Bicycle crashes on two-lane rural roads in Spain

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Description

The aim of this study is to analyze the impact of different conditions and factors on bicycle accidents on two lane roads.

Using the data from Spanish General Traffic Directorate we can determine which factors and/or conditions have the most influence in bike accidents. The results of this work will provide a better knowledge of the characteristics of crashes involving bicycles. This can be useful for the development of new road safety countermeasures.

Previous studies

Objectives :

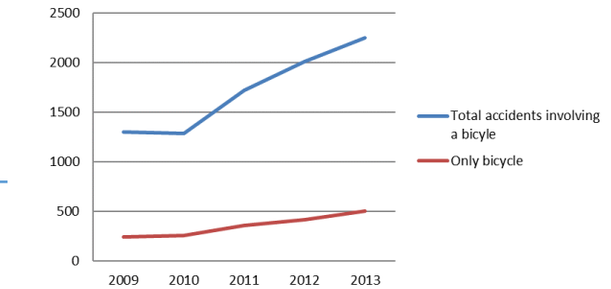
- Present and describe a database of road crashes.
- Select and filter crashes involving bicycles on two-lane rural roads.
- Identify the main typologies of crashes involving bicycles.
- Analyze the different factors affecting cycling safety on two lane rural roads:
  - Temporal evolution.
  - Road design and geometry.
  - Involvement of other users.
- Analyze the frequency of crashes on a small network and compare it with exposure data.
- Determine the most important factors and further requirements to improve safety.

Methodology:

This section describes the methodology that was used to achieve the study objectives.

1. Investigation procedure
2. Selection criteria

Analysis



Conclusions

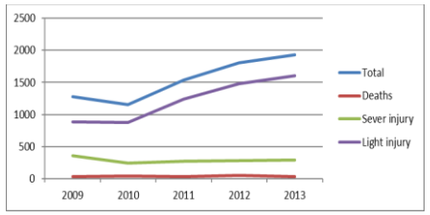
Factors	Human Factor	Vehicle	Environment factors	
			Physical	Social
Pre-event	Distractions, Traffic rule violations	-	Greater road width (>7 m), Lane width 3.25-3.75 m, road markings, road shoulder	Lack of strict normative
Event	-	-	Median lane, Direction panels, Reflector, Reflective signs, Crash-barrier	-
Post-event	-	-	-	Report to police

Haddon matrix applied to our study case.

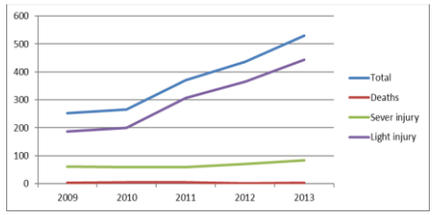
- There are a significant proportion of crashes involving only one bicycle. It means that a collision with a motor vehicle is not the unique cause of cyclist crashes.
- Roads that present paved shoulders with higher width than 1.5m have a significantly lower accidents rate, allowing the cyclist sufficient space between him and other traffic participants.
- Wider roads present a higher number of accidents; this may be caused by the increased volume of traffic in this sections. However, wider lanes present low accident rate, but this type of lane is rarely used on conventional roads.
- Intersections account for a significant proportion of crashes as they concentrate crossing, merging and diverging trajectories.
- Roads with higher traffic volume (motorized) present a higher risk for cyclists.
- A very small rate of accidents take place in curves and an alarming rate happen in straight line; this may be caused by bad road configurations and/or decreased attention.

Further research

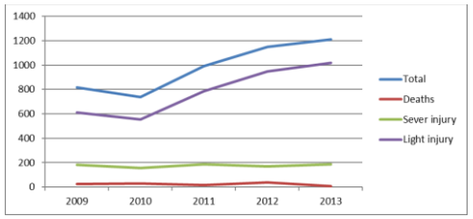
- Additional research on cyclist behavior is needed to understand certain types of accidents and to implement greater safety measurements.
- A larger sample size is necessary to confirm the findings of this report. Ideally, this sample could be expanded to other countries in Europe.
- More research is required on how best to design the road integrating safety and guidance elements for cyclists.
- Further research considering roundabout and T-intersections, where bicycle crashes have showed to be the most frequent.
- Education about traffic rules. It should be investigated how familiar young cyclists are with safety regulation and with following them and how could training enhance it.



Multiple vehicle accidents



Single bicycle accidents



2 vehicle accidents

Valencia Community

Table 1. Top 10 segments with high risk indicator.

CV	AWV 09-13	Deaths	Sever injury	Light injury	VT_m	Lengh (km)	RI (AWV/10e8veh·km)
CV-219	2	0	1	1	64.72	11.231	150.78
CV-705	1	0	0	1	159.76	6.44	53.26
CV-215	2	0	0	2	222.08	10.74	45.95
CV-773	1	0	1	0	237.17	5.8	39.83
CV-195	2	0	1	2	193.1	16.9	33.59
CV-827	2	0	1	1	321.1	10.75	31.75
CV-25	3	0	1	2	356.15	14.65	31.51
CV-775	2	0	2	0	234.61	18.15	25.74
CV-736	11	0	3	10	3598.04	6.95	24.10
CV-715	3	0	0	3	311.43	26.1	20.22

*CV- roads from Valencia Community, AWV 09-13 – accidents with victims between 2009-2013, VTm- exposure , RI- risk indicator

Table 1. Top 10 segments with high mortality rate.

CV	AWV 09-13	Deaths	Sever injury	Light injury	VT_m	Lengh (km)	RI (AWV/10e8veh·km)
CV-86	4	2	1	3	8110.13	3.55	7.61
CV-500	3	1	0	4	9333.8	2.9	6.073
CV-715	4	1	0	3	4767.13	8.5	5.41
CV-32	2	1	0	1	15190.48	3	2.40
CV-70	6	1	1	4	25240.13	4.95	2.63
CV-865	3	1	0	2	15074.43	8.7	1.25
CV-821	17	0	5	16	22015.15	5.15	8.22
CV-736	11	0	3	10	3598.04	6.95	24.10
CV-41	8	0	1	8	7849.16	7.01	7.97
CV-720	6	0	3	5	2206.84	12.1	12.31

*CV- roads from Valencia Community, AWV 09-13 – accidents with victims between 2009-2013, VTm- exposure , RI- risk indicator ,MR- mortality rate

Table 1.Top 10 segments presenting accidents with victims.

CV	AWV 09-13	Deaths	Sever injury	Light injury	VT_m	Lengh (km)	RI (AWV/10e8veh
CV-821	17	0	5	16	22015.15	5.15	8.22
CV-736	11	0	3	10	3598.04	6.95	24.10
CV-41	8	0	1	8	7849.16	7.01	7.97
CV-720	6	0	3	5	2206.84	12.1	12.31
CV-821	6	0	2	4	12769.30	3.05	8.44
CV-300	6	0	2	5	16473.5	3.75	5.32
CV-500	6	0	0	6	17911.84	4.13	4.44
CV-70	6	1	1	4	25240.13	4.95	2.63
CV-300	5	0	5	3	13464.89	1.45	14.03

*CV- roads from Valencia Community, AWV 09-13 – accidents with victims between 2009-2013, VTm- exposure , RI- risk indicator

Proyecto Final de Master. Titulación: Ingeniería de Caminos, Canales y Puertos

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