Evolution in motorcycle crashes and current crash characteristics in the OECD countries

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George Yannis, NTUA
Pierre Van Elslande, IFSTTAR
Veronique Feypell, OECD/ITF
Eleonora Papadimitriou, NTUA
Craig Morris, USDOT
Saskia de Craen, SWOV

Research Framework

This work was carried out within
the Working Group
on Power Two Wheeler (PTW) Safety and Mobility
of the Joint Transport Research Committee (JTRC)
of the Organisation for Economic Cooperation and Development (OECD) and
the International Transport Forum (ITF),
started in 2011
and expected to conclude within 2013.

Background and Objectives

Backround

- Rapid growth in the variety, sales, registrations, and activity of PTWs.
- Acceleration of growth due to economic, mobility and environmental sustainability benefits of PTWs.
- Growth in crashes, injuries and fatalities involving them.
- Benefits against societal costs to establish PTWs as viable transportation alternatives in a more health - conscious world.

Objective

- Analysis of the safety of PTWs in terms of crash, injury and fatality trends, typical injuries and crash characteristics.

Data Issues

Fatality and injury data

- Usage of fatality data from various databases (IRTAD, CARE, National databases).
- Analysis of serious injuries is essential for understanding PTWs' safety issues
  - no common definition of serious injuries among countries
  - Underreported data

Exposure data

- Understanding motorcycles crashes require analysing crash and relating them to several exposure data
- Various indicators to assess risks of transport modes (vehicle – kilometers, passenger – kilometers, number of motorized vehicles, time spent in transport, etc.).
- Lack of exposure data on motorcycles.

Relative Risk of Motorcyclists

- Increase of total PTW fatalities in all OECD countries.

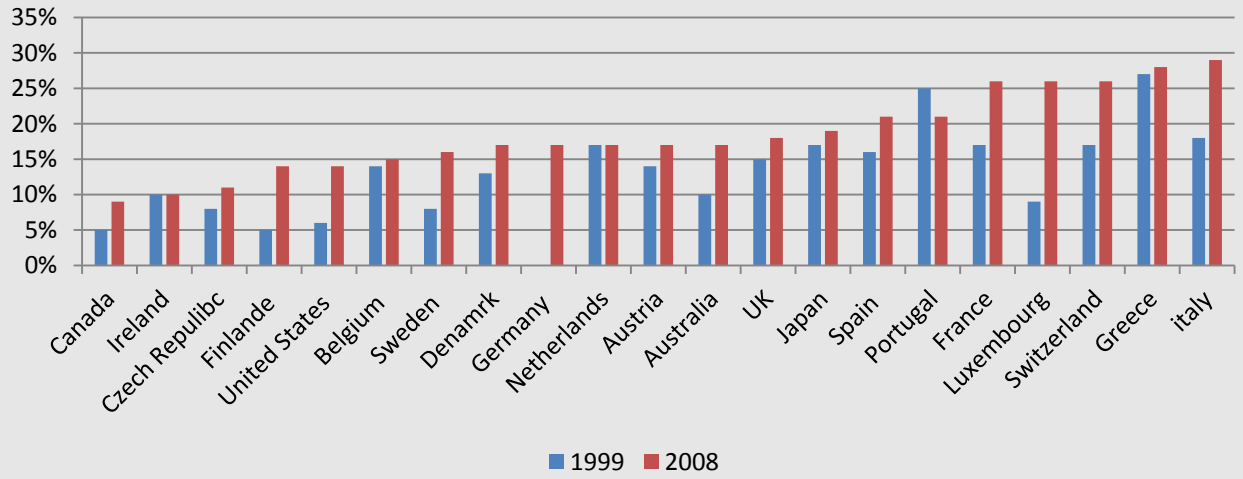


Figure 1. Share of PTW fatalities in total fatalities in the OECD countries on 1999 and 2008

- Motorcyclists are between 8 to 40 times more likely to be killed in a traffic crash than car drivers (when related to the number of kilometres travelled).

Trends in PTW Fatal Crashes

- Reduction by around 27% in the number of persons killed in traffic crashes in 2000-2009.
- Increasing trend for motorcycle users fatalities compared to trends for other modes of transport.

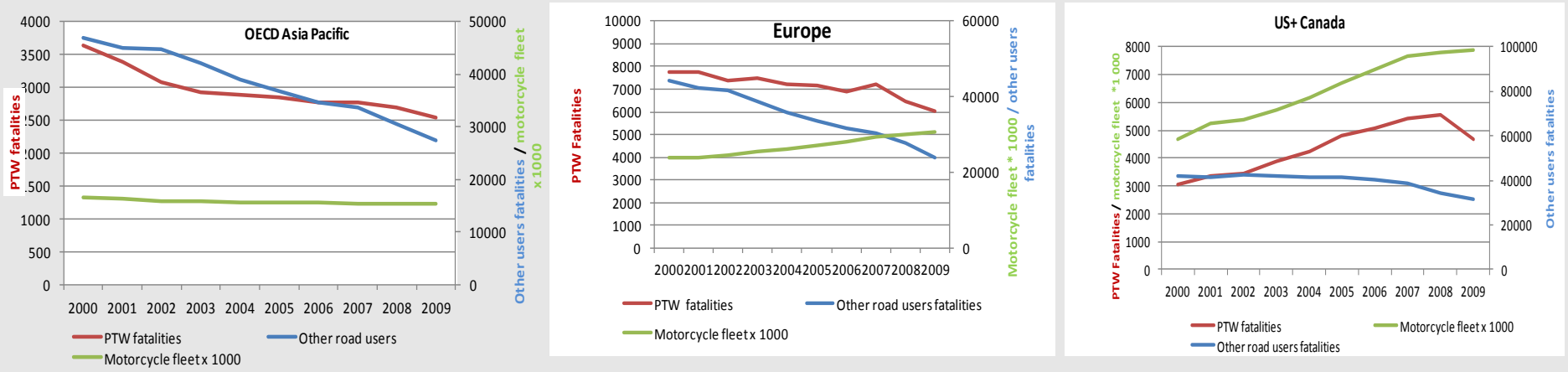


Figure 2: Motorcyclists and other road users killed in the three main regions of the OECD, and evolution of the fleet

Source: IRTAD, Note: OECD Asia Pacific includes: Australia, Japan, Korea and New Zealand

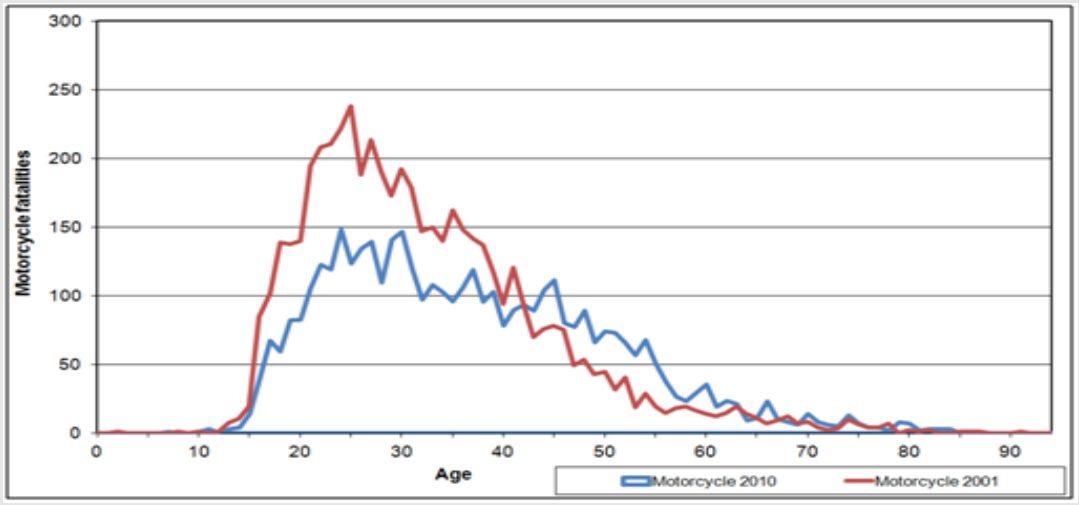
PTW Crash Characteristics (1/3)

Effect of gender

- Share of male or female riders killed, follows the share of motorcyclists' population.
- Heterogeneous epidemiological studies on impact of gender on accident severity.

Effect of rider age

- A shift in fatalities from the youngest age groups to middle-aged riders.
- The highest crash risk are the youngest age groups.



PTW Crash Characteristics (2/3)

Effect of experience

- Inexperienced riders are often over-represented in motorcycle fatalities.
- Distinction between novice rider and young rider is important.

Monthly, Weekday and Hourly Periodic Trends

- PTW rider crashes, injuries and fatalities are correlated with periodic factors.
- Many fatalities in the summer & during the weekend.

Road Type, Area Type and Junctions

- Majority of PTW fatalities occur on non-motorway road network (rural roads).
- Almost one third of all PTW rider fatalities occur at junctions.

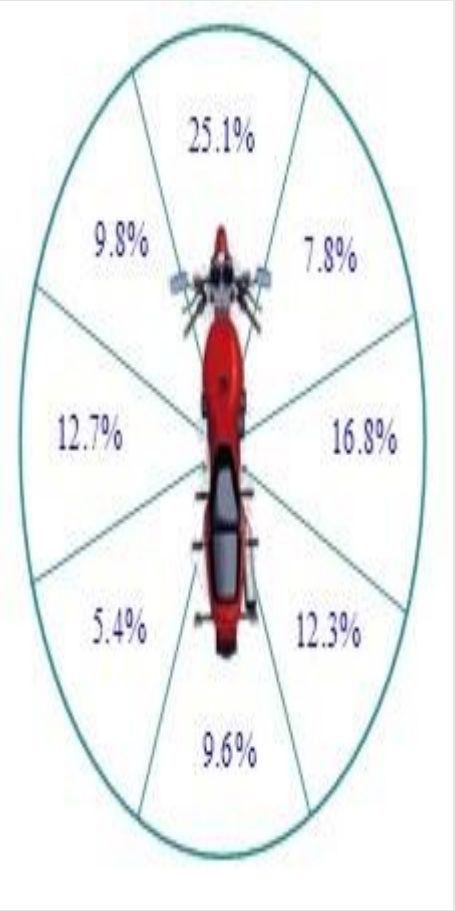
PTW Crash Characteristics (3/3)

Impact of engine displacement

- PTW users with higher displacement have a higher risk of crash and a higher risk of being serious injured.
- Motorcycle power is associated with accident severity (also related with the age of PTW user).

Serious injuries among motorcyclists

- Understanding the nature and extent of serious injuries among motorcyclists is essential in the perspective of a safe system approach.
- Motorcyclists sustain much more severe injuries, compared to other road users.



Crash Scenarios (1/3)

- Motorcycle crash types:
  - Single vehicle crashes (typically 20 - 45% of fatal crashes);
  - Multi vehicle crashes (typically 30 – 50% of fatal crashes);
  - Crash with a pedestrian (estimated less than 10% of fatal crashes).

- Almost half of PTW crashes involved collision with another motor vehicle in transport on the same roadway.

First Harmful Event	Fatal Crashes	Percentage
Collision with Motor Vehicle in Transport on Same Roadway	19793	49.2
Non-Collision - Overturn/Rollover	5980	14.9
Collision with Curb	2247	5.6
Collision with Guardrail Face or End	1785	4.4
Collision with Pole, Post, Sign Support, Etc.	1594	4.0
Collision with Standing Tree	1302	3.2
Collision with Ditch	1118	2.8
Collision with Embankment	956	2.4
Collision with Live Animal	806	2.0
Collision with Concrete Traffic Barrier	498	1.2
Collision with Other Fixed Object	489	1.2
Collision with Fence	461	1.1
Non-Collision - Fell/Jumped from Vehicle	432	1.1
Other Noncollision	419	1.0
Collision with Culvert	411	1.0
Collision with Parked or Stopped Motor Vehicle Off Roadway	406	1.0
Other/Unknown	1518	3.8
Total	40216	100.0

Crash Scenarios (2/3)

Single – vehicle crashes

- Nearly half of single vehicle crashes of motorcycles were recorded as being originated by a loss of control
  - due to excessive speed, influence of alcohol, overbraking, etc.
- Other single – vehicle crashes are caused by a sudden meating of an unexpected obstacle
  - animal who crosses the carriageway, obstacle on the carriageway, etc.

Crash Scenarios (3/3)

Multi – vehicle crashes

- 50% of PTW crashes involving a PTW and another vehicle, occur at junctions.
- A number of different configurations can be considered not at junctions
  - changing lane or overtaking, rear-end accident, aberrant manoeuver, etc.

Crashes with pedestrians

- 5-6 % of PTW injury accidents involve a pedestrian
  - 3% for fatal accidents

Conclusions (1/2)

- In OECD countries, motorcyclists count for 14% of all road fatalities, while only representing 5% of the fleet.
- Motorcyclist around 20 times more at risk than a car occupant.
  - due to higher risk of severe injuries.
- PTW trends are not following the overall fatalities decrease.
  - due to increase in PTW fleet.
- Being young, male and lacking experience is associated with increased PTW fatality risk.

Conclusions (2/2)

- One third of all PTW fatalities occur at junctions
  - counter measures for junction safety improvement for PTWs
- PTW fatalities more likely occur on weekends, between 3pm and 9pm from April to October.
- Majority of crashes are single vehicle crashes occurring on rural roads at intersections.
- Essential to gain more information on serious injuries.

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