

Final report

Hest i trafikk

Horse in road traffic

Project number: H-17-47-302

Project period: 01.04.18-01.04. 21

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Part 1: Detailed summary

Studiens formål er å bedre trafikksikkerheten. Datainnsamling er gjort gjennom intervjuer, spørreundersøkelse, dokumentstudier og utprøvinger på bane. Funnene viser at mange hestebukere er utrygge i trafikken, og at samspillet ikke er godt nok. Hovedårsakene er at andre trafikanter holder for høy fart og kjører for nært. En del førere opptrer uaktsomt og aggressivt, og skaper dermed stor risiko for at hesten kan skremmes til flukt. Informantene er tydelige på at barn ikke bør være alene med hest i trafikken, og at det bør være aldersgrense. Funnene tilsier at gjeldende lovverk ikke holder det nivået av klarhet og presisjon som det bør ha. Funnene viser også at det er stor underrapportering av ulykker med hest i trafikken i Norge. I tråd med Nullvisjonen, må hestebukerne inkluderes i samfunnets satsning på trafikksikkerhet. Det er behov for regulering og tydeligere lovverk som gir hestebukeren bedre vern. Myndighetene bør legalisere den allerede etablerte praksisen i hestemiljøet om bruk av gang- og sykkelveg, dersom dette ikke er til fare eller hindrer for andre trafikanter, slik Finlands lovverk har åpnet for. Det bør vurderes aldersgrense for hestebukere på vei, i kombinasjon med krav om opplæring, og temaet bør tydeliggjøres i læreplaner for føreropplæring. tematikken bør inngå i føreropplæring.

Part 2: Main report (max. 10 pages)

Introduction

The number of horses kept in Norway was greatly reduced in the years from 1950 to 1970, while from 1970 until today it has increased markedly again (Vik & Farstad, 2012), while at the same time the purpose of use has both changed and moved to more urban areas (Ministry of Agriculture and Food, 2018). Thus, there is an increased need to ride along roads with a larger volume of traffic moving at higher speeds than when the traffic rules concerning horse-users were last adjusted in 1978 (Ministry of Transport, 2019). Thus, the main research question addressed in the project was: *How do horses, horse-users and modern road traffic interact, and what measures are required?*

The aim of this study is to provide knowledge that can contribute to better traffic safety, and to provide concrete knowledge about how horse-users and other road users interact within the framework of current legislation and regulations. The study only focuses on the perspective of horse-users. Empirical evidence has been obtained about the experiences of risk and specific challenges that horse-users experience in their interactions with other road users. In this report, the main findings are presented and discussed within a given framework of a small number of pages. Also, a larger report that contains an expanded presentation of the theoretical background, methods, and findings, as well as an account of the legal situation for the legislative and regulatory provisions used in this study will be published later.

Material and methods

Method triangulation has been carried out through document studies, questionnaires, interviews, and scenarios have been tried out in a closed area. In-depth studies have been carried out on the background documents for current and previous regulations on traffic rules, and on reports from Statistics Norway. We have had a dialogue meeting with the Directorate of Public Roads, which provided access to police-reported accidents with horse-users, which we have analyzed. A survey via the website of Norsk hestesenter [the Norwegian Equestrian Centre] provided very rich and comprehensive qualitative and quantitative data material. Its credibility is enhanced by the fact that 90% of the informants in the survey are over 18 years of age, and as many as 87% have reported that they drive a car. Semi-structured research interviews have been conducted, which are quality assured through interview guides, audio recordings and transcripts (Kvale & Brinkmann, 2009). The strategic sample (Halvorsen, 2003) of 12 interviewees are horse-users from different parts of the country, divided into two groups: 1) horse-users who have been exposed to an accident or serious incident in traffic, and 2) horse-users with experience as a rider and/or coachman, and who have a traffic-related profession with a traffic-related education, in order to obtain good reliability in findings related to traffic management and risk perception. Scenarios have been conducted with 28 informants about how horse-users are seen in the dark. Measurements show how large a distance the informant needed to see the horse-user in different scenarios. The data material has been analyzed manually, and the Nvivo tool has been used as a supplement. The research has been reported to the Norwegian Centre for Research Data and follows research ethics rules (NESH, 2016).

Results and discussion

The horse - a living means of transport

The horse's reactions are much more unpredictable than the motorized vehicle. The horse is a flight animal, and many of the informants are clear that they do not want to describe any horse as one hundred percent safe in traffic. Instead, they use terms like *well-used to traffic*. A frightened horse could either jump into the road or run in flight, which can have serious consequences. While one horse may be frightened by something, another horse might not react at all. The findings show a number of circumstances that can frighten a horse, where the main categories are:

- Sounds and lights
- Sudden events and sudden movements
- New, unknown or unfamiliar things

The project has been financed by:

- Weather and wind, thunder
- Cramped situations
- Other road-users' behaviour / lack of interaction

A horse can be frightened by other vehicles and vulnerable road-users, especially cyclists and roller skaters who appear suddenly. Unfamiliar vehicles and associated noise can frighten a horse, in addition to issues associated with actual driver behaviour. The findings show that there may also be completely different elements in the context that the horse may be frightened of, such as plastic that swirls up, a postbox stand, activity in a garden, other animals or birds that fly up. Much of this is unpredictable for other road users. Even an experienced horse-user may be surprised that the horse is suddenly frightened. It is very difficult to regain control of a horse in flight, even for an adult, experienced horse-user.

Horse-users' subjective and accepted risk

Results from the survey show that the informants' attitudes to road safety are the strongest predictor of their perceived, subjective risk. Horse-users' attitudes towards other road users are relatively negative, indicating that other road users are the greatest source of risk for them in road traffic (Simsekoglu, Dalland, & Robertsen, 2020). There is a tendency for some horse-users to attribute negative intentions to other road users by, for example, claiming that other drivers create hazardous situations on purpose. The horse-user may have too high expectations of other road users, and may lack an understanding of the challenges they may face in the situation. A research study from England describes that the rider may be too one-sided in their description of the situation, and have too much faith in their own skill (Trump & Parkin, 2020). Embedded in the individual's subjective perception of risk is both knowledge, experience and emotions, where the feeling of safety and control is included (Høye & Elvik, 2019; Moe, 2016). There is large variation in the data material, where some informants say that they are often in risky situations, while others say that serious situations rarely arise. This variation can have several reasons, for example that they move in different traffic environments and contexts, how the horse is and the horse-user's experience and risk threshold. About 45% (N = 1,736) of the informants say they feel unsafe or very unsafe in traffic. Many are anxious about that the horse may jump out, and what consequences this can have if they collide or are hit.

Children riding in traffic

The findings indicate that it is a practice in equine environments for children to ride alone in traffic. As many as 16% of the informants say they were 10 years or younger when they started riding alone in road traffic, and about half before they were 12 years old (N = 2,632). By the time they were 16, more than 85% had done so. Findings also indicate that it was especially those who have grown up with horses in their own environment, who have been riding in traffic at a young age. The findings indicate that there are different practices at equestrian centres and stable environments when it comes to allowing children to ride alone in traffic. It is up to the individual how systematic the training is, and whether the equine environment itself sets requirements for age and experience. There are no public guidelines or requirements for training horse-users in traffic in Norway. In comparison, the age requirement is 16 years for having a driving licence for driving a moped in road traffic, as well as a requirement for a basic traffic course, compulsory driving and a driver's license. Findings in this study indicate that other road users do not pay special attention when children are riding horses. There are many indications that speed is reduced less when the child is sitting on horseback than if they are walking along a road without a horse. One of the informants in the survey described a situation as follows:

- *I ride horses daily for my own health and as a hobby. I must ride along in road traffic to get to the forest and hiking trail, both in a 60-km zone and a 80-km main road with heavy traffic. Very few drivers in the area make allowances, so we hold our breath every time the younger riders leave the stable.*

Considering that the horse-user's process is complex and complicated, and that other road users do not pay enough attention to the horse-user, there is a major risk factor involved when children ride alone in road traffic. The informants clearly state that children with horses should not be alone in road traffic, and they believe that children should have a long learning process with experienced adults

before they ride alone in traffic. 63.5% (N = 1,785) believe that there should be an age limit both for riding and driving horses and carriages in traffic.

Other road users' lack of consideration for horse-users

Horse-users' subjective perception of risk (Høye & Elvik, 2019; Moe, 2016) is linked to other road users' lack of knowledge and understanding regarding situations with horses. The findings indicate that the other road users are not sufficiently aware that even a calm horse can suddenly be frightened, and that they do not anticipate that the horse may suddenly jump into the road or run in flight. This reduces the quality of the driving process, which consists of the parts sense, perceive, decide and act (Moe, 2015), and leads to poor interaction and hazardous situations. This corresponds with a study in Great Britain that describes shortcomings in other drivers' risk perception in situations involving horse riding on roads (Chapman & Musselwhite, 2011). Main findings related to risky behaviours shown by other road users are:

- Excessive speed
- Getting too close
- Lack of respect for horse-user's signs
- Use of horn (beeping)
- Aggression and negligence

The interviewees describe that some of the reason for this behaviour may be related to cultural changes in society, where other road users are no longer used to horses in their everyday lives. Another possible reason may be that there are conflicts of interest between the driver in a busy work situation and the horse-user, who is engaging in a leisure activity, as the findings in the British study show (Chapman & Musselwhite, 2011). The horse-user is often engaged in a complicated process that requires a large capacity to follow both the traffic situation and the context to identify any factors that the horse may react to. At the same time, they need to focus on the horse's muscles, ears and the way it walks, in order to perceive early signals that the horse is about to be frightened.

Choice of speed and distance

The main reasons why horse-users experience big risky situations are that other road users drive too fast and/ or get too close to the horse. High speeds can have serious consequences for life and health in the event of a collision. At the same time, they emphasize that when other road users slow down and keep their distance, there is little risk. Then they have an opportunity to stop if the horse is suddenly frightened, and the horse-user can prevent the horse from running in flight:

- It is mainly when the vehicle is travelling at high speed that the horses receive no warning and may be frightened. As long as the driver adjusts their speed, most of the horses I have ridden deal with passing vehicles quite well.
- Everything the horse has become frightened of has one thing in common, excessive speed! Experience shows that if the vehicle's speed is low, there are no problems in most encounters on the road!

The horse-users experience a high level of risk when other road users get too close or push past in encounters, because then there are only narrow margins to steer away and avoid collisions if the horse is startled. Similar risks are described where there are physically cramped situations in the environment, for example in blind bends with guardrails, narrow roads with rock walls, narrow bridges or high snowbanks along the road. Many informants describe how other road users push past, even though there is an encounter in the situation:

- Cars following us too close when there is another car coming towards us, - then they are almost touching us
- Cars that force their way past. But it's too narrow, and you have to risk your life and the horse's life to make them stop before we collide (sharp, narrow bends)
- That the car forces its way past when there is no space, e.g. on a bridge, that the driver revs the engine and beeps when they drive past
- Cars that drive close to the horse, and the side mirror of the car actually touched my foot when I was riding

Heavy vehicles represent a greater perceived risk factor than other road user groups. This group includes buses, trucks and lorries, and other large vehicles. Horse-users' experiences of risk with this group are linked to both driver behaviour and the characteristics of the vehicle itself that the horse may be scared by:

- A large truck with trailer, especially with an excavator on the trailer.
- Large vehicles with things dangling from them
- Trailer straps on a heavy goods vehicle
- Large heavy goods vehicles that brake immediately behind the horse (and it squeaks/releases pressure in the brakes).

Some of the reasons why the horse is frightened are related to the size, appearance and noise of vehicles and their cargo. Timber transport and snow ploughs are vehicles that can quickly frighten the horse. The experience of risk is related to the fact that the consequence of a collision with a heavy vehicle will be very serious. At the same time, several of the informants emphasize that within this group, there are also many professional drivers who show consideration, and then it is not perceived as a risky situation. In other cases, the heavy truck driver stops, but the actual start-up causes so much noise that the horse can be frightened. A large number of the informants describe that the horse is often frightened by sounds from air emissions during braking, loud engine noises or sounds during gear changes.

Lack of respect for the horse-user's sign

Horse-users often need to communicate with other road users to ask them to slow down or wait in a particular situation, because they notice that the horse is restless. This is done by arm movement, which is described by the informants as both a "sign" and a "signal". The findings indicate that this is a known practice in the equestrian environment, and is also described in the textbook for equestrian sports (Norges rytterforbund, 2006). The informants have a clear expectation that other road users will respect their sign/ signal, but they describe how hazardous situations often arise when their signals are overlooked or ignored.

- That the driver of the vehicle do not react to the rider's signals, e.g. stop or slow down.
- Those who do not reduce speed, do not pull out, do not follow signs from the rider/coachman
- Do not respect riders' signals

One of the reasons why others do not respect the sign/signal given by the horse-user, may be related to the fact that this is not specifically mentioned either as a sign or signal in the traffic rules (T§14)¹, and horse-users are not given the authority to give any other form of instruction to other road users (T§3). So, it is not certain that the other road riders attach special importance to their sign/signal. However, the findings indicate that the horse-user does not have enough knowledge that this sign/signal is not in the traffic rules. According to the *Basic rules of traffic*, all road users have a duty to be considerate, attentive and careful (V§3)². Based on this, other road users should show respect and willingness to interact in situations where the horse-user asks them with a sign/ signal to wait:

- The only one who knows how this will go, is the one sitting on the horse's back
- Vehicles that do not show consideration. Especially when the rider indicates with a "sign" that they must pay attention/stop/make room. E.g. tractor with a chain and fork that was going to pass at high speed, scared the horse so that it started running with a carriage. He did not take into account when the coachman indicated that now they had to stop/make room

Another possible reason may be that the driver does not respect what they perceive as a traffic instruction from a young person on horseback. A better understanding should be created among fellow road users about the need to respect these signals, even when the horse is apparently calm. The horse-user may have noticed that the horse is restless, and that suddenly the horse can run out in a flight.

¹ T shorts for Traffic rules

² V shorts for *Road traffic legislation*

Use of horns

A surprising finding is that fellow road users often use their horns (beeping) in situations with horses. Many of the informants and interviewees describe beeping as a problem, because the horse can be frightened by the sudden sound:

- Beeping when driving past, or beeping if the horse might be in the way for various reasons, only makes the situation 10 times worse.
- Beeping, flashing of lights
- I have also experienced drivers beeping when they pass, and then it doesn't matter how safe the horse is.

The traffic rules state that "unnecessary or reckless use of a sound or light signal is prohibited" (T§14). A good number of the informants believe that the other road user beeps their horn to deliberately frighten the horse, while it can be very likely that the other driver beeps to make the horse-user aware that a vehicle is approaching behind them. There may be a lack of knowledge that causes that the driver does not understand that the horse may be frightened by the beeping.

Negligence and aggression

Many informants describe how some other drivers exhibit deliberately negligent and aggressive behaviour, which may indicate a bad attitude and little respect for the safety of horse-users. The findings show that it is mainly car drivers and moped riders who act aggressively, where honking is often one of several factors that together create a very high risk that the horse will be frightened. Surprisingly, many say that they are also exposed to abusive shouting:

- Many drivers are annoyed with horses in traffic and are eager to beep, drive very close or very fast. Many do so out of ignorance, but many also out of aggression.
- Sudden braking right behind the horse and then accelerating violently, beeping, rolling down the window and shouting. The list is long. Young drivers who play loud music to see if they can scare the horse.
- Drivers who deliberately rev the engine when they are right next to the horse, drivers who drive back and forth at high speed to deliberately frighten the horses.
- Stone spatter, sudden noises caused by braking or revving the engine, beeping, loud music with bass, passengers shouting/throwing things out the window, cars driving very close when they pass.

The findings indicate that there are many situations with horse-users, where other road users act in violation of both the *Basic traffic rules* (V§3), as well as traffic rules concerning speed (T§13.1) and the use of sound horns (T§14.1). Some of the informants describe how they have experienced such a high level of risk that they have simply stopped riding horses. Horse-users are then no longer willing to expose themselves and the horse to the risk they have experienced. This indicates that their threshold for acceptable risk has been passed (Moe, 2016). Another consequence of other people's negligence is that the horse may change from being a calm horse to becoming a nervous and anxious horse in traffic.

The horse-user's visibility and attention

An important prerequisite for good interaction with other road users is that the horse-user makes themselves very visible and is aware of their surroundings. The findings of this study suggest that horse-users overestimate how visible they are in traffic. 29.7% of the informants ride in the dark several times a week, and about 50% of them believe that they are clearly visible to drivers, even where there is no street lighting. The answers indicate that most people use different forms of reflectors on both the horse and themselves. This is consistent with the findings of a study in Great Britain (Trump & Parkin, 2020). In the project, we tried out different scenarios in the dark with both riders and coachmen, and all of the 28 test participants had a driver's license for a car. This trying out demonstrated that even if the rider or coachman uses a reflective vest, the distance where the driver perceives the horse is relatively short, except when approaching a coachman with a reflective vest. The trying out shows that the most hazardous situation is when a rider *without* a reflective vest is approached by a car from behind, with another oncoming car in front at the same time. In these cases, the average distance from the horse when the driver perceives it is 19 metres. With a normal reaction time of 1 second, a driver moving at 60 km/h will barely be able to start braking. The subjects in the

tests were very expecting to see horse-users, while in road traffic it may take longer with the perception of risk. The rider sits so high up that the light beam does not hit the reflective vest as well as when you are a pedestrian, and in the case of oncoming vehicles, the horse's head can hide parts of the reflective vest. This will be an even worse situation if the rider is a child. Another hazardous situation is when the coachman encounters an oncoming vehicle, because the coachman is then hidden behind the horse. 35% of the informants in the survey believe they are very visible in similar situations. Very few believe they are not very visible. The horse-user may have a false sense of security regarding being seen, which may be a contributing factor in some of the cases where the horse-user experiences negligent driving from others. It is very important that the horse-user is aware of how short the distance is from where they are first seen by a driver, and that they use good reflective equipment on both themselves and the horse. A riding blanket with good reflectors on the horse's chest will be able to increase visibility significantly.

Another factor that weakens the horse-user's riding process (Moe, 2015), is the use of a mobile phone. One of the interviewees described that since the horses often move at a leisurely pace, the horse-user can overlook the hazardous situation that can suddenly arise if they are busy typing on a mobile phone:

- *In the riding environment, they sit up there texting, do you understand what I mean? If something happens then, you have no chance to bring the horse back (Are).*

The horse-user's lack of attention could lead to poor interactions with other road users. A study in Great Britain describes how horse-users can be distracted by the use of mobile phones or headphones (Trump & Parkin, 2020). Regulations (of 17th December 1999) prohibiting drivers from using a hand-held mobile phone while driving a motor vehicle do not apply to horse-users under the current law. Horse-users' use of mobile phones is regulated solely in accordance with V§3. The law provides for unnecessary assessments. The use of a mobile phone while driving should be regulated with clearer rules.

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The horse-user's lack of attention could lead to inadequate attention to other road users. The study in Great Britain describes how horse-users can be distracted by the use of mobile phones or headphones (Trump & Parkin, 2020). Regulations prohibiting drivers from using a hand-held mobile phone while driving a motor vehicle (of 17th Dec. 1999) do not apply to horse-users under the current law. Horse-users' use of mobile phones is regulated solely in accordance with V§3. The law provides for unnecessary assessments. The use of a mobile phone while driving should be regulated with clearer rules.

The horse-user's place in road traffic

The findings show that horse-users need to be in traffic for relatively short distances to get to and from more suitable areas for horses. This is about their accepted risk of being able to perform activities on horseback. Half of the informants answered that they travel by horse where the speed limit is 70 or 80 km/h (N = 2,170). The findings indicate that legislation and traffic regulations are not in accordance with the needs of horse-users in today's traffic. The horse-user must follow the traffic rules in the same way as other vehicles. *The rules about traffic with vehicles apply as far as they are appropriate also to horse riders and to those who lead riding-, loading- or draft animals, or lead farm animals* (T §2.2). The horse-user is thus directed to be in mixed traffic that maintains a far greater speed than themselves, and they must follow traffic rules for *driving*, even if they are walking along the side leading the horse, regardless of the age of the horse-user or the size of the horse. In comparison, there is a special section that imposes special obligations on other drivers to take care of pedestrians (T§9). The horse-user does not have such special protection. While the child as a horse-user is directed to use the roadway, the adult cyclist can use the pedestrian and bicycle path or pavement next to the roadway, as long as the pedestrians are not obstructed (T §18.3).

- It is not about existing traffic rules. The rules are in many cases unusable. If I ride according to the rules I learned, I would have to stop riding. It would just not have worked. So we make our own assessments about what we think is safest for all parties. If I ride on the pavement and see a mother with a pram or a cycling toddler (...). It's about fewer people having a relationship with animals in traffic. Even though they know the rules, they do not have a basis for seeing why I might have problems with a slightly anxious horse and the car driver is then unable to react in a safe way. In other words, as a rider, I have to think about both the horse's reactions, the other road users' usual reaction patterns and my own assessments. At the same time, if an accident happens, I have probably chosen something that is not according to the rules and I will thus be seen as the guilty one. It becomes more and more stressful to ride in traffic.

The findings show that many horse-users deliberately disregard the legislation to achieve better traffic safety. When they cross their own threshold for acceptable risk, they choose to reduce the risk by doing other solutions, such as using pedestrian and bicycle paths when they see it as the most sensible thing to do, or by switching between riding on the right or left side of the road. They make conscious choices to reduce risk based on visibility, opportunities to ride the horse on the side or to make themselves as visible as possible to other road users.

Use of pedestrian and bicycle paths - an established practice

The findings indicate that there is an established practice in the equine environment, where many people use footpaths and bicycle paths, either because they do not know what the sign means for them, or in order to achieve better traffic safety.

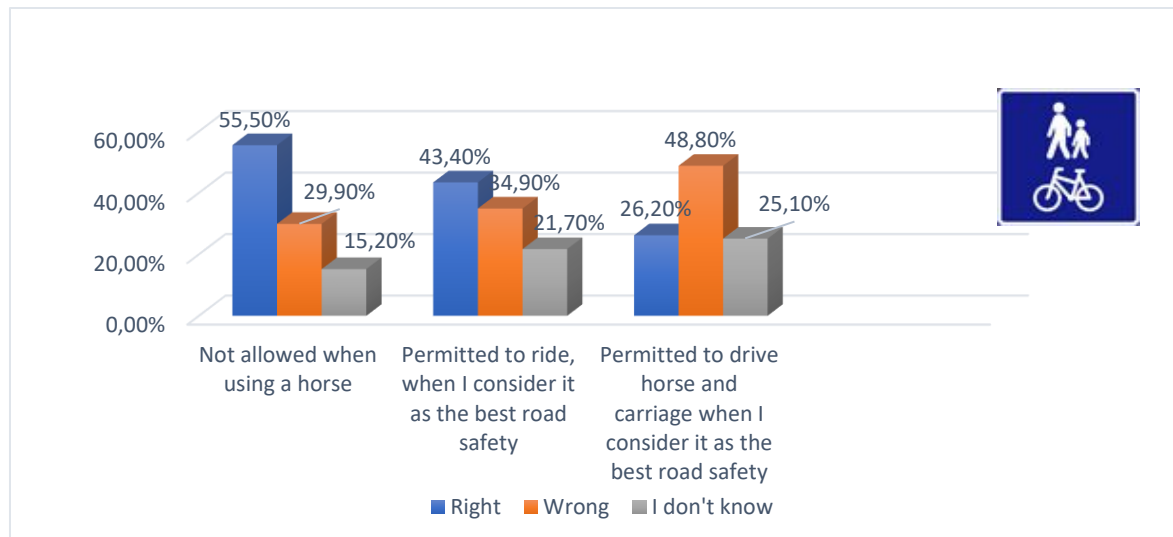


Figure 1. How horse-users understand and interpret the sign that marks footpaths and bicycle paths (N = 2,034)

Although 87% of the informants have a driver's license, only 55.5% of them know that it is not allowed to use footpaths and bicycle paths when they are out with a horse. At the same time, 43% of the riders, and 26% of those who drive horse and carriage, perceive the traffic rules' meaning as permitted to use footpaths and bicycle paths when they consider it as the best road safety. This interpretation of the traffic rules is probably related to the wording of the traffic rule, which states that it applies *as far as appropriate* for this group of road users (T§2.2). The interviewees with a professional traffic-related background also consider the wording to be imprecise:

It's so unclear. What is "as far as appropriate"? So, it's not clear enough. And it should have been stated much more clearly and said a little bit about responsibility in relation to this. I think there should have been a separate set of rules that were clearer when it comes to horses in traffic (Eli)

The document studies show interpretive arguments that indicate that the applicable law should be understood such that the provision does not cause horse-users to exercise discretion. The wording is included to ensure the completeness and systematics of the regulations, which is not easy to understand from the wording, which is the population's primary approach to legal understanding.

Car drivers have very little understanding about that I have to use the road even when there is a footpath and bicycle path next to it. There is little understanding of that. Most of the cyclists who use the footpath and bicycle path are probably not aware that we should really have been on the road (Are).

Several of the horse-users express the feeling that other road users do not accept that they use the carriageway, and that the others have an expectation that they instead should use the footpath and bicycle path next to it. Many of the informants said that they pay attention to vulnerable road users, and leave pedestrian and bicycle paths when necessary.

Significant under-reporting of accidents with horse-users

The findings show that there is significant under-reporting of traffic accidents involving horses that result in both light and serious injuries, and that so many informants have experienced near-accidents. Research from Great Britain shows similar under-reporting of traffic accidents involving horses (Chapman & Musselwhite, 2011). Our analysis of police-reported accidents in which a rider or coachman has been involved in the period 2009-2019, shows a total of 25 accidents, in which 3 people died, 5 were seriously injured and 28 people were slightly injured. Half of the seriously injuries occurred in a 70-80 km/h zone. This apparently accounts for a low proportion of people injured and killed in traffic, compared to other road user groups. The survey shows completely different numbers. In the period 2009-2019, 1,683 of the informants in the study were involved in traffic accidents with horses, where 366 of them were injured.

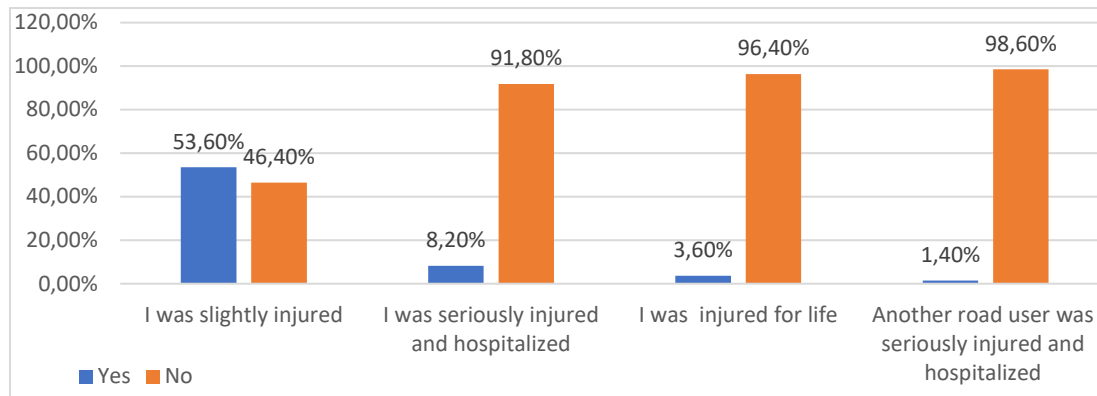


Figure 2. Percentages of different types of injuries reported by the informants (N = 366)

Figure 2 shows that of the 366 horse-users who were injured, 8.2% (30 people) were seriously injured and hospitalized, of whom 3.6% (12 people) say that they were injured for life. 53.6% (196 people) of horse-users say they were slightly injured. The data material from this study alone shows six times more people who were seriously injured than what appears from police-reported accidents (5 people). In relation to the fact that the survey only covers a small proportion of horse-users in Norway as a whole, the finding indicates that there is a very large level of under-reporting. A report from the Directorate of Public Roads describes challenges related to the degree of injury in the police-reported accidents in general (Directorate of Public Roads, 2020). The report details that it is the role of the police to state the degree of injury to persons at the accident site, even if they do not have formal competence in this area, and that there may be injuries for which it is not possible to determine the level of severity at the accident site. The health sector is bound by a duty of confidentiality towards individual patients, and therefore does not provide information on the degree of injury. The report accounts for under-reporting of accident-prone groups such as cyclists, while horse-users are not mentioned. Another possible reason why accidents are not reported to the police may be that the horse has not physically collided with the vehicle, even though the driver has caused the horse to bolt. Both the rider and the horse may have been injured, but the accident itself may have happened after the horse bolted. Then the accident does not fall under the given guidelines for reporting road traffic accidents (Høye & Elvik, 2019). Findings show that in several cases, the driver of the other vehicle does not stop.

Serious accidents with horse-users are drowned out in the big statistics

In 2014, a tragic accident occurred in which two girls aged 11 and 13 with a horse and carriage were hit and killed on a public road. This serious accident is overshadowed in the large numbers when the Directorate of Public Roads conducted an overall in-depth analysis of all fatalities throughout the country for 2014. In the report, the accident ended up under the collective category "other accidents". In a table with an overview of "involved traffic units", a horse with a carriage is mentioned as a unit where two were killed (Haldorsen, 2015 p.8). In a comment on the number of deaths under 25, it is mentioned that two of these were people with a horse and carriage. The actual fact that it was 2 children who died, is not stated. Three insurance companies have informed us that accidents with horse-users are registered together with other collisions with animals, so that statistics from insurance companies do not necessarily show that a person was sitting on the back of the animal.

Conclusion and relevance

Overall, the findings of the study show that the interaction between other road users, horses and horse-users should be improved, and that measures and changes in legislation should be implemented. A large proportion of horse-users feel unsafe in traffic, and experience many hazardous incidents. There is a high level of under-reporting of personal injury accidents related to horses in traffic. In line with the Vision Zero (Ministry of Transport, 1999, 2017, 2021), it is necessary that horse-users also are included in society's investment in traffic safety. Under-reporting can cause that politicians and other

decision-makers do not receive adequate information to realize the actual risk this road user group is exposed to. This group of road users is not mentioned in the guidance documents for road safety measures. Existing legislation has not placed sufficient emphasis on the horse-user's need for protection. Measures are needed to improve the interaction between the horse-user and other road users, as well as measures that give the horse-user better protection as a vulnerable road user. The topic should be made visible in curricula for all driving license classes, in order to be emphasized in driver training. There is also a need for information and attitude campaigns about how others should behave towards a horse-user. It is necessary that the other road users are instructed to maintain a particularly slow speed near the horse-user and show respect and consideration when the horse-user gives a sign/signal to ask others to wait in a particular situation. The traffic rules should clarify the horse-user's sign/signal and how other road users should react to it, for example under T§13.2. There is a need for better regulation and training of the horse-user as a road user. In order to protect young horse-users in traffic, an age limit should be considered in combination with requirements for completed training, as well as restricting children riding alone in traffic. Horse-users need to be aware of what duties V§3 imposes on them in general, and about how invisible they are to others in the dark.

In order to reduce risk and create a better basis for interaction, the authorities should consider prohibiting drivers from using a hand-held mobile phone when riding horses. The use of lighting equipment and reflectors on horses and horse-users should be specified in traffic rules or vehicle regulations. The findings of the study indicate that current legislation and regulations do not maintain an adequate level of clarity and precision for horse-users. There is a major need for the traffic rules and other regulations to be adapted so that they are clear to both horse-users and other road users, and that they provide the horse-user with better protection. The wording in T §2.2 that the horse-user must follow traffic rules for riders "as far as appropriate" can be understood in several different ways, and should as a minimum be designed with clearer language that is easier to understand for public road users.

The traffic rules should be changed so that horse-users are given the opportunity to use the left side of the road when they consider this to be the safest. Today's traffic rules result in an unfortunate mix of slow-moving horse-users and motorized vehicles that maintain a much higher speed, and which expose horse-users to many hazardous situations. If a horse-user, who is a vulnerable road user, could use footpaths and bicycle paths, this would lead to fewer hazardous situations, especially on roads with speeds above 50 km/h. At the same time, it is problematic to propose a general use of footpaths and bicycle paths. A frightened horse can create an unsafe situation for other vulnerable road users who use footpaths and bicycle paths. The findings indicate that a practice has already been established where horse-users use footpaths and bicycle paths, mainly to reduce their own risk. The traffic rules should be changed so that riders and those who lead horses, may use footpaths and bicycle paths if this can be done without endangering or inconveniencing other vulnerable road users. Finland has already allowed this through a new road traffic law, with effect from 1 June 2020.

Consideration should be given to using secondary signs to a greater extent to allow horse-users with carriages/sulky to use certain stretches of footpaths and bicycle paths. This could be, for example, when travelling to and from a track for training, to avoid having to drive on a busy road. Secondary signs could also regulate the time of day when there is otherwise little pedestrian or bicycle traffic. It should be allowed for danger sign no. 155 "Riders" to be used on stretches where there are often riders along the road, and not just at intersections. Research should be able to be a useful basis for the authorities in terms of the content of future plans, legislation, regulations, information material and public campaigns. Equine communities should work to develop common teaching requirements and guidance for young horse-users. Efforts should be made to raise awareness of how horse-users can contribute to reducing risk. Everyone who uses a horse for transport should be shown how difficult they are to see in the dark.

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Part 3: Result dissemination

Scientific publications, published	<p>Simsekoglu, Ö., Dalland, E. B., & Robertsen, K. (2020). Predictors of perceived road collision/incident risk among horse users: A survey study from Norway. <i>Elsevier. Transportation Research Part F 74</i>, 248-258.</p> <p>https://authors.elsevier.com/c/1bkvo4tTwCkSBI</p>
Scientific publications, Submitted	<p>•</p>
Scientific publications, Manuscript	<p>A comprehensive report is in progress, and will be available for public in webpage. Both horse environments and the Directorate of Public Roads ask for it.</p> <p>2 scientific articles are discussed and planned to be written and published, based on this comprehensive report.</p>
Conference publications/presentations	<p><i>2 abstracts accepted for oral presentations in Göteborg in aug. 2020, but the conference is moved to next year, because of Corona. We will present this in aug. 2021. Look at attachments.</i></p>
Other publications, media etc.	<p>07.10. 2019 In radio programme, NRK Trøndelag</p> <p>March, 2020: In local Newspaper theme: trying out about sight in darkness</p> <p>A short report (4p) to Forskningsrådet</p> <p>This report in English is also written in Norwegian, and will be available in our webpage.</p>
Oral communication, to horse sector, students etc.	<p>(dato) a discussing meeting with three committee members of the local Horse breeding organization. (Stjørdal-og Hegra hestavslag).</p> <p>Meetings with persons working in the horse environment and in Norsk hestesenter</p> <p>16.08.2019 We took part in a great conference in Levanger about horses in traffic, open for public, organized by the local horse environment. Robertsen in this research group organized a practical demonstration where students from Nord university were engaged to show how to pass horse users with heavy vehicles. He also took place in the debate panel afterwords.</p> <p>https://www.tryggrafikk.no/nyheter/en-hest-er-ogsaa-et-kjoretoy/</p> <p>http://www.travsport.no/DNT_Files/Til_Start/Nationen%20-%20papirutgaven%2023.%20Sep.%2019side%20121314.pdf Oral</p>

	<p>12.01.2020 Presentation and discussing in a in a research seminar for colleagues, all of them working with students in different studies related to Driving teacher education.</p> <p>19.02.2021 (3 hours) Oral presentation about our research and results/ findings given to the students in the Study for Driving teachers, Nord university.</p> <p>Other presentations during the whole process: Short oral presentations for students in different further studies in Nord University:</p> <ul style="list-style-type: none"> - Driving teachers in different classes - Driving test examiners - Driving school managers - Instructors for emergency drivers
	<p>28.01.2020 Presentation and a dialogue-meeting with 3 persons in the Directorate of Public roads</p>
	<p>13.02.2020 Presentation in the Road Safety Committee in Trøndelag (Trafikksikkerhetsutvalget), about 30 persons</p>
	<p>09.06. 2021 Project leader is invited to do a presentation in the Road Safety Committee in Troms and Finnmark. (Trafikksikkerhetsutvalget), about 10 persons will take place.</p>
Student theses	<p>During this periode the project leader has been a supervisor for to candidate theses (4 students) about horses in traffic.</p>
Other	<p>4 students (with horse experiences) in our Driving teacher education were engaged in our discussion group to ensure quality in the survey, and to be help persons in the testing scenarios.</p>
	<p>In the beginning of the project the research group were invited to stay in the context in a horse racing environment (V6) in Trondheim.</p>
	<p>The research group were invited to visit a local stable, where we could try to ride the horses in traffic roads.</p>