

# EPIDEMIOLOGY OF BICYCLE-RELATED INJURIES ON SCHOOL TRAVEL - TRENDS AND PATTERNS

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## 1. Background

Promoting the use of cycling should concentrate on early ages and daily routines like school travel. But accidents represent undesirable side effects of bicycling. Injury Risk and Unsafety is one of the major barrier for children taking bikes to school.

## 2. Objectives

To determine the magnitude, time-trends and patterns of mortality and morbidity resulting from bicycle-related injuries on the way to and from school in Germany.

## 3. Methods

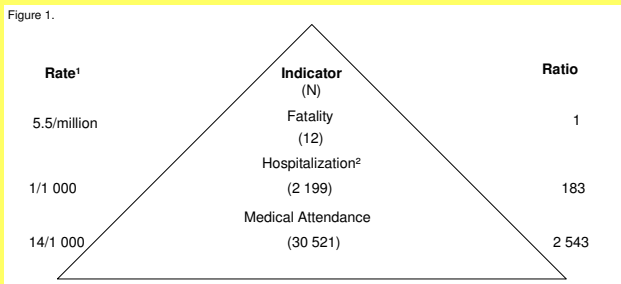
The national School Injury Surveillance System (SISS-Ger) is a long-lasting nationwide population-based monitoring program that collects information on school-related injuries on the basis of statutory accident insurance in Germany.

- Population at Risk: It covers all children and adolescents (17,5 mio pupils) from nursery school to university during school-related activities including school travel.
- Case Definition: The four definition criteria are: 1) acute external influence; 2) damage to one's health; 3) medical attention; 4) multiple injuries are counted as one case per injured person.
- Data Elements: There are a lot of mandatory data elements encompassing demographics, region, type of school, diagnosis and time of occurrence.

The injury surveillance system has been fully described elsewhere [1]. Contrary to police traffic crash reports the serious problem of underreporting does not exist. For risk estimation, data linkage is conducted using specific exposure information.

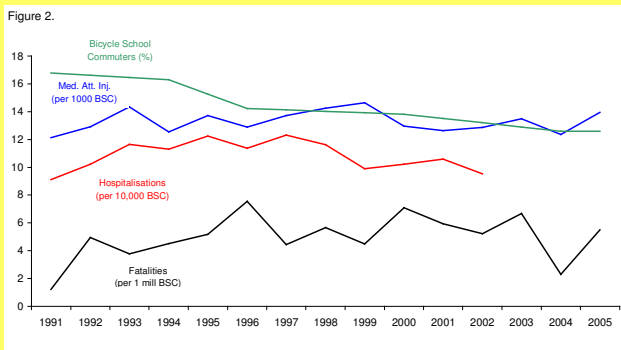
## 4. Results

### 4.1. The Magnitude of Bicycle-Related Injuries on School Travel (2005)



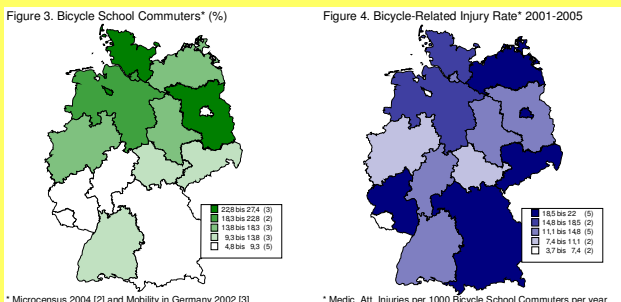
<sup>1</sup> Exposure Data Source: Microcensus 2004, Bicycle School Commuters 12.6% (ca. 2.2 million pupils)  
<sup>2</sup> 2002 being the last year for which data are available

### 4.2. Trends of Bicycle Usage and Bicycle-Related Injuries on School Travel



Over the last 15 years bicycle usage on the way to and from school decreased from 16.8 percent to 12.6 percent. At the same time the injury rates of different severity indicators remains roughly stable, with the exception of a slight increase at the beginning of the 1990s. The decreasing hospitalization rate in the second half of the time series might be caused by the shift from inpatient to ambulatory care.

### 4.3. Cycling Modal Split and Bicycle-Related Injuries on School Travel

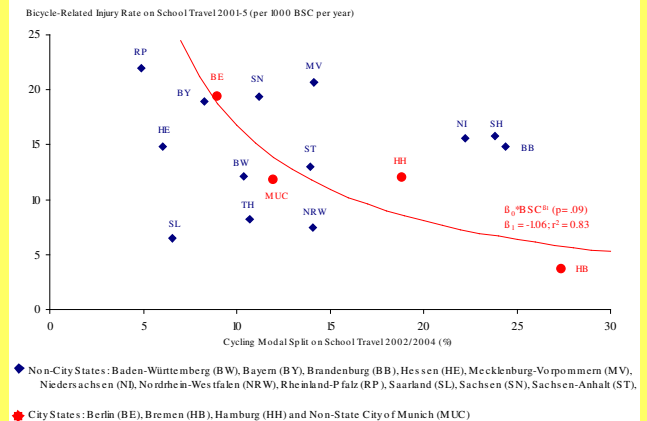


\*Microcensus 2004 [2] and Mobility in Germany 2002 [3]

\* Medic. Att. Injuries per 1000 Bicycle School Commuters per year

There are extreme differences among regions in bicycle usage on school routes with the maximum in Bremen (27.4%) and the minimum in Rheinland-Pfalz (4.9%). The map in figure 3 shows a big north-south gap with more commuters in the northern part of Germany. There are also great geographical inequalities in bicycle-related injuries (figure 4). The highest incidence rate (number of injuries per 1000 bicycle school commuters) is found in Rheinland-Pfalz (21.9), and the lowest in Bremen (3.7). Overall the injury risk tend to be higher in south, east and northern regions of Germany.

Figure 5. Cycling Modal Split and Bicycle-Related Injury Rate on School Travel

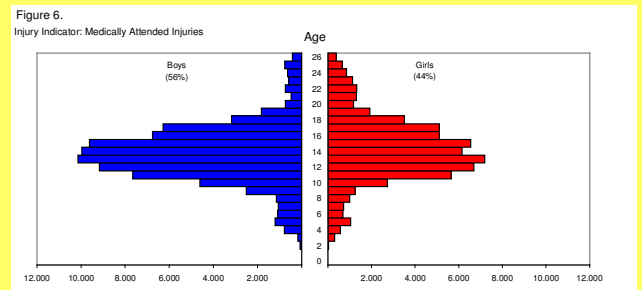


◆ Non-City States: Baden-Württemberg (B.W), Bayern (B.Y), Brandenburg (B.B), Hessen (H.E), Mecklenburg-Vorpommern (M.V), Niedersachsen (N.I), Nordrhein-Westfalen (N.R.W), Rheinland-Pfalz (R.P), Saarland (S.L), Sachsen (S.N), Sachsen-Anhalt (S.T)  
◆ City States: Berlin (B.E), Bremen (B.B), Hamburg (H.H) and Non-State City of Munich (M.U.C)

The direct comparison between exposure and morbidity of cycling indicates no correlation (figure 5). The scatter plot appears to contain three identifiable clusters of states:

- cluster 1 (high injury and low cycling rates)
  - cluster 2 (low injury and low cycling rates)
  - cluster 3 (middle injury and high cycling rates).
- There is only one region (city-state of Bremen) with high cycling and low injury rate. For the City-states and Munich, the data shows a negative association (red points).

### 4.4. Bicycle-Related Injuries on School Travel 2001-2005, by Sex and Age



The pattern of distribution according to sex and age is distinctive (figure 6). Boys in the age of 12 to 15 years have the highest bicycle-related injury frequencies. Taking into account disparities in exposure, the differences of sex- and age-specific injury rates were reduced but remained. The risk (injury rate ratio) is more than two times higher in the age group between 10 to 14 years compared to children aged 6 to 9.

## 5. Conclusion

Including exposure data from different sources, the School Injury Surveillance System (SISS-Ger) delivers essential information on monitoring trends and patterns of bicycle-related injuries on routes to school. During the last years the decreasing trend of cycling to and from school is still going on, whereas the bicycle-related mortality and morbidity risks remained constant.

The results from linking observational large-scale data suggests that there is no direct relationship between the risk of injury and the amount of cycling, with the exclusion, perhaps, of urban data which agreed with other observations [4]. Based on both performance indicators, the city state of Bremen, where the registered office of the national cycling organization is located, outperforms all others.

Strategies and programs promoting cycling should focus on both exposure to and safety of cycling in primary as well as secondary school settings.

## References

- [1] Scherer, K., Mausner-Dorsch, H., Kemény, P. (2006) Surveillance-based injury epidemiology in schools in Germany. International Journal of Injury Control and Safety Promotion, 13, 3, 159-169
- [2] Microcensus 1991, 1994, 1996, 2000, 2004; Federal Statistical Office Germany
- [3] BMVBS. Mobility in Germany (MID) 2002 © Federal Ministry of Transport, Building and Urban Affairs
- [4] Jacobsen P.L. (2003) Safety in numbers: more walkers and bicyclists, safer walking and bicycling. Injury Prevention, 9, 205-9