About pedestrian safety in Europe

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Background

- Pedestrians are the most vulnerable users of road transport networks
  - Lack of speed, mass and protection
  - Other particular characteristics (e.g. flexibility, ample space requirements, diversity of attention etc.)
  - Behaviour, affecting their interaction with motorized traffic
- Despite the fact that pedestrian road casualties in Europe present a constantly decreasing trend, the number of pedestrians involved in road accidents in several countries and as a whole is still unacceptable
- The peak or abnormal situations remain practically unchanged, suggesting a persistence of the basic pedestrian risk factors.

Objectives

- Create an overall picture of pedestrians road safety in European countries
- Identify factors associated with increased pedestrian fatality risk
- Identify needs for further research
- Explore the role of pedestrian behaviour on pedestrian safety

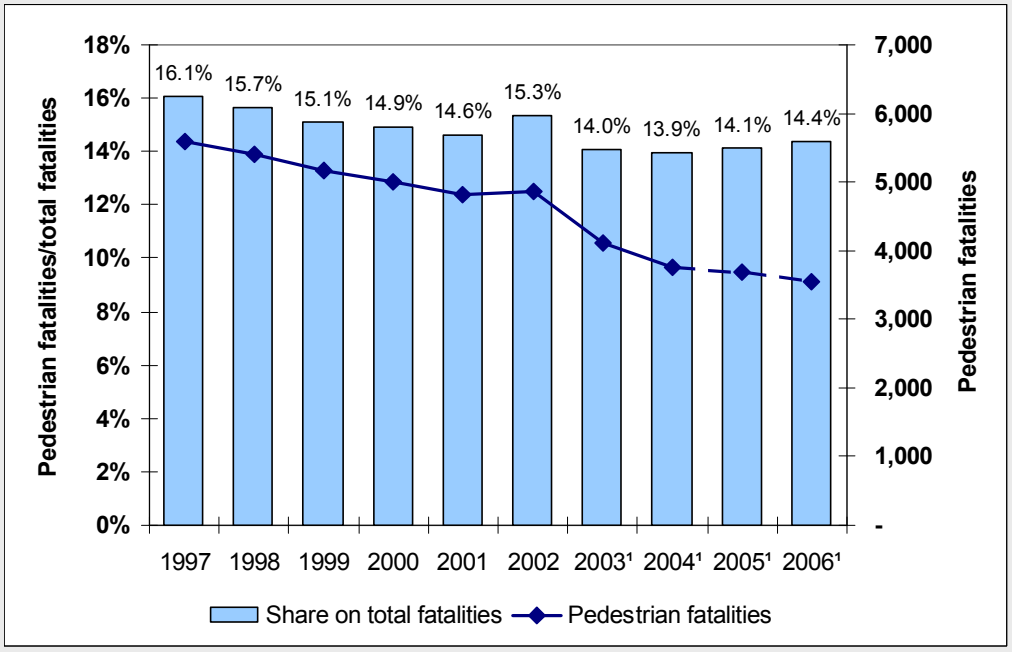
Methods

- Data on pedestrians' road fatalities for the period 1997-2006 from 19 EU countries are associated with basic road safety factors
  - pedestrian's age and gender (with particular focus on children and the elderly)
  - lighting conditions, area type, month…
- Both overall trends and countries comparisons are examined, whereas pedestrians' accident risk rates (fatalities per population) are estimated when possible.
- Pedestrian behaviour is examined on the basis of the international experience

Data

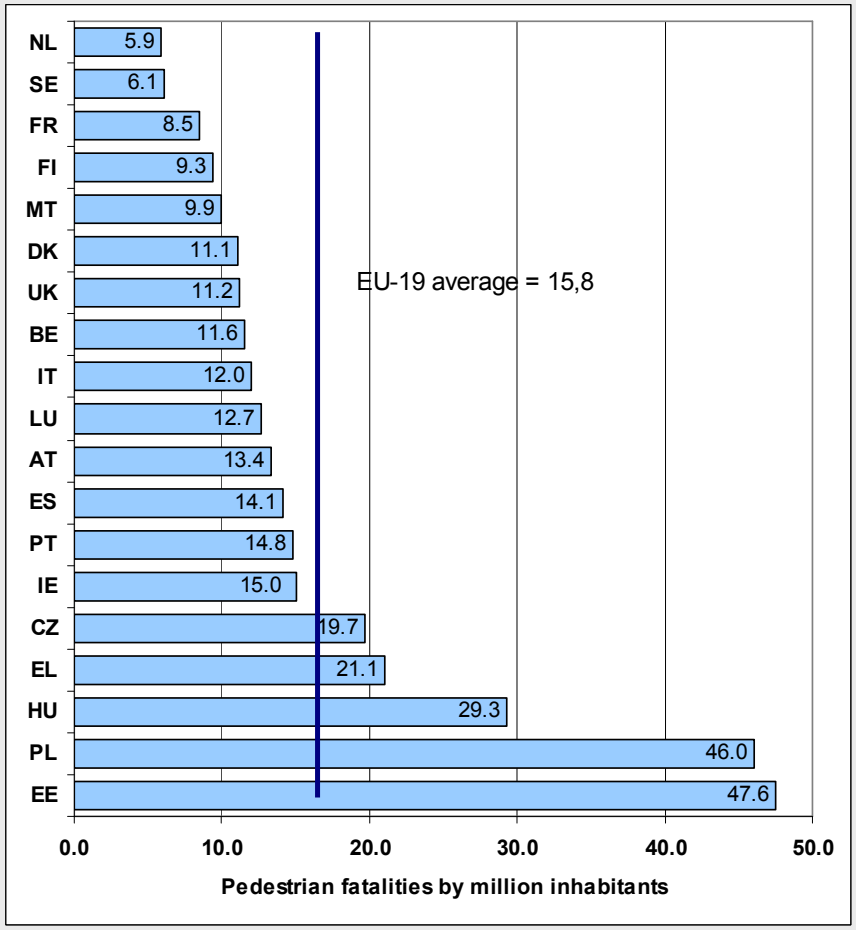
- Disaggregate data on pedestrians' road accidents were extracted from the EU-CARE database
- Other international data sources (Eurostat etc.) were also used
- The data used are the latest data available, i.e. year 2006 for all countries except LU (2002), IE and NL (2003), IT (2004), PL (2005) and UK (2006 for GB, 2005 for NI). Data from CZ, EE, HU, MT and PL are not always considered.

Overall trends



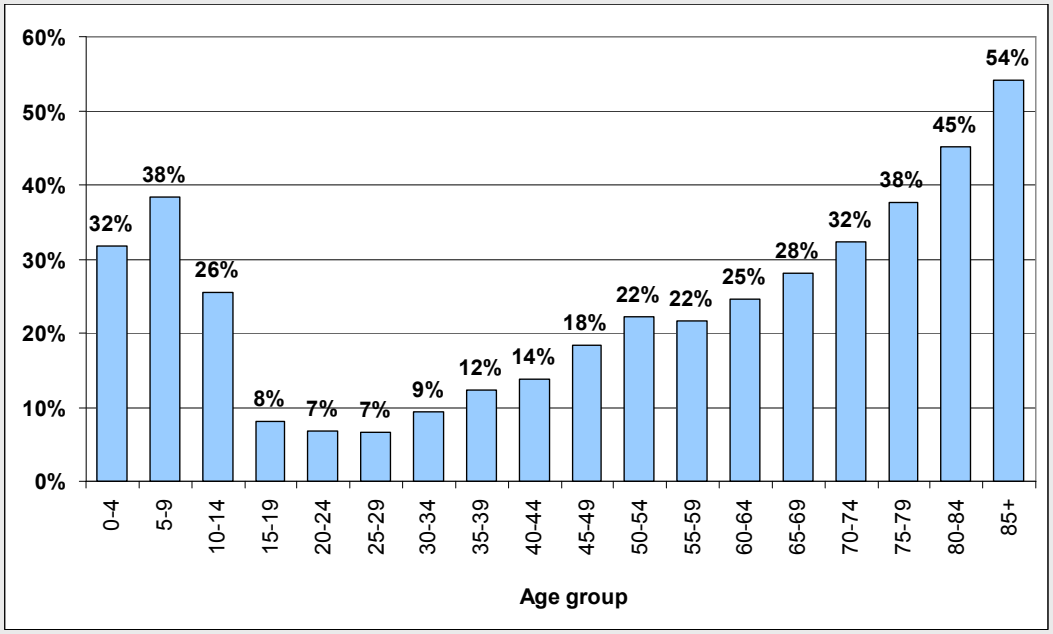
- In 2006, 3.547 pedestrians were killed in road traffic accidents in the EU-14 (14.4% of all fatalities)
- In the last decade, pedestrian fatalities have reduced by 36.6%
- The proportion of pedestrian fatalities shows a slight increase since 2005

Country comparisons



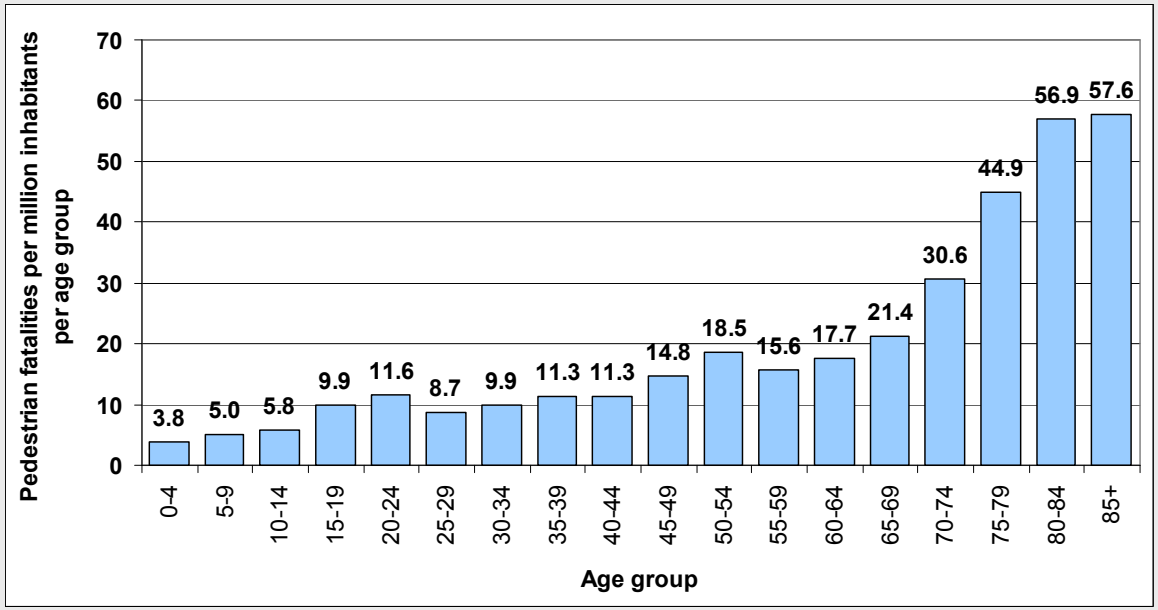
- Pedestrian fatality rates are increased in Southern European countries, as well as in the new Member States
- In accordance to the overall safety level of these countries
- Increased exposure of pedestrians, as a result of favorable climate, low motorization levels etc.
- Pedestrian / driver behaviour in these countries?

Effect of age (1/2)



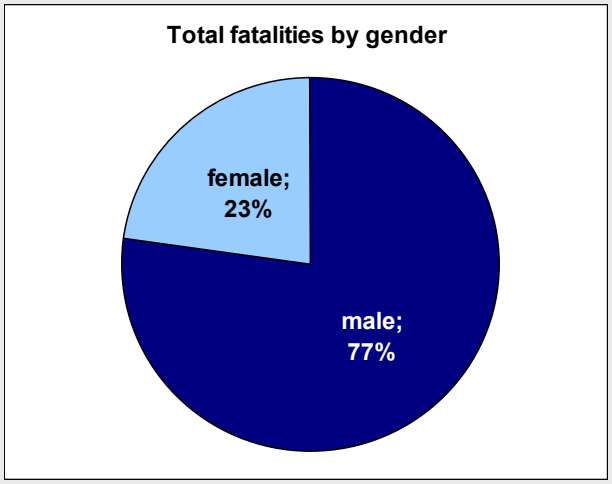
- The proportion of fatalities who are pedestrians is considerably high for children and the elderly
  - physical vulnerability, together with a lower level of motorization in these age groups (exposure)

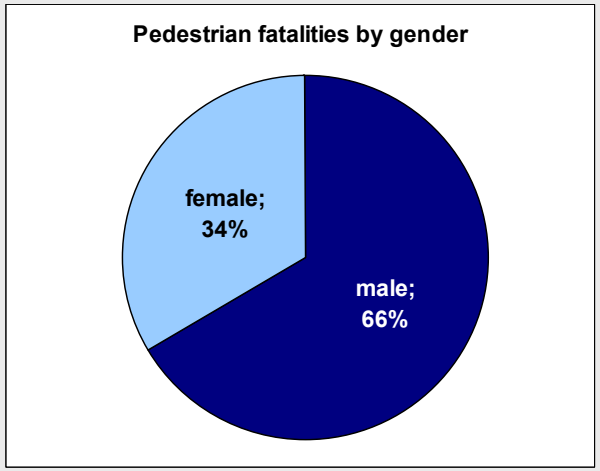
Effect of age (2/2)



- Children have a lower fatality rate than the average population. On the other hand, the pedestrian fatality rate of the elderly is much higher than the average, increasing up from the age of 70.

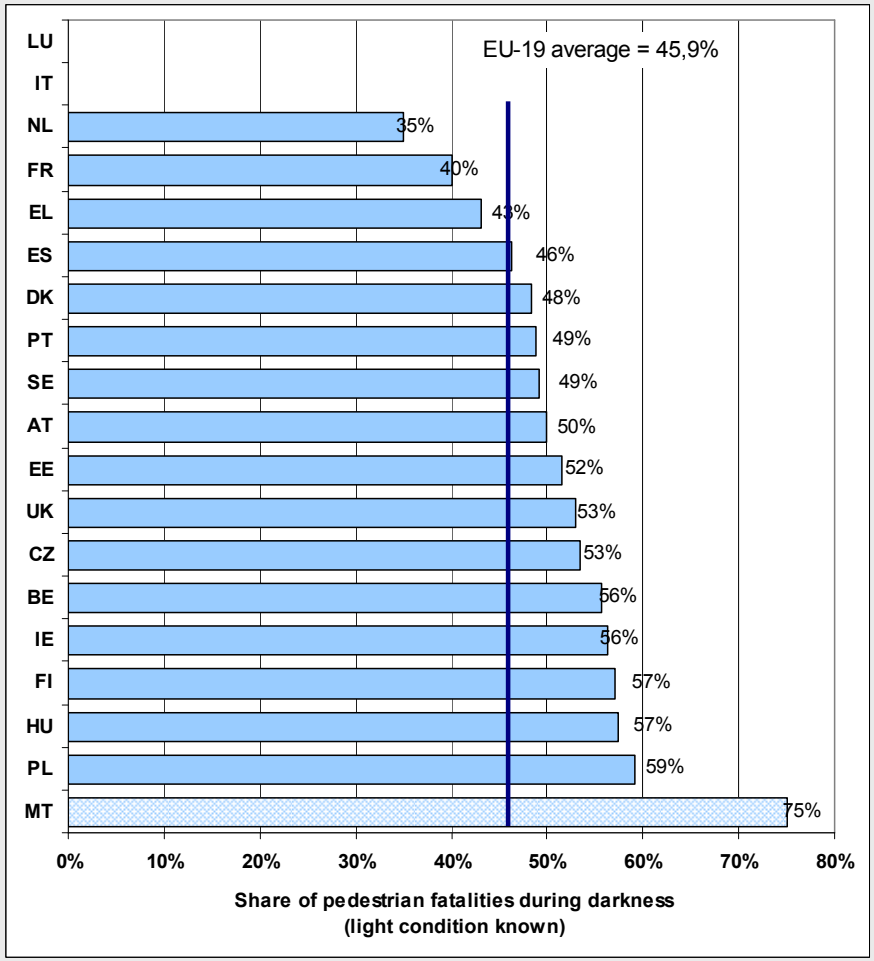
Effect of gender





- In all European countries male pedestrian fatalities are more than female pedestrian fatalities (from 60% in Finland to 70% in Poland)
  - Differences in behaviours of males compared to females
  - Differences in exposure
- It is possible that female exposure as pedestrians is higher compared to their exposure as drivers

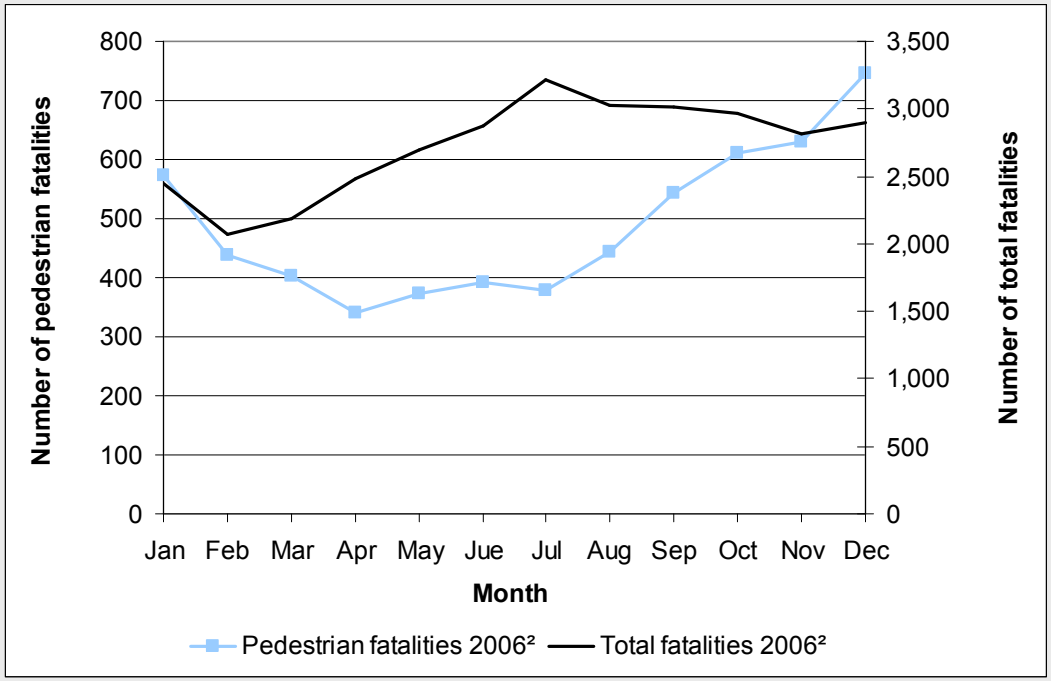
Effect of area type and lighting



- Although most of all fatalities occur outside urban areas (around 65%), the majority of pedestrian fatalities occur inside urban areas (more than 60%)
- Pedestrians have increased fatalities during night-time with an average of 45.9% of pedestrian fatalities (from 59% in Poland to 35% in The Netherlands)

Seasonality

- The peak season for total fatalities is in summer
- Pedestrian fatalities are most frequent in the winter, although exposure is expected to increase during spring and summer
    - Increased exposure of pedestrians inside urban areas during the winter
    - Role of weather and lighting conditions



Basic remarks from the statistics

- The most updated comparable data at European level reveal a persistence of the basic factors associated with increased accident involvement of pedestrians
- They suggest that, although pedestrian fatalities in Europe present a decreasing trend, pedestrian fatality rates are still increased in Southern European countries, as well as in the new Member States.
- Moreover, pedestrian fatalities are increased inside urban areas, at night-time and during the winter, whereas children and the elderly remain the most vulnerable groups
- Causation?

The need for further research

- The analysis of macroscopic pedestrian safety data (e.g. CARE) are useful for monitoring overall trends and figures
  - Lack of exposure data
  - Difficulties in interpretation
- Detailed (microscopic) pedestrian safety analyses are required in order to understand pedestrian accident causes, mechanisms and patterns
- …so that specific actions can be linked to specific problems

Pedestrian risk factors

- Excessive speeds of motor vehicles
- Conflicts between pedestrian flows and motorized traffic
- Unprotected pedestrian crossings
- Visibility of pedestrians to drivers (and of vehicles to pedestrians)
- Readability of the road environment for all road users
- Behaviour of pedestrians / drivers
- Vehicle design, so as to prevent pedestrian accidents or reduce their severity
- Children, elderly and handicapped people
- More to be proposed by current research

Analyses of pedestrian behaviour

- Pedestrian behaviour analyses:
  - gap acceptance
  - Vehicle / pedestrian interaction
  - Pedestrian level of service
  - Compliance to traffic rules
  - Before-and-after studies

- Several researchers suggest that, despite the improvements of the road and traffic features creating a safer environment, the unsafe behavior of pedestrians is less affected

- Need for further research on pedestrians behaviour

Analyses of pedestrian behaviour

- Simulation analyses
  - Macroscopic analyses of pedestrian flow
  - **Microscopic analyses** (agent-based)
  - Numerous studies on crowd / evacuation analyses
  - Fewer studies on vehicle / pedestrian interaction, route choice, crossing behaviour
  - Mainly local level analyses (e.g. pedestrians movement at junctions, crosswalks etc.)
  - Very few studies on pedestrian behaviour along entire trips
  - Mostly stochastic models
  - Rules often defined on the basis of observational data
  - Analyses often focused on a single type of determinants
  - Models validation?

Challenges for research on pedestrians

- Research on pedestrian safety should not be focused on the effect of traffic and infrastructure measures only
  - Overall safety effect / change of behaviour (e.g. compliance) before-and-after
- Detailed and integrated analysis of pedestrian behaviour in relation to driver behaviour and the roadway / traffic environment
- Detailed estimation of pedestrians exposure
  - Interpret important differences in pedestrians safety (e.g. male/female, day/night etc.)
  - Understand causes, patterns etc.
  - Evaluation of safety measures

Conclusions

- Pedestrian safety remains an important problem in all European countries, despite the considerable efforts
- Lack of knowledge (and data) on several important issues of pedestrian safety and behaviour (especially compared to drivers)
- Research on pedestrian safety needs to be promoted
  - Detailed analysis of pedestrian behaviour, exposure, response to measures.
- Need for specific objectives and actions for pedestrian safety
  - 4th EU Action Plan

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