Data for evidence:
Overcoming the problem of insufficient information on accidents involving new forms of active mobility by generating specific data as a basis for evidence-based analyses.
The example of accidents with electric bicycles

Tobias Panwinkler, German Federal Highway Research Institute (BASt)
Tobias Panwinkler

Geographer
Cyclist on urban bike, race bike and cargo-pedelec

Scientific researcher - accidents statistics and analysis
at Federal highway research institute (BASc)

PhD candidate
at TU Dortmund University
Department of Transport Planning
Initial Situation

- Bicycle experiencing renaissance & Pedelec boosting this trend
- With growing number of pedelecs, potential of conflict increases

- most pedelec accident analysis based on standardised accident data but: initially designed for double-track motor vehicles
- Official statistics build important fundament for accident analysis but: important, bicycle/pedelec-specific information not collected

- Barrier: bicycle-specific categories of accidents cannot be analysed
- However, accident statistics most important basis for evidence-based measures in road safety work

All graphics drawn by: Panwinkler
Data and Sampling

Two different datasets analysed:

1. Official accident statistics
2. Accident text descriptions written by police on site
   → provided by German polices as special data set
   → included 6,253 accidents with pedelecs from 2016 and 2017
   → covering 68 % of all police recorded pedelec accidents in this period

Preliminary research showed:

• Special data set representative
• Pedelec single accidents different
  → separate evaluation and publication [1]

first objective: define **new, pedelec-specific characteristics**

second objective: analyse these newly created categories

This presentation deals with first objective:
→ shows how new, pedelec-specific categories can be identified
→ Including brief overview of quantitative analysis

More detailed quantitative analysis (frequencies / severities) in winter 2022/2023
1. **Defining new categories** → literature analysis to cover all pedelec specific aspects

2. **First screening** → data viewed and sorted by experts

3. **Draft of new features** → based on first screening, literature analysis, previous findings and presumed focal points

4. **Partitioning of accident data** → data set (4,196 cases) randomly assigned to two experts

5. **Quality assurance** → 5% of the cases categorised by both experts to quantify differences

6. **Test phase** → daily discussion & revisions. Afterwards systematology of new categories fixed

7. **Categorisation** → all 4,196 accidents assigned to one or more categories

8. **Final data set** → datasets merged back, results checked for plausibility & completeness
13 new, pedelec-specific accident categories have been defined

mostly subdivided into further sub-categories

12 new accident categories describing accident causes

1 additional new category describing area pedelec used during conflict
most frequent conflicts:

- pedelec is **overlooked** by opponent (59%)
- road users (mostly opponents) **disregarded** the **right of way** (31%)
- road users (more often the opponents) **misjudged** the **space required** (25%)

pedelec user **mostly** (75%) **not mainly responsible**, but if, **severity** significantly **higher**

highest accident severity when pedelec user:

- **violated red light**
- did **not** give (proper) a **hand signal** when changing direction
- **disregarded** the **right of way**
- stuck on an **obstacle** or touched it

In almost **half** (46%) of all accidents, pedelec riding on pedestrian and/or **cycle facility** during conflict → **severity** significantly **lower** than for accidents on carriageway
Conclusions

4,196 accident descriptions (with at least two road user) read & analysed

Qualitative analysis:

• made it possible to create thirteen new pedelec-specific categories (with additional subcategories) that do not exist in the standardised accident statistics to this extend

• With new categories possible to take closer look at this problem

• Possibility to verbalise conflicts

Quantitative analysis:

• Pedelecs often not seen → Better visibility of pedelecs appears to be priority

• Highest accident severities related to pedelec user errors → Raising awareness among pedelec users a second priority

• Accidents on cycling facilities significantly less severe → highlights expansion of safe cycling infrastructure as third priority

Results provide pedelec-specific information → can be used as basis for analysing the need of new requirements/measures for road safety work
Further Information on Accidents involving Pedelecs

- **Paper to this presentation (in English):** [fersi.org](https://fersi.org)
  
  Panwinkler, T. (2022): Data for evidence: Overcoming the problem of insufficient accident information - The example of electric bicycle accidents.

- **Peer reviewed paper comparing accidents of pedelecs and conventional bicycles (in German):**


- **Presentation (in English) at International Cycling Safety Conference 2021:**


- **Peer reviewed paper about causes of pedelec single accidents:** [doi.org/10.1016/j.aap.2021.106082](https://doi.org/10.1016/j.aap.2021.106082)


- **Science Slam (in German):** [https://youtu.be/gzbcI66aPIE](https://youtu.be/gzbcI66aPIE)
Any questions? Please ask! Otherwise: enjoy cycling!

Tobias Panwinkler, Federal Highway Research Institute (BASt) 
Bruederstrasse 53, 51427 Bergisch Gladbach, Germany 
Phone: +49 2204 43-3209, Mail: panwinkler@bast.de 
www.bast.de