Institute of Transport Economics
Norwegian Centre for Transport Research

Summary

Bicycle use - in traffic and off-road

Exposure and accident involvement

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A survey among cyclists in Norway shows that about 15 percent of the cycling takes place off-road. The risk (accidents/exposure) of being involved in a bicycle accident is higher in traffic (62 accidents per million km) than off-road (48 accidents per million km). For injuries involving medical treatment, the risk is slightly higher for off-road cycling (18 accident per million km) than for cycling in traffic (16 accidents per million km). The risk estimates are calculated from self-reported data on cycling and accidents in a sample of approx. 6 000 cyclists. Among these, the travel distance is 3.3 kilometers a day. Single accident occurs most often (seven out of ten). Only 16 percent of the bicycle accidents with medical treatment (in our sample) are reported to the police and hereby included in the official records of accidents.

How to find "good" numbers for bicycle exposure

In order to say something about how dangerous different activities are, we need risk calculations, i.e. estimates of how many accidents or injuries occur in relation to the scope of the activity. So, to say something about how dangerous, or how safe, it is to ride a bicycle, we need good numbers for how much cycling (exposure) and how many accidents and injuries that occur.

In this project we have collected data from a selection of cyclists on cycling kilometers per week, distribution between cycling on- and off-road, and distribution of cycling throughout the year. The data is collected during May, June, August and September 2015. Based on this information, we have calculated kilometers of cycling in the sample, broken down by road environment (on- /off-road) and months.

The survey

Respondents were drawn from Falck's bicycle register, distributed throughout the country, with a sub-sample in Oslo and Harstad (northern part of Norway). A total of 6 000 cyclists responded to the survey (35 per cent of the total sample), which is above average for what can be expected of this type of survey. The sample is not representative for all types of cyclists in Norway, as this sample is expected to be more dedicated cyclists, and those recently bought a new bicycle . Nevertheless, it provides a good indication of the distribution, and expected risk between on- and off-road cycling.

The survey is funded by the Research Council of Norway, under the TRANSIKK program.

About 15 percent of the cycling takes place off-road

In our sample there is an overweight of men. We have therefore looked at the number of kilometers and distribution on- and off road for men and women, respectively. For men, a

80:20 ratio is stated between cycling on- and off-road. For women, the ratio is closer to 90:10. In total, it is a 85:15 ratio.

Figure S.1 and Figure S.2 show the distribution of cycle kilometers (total, on- and off-road) throughout the year for men and women in the sample.

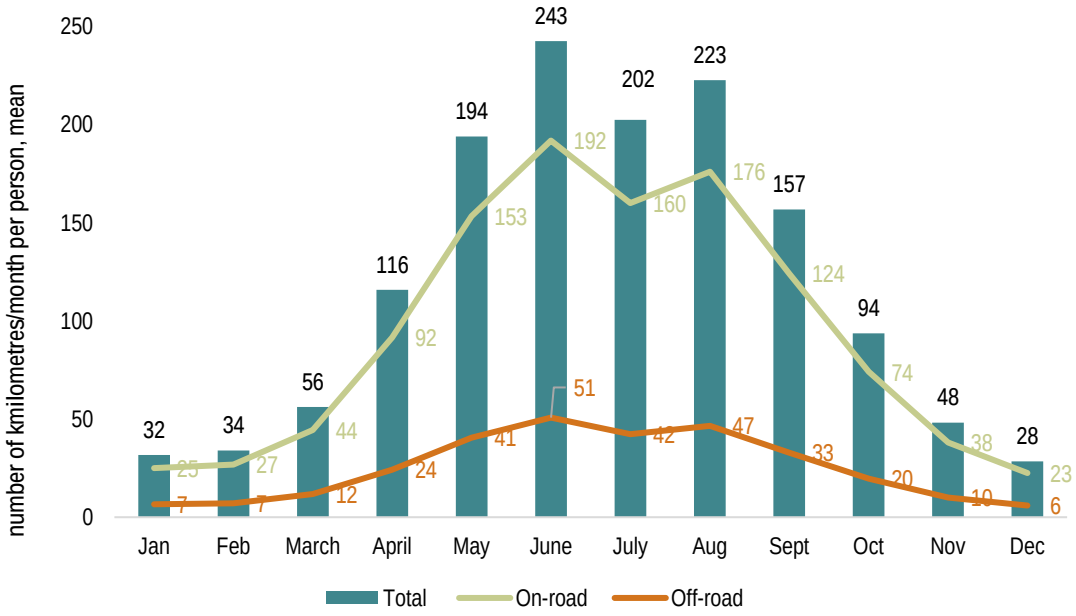

Figure S.1: Distribution of cycling (kilometers) throughout the year, for men in the sample.

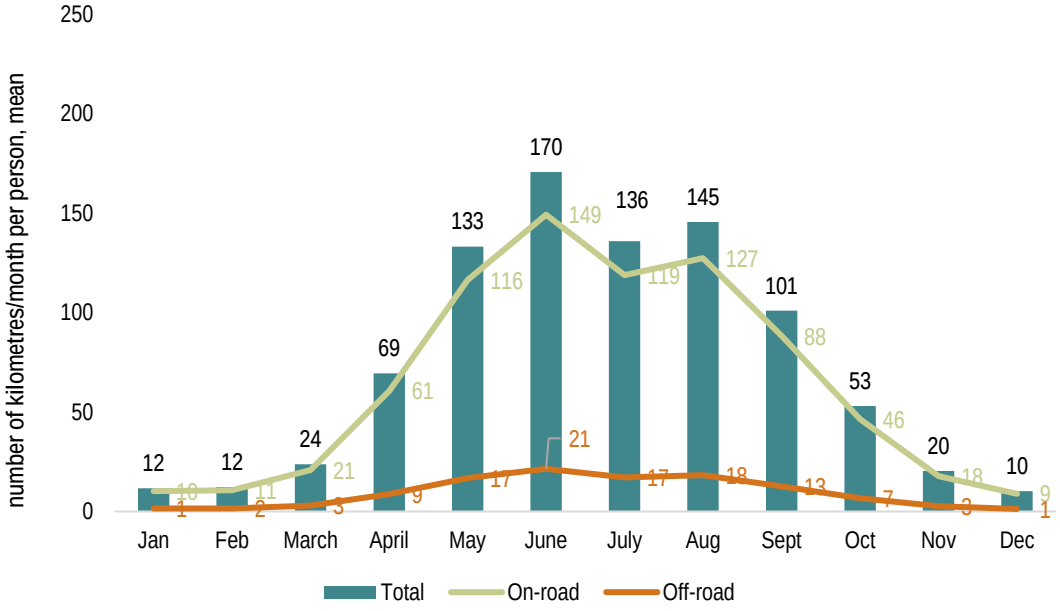

Figure S.2: Distribution of cycling (kilometers) throughout the year, for women in the sample.

The seasonal variance, with less cycling in July compared to June and August is in line with what bicycle counters show on the bicycle network (https://www.eco-visio.net/Ecovisio/). The decline observed in July can be explained by the holiday, with generally less daily transport cycling.

The distribution over the year is the same for both men and women, but men generally cycle more both on- and off-road. Figure S.3 shows the total number of kilometers for the sample.

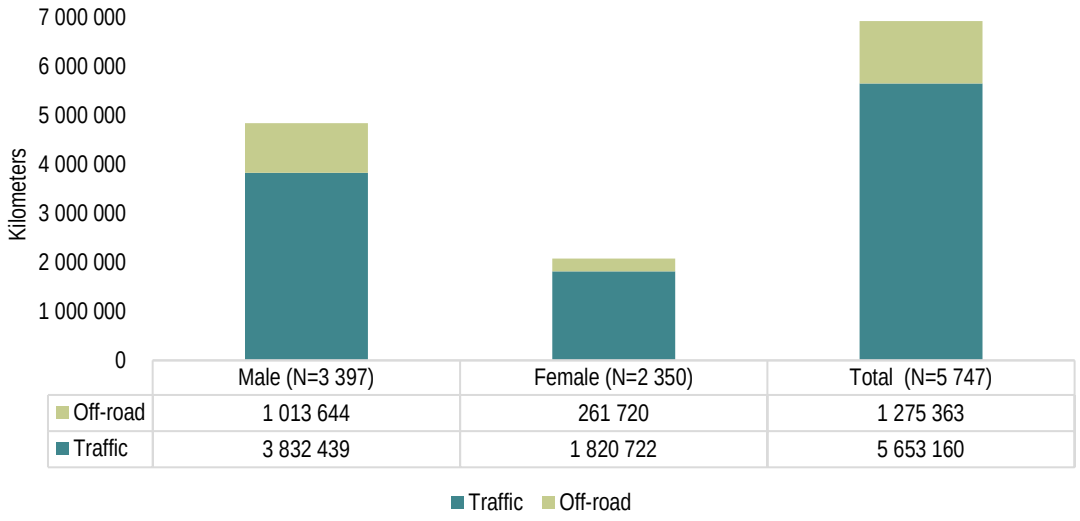

Figure S.3: Aggregated kilometers for the selection. In traffic and off-road (gravel road/ terrain).

The total number of kilometers traveled is almost 7 million kilometers, with an daily average of 3.30 km (2.69 on-road and 0.61 off-road). These are the distances used for the risk calculations for on- and off-road cycling.

Characteristics of bicycle accidents, three out of 10 seek medical treatment

During the period 1 January 2010 through August and medio September 2015, it was a total of 22 per cent who said they had been involved in at least one accident (collision, running off road or overturning that led to injury to oneself or the bicycle) (see Figure S.4).

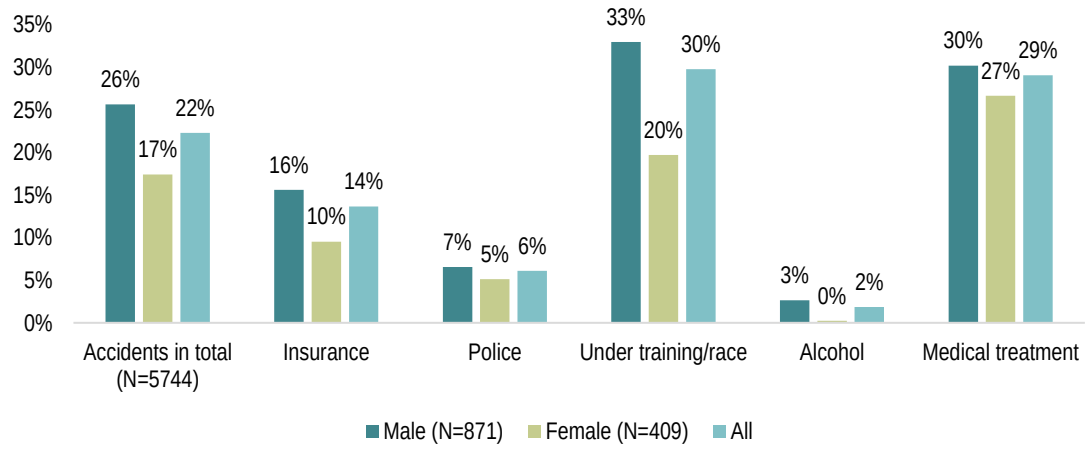

Figure S.4: Distribution of accident for the total sample (N=5744) and characteristics for the accidents (1280 accidents for the period 2010-2015). Male, female and total. Percent.

We have information about the accident that occurred last; in other words, if the person experienced an accident in both 2014 and 2015 is the accident in 2015 we have detailed information about. Of the 1 280 accidents, three out of 10 sought medical treatment.

Most accidents in on-road, and most single accidents

Overall, most road accidents occur on-rod – more precisely in the road ways (46 percent), on shared paths (10 per cent), on sidewalk (eight percent), in a cycle lane (eight per cent) and when crossing the roadway (five per cent). Accidents off-road account for 12 percent. The remaining percentages occurs in a pedestrian zone/city squares. The fact that most of the accidents on-road are as expected, as this is where the largest part of the cycling is conducted. Seven out of ten accidents are single accidents, and the most common reason is that they slipped and overturned.

A higher number of the single accidents resulted in a physical injury (with or without medical treatment) compared to collisions. The injuries caused by single accidents are mainly those less serious (do not seek medical treatment).

Most accidents among racer cyclists, males and those with click pedals

There is a significant tendency for racing bicycle, bicycles with click pedals and bicycles with disc brakes to have a higher share of accidents than other types of bicycles.

There is a clear tendency for men to have experienced an accident to a larger extent than women , but if the severity (injury and / or medical treatment is required) is taken in to account there is no statistically significant difference. The age group below 25 years appears to be more often involved in accidents than elderly cyclists, but those below 25 years are less often involved in accidents requiring medical treatment.

Safety Behavior

Figure S. 5 shows self-reported cycling behavior (percentage) for the sample overall.

We find that over 70 percent states that they always use helmet. Over 60 per cent use light in the dark and give a signal on turning left. They score high on behaviors related to use of safety equipment (helmet, light and "turn signal"). For the behavior related to the use of infrastructure (use of sidewalks, crossing etc.), the variation in behavior is more scattered.

There are some significant differences between women and men. Women more often cross the pedestrian crossing by walking with the bicycle, cycle more rarely on red traffic light and use the sidewalk and cycle path to a larger degree than men. Men report more often use of a helmet and cycle rarely towards driving directions on sidewalk than women.

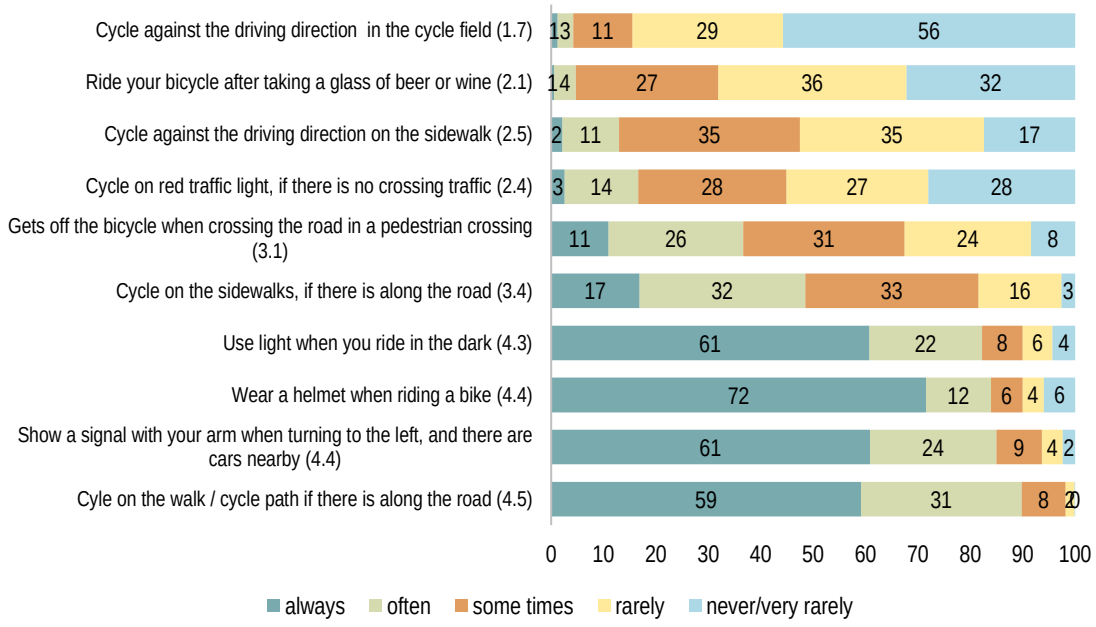

Figure S. 5: Distribution of self-reported behavior. Percentage. N = 5747. (Mean) 1=never og 5=always.

Exposure and risk

In order to estimate a number of accidents in 2015, we use the numbers reported up until September and estimate a total for the whole year. Estimated total is 410 accidents in 2015, i.e. 7.1 percent of the total sample.

We find, with self-report for both exposure and injury - including all accidents, a risk of nearly 60 accidents per million bicycle kilometers. For more serious injuries (seek medical treatment) we find a risk of injury of 16 accidents per million bicycle kilometers. This is higher than risk estimates based on data from the Norwegian Travel Survey (RVU) in Oslo, and data form Oslo Legevakt (Emergency) (Bjørnskau and Ingebrigtsen, 2015). One explanation for the difference could be that the emergency data does not catch up on those who sought their doctor after a day or two because of a minor acute injury. Another possible mechanism is the sample, as many of the Falck-registered cyclists are very active and exercising, etc. They might have a higher speed than the average cyclist, and probably have an actual higher risk. The figures used for risk calculation apply to a selection of cyclists and cannot be transferred directly to the bicycle population as one unit. The data provided are important and (partly) new information, about the risk of injury on- and off-road. We find overall that the risk of injury is higher on-road (62 per million kilometres cycled) than off-road (48 per kilometres cycled), looking at the more serious injuries (seeks medical treatment) the risk is somewhat higher for off-road cycling (18 per million kilometres cycled) than on-road (16 per million kilometres cycled).