

Session 2 - Issues and specific characteristics of urban roads



Paper :

Road safety in urban environments

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Road Safety in Urban Environments

This paper summarizes statistics on road safety on urban roads in four chapters:

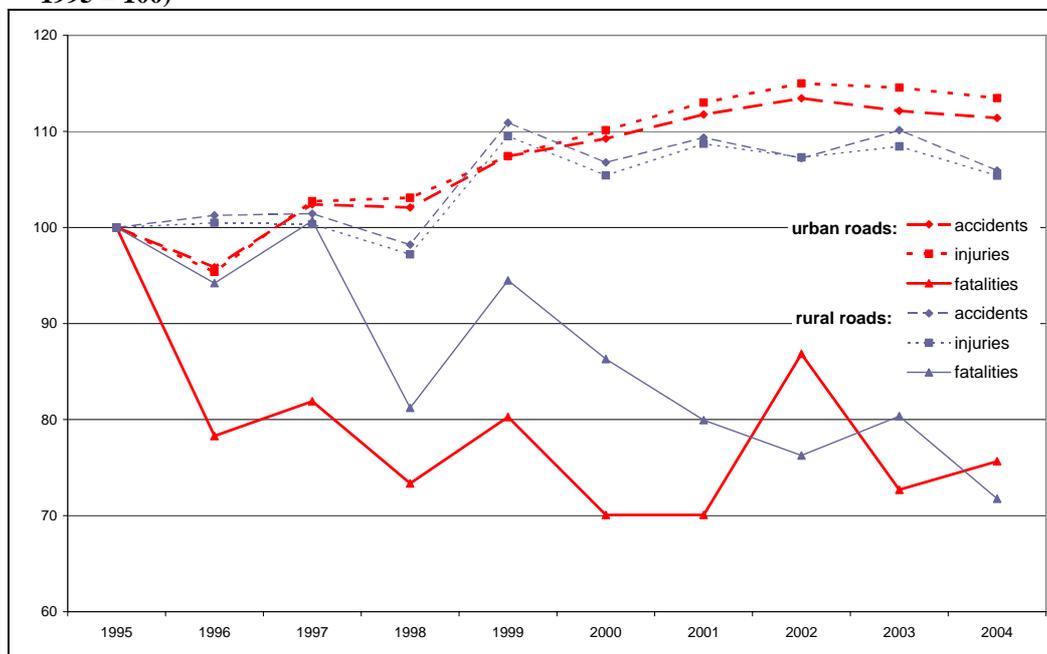
- Accidents on urban roads – development 1995-2004
- Differences in road safety characteristics between urban and rural roads
- Road safety in Austrian towns with more than 20,000 inhabitants
- Road safety findings from selected European towns – based on the DUMAS-project

In the first two chapters, road safety on urban roads is being compared with rural roads. Concerning rural roads, accidents on motorways have been excluded from the analysis because of completely different road user characteristics.

Accidents on Urban Roads – Development 1995-2004

The following figure indicates the development of injury accidents, number of injuries and number of fatalities on urban and rural roads in Austria.

Figure 1: Injury Accidents on Urban and Rural Roads (without Motorways) in Austria 1995-2004 (index: 1995 = 100)



Both the development of injury accidents and the number of injuries show a common tendency on urban and rural roads. Due to different numbers (urban roads: 24,800 accidents and 30,300 injuries per year in average, rural roads: 13,900 accidents and 19,500 injuries per year) a distinctive variance on rural roads is obvious.

On the other hand, there are similarities in the development of the numbers of fatalities between urban and rural roads, too. Here, the variance is higher on urban roads (in average 240 fatalities per year on urban roads and 610 fatalities per year on rural roads).

On both urban and rural roads, the number of injury accidents as well as the number of injuries increased during the last 10 years whereas the number of fatalities decreased during that period.

This tendency indicates a better road safety performance on rural roads (accidents +6%, injuries +5%, fatalities -28%) compared to urban roads (accidents +11%, injuries +14%, fatalities -24%).

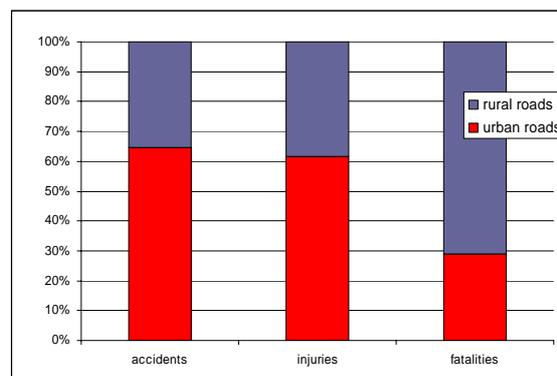
Differences in Road Safety Characteristics between Urban and Rural Roads

The main differences in road safety characteristics between urban and rural roads will be discussed according to the following selected attributes:

- Allocation of accidents between urban and rural roads
- Proportion of accidents and fatalities on urban roads by road users
- Comparison of involved parties by age
- Comparison of accident type
- Comparison of road category
- Comparison of pavement
- Comparison of road condition
- Comparison of light condition

Allocation of Accidents between Urban and Rural Roads

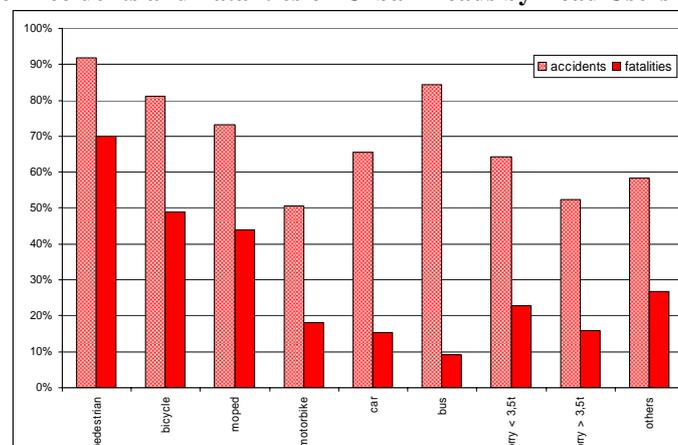
Figure 2: Allocation of Injury Accidents between Urban and Rural Roads (without Motorways) in Austria – 2000-2004



About two thirds of both accidents and injuries occur on urban roads whereas less than one third of the fatalities take place on urban roads. This indicates a lower level of severity of injuries on urban roads due to lower speeds.

Proportion of Accidents and Fatalities on Urban Roads by Road Users

Figure 3: Proportion of Accidents and Fatalities on Urban Roads by Road Users in Austria – 2000-2004

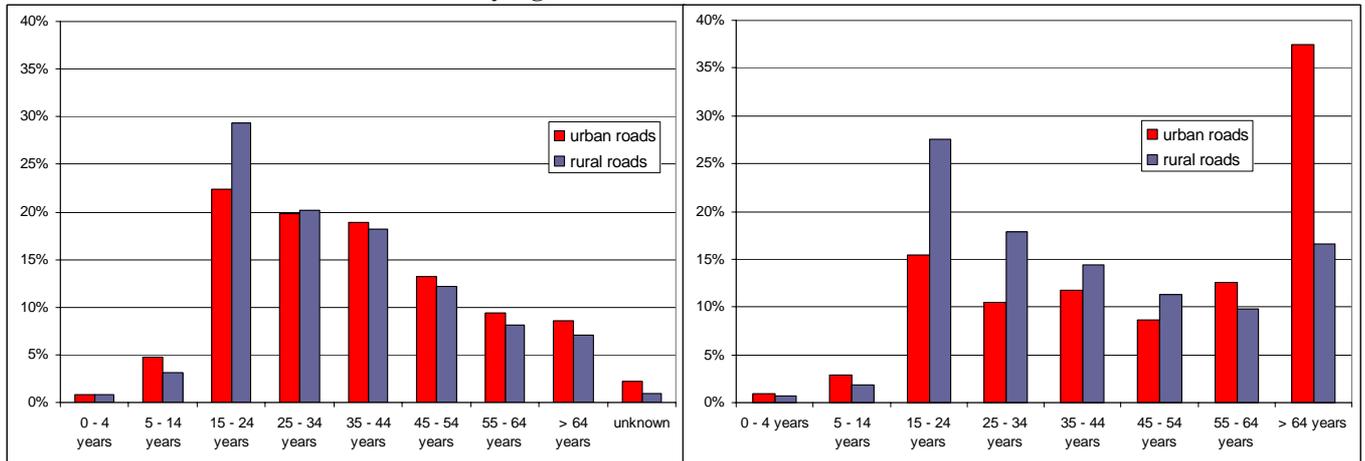


Nine out of ten accidents with pedestrians occur on urban roads and only 8% on rural roads. For vulnerable road users (e.g. pedestrians, bicyclists, ...), the differences between share of accidents and share of fatalities is lower than for protected road users (e.g. in cars, busses, ...).

The probability to be killed in an accident on urban roads (and thus driving at a lower speed limit) is much lower for protected road users than for vulnerable road users. With just above 50% motor bikers are the group with the lowest accident involvement on urban roads.

Comparison of Involved Parties by Age

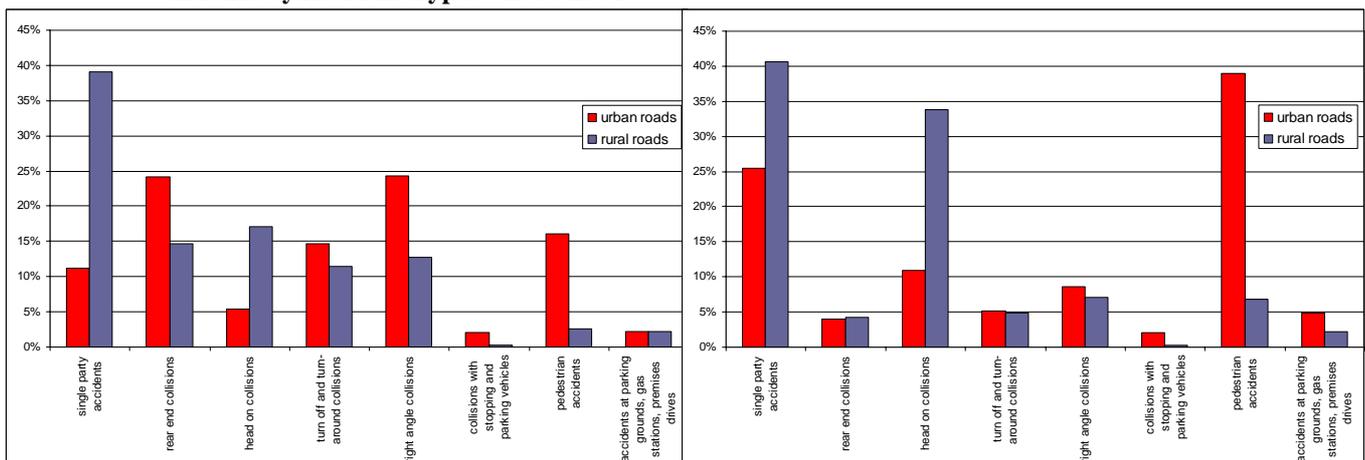
Figure 4: Injury Accidents (left) and Fatalities (right) on Urban and Rural Roads (without Motorways) in Austria - Involved Parties by Age – 2000-2004



The allocation of accidents and injuries by age of involved parties is quite similar on urban and rural roads. Only young road users between 15 and 24 years have a high share on rural roads and are therefore considered as a high risk group. Elderly people (>64 years) are the only group with a dramatically high fatality share on urban roads, often involved as pedestrians with severe injuries or fatalities.

Comparison of Accident Type

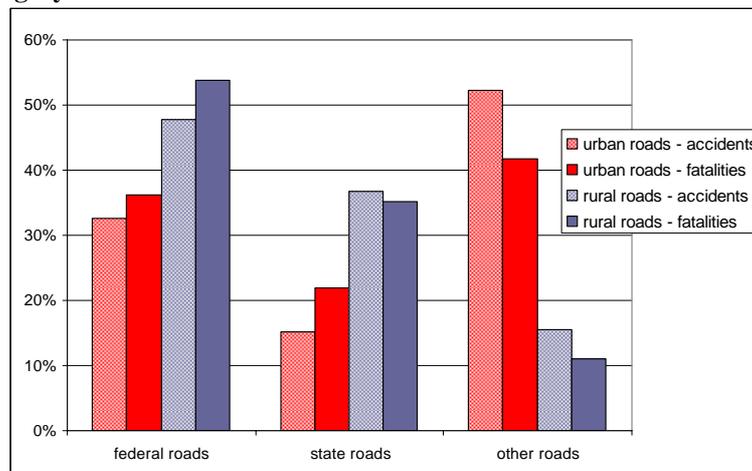
Figure 5: Injury Accidents (left) and Fatalities (right) on Urban and Rural Roads (without Motorways) in Austria by Accident Types – 2000-2004



Rear end collisions and right angle collisions as well as pedestrian accidents are the main accident types on urban roads whereas single party accidents dominate on rural roads. In contrast, fatalities due to pedestrian accidents have their highest share on urban roads. Furthermore, fatalities from single party accidents and head on collisions on urban roads are disproportionately high.

Comparison of Road Category

Figure 6: Injury Accidents and Fatalities on Urban and Rural Roads (without Motorways) in Austria by Road Category – 2000-2004



In Austria, there are three road categories defined on the secondary road network:

- federal roads (with the Federal Road Devolution Act 2002 these roads are reassigned to the nine states, before that they were federal administered) – about 10,000 km in Austria 2004
- state roads – about 23,650 km in Austria 2004
- other public roads (mainly municipal roads) – about 83,100 km in Austria 2004

The main distinction of these categories is the relevance of the road: local relevance for municipal roads, regional and national relevance for state and federal roads. Thus, in most cases the road's condition of construction (e.g. road width, road furniture, ...) is depending on the relevance of the road. That means, for instance, on federal and state roads often higher speeds are possible.

In urban environments municipal roads are prevalent, thus every second accident in urban environments occurs on a municipal road. Because of higher speeds, the proportion of fatalities on federal and state roads is disproportionately high.

Comparison of Pavement

Table 1: Injury Accidents on Urban and Rural Roads (without Motorways) in Austria by Type of Pavement – 2000-2004

	urban roads	rural roads
asphalt	96.8%	97.3%
concrete	1.7%	0.5%
paving	0.8%	0.1%
gravel, sand	0.5%	1.8%
other pavement	0.2%	0.3%
total	100.0%	100.0%

For analysing the road safety by the type of pavement, information on the proportion of the different pavement types as well as the traffic performance would be necessary. For the time being, such information is not available. Thus, the table above indicates only the quantitative rating.

Asphalt is the dominating type of pavement. Compared with rural roads, concrete and paving seems to be more often in use for urban roads. Accidents on gravel and sand have a minor relevance in urban environments, whereas on rural roads there is significance on such pavements.

Comparison of Road Condition

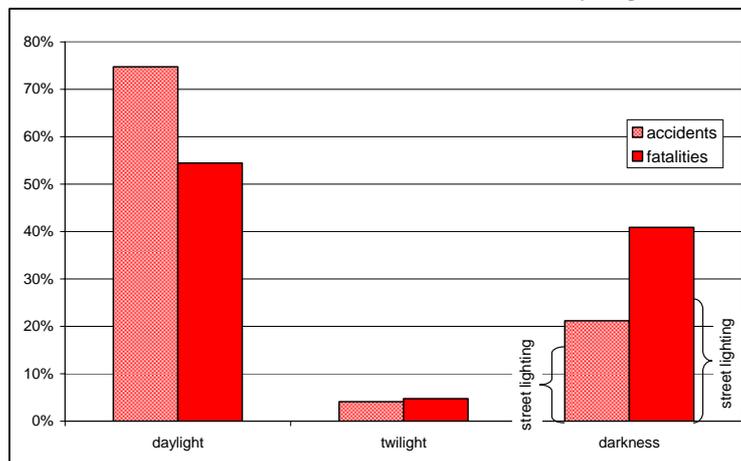
Table 2: Injury Accidents on Urban and Rural Roads (without Motorways) in Austria by Road Condition – 2000-2004

	urban roads	rural roads
dry	75.2%	65.7%
wet	20.4%	22.6%
sand, grit	0.6%	1.4%
snow, - slush	1.3%	3.9%
ice (gritted)	1.0%	2.1%
ice (not gritted)	1.1%	3.7%
other (e.g. oil, soil)	0.3%	0.7%
total	100.0%	100.0%

Three of four accidents occur on dry conditions on urban roads, every fifth accident on wet conditions and 3.4% on wintry conditions. Compared to this situation, rural roads accidents occur more frequently on wintry conditions just as well as accidents on wet conditions.

Comparison of Light Condition

Figure 7: Injury Accidents and Fatalities on Urban Roads in Austria by Light Condition – 2000-2004

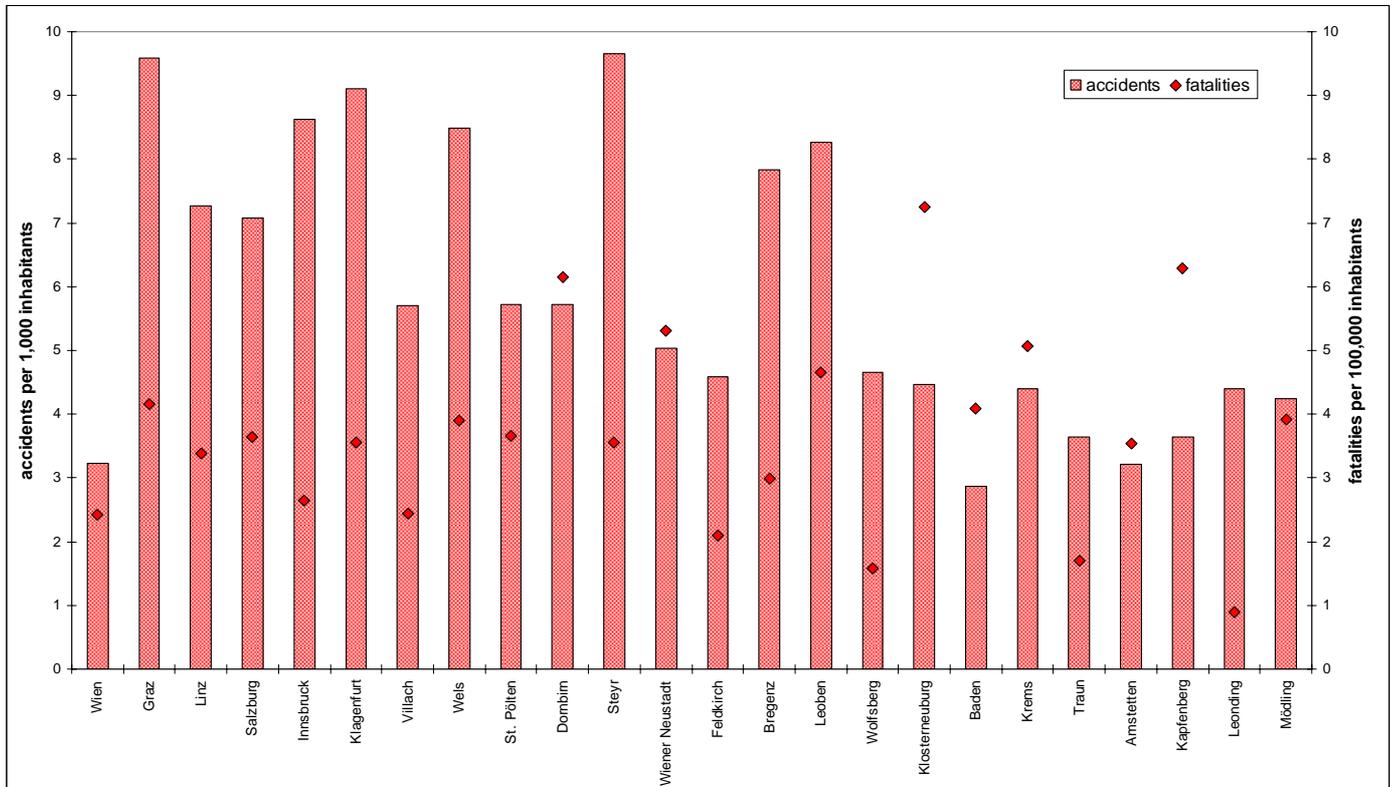


On urban roads, most accidents occur during daytime (the distribution by light conditions is quite similar on rural roads): Three out of four accidents take place during good light conditions whereas the share of fatalities is disproportionately low.

Every fifth accident occurs when it is dark – about three quarter of them on roads with artificial street lighting. Fatal accidents occur relatively often in the darkness on roads without street lighting.

Road Safety in Austrian Towns with more than 20,000 Inhabitants

Figure 8: Average Yearly Injury Accidents and Fatalities per Inhabitants on Urban Roads in Austrian Towns with more than 20,000 Inhabitants – 2000-2004



The number of inhabitants is one of the main attributes to describe the degree of road safety in towns. Other important aspects are the number of commuters, size of the community, length and category of road network as well as number of tourists. Further essential factors are the social structure, the spatial-constructional structure of the town, the traffic system (including public transport and modal split), the road environment design (with effects on the speeds driven) and traffic regulations.

The figure above indicates a wide range of road safety indicators in Austrian towns.

For instance, in Vienna there is a comprehensive public transport and as a consequence a high public transport share in the modal split (about 32%).

Graz, the second largest town in Austria, has a comparable good public transport, too, but a smaller share in the modal split (18%). On the other hand, in Graz there is a high share of bicyclists (14% in comparison with 1% in Vienna). Furthermore, in Graz there are wide-stretched tempo 30 zones.

One of the main reasons for the differences in road safety indicators between Vienna and Graz might be the different proportion of commuters: In Graz the proportion commuter to inhabitants is 0.40 whereas in Vienna it is 0.22.

Road Safety Findings from selected European Towns – DUMAS

In the EU-Project DUMAS (Developing Urban Management and Safety) within the 4th Framework Program, ten town studies were conducted. The following towns were covered:

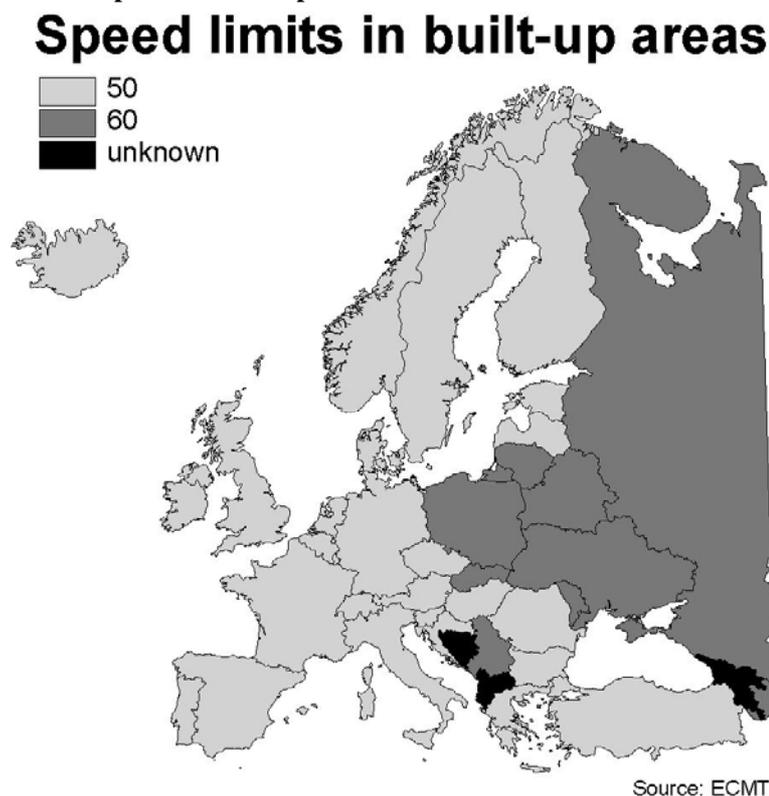
- Baden – Austria
- Brescia – Italy
- Cottbus – Germany
- Gladsaxe – Denmark
- Gloucester - UK
- Katerini– Greece
- Kromeriz – Czech Republic
- Larissa – Greece
- Lille (urban community) – France
- Maastricht – Netherlands

Out of the DUMAS project, the following findings indicate the way to an improved urban road safety (examples):

- Introduction of town management and urban safety management, including strong management and communication structure and clear policy objectives (e.g. Baden, Cottbus, Gladsaxe, Gloucester, Katerini and Larissa, Lille)
- Achieving high levels of public transport usage, cycling and walking (e.g. Baden, Cottbus, Gladsaxe, Gloucester)
- Overcoming institutional barriers and achieving funding for road safety (e.g. Brescia, Gloucester, Kromeriz)
- Inclusion of education (e.g. Cottbus)
- Pedestrianisation, traffic calming and speed control measures (e.g. Gloucester, Katerini, Larissa)
- Introduction of methods to identify traffic safety consequences of local infrastructure plans (e.g. Maastricht)

An important aspect concerning road safety in urban environments is the general speed limit in urban areas. The following figure indicates different speed limits in Europe.

Figure 9: Speed limits in Built-Up Areas in Europe



Sources:

DUMAS: Work Package 10 – DUMAS Town Studies Report; 2000

ECMT: Speed limits in Built-Up Areas in Europe; 2005

Herry, M.: Verkehr in Zahlen; Bundesministerium für Verkehr, Innovation und Technologie (BMVIT), Vienna 2002

Kuratorium für Verkehrssicherheit (KfV): Road Traffic Accidents in Austria; Series “Verkehr in Österreich“, Edition No. 36, Vienna 2005

Risser, A.: Verkehrssicherheit im Gemeindevergleich – unter Einbeziehung kommunaler Bezugsgrößen; Kuratorium für Verkehrssicherheit (KfV), Wien 2003

Statistik Austria: Census-Results 2001; www.statistik.at

Statistik Austria: Road Accident Statistics 1995-2004; with amendments by the Austrian Road Safety Board (KfV)