.4 PTW rider fatalities per million inhabitants, 2000 versus 2007

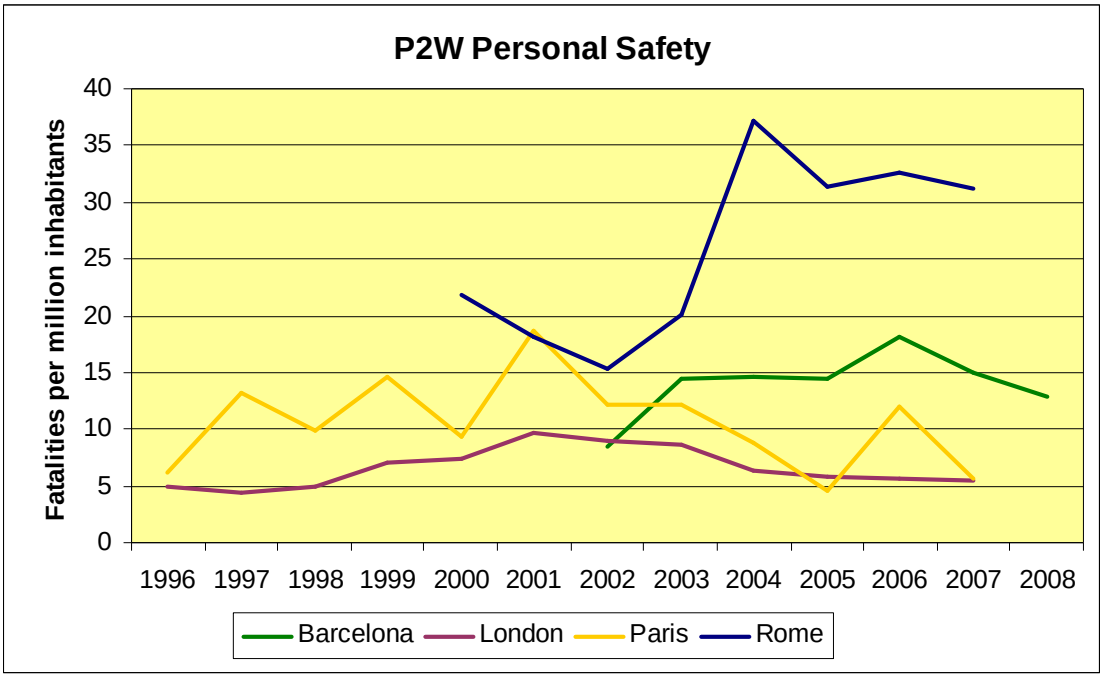


Figure 5.5 PTW Personal Safety evolution 1996-2008 (PTW fatalities / million inhabitants)

London presents the worst PTW traffic safety rate but with a positive trend. Since 2001, when the indicator was almost 69 fatalities per 100,000 vehicles, the rate has been halved.

The best figure is presented in Barcelona but from 2002 to 2006 the rate has almost doubled. During the last two years the trend is positive and shows a reduction of 33%.

Rome's PTW traffic safety indicator has its maximum at 2004. From 2000 to 2007 the rate has been reduced by 16%.

	Barcelona	London	Paris	Rome
2000		56.12		27.68
2001		68.93		20.17
2002	5.64	64.08		15.39
2003	9.82	59.43		18.55
2004	9.58	43.52		33.04
2005	9.13	39.64		25.34
2006	10.89	38.05		24.42
2007	8.61	35.34	11.76	23.25
2008	7.31			

Table 5.8 PTW traffic safety rate (fatalities per 100,000 vehicles) by city

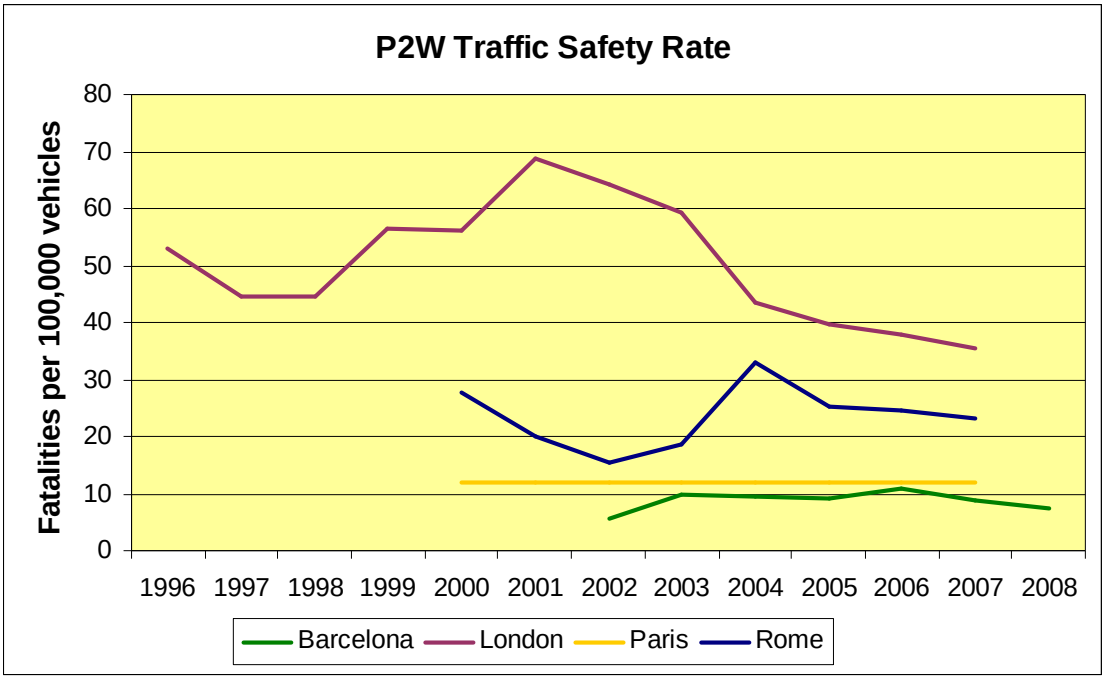


Figure 5.6 PTW Traffic Safety rate evolution 1996-2008 (fatalities per 100,000 vehicles)

Comparing fatalities per million trips, a similar steady decline for both London and Barcelona can be appreciated. With Barcelona at less than a third of London's value this may be due to differences in trip definitions (eg relating to short walking journeys) or due to differences in areas.

Only London presents information about veh-km traffic safety risk. The veh-km trend is positive but the value for 2008 needs to be monitored. It could represent a temporary peak or a new tendency.

	Traffic safety risk (fatalities per million veh-km)	Traffic safety risk (fatalities per million trips)	
	London	Barcelona	London
2000	0.17		275.00
2001	0.21		355.00
2002	0.20		330.00
2003	0.19	87.69	315.00
2004	0.14	79.55	235.00
2005	0.13	75.36	220.00
2006	0.13	80.82	215.00
2007	0.12	64.86	205.00
2008	0.15	57.91	

Table 5.9 PTW traffic safety risk (fatalities per million veh-km) and PTW Traffic Safety risk (travels) by city

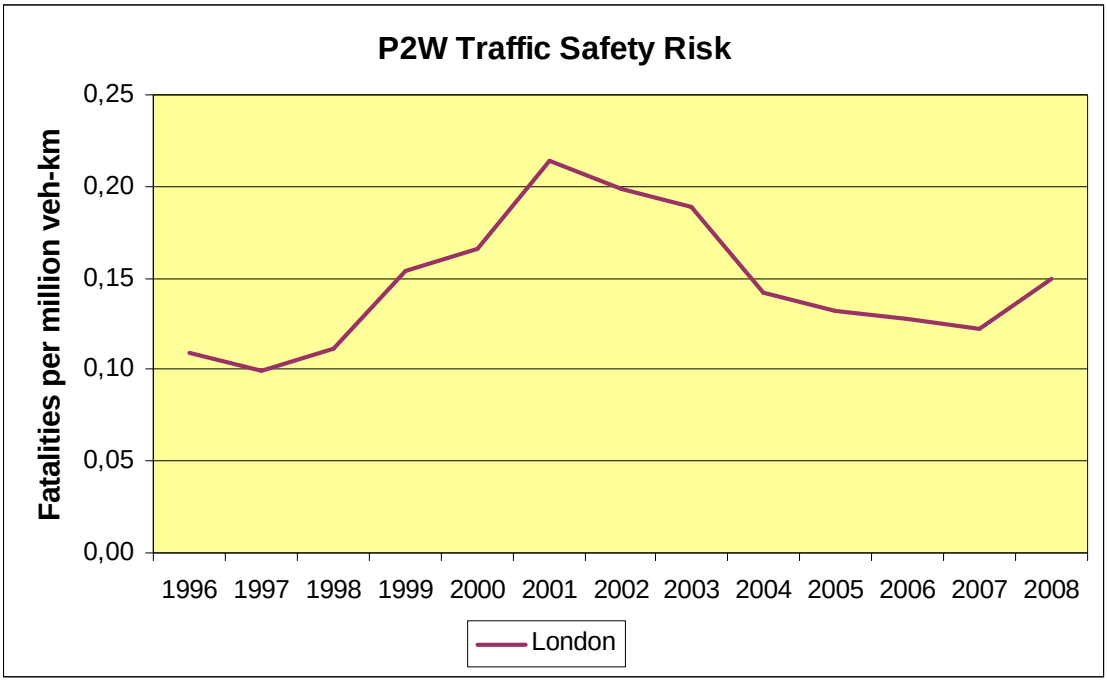


Figure 5.7 PTW Traffic Safety risk (veh-km) evolution 1996-2008

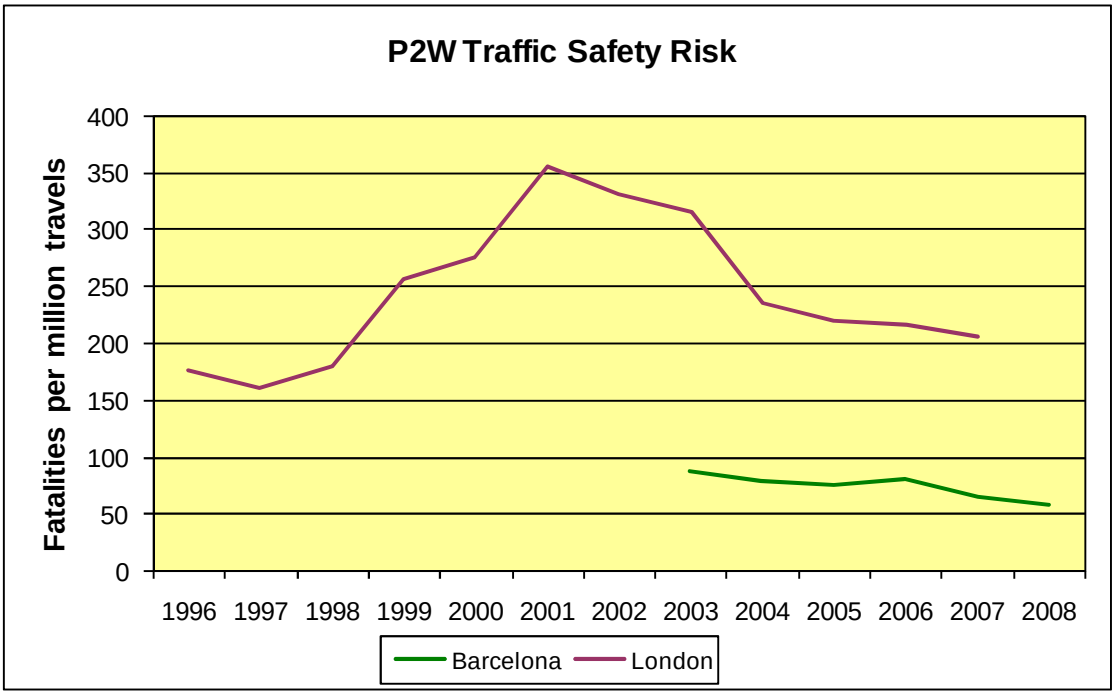


Figure 5.8 PTW Traffic Safety risk (travels) evolution 1996-2008 (PTW fatalities / million trips)

Barcelona with a similar area of study to Paris, smaller than the other cities, shows low PTW traffic safety rates that vary very little over time. Its PTW safety rate varies more, showing an initial deterioration but then reducing to the lowest level of 4.3 in 2008.

Rome shows growing personal safety and traffic flow through the period.Whilst the personal safety situation falls more rapidly, the PTW safety rate trebles from 2000 to 2007.

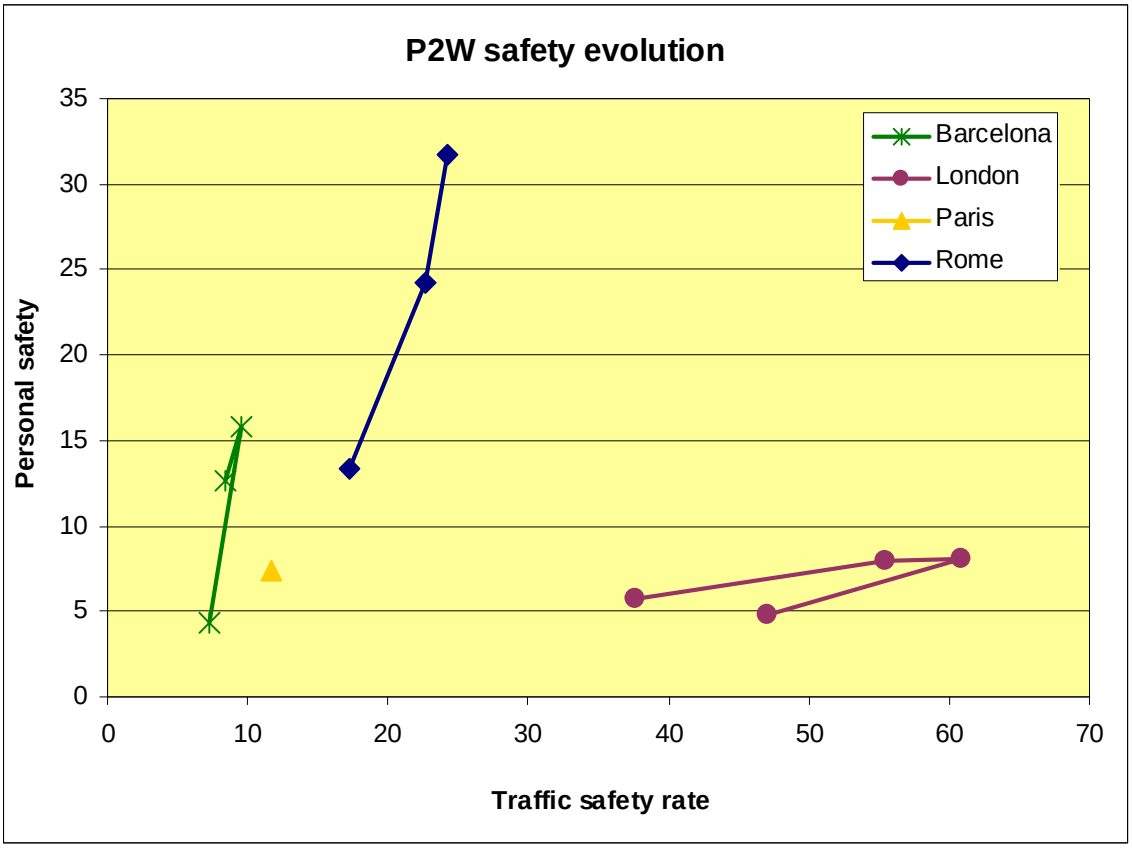


Figure 5.9 PTW safety evolution as personal safety (PTW fatalities per million inhabitants) versus traffic safety rate (PTW fatalities per 100,000 vehicles)

	PTW Personal safety (fatalities per million inhabitants)				PTW Traffic safety rate (fatalities per 100,000 vehicles)			
	Barcelona	London	Paris	Rome	Barcelona	London	Paris	Rome
1996-1998		4.84	9.78			47.03		
1999-2001		8.05	14.24	13.29		60.82		17.20
2002-2004	12.58	7.96	11.03	24.23	8.37	55.52		22.68
2005-2007	15.85	5.68	7.41	31.74	9.54	37.65	11.76	24.29
2008	4.30				7.31			

Table 5.10 PTW personal safety and traffic safety evolution by city

1. Value related to the single year of 2007

5.4. Relative risk indices

When PTW safety is considered in terms of the relative proportion of the overall city safety by comparing fatalities and taking account the proportion of PTWs in the vehicle stock, the relative risk is seen to be lower for cities having a large PTW stock (Barcelona and Rome). However, the risk of PTW fatality in Barcelona is double and in Rome triple that for all vehicles.

In 2007, London's stock PTW relative risk ratio was 4.8, that is to say, the number of fatalities related to the PTW stock was almost five times bigger than the same figure for all kind of vehicles. It has to be said that since 2002 the London rate trend is positive whereas the Barcelona rate is worsening.

Only Rome, in 2002, shows a ratio almost equal to 1, that is to say, the PTW risk was similar to that for all vehicles.

$$\text{Stock relative risk ratio} = \frac{\dfrac{\text{Number of P2W fatalities}}{\text{Number of fatalities}}}{\dfrac{\text{Number of P2W}}{\text{Number of all vehicles}}}$$

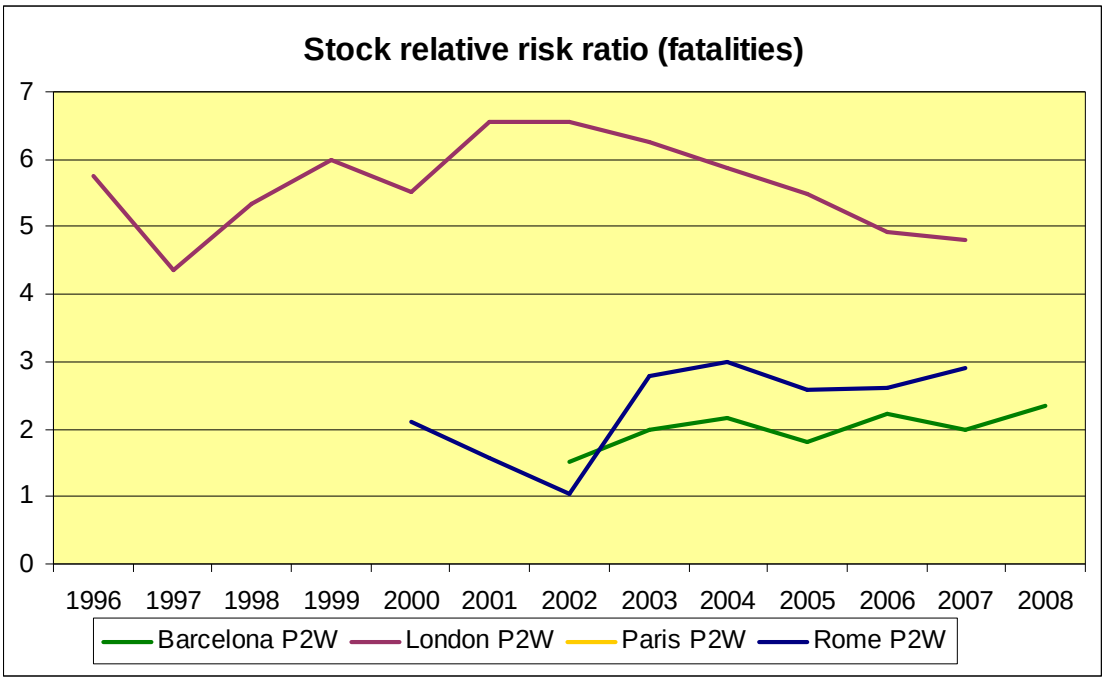


Figure 5.10 PTW stock relative risk ratio

Looking in more detail at the relative risk (stock) trends for Barcelona, 2008 data show a convergence of the ratios for moped and motorcycle injuries (moped risk higher) and the fatality ratios follow a similar pattern but with motorcycles having the higher value.

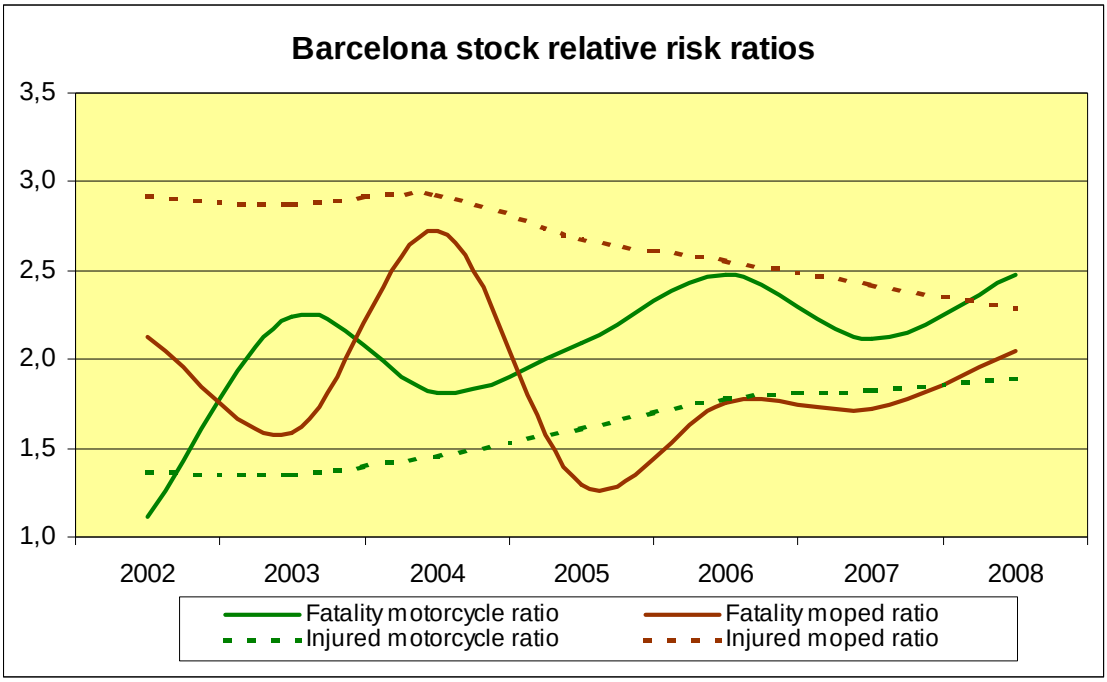


Figure 5.11 Barcelona PTW stock relative risk ratios

As mentioned before, only London and Barcelona have data for the number of trips. Travel relative risk ratio compares PTW safety in terms of the relative proportion to the overall city safety (fatalities) and the proportion of PTW trips.

In Barcelona in 2008, PTW fatalities per PTW trips was 15 times higher than the average for all vehicles. With a positive trend but still high, London's risk ratio was almost 22 in 2007.

$$\text{Travel relative risk ratio} = \frac{\frac{\text{Number of P2W fatalities}}{\text{Number of fatalities}}}{\frac{\text{Number of P2W trips}}{\text{Number of all trips}}}$$

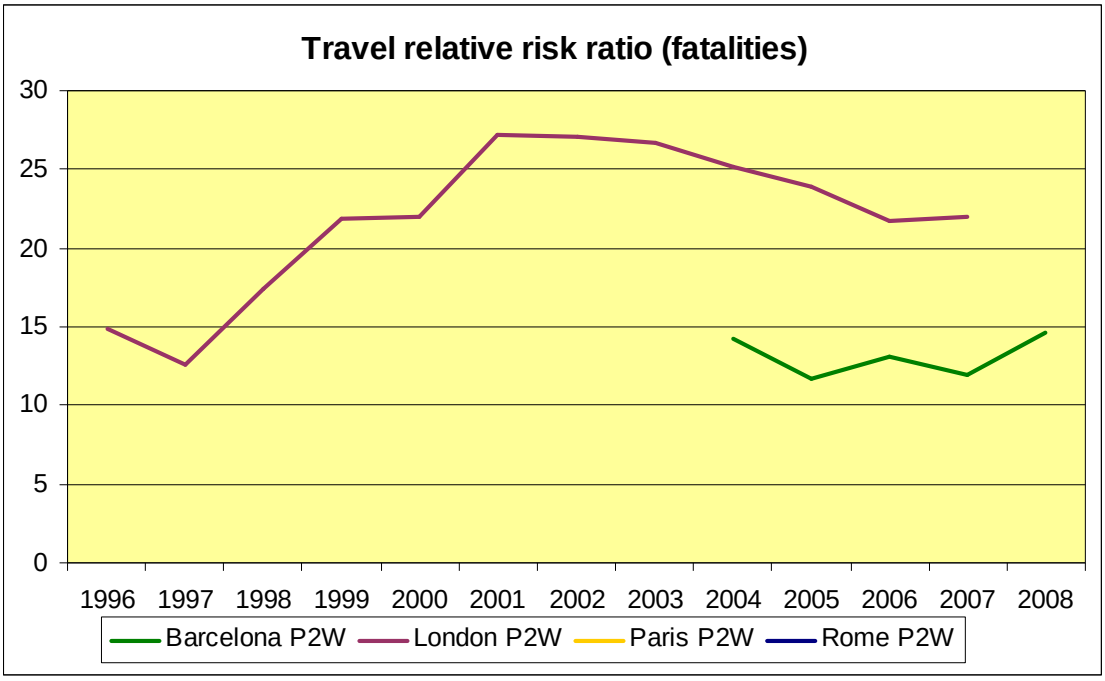


Figure 5.12 PTW travel relative risk ratio

5.5. Casualties by day

While London and Rome have a higher level of fatalities during working days, Barcelona and Paris has quite similar levels for working day and weekends.

Unfortunately, there is no data on mobility (trips or veh-km) by type of day. It would be interesting to check if mobility distribution is similar to the casualty frequency.

Casualty distribution is quite similar in Barcelona, London and Rome, four out of five casualties occur on working days. In Paris in 2008, three out of five casualties are on working days.

	Moped		Motorcycle		PTW		% PTW	
	Working day	Weekend	Working day	Weekend	Working day	Weekend	Working day	Weekend
Barcelona	4	2	8	7	12	9	57%	43%
London	2	2	29	8	31	10	76%	24%
Paris	3	2	5	4	8	6	57%	43%
Rome	6	3	67	9	73	12	86%	14%

Table 5.11 PTW fatalities by type of day

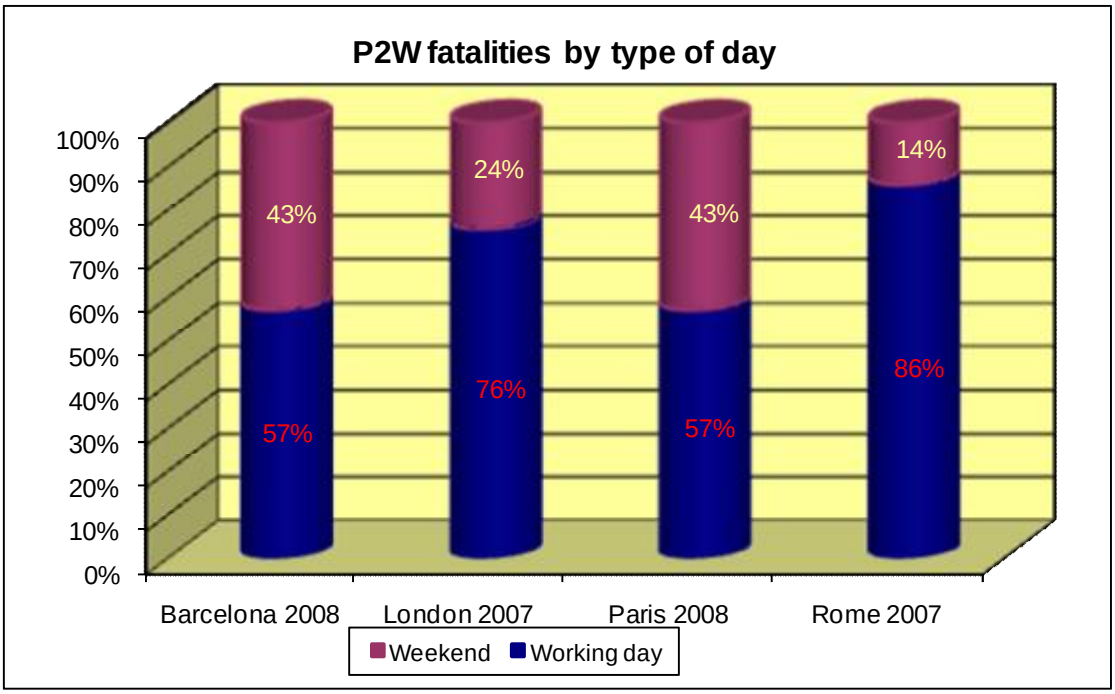


Figure 5.13 The percentage of PTW fatalities by type of day

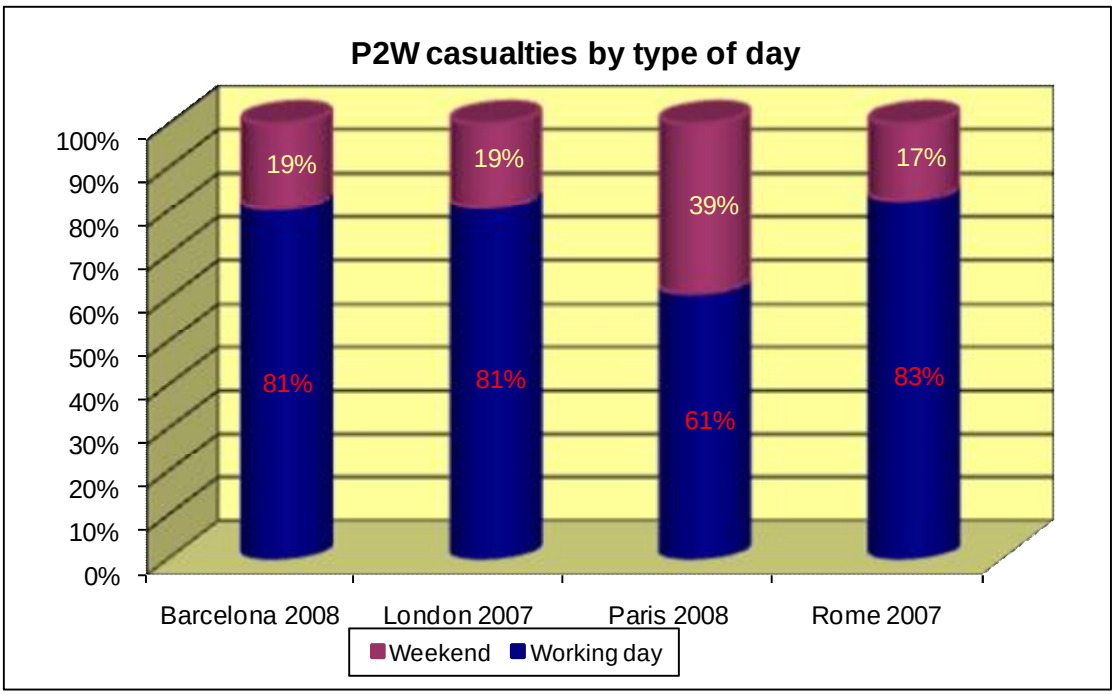


Figure 5.14 The percentage of PTW casualties by type of day

5.6. Casualties by month

Due to the small sample, it is difficult to draw conclusions but it appears that Paris and London have more fatalities during the winter and autumn months, while Barcelona and Rome fatalities are during spring and summer.

Although sample size is small, it is interesting to note the differences in fatality and casualty patterns (see next figure). Whilst casualty patterns are evenly distributed (all months quite similar), fatality patterns appear to show a weather influence.

	Barcelona (2008)		London (2007)		Paris (2008)		Rome (2007)	
Month	Motorcycle	Moped	Motorcycle	Moped	Motorcycle	Moped	Motorcycle	Moped
January	3	0	5	0	0	0	6	0
February	0	1	0	0	3	2	4	0
March	0	0	1	2	0	0	7	1
April	1	1	5	0	0	1	7	0
May	3	0	2	0	0	0	7	0
June	4	0	2	0	0	0	10	0
July	1	2	5	0	1	0	10	2
August	0	0	1	1	1	0	8	3
September	0	0	5	0	2	2	5	0
October	1	1	1	0	1	0	2	1
November	2	1	8	1	1	0	3	1
December	0	0	2	0	0	0	7	1
Year	**15**	**6**	**37**	**4**	**9**	**5**	**76**	**9**

Table 5.12 PTW fatalities by month

Comparing PTW casualties by month, it is seen that the participating cities have similar patterns, with lower levels during the winter months and during August. These are the months when usage levels drop, either due to poorer weather or for holidays. The similarity in the patterns for Paris and Barcelona (similar study areas) is particularly noticeable. London does not have a dramatic monthly change in PTW casualties. This might be as a result of London's weather conditions.

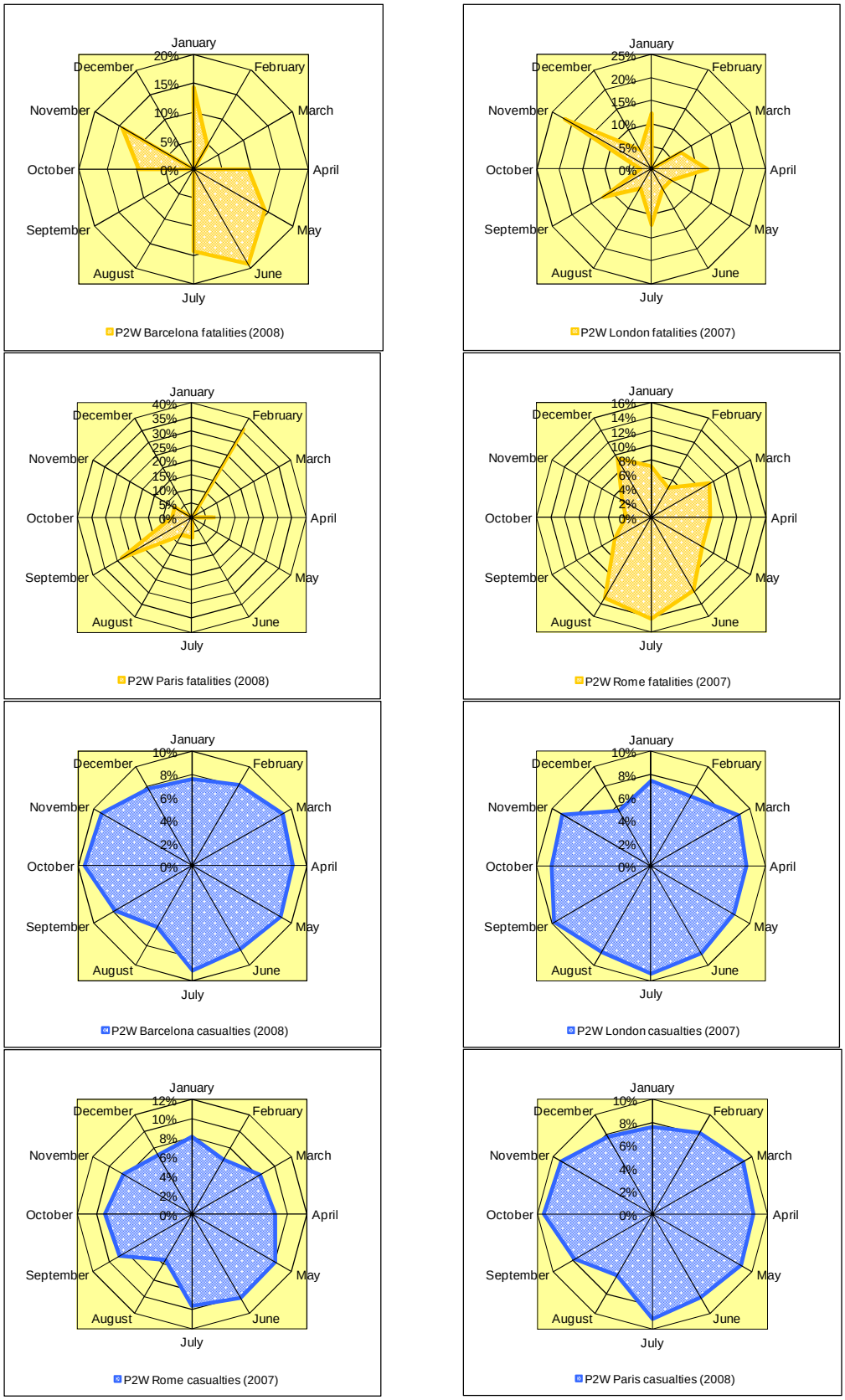


Figure 5.15 PTW fatalities and casualties by month

5.7. Casualties by hour

The time of day of PTW fatalities shows considerable variation. The highest concentration is between midnight and 6h for Paris, followed by 12 to 18h for Rome. The 12 to 18h period is also the highest concentration for fatalities in London. For Barcelona the highest concentration is between midnight and 6h.

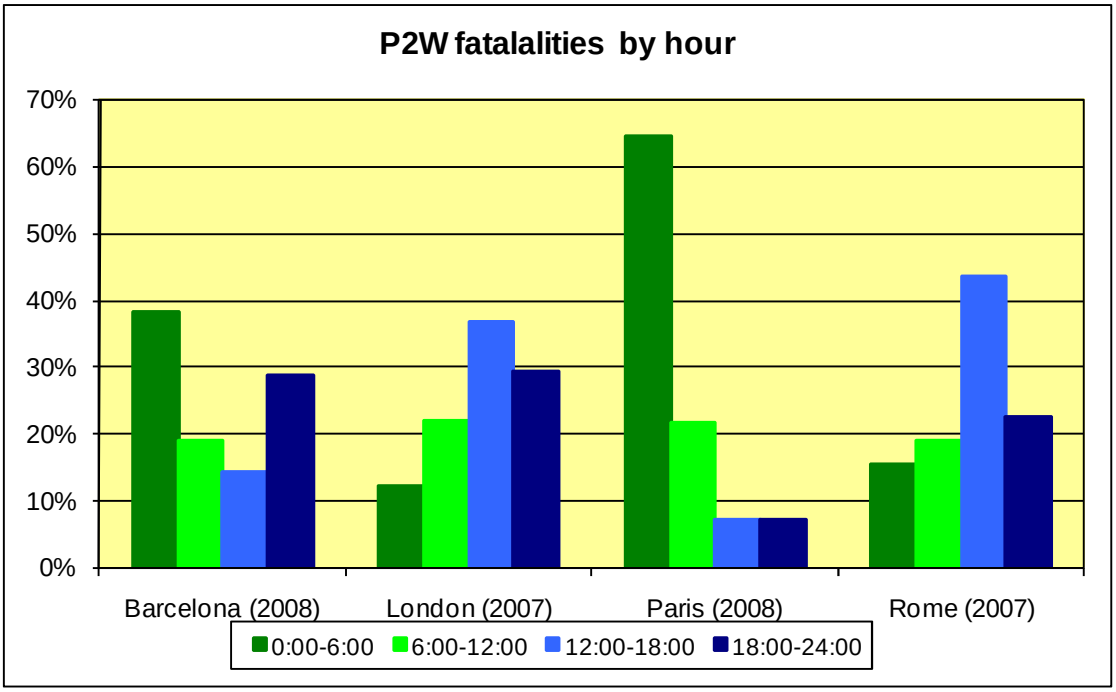


Figure 5.16 PTW fatalities by hour

Figure 5.17 provides more detail regarding the times of PTW fatalities. The basic patterns for Paris and Barcelona (central study areas) are different from the larger areas of Rome and London.

Some difference could be discerned for PTW casualties but are not so pronounced.

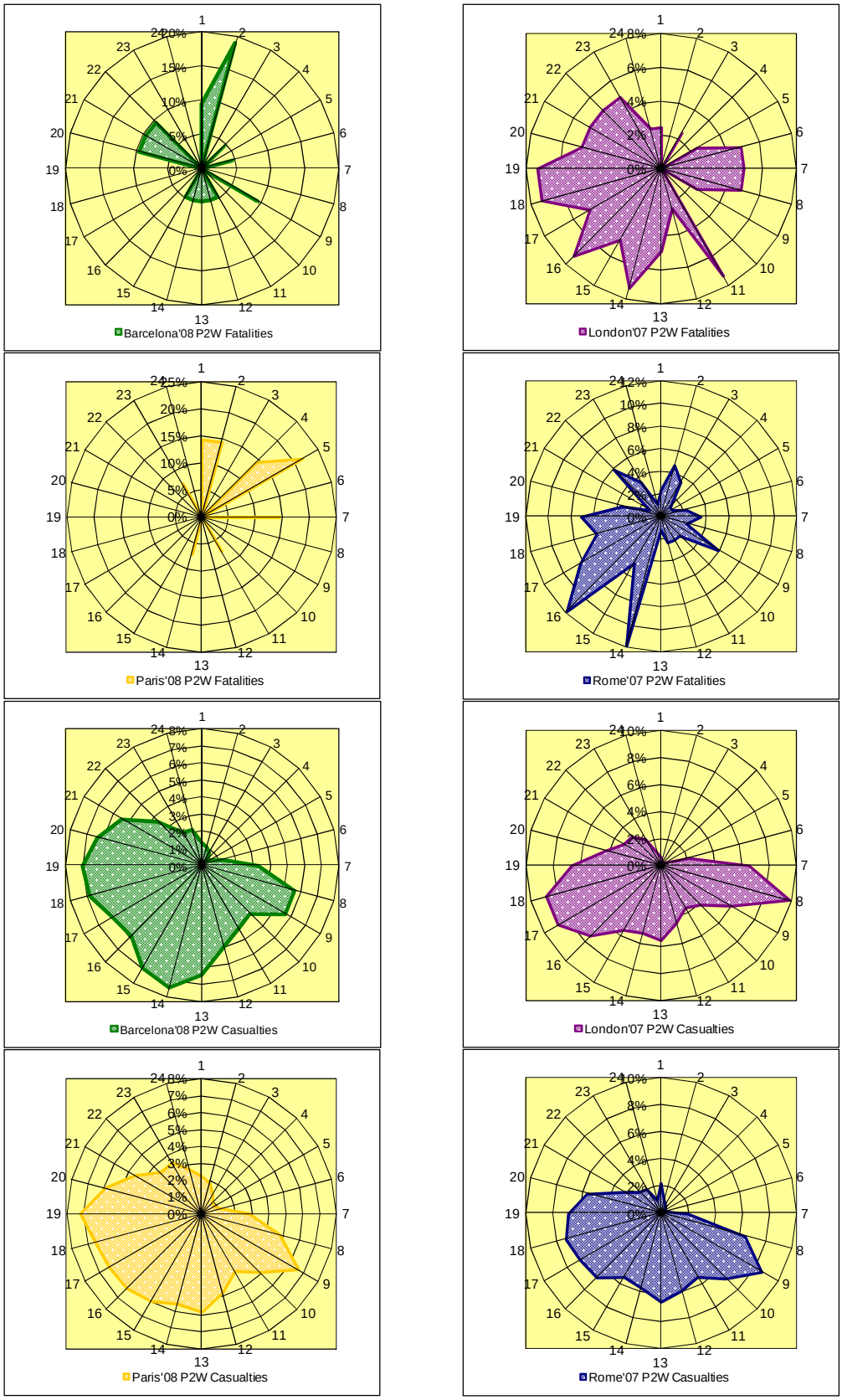


Figure 5.17 PTW fatalities and casualties by hour

5.8. Casualties by gender

	Moped		Motorcycle		PTW		% PTW	
	Male	Female	Male	Female	Male	Female	Male	Female
Barcelona (2008)	5	1	12	6	17	7	67%	33%
London (2007)	4	0	37	0	41	0	100%	0%
Paris (2008)	4	1	9	0	13	1	93%	7%
Rome (2007)	9	1	73	4	82	5	94%	6%

Table 5.13 PTW fatalities by gender

Table 5.13 shows the number of deaths registered for the last available year, divided by gender. The proportion of females in PTW fatalities is highest for Barcelona (33%) and lowest for London (0%).

Almost all the fatalities on PTWs were males (92%). Amongst these, 86% are motorcyclists. For females (8% of total victims) the percentage of motorcyclists is less, around 77% of the total. The relatively low number of female riders in London is reflected in the nil return for fatal casualties for 2007.

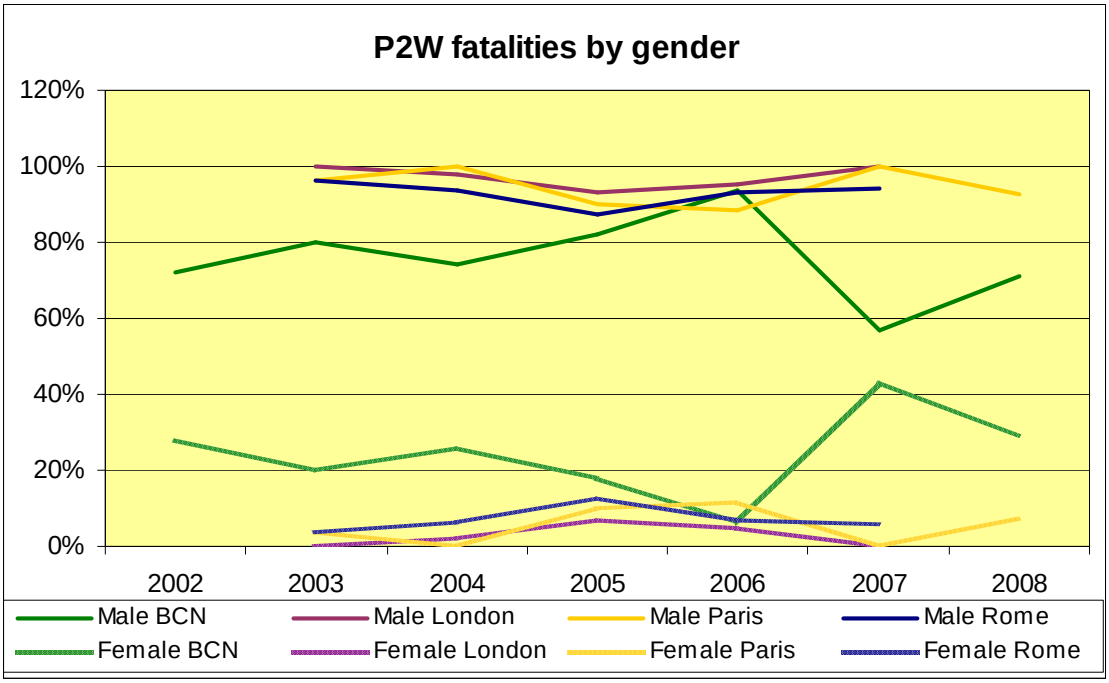


Figure 5.18 The percentage of PTW fatalities by gender

Note: BCN data includes pedestrians.

Comparing the situation in each city (Figure 5.18), in London and Paris, in 2007, no female victims were reported. In Rome, in the same year, the situation was almost

the same with 94% of fatalities being male. Barcelona is the only case that deviates significantly from the others. In 2008, 29% of victims were female.

5.9. Casualties by victim's position

Table 5.14 summarizes the deaths involving a PTW divided by position (driver / passenger). The latest data available at the aggregate level reveals a clear majority fatalities are drivers with few passengers represented.

Position	Barcelona (2008)		London (2007)		Paris (2008)		Rome (2007)	
	Motorcycle	Moped	Motorcycle	Moped	Motorcycle	Moped	Motorcycle	Moped
Driver	15	6	37	3	9	4	74	8
Passenger	0	0	0	1	0	1	3	2
Total	**15**	**6**	**37**	**4**	**9**	**5**	**77**	**10**

Table 5.14 PTW fatalities by position

Almost all fatalities on PTWs involve drivers (96%) among these, 87% are motorcyclists. For passengers who are victims in a collision (4%) the percentage of motorcyclists reduces significantly, down to around 43% of the total.

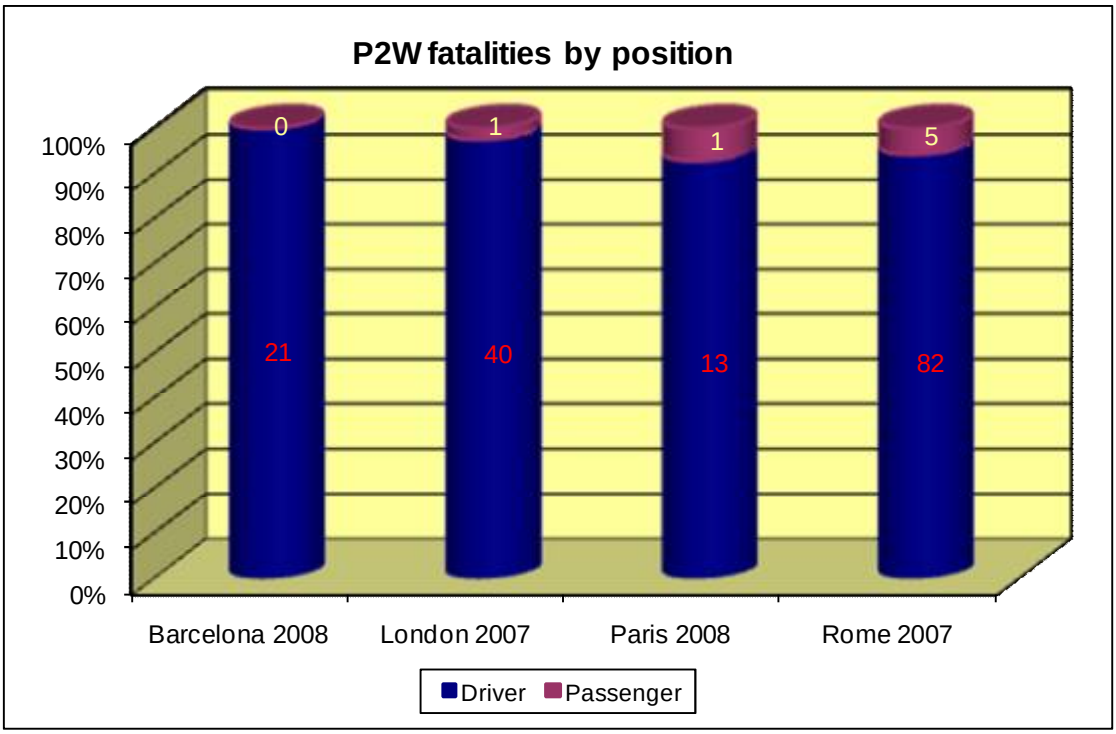


Figure 5.19 The percentage of PTW fatalities by position

Comparing each city (Figure 5.19), we can say that in Barcelona in 2008, there have been no passenger traffic collision victims on PTWs. In Rome 6% and Paris 7% of fatalities were passengers. In London, the vast majority of deaths involved motorcyclists rather than moped riders.

5.10. Casualties by age groups

Table 5.15 summarizes, for the year 2007-2008 in the four cities involved, the number of motorcycle riders killed in road collisions by age group. The data at the aggregated level show a clear prevalence of victims in the middle groups for all cities and all types of PTW.

	Barcelona (2008)		London (2007)		Paris (2008)		Rome (2007)	
Age	Motorcycle	Moped	Motorcycle	Moped	Motorcycle	Moped	Motorcycle	Moped
0 - 15	0	0	0	0	0	1	0	2
16 - 19	0	2	1	0	0	0	4	2
20 -29	8	1	17	2	5	4	23	2
30 -39	2	0	10	0	3	0	22	2
40 -49	3	2	5	1	0	0	16	
50 -59	2	1	3	0	1	0	7	0
>=60	0	0	1	0	0	0	2	
Total	**15**	**6**	**37**	**3**	**9**	**5**	**74**	**8**

Table 5.15 PTW driver fatalities by age groups

Almost all the fatalities PTWs involve riders between 20 and 49 years of age (82%). Amongst these, 73% are motorcyclists.

Within this subgroup (20 and 49 years), the most representative class consists of fatalities aged between 20 and 29 years (39%), followed by those between the ages of 30 and 39 years (25%). There is also a high proportion of deaths between the ages of 40 and 49 (17%).

Comparing the individual cities, Figure 5.21 shows in London in 2007, the three age groups between 20 and 49 years account for 88% of the total victims. A similar situation is observed in Paris, where the majority of deaths (86%) relate to the central age classes. In the cities of Rome and Barcelona, the distribution of deaths for the same age classes are respectively 79% and 76%.

Regarding mopeds, in Paris in 2008, all fatalities where in age groups under 29 and in Rome in 200750% were under 19. In Barcelona, half of the fatalities are drivers older than 40 while in London this is 33%.

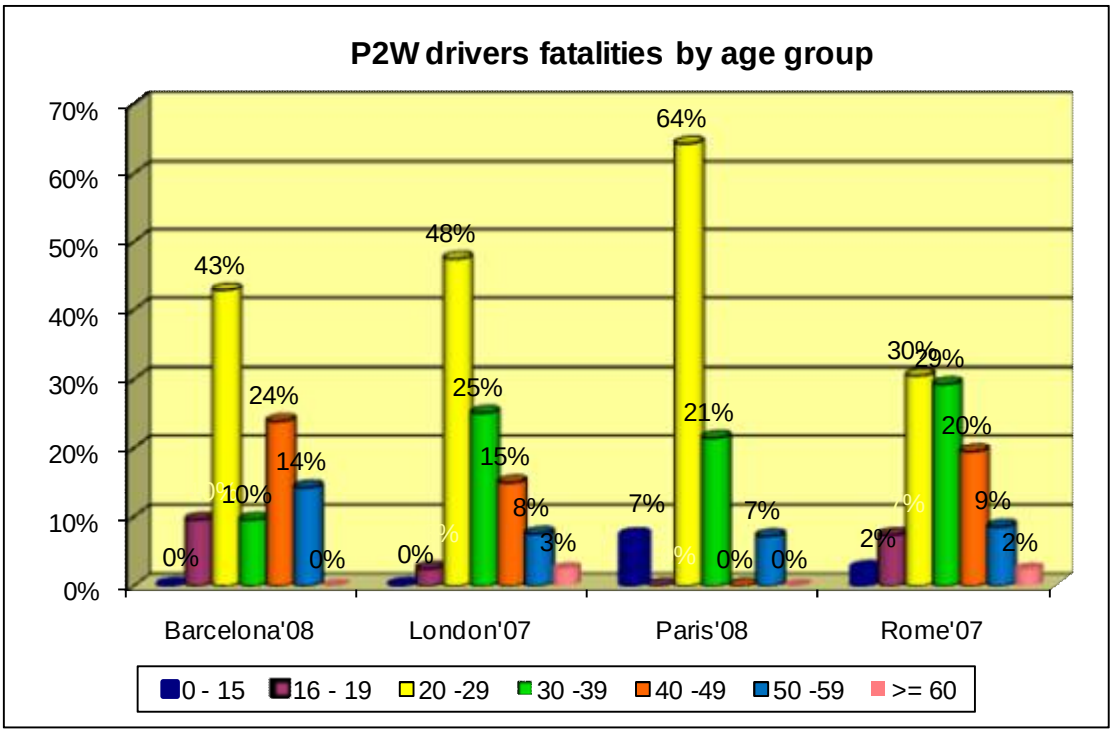


Figure 5.20 The percentage of PTW drivers fatalities for seven age groups in 2007

5.11. Casualties by road conditions

When the weather is bad, the PTW mobility is lower and as a result also the fatalities. Despite this the percentage of fatalities with bad road conditions is about 15%.

Year	London					Rome				
	Road Dry	Road Wet	Road Frost / Ice	Slippery Road	Total	Road Dry	Road Wet	Road Frost / Ice	Slippery Road	Total
2000	45	10	0	0	55	50	6	0	0	56
2001	51	17	2	1	71	41	5	0	0	46
2002	56	10	0	0	66	35	4	0	0	39
2003	56	7	0	0	63	43	7	0	1	51
2004	35	11	1	0	47	81	13	0	1	95
2005	39	5	0	0	44	73	6	1	0	80
2006	34	9	0	0	43	83	5	0	0	88
2007	39	2	0	0	41	76	9	0	0	85

Table 5.16 The number of PTW fatalities by road surface, 2000 - 2007

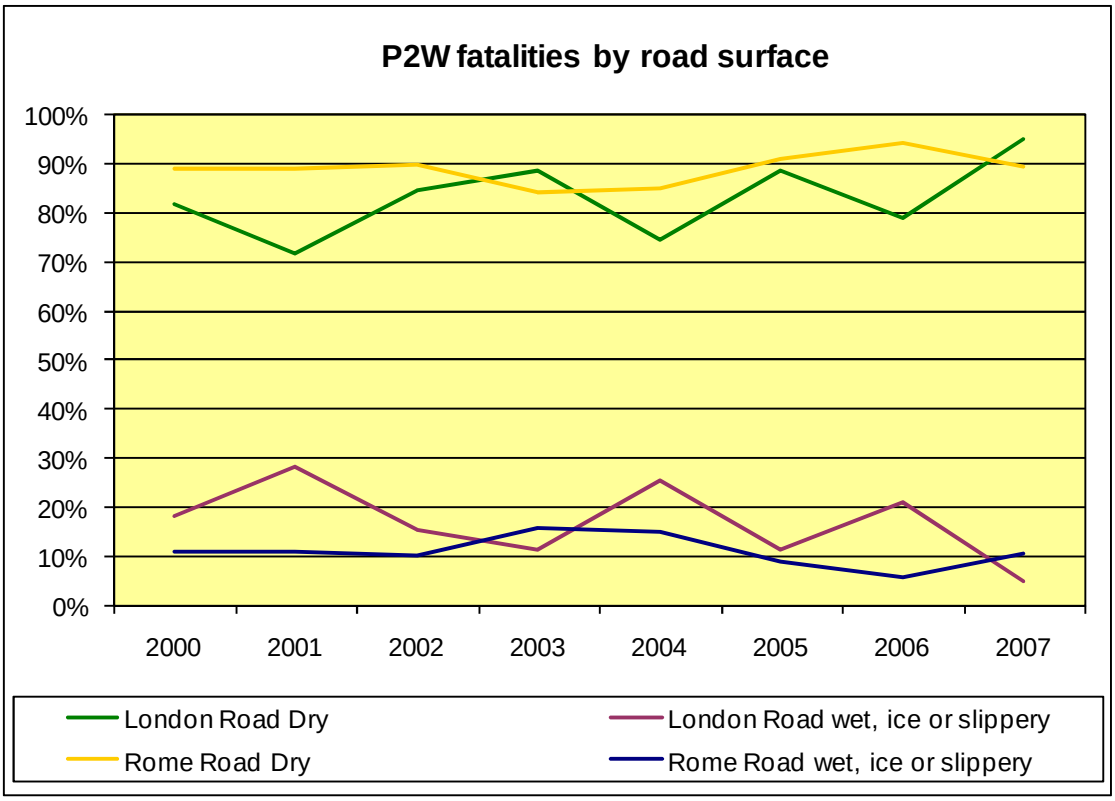


Figure 5.21 The PTW fatalities by road surface

5.12. Casualties by type of collision

The cases of collisions divided by type were analysed (impact with another vehicle, fixed barrier and single vehicle). Collisions involving a pedestrian and a PTW were also considered. By analyzing the time series, Barcelona shows a modest increase in collisions (+11%), whereas for Rome there is an increase of 24% and for Paris there is an increase of 4%.

The main cause of collisions is due to impact with another vehicle; 56% for Barcelona, 66% for Rome, 29% for Paris. The trend for Barcelona shows an increase in this type of incident (+3%), whereas for Rome there is an increase of 35% and for Paris a decrease of 6% has been recorded.

	Year		2000	2001	2002	2003	2004	2005	2006	2007
Barcelona	Collision	with vehicle	-	-	3,978	3,948	3,832	4.006	4,232	4,105
		with fixed object	-	-	149	157	143	165	167	168
		Rear-end	-	-	1,098	1,052	1,102	1,189	1,196	1,390
	Running over		-	-	550	512	470	524	482	459
	Fallen from PTW			-	705	692	767	867	904	979
	Other			-	140	133	176	164	172	229
Rome	Collision	with vehicle	5,382	7,191	6,851	7,001	8,172	7,548	7,472	7262
		with fixed object	425	555	555	1,193	1,350	1,078	1,129	926
		Rear-end	1,073	1,255	1,297	1,223	1,354	1,238	1,275	1,272
	Running over		762	680	624	570	709	719	643	658
	Fallen from PTW		121	390	469	324	326	378	486	491
	Other		1,102	639	556	300	386	504	317	355
Paris	Collision	with vehicle	3,040	3,269	2,906	2,573	2,606	2,725	3,010	2,843
		with fixed object	307	318	248	233	277	286	353	523
		Rear-end	162	117	167	149	188	226	328	382
		with pedestian	781	740	669	603	556	566	651	647
	Running over by PTW		364	331	239	319	330	454	550	510
	Fallen from PTW		582	585	505	488	595	655	835	891
	Collision PTW not alone		4,154	4,058	3,610	3,230	3,158	3,286	3,664	3,945

Table 5.17 Number of collisions with a PTW involved by motive

5.13. Helmet use

Motorcyclist		Barcelona						Paris					
		2003	2004	2005	2006	2007	2008	2003	2004	2005	2006	2007	2008
Killed	With helmet	13	12	16	20	16	13	20	15	9	21	8	7
	Without helmet	3	0	1	1	1	2	0	1	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0	1	2
Seriously injured	With helmet	45	144	114	132	142	105	150	189	271	215	208	272
	Without helmet	2	2	4	12	6	1	3	2	3	6	5	4
	Unknown	9	31	28	18	21	19	3	1	3	0	20	32
Slightly injured	With helmet	2,283	2,251	2,751	3,488	3,672	3,615	2,130	2,279	2,224	2,429	2,377	2,458
	Without helmet	6	2	24	20	14	14	10	15	31	84	117	23
	Unknown	475	512	678	374	503	512	14	4	3	7	228	338
Moped rider		**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Killed	With helmet	6	7	2	3	6	6	4	2	1	4	3	5
	Without helmet	1	4	4	5	1	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	2	1	0	1	0	0
Seriously injured	With helmet	41	111	94	93	54	45	63	56	97	87	103	109
	Without helmet	4	2	4	7	7	3	4	1	1	4	10	1
	Unknown	10	22	28	6	6	5	0	3	2	2	7	28
Slightly injured	With helmet	3.012	2.794	2.544	2.629	2.484	2.093	1.059	1.014	1.169	1.393	1.339	1,427
	Without helmet	26	10	24	26	11	10	17	21	24	61	80	18
	Unknown	610	674	725	369	374	331	8	6	2	11	160	255

Table 5.18 Motorcyclist and moped rider casualties: helmet usage

The figures comparing helmet use in PTW collisions for Paris and Barcelona generally show a positive change from 2003 to 2007. The trends in levels of helmet use are similar for motorcyclist and moped rider casualties.

With specific regard to London, it should be noted that since 1973 legislation has been in force in the UK making the wearing of crash helmets compulsory for Powered Two-Wheeler riders and passengers.

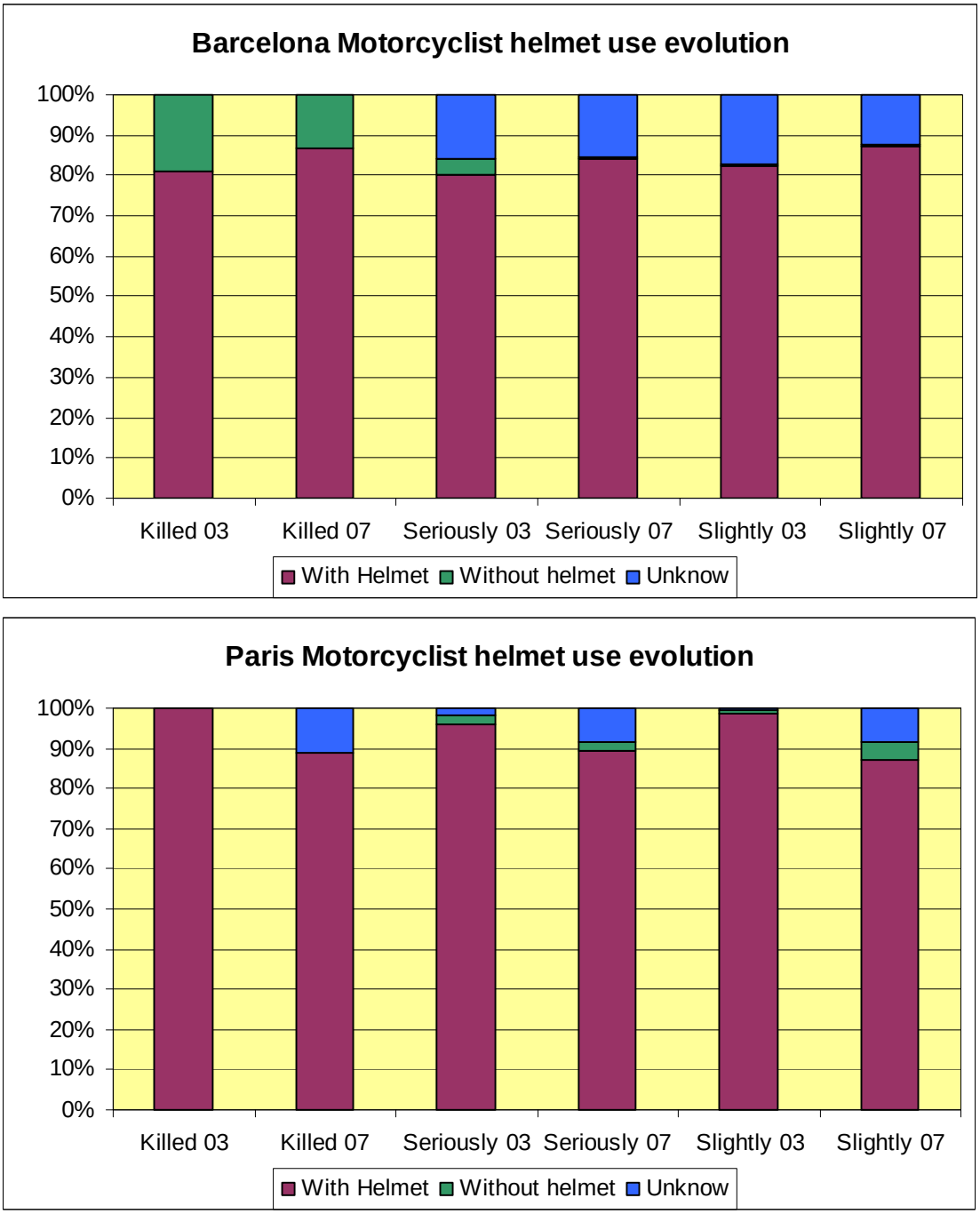


Figure 5.22 The percentage of motorcyclist fatalities by helmet usage

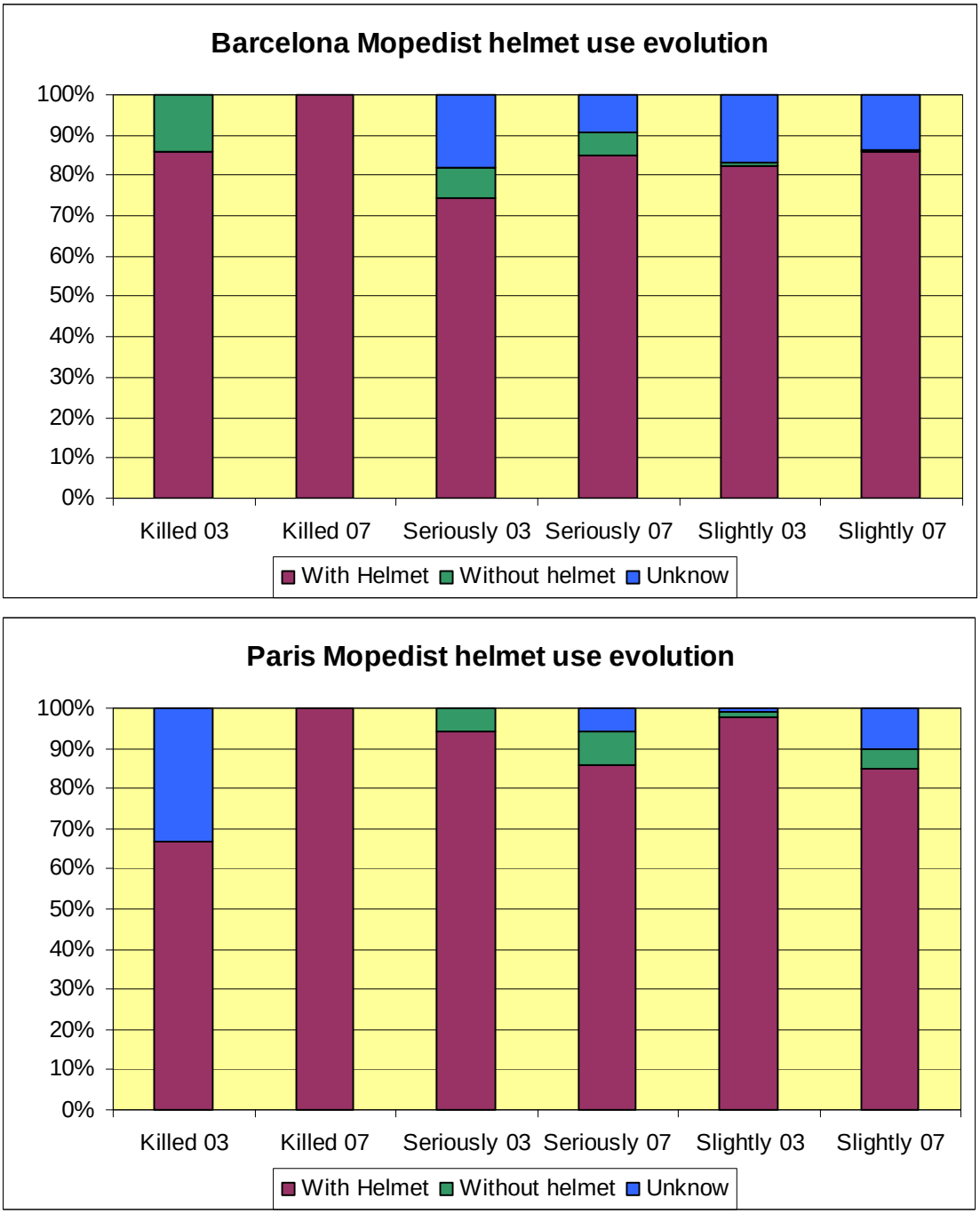


Figure 5.23 The percentage of moped rider fatalities by helmet usage

5.14. Alcohol, speed

Tables 5.19 and 5.20 show, for Barcelona and Paris, the collisions caused by alcohol or speed.

In Barcelona the ratio of collisions caused by speed, compared to total collisions, shows a decrease (from 2004 to 2008), while in the case of collisions caused by alcohol, the ratio is stable.

Paris shows an increase in both cases (+116% and +14%) from 2000 to 2008.

	2004	2005	2006	2007	2008	% 08 vs 07	%08 vs 05
Speed	384	266	251	252	169	-32.9%	-36.5%
Speed / Total accid. %	5.9	3.8	3.5	3.4	2.5		
Positive alcohol	537	561	593	591	558	-5.6%	10.1%
Alcohol / Total accid. %	8.2	8.1	8.2	8.0	8.2		

Table 5.19 Barcelona presence of alcohol or speed in collisions

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Collisions with alcohol from PTW users	112	122	102	91	104	112	157	189	242
Collisions with speed from PTW users	640	628	667	438	524	517	587	697	727

Table 5.20 Paris trend of collisions caused by alcohol and speed

6. Conclusions and recommendations

This report draws together key data for the 4 partner cities of Rome, Paris, Barcelona and London, effectively setting the scene for a comprehensive comparison of the PTW casualty situation.

In this chapter the main findings are summarised and recommendations are made for the participant cities, mainly regarding the work on diagnosis (WP2) and demonstration (WP4), for transfer cities (WP6) and to the European Commission.

6.1. Conclusions

Chapter 1 presents the EU context for PTW road safety. Whilst the overall trend for persons killed on Europe's roads shows a positive reduction during the new millennium, motorcycles are the only type of vehicle for which fatalities have consistently increased. In 2006, motorcycle and moped riders comprised 21% of the fatalities on (EU-19) urban roads. Summarising the national context relating to the cities in this comparison, in 2007 all countries have a bigger problem with motorcyclist fatalities than with moped rider fatalities. In general the problem of moped rider fatalities in Europe's urban areas is reducing, whilst the number of motorcyclist fatalities has not generally improved. Italy has the biggest (growing) problem – both for moped rider and motorcyclist fatalities - followed by France (where moped rider fatalities have recently increased). The UK has the lowest level of moped rider fatalities and Spain the lowest level of motorcyclist fatalities (but with increases during recent years).

Chapter 2 presents the adopted methodology for comparing PTW road safety in the participating cities. The basis for making comparisons comprises time series of fatal collision data covering the period 2000 to 2008. Differences in classifications for serious injury data are noted along with possible under-reporting of PTW serious injury collisions in Rome. Changes are also observed in the classification of injury collisions in Paris since 2005. The wider analysis of collision data (using injured persons as well as fatalities) is therefore used selectively to identify patterns.

Given that PTW fatalities show a consistent increase at EU level (ie. there exists a problem that is not readily rectified) it is proposed that cities generally consider adopting a classification of serious injury collisions involving PTW users so as to quantify in a common way those that are non-fatal with MAIS>=3, in line with CARE recommendations.

Whilst the numbers of motorcycles are considered to be comparable, mopeds are not always subject to vehicle registration. Data was not available for Paris, and were estimated for London. This raises difficulties in interpreting the trends in the defined "traffic safety" indicator.

Concerning exposure, there are additional difficulties in obtaining comparable measures of mobility and hence in generating comparable "traffic safety risk" indicators. Trips rather than veh-kms are used, with data from at least two surveys giving an indication of PTW mode share trends.

Chapter 3 presents the trends in PTW safety for each city in terms of the legislation, changes in the law and the main actions relating to traffic regulation, training of riders and safety awareness campaigns. Between 2000 and 2007/2008, the PTW persons injured annually range between 6,500 and 7,500 in Barcelona, between 4,500 and 8,000 in London, between 4,000 and 5,000 in Paris and between 8,000 and 12,000 in Rome. The PTW annual fatalities range between 10 and 30 in Barcelona, between 40 and 70 in London, between 10 and 50 in Paris and between 40 and 100 in Rome.

All cities show considerable variations over the 7-year period. It is difficult to explain the trends in terms of specific policy interventions but the cases could be summarised as follows:

- Barcelona's low PTW collision levels of 2003-2004 appear to have been adversely affected by the unfortunate coincidence of changes in driver licensing that allowed car drivers with no PTW training to drive PTWs together with parking management interventions that favoured PTWs instead of cars and a reduction in enforcement effort (number of issued penalty notices). Thereafter, the PTW collision levels have reduced, suggesting that actions such as changes in the penal code, training and communication campaigns and the generalised application of a collision management (Risk Zones) system have helped to improve PTW safety.

- London's PTW collision levels (fatalities and injured persons) have been reduced progressively since 2001. Possibly a result assisted by a sustained series of training and communications campaigns.

- The PTW fatalities in Paris have declined progressively since 2001 but not so the PTW injuries. Although the collision levels do increase at a slower rate than PTW usage. The diverging trend (fatalities v. injured persons) is at least partly explained by the change in recording of injury collisions since 2005. Before 2005, slight injury collisions were only reported if the person was hospitalised (less than 6 days) whereas after 2005 slight injuries include those victims receiving less than 24 hours of hospitalisation or not hospitalised at all.

- The introduction of compulsory helmet use in 2000 appears to have had a positive effect in reducing fatalities in Rome during the first half of the decade. However, the levels since 2004 have exceeded 80 PTW fatalities annually. PTW injuries also rose to a peak in 2004 with no apparent counter measures. With the introduction of various laws, the level appears to have stabilised but at 10,000+ PTW injuries per annum.

London has a significantly larger number of cameras deployed for traffic enforcement than the other cities. For example, even taking into account the eSUM camera demonstrations in Barcelona and Rome, London has 30 to 40 times more red-light cameras than these cities.

Rome has the worst level of PTW safety and the Italian level of PTW road safety is a growing concern. Within eSUM, Rome is demonstrating actions to improve PTW rider training as well as piloting camera-based red-light jumper enforcement. These

actions need to be evaluated but it is clear that these are the types of actions that are effective in other cities. Rome should work on an exploitation plan to expand these pilot schemes. Also, there is little information about enforcement by police and what information is available suggests that there is a concentration on parking offences rather than speeding and red-light jumping – the main offences reported for Paris. More, better-targeted and better-monitored police control would probably be effective in reducing PTW casualties in the Italian capital and this example could help lead to positive changes in other Italian cities.

Another important difference would appear to be the organisation and level of definition of Road Safety Plans. Both the 2001 and 2006 London plans contained specific targets for reducing PTW casualties and a specific unit was established (in 2002) to implement and monitor the plan. Within the London Road Safety Unit (LRSU) there is a sub-unit with staff and budget dedicated to developing safer motorcycling. The other cities have not made such a clear policy, nor such a clear resource provision for implementing it.

Chapter 4 presents basic data about the studied areas, the evolution in vehicle stock, mobility shares and presents the overall road safety levels of each city.

The studied areas correspond to the central city areas for Barcelona and Paris (both of the order of 100 sq km.) and the larger urban areas of London and Rome (approximately 1,300 and 1,600 sq. km., respectively) – more than 10 times the areas of Barcelona and Paris.

With relatively high, not-dissimilar population densities, Barcelona and Paris present similar overall traffic safety levels, with Paris having better (lower) personal safety. These two cities also show similar changes in mobility (Barcelona: 2000-2008 and Paris: 1991 - 2001) – with increased use of walking and cycling and a strong growth in PTW trips (Barcelona:+80%, Paris:+60%) within an overall reduction in private (car) mode. The level of PTW trips in Barcelona (5% of 2008 mobility) is higher than Paris (2% in 2001).

Rome and London are study areas of similar spatial extension, with similar traffic safety rates (in 2007). However, London has more than twice the population of Rome and a much lower (better) personal safety rate. The trends in mobility suggest that PTW usage is stable for London but increasing for Rome and from a higher base share for PTW (8% in 2004, up from 7% in 1996, a 15% increase in number of trips), compared with 1% in London (2006 showing same PTW mode share as 1993).

Chapter 5 compares the PTW collision data of the four cities. With regard to personal safety (mortality rate per million inhabitants) Paris and London show a reduction from 2000 to 2007 in line with the trend in Europe. Barcelona shows an increase. As in Rome, Barcelona's rate is well above the European average.

Looking at the monthly distribution of injuries resulting from the use of PTWs, the four cases examined show a common trend. There are clear decreases in numbers of PTW casualties in the winter months and the month of August. These lower levels are attributed to lower use of two wheel vehicles connected to the worsening weather conditions and to the changes in traffic levels during the summer vacation.

The hourly distribution highlights different situations. In Rome and London most of the collisions are concentrated between 12:00 am and 18:00 pm and this may result from the high levels of motorization of the two cities. For Paris and Barcelona the most dangerous times are between 18:00 pm -24:00 and 00:00 -06:00 am.

In general, 80% of victims are recorded on working days. In this study, the percentage varies from 80% for the city of Rome to 50% reported in Barcelona

Almost all the PTW fatalities are males (93%). Barcelona is the only case where there is a significant proportion of female victims recorded (29% in 2008).

Comparing type of user of PTWs, it is noted that almost all the deaths involve riders, rather than passengers, in all of the four cities examined.

6.2. Recommendations for eSUM cities

The compatibility of data relating to injuries other than fatal should be clarified. It is proposed that cities generally consider adopting a re-classification of the serious injury collisions involving PTW users so as to quantify those that are non-fatal with MAIS>=3. The aim is to increase the sample size that can be used for benchmarking and problem identification/diagnosis. Initially, this might be done as a sensitivity test for the data for 2007 and 2008 – comparing KSI[8] with fatal personal safety indicators.

It is recommended that a closer cooperation between police forces working on road collisions and hospitals is encouraged to determinate the seriousness of injuries which occur. The next step is to determine a scale, based on the AIS model (system of injury classification - such as minor, moderate, serious, critical) to make a valid comparison between different cities possible. This could then be used by follower cities involved in projects to reduce PTW casualties.

It is recommended that new data are provided, excluding mopeds from the vehicle stock (and from the collision data) to allow a valid comparison analysis for motorcycles only.

More work is needed to collect and compare data regarding levels of enforcement. In general, we can probably say that more control of PTWs is needed, especially for Rome.

6.3. Recommendations for Transfer cities

It is proposed that cities generally consider adopting a re-classification of the serious injury collisions involving PTW users so as to quantify those that are non-fatal with MAIS>=3 and hence increase the cases available for performance monitoring and comparison with other cities.

[8] KSI: Killed or Seriously-injured

To provide a contextual overview of PTW safety in a partner or follower city, comparison data should be high level and kept to the minimum necessary to assess comparative casualty rates. The following variables are suggested:

1. PTW fatalities & KSI casualties
2. All fatalities
3. Number of PTWs registered
4. Population of city
5. Modal split

The marginal extra effort required to collect the data for a time series is considered worthwhile so as to take account of major legislative changes or regulatory actions.

It is evident that the benchmarking (cross-city) comparison of PTW safety in cities is a complicated process. The analysis presented identifies some of the key issues to be taken into consideration. A step-wise approach is recommended:

- Basic data about study area, population, vehicle stock (mopeds – if this is of national importance - and motorcycles separately) are collected.
- A times series of PTW fatalities and KSI (MAIS>=3) be produced covering at least 7 years.
- The main regulatory actions (including data about enforcement of drink-driving, speed and red-light jumping) and safety campaigns.
- The evolution of the PTW share of trips be computed (last two trip surveys).

Of particular importance is the selection of appropriate cities for making comparisons.

6.4. Recommendations for the European Commission

Promote a wider awareness/uptake of the CARE recommendations for classifying collisions – applying them to injury collisions involving PTW users.

Increase the number of cities involved in PTW collision studies; more big cities from countries with PTW problems, develop a medium city group.

Develop common monitoring methods for key actions; camera enforcement of speeding and red-light jumping and for the evaluation of training /awareness campaigns.

Promote the development of resourced road safety units having quantative collision reduction targets.

Promote the figure of a specific individual responsible for PTW safety within the aforementioned road safety units.

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Appendix A: Care Glossary (Extract)

A.1 Main definition used in Task 2.1

1. Collision

Definition: Occurs on a public road or on a private road to which the public has right of access (except B, NL, P). Involves at least one moving vehicle (except P, UK). Involves at least one injured or killed person. Is reported by the police. Self reporting possible (B, EL, IRL, I, UK). Self reporting not possible (DK, D, NL, A, P, FIN). Confirmed suicides excluded (B, D, DK, IRL, NL, A, P, UK). Confirmed suicides included (E, I, L).

Note : The variation in the types of road and the coverage of the injury categories included in injury collisions, together with differences in the level of self reported collisions, will lead to significant variations in the number of injury collisions reported, and their reporting rate, between Member States.

2. Collision Severity

Definition: The highest level of injury affecting one person involved in the collision. Injury severity from slightly injured, seriously injured up to killed. Values defined: fatal collision - injury collision - serious injury collision - slight injury collision - unknown.

Fatal collision

Definition: Collision with at least one killed person regardless the injury severity from any other involved persons.

Note: See 'killed' definition from Injury Severity defined in Person type item.

Data availability: All countries.

Injury collision

Definition: Collision with at least one injured person among the person(s) involved without specification of type of injury.

Note: See 'injured' definition from Injury Severity defined in Person type item.

Data availability: FI, IT, NL.

Serious injury collision

Definition: Collision with at least one or more seriously injured person stated among the person(s) involved and wherein no other killed person was reported.

Note: See 'seriously injured' definition from Injury Severity defined in Person type item.

Data availability: All countries except FI, IT, NL.

Slight injury collision

Definition: Collision with at least one or more slight injured person stated among the person(s) involved and wherein no other seriously injured or killed person was reported.

Note: See 'seriously injured' definition from Injury Severity defined in Person type item.

Data availability: All countries except FI, IT, NL.

Unknown

Definition: Collision for which no injury severity was reported among the person(s) involved.

Note: See 'unknown' definition from Injury Severity defined in Person type item.

Data availability: BE, DK, SE.

3. Collision Type

Angle collision

Definition: Collision between two moving vehicles. First vehicle has a side collision. point, other vehicle has a frontal collision point (ES 1993 onwards, GR, IT, IE).

Data availability: AT, DK, ES 1993 onwards, GR, IT, IE,EE

Value included in another value: lateral collision.

Chain collision

Definition: Collision between more than two moving vehicles (BE, ES, FR). First. vehicle has a rear collision point, other vehicle has a frontal collision point (ES, FR).

Data availability: BE, ES, FR,EE.

Value included in another value: chain or rear collision.

Chain or rear collision

Definition: Collision between two or more vehicles travelling in the same direction on the same road. First vehicle has a rear collision point,

other vehicle has a frontal collision point (ES, FR, GR, IT, IE, NL, PT).

Data availability: All countries (except GB, LU, NI, SE 2003 onwards).

Collision with animal

Definition: Collision between vehicle and animal.

Data availability: All countries (except , GB, IE 1996 onwards, IT, NI).

Collision with obstacle

Definition: Collision between moving vehicle and obstacle. On or off the road. Fixed or moving obstacle. Includes trees, posts, crash barriers.

Data availability: All countries (except GB, NI, SE 2003 onwards).

Collision with parked vehicle

Definition: Collision between moving vehicle and parked vehicle. Includes vehicle moving off (DK).

Data availability: All countries (except B, GB, NI, P).

4. Road Surface Conditions

Dry

Definition: Dry road surface.

Data availability: All countries.

Frost,ice

Definition: frost or ice on the road.

Data availability: All countries except BE, DK, LU,NL, PT

Other, unknown

Definition: none of these above.

Data availability: All countries.

Slippery

Definition: Slippery road surface. Includes gravel, mud, leaves on the road, snow or ice are not included in this value..

Data availability: All countries excepted GB,IE,SE.

Snow

Definition: Snow on the road.

Data availability: AT,IT,FI,GB,GR,SE,IE,ES,FR,NI,EE.

Snow, frost or ice

Definition: Snow, frost or ice on the road. .

Data availability: DK 2003 onwards,LU,SE,NL,BE,PT

Wet, damp, flood

Definition: Wet road surface. Includes flood and damp.

Data availability: All countries.

5. Area Type

Inside urban area

Definition: Area inside urban area boundary signs (except GB, IE, NI). Includes dual carriageways and national roads. Can include motorways (except DK, GR, IT). Opinion of the police (DK, SE).

Note:Data approximated from speed limit of 40 mph or less (GB, IE, Note NI).

Data availability: All countries.

Outside urban area

Definition: Area outside urban area boundary signs. Opinion of the police (DK, SE). Includes motorways.

Note:Data approximated from speed limit of over 40 mph (GB, IE, NI).

Data availability: All countries.

6. Number Of Vehicles

Definition: The number of vehicles involved in the collision. Not counting a pedestrian as a vehicle.

Data availability: All countries

7. Number Of Persons

Definition: The number of persons involved in the collision.

Data availability: All countries

8. Number Of Pedestrians

Definition: The number of pedestrians involved in the collision.

Data availability: All countries

9. Age

Definition: Length of life of person. Rounded down to whole number of years (except GR, IT, NI : rounded to nearest year).

Note: Age 0 to 1 is exceptionally rounded up (FR, IT, IE, LU, NI, PT). Age over 99 only available for ES, FR (1993 on), NL.

Data availability: All countries.

10. Gender

Female

Definition: Determined by the police (except AT, ES, IT, LU, PT : on the basis of identity documents ; DK, FI, SE : on the basis of personal id number).

Data availability: All countries.

Male

Definition: Determined by the police (except AT, ES, IT, LU, PT : on the (basis of identity documents ; DK, FI, SE : on the basis of personal id number).

Data availability: All countries.

Unknown

Definition: Sex could not be determined (hit and run collision, police unable to trace person, not specified).

Data availability: Data availability: All countries (except FR before 1993).

11. Person Class

Driver

Definition: Person driving or riding any motorised vehicle or pedal cycle. Person herding animals is not a driver (except AT, BE). Learner driver is a driver (except ES, PT). Learner driver is a driver during a driving test, but not in a driving lesson (DK). Driving instructor is not a driver (except ES, PT). Driving instructor is a driver during a driving lesson, but not during a driving test (DK).

Note: Uninjured drivers are included in the database (except GB, NI,NL: implicitly included in vehicle records only).

Data on driving instructors and learner drivers collected separately from 1993 onwards (SE).

Data availability: All countries.

Passenger

Definition: Person on or in a vehicle, who is not the driver. Includes person in the act of boarding or alighting from a vehicle (except DK). Learner driver is not a passenger (except ES, PT). Learner driver is a passenger during a driving lesson, but not during a driving test (DK). Driving instructor is a passenger (except ES, PT). Driving instructor is a passenger during a driving test, but not in a driving lesson (DK).

Note: Uninjured passengers not included in the database (except FR, IE, LU; AT, ES, FI in some cases).

Data availability: All countries.

Pedestrian

Definition: Person on foot. Person pushing or holding bicycle (except DK). Person pushing a pram or pushchair. Person leading or herding an animal (except AT, DK). Person riding a toy cycle on the footway (except AT). Person on roller skates, skateboard or skis (except AT). Does not include person in the act of boarding or alighting from a vehicle (except DK, ES).

Note: Uninjured pedestrians not included in the database (except BE, IE, LU; NL implicitly included in element records ; AT, DK, FR, FI, SE if they caused the collision ; ES not consistently).

Data availability: All countries.

12. Person Injury

Injured

Definition: Injured in a road collision. Hospitalisation or medical treatment not necessarily required (except FR). Self declaration of injury (DK if slight ; FI, GB, IT, IE, NI). Opinion of the police.

Note: see ‘seriously injured’, ‘slightly injured’ definitions.

Data availability: FI,IE 1996 onwards,IT,EE

Killed

Definition: Death within 30 days of a road collision (UN/ECE Geneva 1995 Statistics of Road Traffic Collisions in Europe and North America, annex 1), except AT (3 days before 1992), ES (24 hours in CARE ; 24 hours before 1993 in publication), FR (6 days), GR (24 hours), IT (7

days), PT (24 hours). Suicide not included (except DK, ES, FR). Natural death not included (except LU, SE).

Data availability: All countries.

Not injured

Definition: Not injured in an collision. Person does not require medical treatment (AT, DK, ES, FR, FI, IE, LU). Opinion of the police (AT, BE, DK, IE, SE).

Note: Uninjured drivers are included. Uninjured passengers may be included (AT, ES, FR, FI, IE, LU). Uninjured pedestrians may be included (except GR, IT, PT).

Data availability: All countries (except GB, IE 1996 onwards, NI, NL: not injured availability: drivers implicitly included in vehicle record).

Seriously injured

Definition: Injured in a road collision. Hospitalised at least 6 days (FR). Hospitalised at least 24 hours (BE, DK, ES from 1993 onwards, GR, LU, PT). Hospitalised as in-patient (DK, NL). Not hospitalised, hospitalised for observation or as in-patient (GB, IE, NI). No reference to hospitalisation (AT, SE). Opinion of the police (except BE, ES from 1993 onwards, FR, LU, NL, PT). Police guidance provided (DK, ES before 1993, GB, IE, NI). Persons died 30 days after collision included (except FR, LU, PT).

Data availability: All countries (except FI, IT,EE).

Slightly injured

Definition: Injured in a road collision. Hospitalised 6 days or less (FR). Hospitalised less than 24 hours (BE, DK, ES, GR, PT). Not hospitalised (DK, GB, IE, NI, NL). Medical treatment required (DK, FR, LU, PT). Police guidance provided (DK, ES before 1993, GB, IE, NI). Opinion of the police.

Data availability: All countries (except FI, IT,EE).

13. Day Of Week

Definition: 24 hour day within 7 day week.

Note: Data calculated by the CARE system from the date of collision, where data is not available in national files (AT from 1992 onwards, BE, FR prior to 1993, PT, SE).

Data availability: All countries.

14. Hour

Definition: Period of 60 minutes. Rounded down to whole hours (except ES, GR, IT : rounded to nearest hour).

Note: Winter time is:

- GMT from November to March (DK from 1996 onwards, GB, IE, NI, PT)

- GMT +1 hour from October to March (AT, BE, DK prior to 1996, DK, ES, FR, IT, LU, NL, SE)

- GMT +2 hours from October to March (FI, GR).

Summer time is one hour ahead of winter time :

- GMT +1 hour from April to October (DK from 1996 onwards, GB, IE, NI, PT)

- GMT +2 hours from April to September (AT, BE, DK prior to 1996, DK, ES, FR, IT, LU, NL, SE)

- GMT +3 hours from April to September (FI, GR).

For PT, unknown hour coded as '12' during daytime and '0' during night time

Data availability: All countries (except DK).

15. Month

Definition: Calendar month.

Data availability: All countries

16. Year

Definition: YEAR expressed in format yyyy (four digits) from year 1990 up to the latest year of data available.

Data availability: All countries.

17. Definition of measures

a. Collision

Definition: Occurs on a public road or on a private road to which the public has right of access (except B, NL, P). Involves at least one moving vehicle (except P, UK). Involves at least one injured or killed person. Is reported by the police. Self reporting possible (B, EL, IRL, I, UK). Self reporting not possible (DK, D, NL, A, P, FIN). Confirmed suicides excluded (B, D, DK, IRL, NL, A, P, UK). Confirmed suicides included (E, I, L).

Note: The variation in the types of road and the coverage of the injury categories included in injury collisions, together with differences in

the level of self reported collisions, will lead to significant variations in the number of injury collisions reported, and their reporting rate, between Member States.

b. All Persons

Definition: Sum of all victims and all unknowns. Therefore, aggregation of the following injury severities:

- SERIOUSLY INJURED AS REPORTED

- SLIGHTLY INJURED

- INJURED

- KILLED AS REPORTED

- UNKNOWN

c. Injured (not specified)

Definition: INJURED (no specification of slight or serious injury). Injured in a road collision. Hospitalisation or medical treatment not necessarily required (except F). Self declaration of injury (D if slight; FIN, GB, I, IRL, NI). Opinion of the police.

Aggregation of the following injury severities:

- SERIOUSLY_INJURED_AS_REPORTED + SLIGHTLY_INJURED + INJURED

Note : see 'seriously injured', 'slightly injured' definitions.

Data availability : All countries.

d. Injured at 30 days

Definition : Injured with application of correcting coefficient as stated for the 'Killed at 30 days'. Aggregation of the following injury severities:

- SERIOUSLY INJURED AS REPORTED + SLIGHTLY INJURED + *INJURED - 1 COEFFICIENT*

e. Killed

Definition: Death within 30 days of a road collision (UN/ECE Geneva 1995 - Statistics of Road Traffic Collisions in Europe and North America, annex 1), except A (3 days before 1992), E (24 hours in CARE ; 24 hours before 1993 in publication), F (6 days), GR (24 hours), I (7 days), P (24 hours). Suicide not included (except DK, E, F). Natural death not included (except L, S).

Data availability : All countries.

f. Seriously Injured

Definition: Injured in a road collision. Hospitalised at least 6 days (F). Hospitalised at least 24 hours (B, D, E from 1993 onwards, GR, L, P).

Hospitalised as in-patient (DK, NL). Not hospitalised, hospitalised for observation or as in-patient (GB, IRL, NI). No reference to hospitalisation (A, S). Opinion of the police (except B, E from 1993 onwards, F, L, NL, P). Police guidance provided (DK, E before 1993, GB, IRL, NI). Persons died 30 days after collision included (except F, L, P).

Data availability : All countries (except FIN, I)

g. Seriously Injured at 30 days

Definition: Seriously injured with application of correcting coefficient as stated for the 'Killed at 30 days'.

Aggregation of the following injury severities:

- SERIOUSLY_INJURED_AS_REPORTED + 1 COEFFICIENT

h. Slightly Injured

Definition: Injured in a road collision. Hospitalised 6 days or less (F). Hospitalised less than 24 hours (B, D, E, GR, P). Not hospitalised (DK, GB, IRL, NI, NL). Medical treatment required (DK, F, L, P). Police guidance provided (DK, E before 1993, GB, IRL, NI). Opinion of the police.

Data availability : All countries (except FI, IT,EE).

i. Unknown

Definition: Sum of the cases for which no injury severities were reported.

j. Vehicles

Definition: Number of vehicles reported regardless its type.

k. Victims

Definition: Aggregation of the following injury severities:

- SERIOUSLY INJURED AS REPORTED

- SLIGHTLY INJURED

- INJURED

- KILLED AS REPORTED