Consequences of Traffic Casualties in Relation to Traffic-Engineering Factors - An Analysis in Short-term and Long-term Perspectives

Berntman, Monica

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Department of Technology and Society
Lund Institute of Technology
Box 118
S-221 00 Lund
Sweden

Consequences of Traffic Casualties in Relation to Traffic-Engineering Factors

An Analysis in Short-term and Long-term Perspectives

Doctoral Thesis

Monica Berntman

Photography: Anna Berntman, Gunilla Brorson-Collin, Yvonne Palm-Lundström, Mats Johansson. Lay-out: Anna Berntman.


To everyone who has assisted me in this study, and especially the victims of the traffic accidents who have participated in the health follow-ups: I hope and trust that your efforts will contribute to fewer and less serious injuries in traffic in the future!

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Lund, January 2003

Monica Berntman

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Summary

The *Zero Vision* adopted by the Swedish parliament states that nobody should be killed or severely injured in road traffic accidents in Sweden. The introduction of this concept transfers the main focus from the occurrence of road traffic accidents to their consequences and, thereby, creates postulations for a new paradigm for traffic safety approaches.

To accomplish this, the necessity of updating information on the consequences of traffic injuries is urgent, as today's assessments are based on data collected more than 30 years ago. Since then, the infrastructure design has been questioned, altered, and improved. Vehicle performances have improved, while the development of active and passive safety systems has reduced the injuries received. New treatments involving surgical techniques and pharmacology have most probably decreased the consequences of the acquired injury as well.

There are problems involving lack of validity in the injury severity measurement in the data provided by the police, the low coverage of the people injured in traffic accidents especially in terms of the threat to public health, and the actual accident sites for the non-registered traffic victims. These problems stress the need for new procedures and indicators for studying both short-term and long-term consequences of traffic injuries.

Objectives and principal goals

The over-arching objectives of this study were to formulate a method to describe the consequences suffered by traffic victims, and to explain the influence of different traffic-engineering factors on these consequences for society and individuals over time. One of the more detailed objectives was to examine whether certain short-term indicators can be used to predict the total consequences of traffic injuries in a long-term perspective.

The principal goal was to create a better understanding of the multidimensional nature of the traffic safety problem. This is a prerequisite for deciding how to allocate resources and traffic safety measures, and to identify changes in traffic safety problems over time.

Method

The approach of the data collection is detailed, as the assumed task is dual, i.e. both to describe the chosen methodology and to report findings from the data gathered. The study was restricted to one year's traffic accident victims that have received treatment at five hospitals; in Karlshamn, Karlskrona, Lidköping, Lund and Umeå, to obtain detailed information about people most severely injured in traffic, and to provide good coverage of all road users. Data were collected with an incidence approach, and in a public health perspective, i.e. including pedestrians injured in single accidents, e.g. when falling on a slippery road surface or stumbling on bare ground. Official statistics were used to contribute data about the killed and the immediate consequences for the injured.

Data about the injured, and the course and site of the accident were collected in an interview of the victims by medical staff in the ER (Emergency Room). Selected medical data were also collected from hospital case records about injury severity, diagnoses and received care. On several occasions up to more than three years after the accident, the victims answered postal questionnaires about their health situation, and the care they have received.

All analyses involved both police and hospital data set. However, the hospital data set was most important for this thesis. The impacts of the consequences were illustrated immediately after the accident, within one month after the accident, and in several long-term perspectives (within six months or more after the accident). The traffic safety problems were expressed in the following indicators: numbers of killed and injured, hospital care, ISS (Injury Severity Score), length of hospital stay and numbers of visits to a doctor or physiotherapist/nurse, length of sick leave and health loss (using the Rosser Index). The effects of six selected traffic-engineering factors on these indicators of consequences were thoroughly analysed. Moreover, the potential of four traffic safety measures were examined.

The traffic safety problems were described in terms of average injury severities, total consequences, and distributions of total consequences. The standard errors were displayed to indicate the range where the value of the selected indicators could be expected with a chosen degree of certainty. For estimating the total consequences, the procedures for the enumerations were based on average severity.

The indicators were also used to obtain a basis for a discussion about how the total consequences resulting from a traffic injury, and an actual traffic safety problem, could best be predicted by preferably one indicator measurable in a short-term perspective. For this purpose, the target indicators were derived from the follow-up performed more than three years after the accident. Combined costs of hospital stay, visits to a doctor and/or a physiotherapist/nurse and sick leave, as well as health loss (Rosser Index) were selected as target indicators. The choice of the most appropriate predictor was based on its capacity, with regard to size and direction, to predict the value of two selected target indicators.

Data

During one year, 1991/92, 1,722 traffic fatalities and injuries were reported by the police in the admittance areas of the five hospitals participating in the study. In the police reports there were 56 fatalities and 427 severe injuries.

The corresponding hospital data set contained 70 % more registered traffic injuries, i.e. 2,915 victims. The hospitals reported a total of 59 fatalities, some (three) of whom died of heart failure in a traffic environment. The number of in-patients was 726.

Within the first month after their traffic accident, 1,833 injured people, about 63 % of all those registered, had answered one or more health inquiries. Of these victims, either not recovered or belonging to a small group who had recovered, 1,177 were asked to describe their health status six months after the accident. About 69 % responded to this request.

Consequences of injuries

The immediate consequences of traffic accidents are usually expressed as numbers of killed and injured. According to the police data set, 3 % of the accident victims were killed, while their share is 2 % in the hospital records. The police classified 25 % as severely injured, while hospital data had 25 % as inpatients. The average injury severity among all people registered by hospitals was ISS 3.5. The relation between the average injury for an inpatient and an outpatient is about 4:1. The total ISS amounts to about 10,200. The distributions of the ISS sum among the dead and the inpatients indicate the heavy burden for society imposed by these victims as compared to that imposed by the outpatients.

The long-term consequences for society more than three years after the accident are on average per victim registered at hospital: 7.6 days of hospital stay, 3.5 visits to a doctor (including the first visit to ER), 6.4 visits to a physiotherapist/nurse, and 15.2 working days in sick leave. The long-term health loss for the individuals in the same time perspective was 59.4 lost days with full health. After this long-term period about 17 % of the traffic victims were not yet fully recovered.

Effect of traffic-engineering factors

Road environment According to the two data sets, the average injury due to a traffic accident was more severe in rural areas than in urban areas, as measured by all indicators except for visits to a doctor.

The immediate total traffic safety problem was more critical among those injured in rural areas in the police data, while the contrary, if not dramatically, was valid in the hospital data. One month after the accident most of the safety problem was found among those injured in urban areas. In a long-term perspective most indicators presented those injured in urban areas as the greater burden for society, while the individuals suffered most health loss from injuries in rural areas.

Road users Immediately after the accident the average severity was higher among injured motorists than among injured cyclists and pedestrians. In a long-term perspective, the average severity was most often greater among injured motorist than among pedestrians. The average severity among injured cyclists was constantly lower.

The immediate total traffic safety problem focused on the motorist when using indicators related to police data. In hospital data, the focus was less distinct due to the cyclists. However, in a long-term perspective the injured motorists represented the greatest burden for both society and the individuals. In spite of this, the traffic safety problems among the unprotected road users were by no means negligible.

Type of accident Irrespective of the time perspective, the average severity was higher among people injured in collisions than in single accidents, according to most indicators used.

The magnitude of the immediate traffic safety problem was greatest for people injured in collisions. That was not so clear in hospital data. In a long-term perspective, the victims in collisions represented the greatest burden for both society and the individuals.

Road design Immediately after the accident the average severity was higher among victims on links than at junctions and in separated areas. Within one month, the average severity for those injured on links and at junctions was rather similar. However, in a long-term perspective, the average severity was most often greater among people injured at junctions than on links. The average severity among people injured in separated areas was constantly lower.

Irrespective of time perspective, the total traffic safety problem was focused to the injured on links, and burdened both society and the individuals. The proportion of traffic safety problems connected with the injured on separated areas declined by time.

Road surface conditions The immediate average severity did not differ obviously between injuries on dry and wet roads. Within one month, the average severity for those injured on wet roads was higher than for those injured on dry roads when measured by most indicators. In a long-term perspective, average severity remained greater among the people injured on wet roads.

Immediately after the accident, those injured on dry road surfaces completely dominated the traffic safety problem irrespective of the indicator chosen. Their traffic safety problems defined by indicators from the police data are especially severe. In any long-term perspective, people injured on dry roads were still the main traffic safety problem.

Light conditions The immediate average severity was highest among people injured in darkness. However, in a long-term perspective, the image of the average severity for different light conditions was not altogether clear. More than three years after the accident, the average severity among people injured in darkness was a little more severe than among those injured in daylight.

Immediately after the accident people injured in daylight conditions completely dominate the magnitude of traffic safety problems irrespective of chosen indicator. In any long-term perspective, people injured in daylight were still the main traffic safety problem.

Unprotected and protected road users in urban areas Immediately after the accident, the vulnerable road users (pedestrians, cyclists and mopedists) were on average more affected by their traffic injuries than the motorists. In a long-term perspective, the consequences for the motorists indicated a need for longer treatments and more health loss than was the case for unprotected road users.

In the short-term, the unprotected road users dominate the image of traffic safety problems in urban areas. In a long-term perspective, the differences were smaller. However, traffic safety problems with regard to consequences in urban areas still mainly involve the unprotected road users.

Motorists on links at different speed limits in total areas Immediately after the accident, the motorists at 110 km/h (the motor-ways were excluded from this analysis for methodological reasons) were more affected by their traffic injuries than those injured at other speed limits. In a long-term perspective, mainly the length of hospital stay and health loss among the motorists in rural areas increased with increased speed limits.

Irrespective of time perspective, the total consequences were the largest among those injured on links in rural areas in the speed limit of 90 km/h.

Cyclists in different types of accidents in urban areas Irrespective of time perspective, the cyclists in urban areas received more severe consequences in collisions with motor vehicles than in single accidents.

With regard to the magnitude of the total consequences, single accidents were the main problem for the cyclists injured in urban areas. However, the few cyclists very severely injured in collisions with motor vehicles also caused substantial long-term effects for society.

Pedestrians in single accidents in different road surface conditions in urban areas The pedestrians injured in single accidents in urban areas were, on average, more affected by the consequences of injuries on slippery road surfaces than those injured on other road surfaces. The injuries suffered by the pedestrians in single accidents had a relatively low severity in this study, and the prolongation of the follow-up period beyond six months did not seem to yield additional information.

Also in terms of the magnitude of the total consequences the main problems among the pedestrians injured in single accidents as that of icy and snowy road conditions.

The indicators as predictors

It would be most attractive, in terms of workload and economy, to recommend one indicator that can be measured with satisfactory reliability, and that can be easily acquired soon after the traffic accident. The results of this thesis show that this is not possible with the indicators included. Therefore the 'ISS' and the 'length of hospital stay within the first month after the accident' were both selected as the best predictors.

'ISS' proved to be the most consistent immediately available indicator throughout the review of the total traffic safety problems. The 'length of hospital stay within the first month' performed in a satisfactory manner in forecasting both societal and individual average injury severity and total safety problems.

Conclusions

This study has revealed that most of the consequences occur during the first six months after the accident and then ebb away for of those injured. After that, a mainly small but important group of victims was still suffering from their injuries, and was contributing considerably to the total accident consequences.

The injury data reported by the police are valuable as a supplement to hospital data, as those killed in traffic can never be fully obtained through hospital data alone. Despite the rarity of the killed, they are essential for

the characterization of the total traffic safety problem, according to the results of this thesis. The police data on injury severity performed also well in prediction of the long-term health losses due to traffic injuries.

Hospital data add knowledge about the extent and distribution of traffic safety problems, and offer possibilities to consider traffic injuries in a more diverse way than data reported by the police.

The analyses indicate that the consequences estimated for injured people registered at the five hospitals included in this study may also be used nationally.

This thesis contributes to more organized and improved knowledge about consequences. With increased knowledge of the extent and distribution of traffic injuries available from the current STRADA system (Swedish Traffic Accident Data Acquisition, i.e. 'The new Swedish accident injury registration system from 2003'), more optimal measures could be selected to reduce traffic safety problems more profoundly in the future.

Sammanfattning

Nollvisionen antagen av Sveriges riksdag fastlägger att ingen skall behöva dödas eller skadas svårt i trafiken i Sverige. Införande av detta begrepp förskjuter fokus från trafikolyckorna till konsekvenserna av trafikolyckorna och härmed skapas förutsättningar för ett paradigmskifte i trafiksäkerhetsarbetet.

För att åstadkomma detta är det nödvändigt och brådskande att uppdatera informationen om trafikskador och dess konsekvenser, då dagens värderingar av de senare baseras på uppgifter insamlade för mer än trettio år sedan. Sedan dess har infrastrukturens utformning blivit ifrågasatt, förändrad och förbättrad. Fordonens köregenskaper har förbättrats. Utvecklingen av aktiva och passiva säkerhetssystem har minskat omfattningen på skadorna. Nya behandlingsmetoder inom kirurgi och farmakologi har sannolikt också minskat bestående konsekvenser.

Problem uppstår till följd av polisens svårigheter att bedöma skadans allvarlighet, den låga och varierande täckningsgraden i rapporteringen av skadade, vilket är ett hot mot folkhälsan, samt att uppgifter saknas om de platser där de icke-rapporterade skadade har varit inblandade i olyckor. Dessa problem understryker betydelsen av nya tillvägagångssätt samt behovet av indikatorer för studier av både kortsiktiga och långsiktiga konsekvenserna av trafikskador.

Syften och mål

De övergripande syftena i studien är att ta fram en metod som kan beskriva konsekvenserna av skador som uppstår i trafiken och att förklara hur olika trafiktekniska faktorer påverkar konsekvenserna av skadan för samhället och individen över tid. Ett mer detaljerat syfte är att undersöka om någon av de kortsiktiga indikatorerna kan användas för att förutsäga trafikskadornas mer långsiktiga konsekvenser.

Målet är att skapa en bättre förståelse för det mångfasettera problemet som bristerna i trafiksäkerhet utgör. Detta är en förutsättning för att kunna besluta om hur resurser skall fördelas och hur åtgärder skall väljas samt att kunna identifiera förändringar i trafiksäkerhetsläget över tid.

Metod

Uppläggningen av datainsamlingen redovisas detaljerat då den påtagna uppgiften är tudelad, dels att beskriva den valda metoden, dels att redovisa resultaten från insamlade uppgifter. Studien har avgränsats till ett års skadade som sökt vård på fem sjukhus i Karlshamn, Karlskrona, Lidköping, Lund och Umeå för att få detaljerade uppgifter om de svårast skadade i trafiken samt en god täckning av samtliga skadade trafikanter.

Datainsamlingen har haft en incidensansats (att fånga nytillkomna skadade under året) samt ett folkhälsoperspektiv (att inkludera fotgängare som skadats i fallolyckor). Officiell statistik har använts för att förmedla upp gifter om de dödade och de omedelbara konsekvenserna för de skadade.

Uppgifter om den skadade, olyckshändelsen och olycksplatsen, insamlas vid en intervju med den skadade av personalen på akutmottagningen. Utvalda medicinska uppgifter hämtas också från den skadades journal, t.ex. om skadans allvarlighet, diagnoser och erhållen vård. Vid flera tillfällen under mer än tre år efter olyckan besvarar de skadade en hälsouppföljning om hälsotillståndet och erhållen vård och omsorg från samhället.

Analyserna omfattar uppgifter från både polis och sjukhus. Sjukhusen är huvudkälla i studien. Konsekvenserna av skadan belyses omedelbart efter olyckan, inom en månad efter olyckan samt i ett mer långsiktigt tidsperspektiv (inom sex månader och längre efter olyckan). Trafiksäkerhetsproblem uttrycks i följande indikatorer: antal dödade och skadade, typ av sjukhusvård, ISS (Injury Severity Score), längd på sjukhusvård, antal besök hos läkare och sjukgymnast/sjuksköterska, längd på sjukskrivning och hälsoförlust (enligt Rosser Index). Påverkan av sex utvalda trafiktekniska faktorer på de här använda indikatorerna har analyserats ingående. Tillika, har potentialen hos fyra områden för trafiksäkerhetshöjande åtgärder studerats.

Trafiksäkerhetsproblemen beskrivs med hjälp av indikatorer i termer av medelallvarlighet på skadan, totala konsekvenser och fördelning av totala konsekvenser. Samtliga standardfel beräknas för att visa i vilken storleksordning som värdet på den utvalda indikatorn kan förväntas ligga vid en vald statistisk säkerhet. Uppskattningen av den totala konsekvensen baseras på skadans medelallvarigheten multiplicerat med förväntat antal skadade.

Indikatorerna användes också för att erhålla ett underlag för en diskussion om hur de sammantagna konsekvenserna av en trafikskada och därmed det faktiska trafiksäkerhetsproblemet bäst kan predikteras med hjälp av någon kortsiktig indikator. För detta ändamål används de två långsiktiga indikatorerna; sammantagna kostnader för sjukvård och sjukskrivning samt hälsoförluster enligt Rosser Index, som facit. Valet av prediktor baseras på dess förmåga att förutsäga verkliga värden för två utvalda facit med avseende storlek och riktning, d.v.s. över- och underskattning, vid en tidpunkt mer än tre år efter olyckan.

Datamaterial

Under ett år, 1991/92, rapporterades 1 722 dödade och skadade i trafiken av polisen i de fem sjukhusens upptagningsområden. Av dessa var 56 avlidna och 427 svårt skadade.

Sjukhusens datamaterial omfattade, ca 70 % fler skadade än i poliskällan, d.v.s. 2 915 dödade och skadade. I detta antal ingick de dödade från den officiella statistiken. Sjukhuskällan uppgav totalt 59 avlidna, varav tre dödsfall till följd av hjärtinfarkt i trafikmiljö. Sammanlagt 726 var inlagda.

1 833 av de skadade i trafiken, eller ca 63 % av samtliga registrerade skadade, besvarade en eller flera enkäter i hälsouppföljningen under den första månaden efter olyckan. Sex månader efter skadan besvarade 1 177 skadade en ny hälsoenkät. Huvuddelen var personer som inte hade återhämtat sig en månad efter olyckan men även ett mindre antal som återfått hälsan blev tillfrågade. Sammanlagd svarsfrekvens var 69 %.

Konsekvenser av trafikskadan

De omedelbara konsekvenserna av trafikolyckor uttrycks oftast i antal dödade och skadade. Enligt poliskällan, avled 3 % av de skadade. Motsvarande andel bland de sjukhusregistrerade var 2 %. Polisen klassificerade 25 % som svårt skadade i trafiken och sjukhuskällan hade lika stor andel inlagda. Medelallvarligheten på en skada i trafiken bland skadade registrerade på sjukhus var ISS 3,5. Förhållandet mellan en genomsnittlig skada i trafiken för de inlagda och de polikliniskt behandlade var ca 4:1. Summa ISS uppgick till ca 10 200. Fördelningen av ISS mellan polikliniskt behandlade och avlidna eller inlagda patienter antyder att samhället drabbas påtagligare den senare gruppens skador.

De långsiktiga konsekvenserna för samhället, d.v.s. mer än tre år och fem månader efter skadan, är i genomsnitt följande per skadad bland de sjukhusregistrerade: 7,6 dagars vård på sjukhus, 3,5 läkarbesök (inräknat det första besöket på akutmottagningen), 6,4 besök hos sjukgymnast och/eller sjuksköterska och sjukskrivning under 15,2 arbetsdagar. De långsiktiga hälsoförlusterna under samma tidsperiod uppskattas till 59,4 förlorade dagar med full hälsa. Efter denna tidsperiod är fortfarande 17 % inte fullständigt återhämtade enligt egen uppgift.

Effekterna av olika trafiktekniska faktorer

Här följer några resultat som kommenterar hur de trafiktekniska faktorerna påverkar genomsnittlig konsekvens och fördelning av den totala konsekvensen.

Bebyggelse Enligt de två datakällorna var den genomsnittliga skadan i trafiken allvarligare på landsbygden än i tätorten för alla indikatorer utom läkarbesök.

De omedelbara konsekvenserna för samhället och individen var mer kritiska för skadade på landsbygden än i tätorterna enligt poliskällan, medan det motsatta gällde för sjukhuskällan. En månad efter olyckan var de skadade i tätorter mest drabbade. Långsiktigt drabbades samhället mest av de som skadats i tätorter, medan individen förlorade mest hälsa till följd av skador på landsbygden.

Trafikanter Omedelbart efter olyckan var den genomsnittliga skadan allvarligare bland bilister jämfört med cyklister och fotgängare. Långsiktigt var bilisterna fortfarande mest utsatta följt av fotgängarna. Cyklisternas genomsnittliga allvarlighet var genomgående lägre.

Det omedelbara sammanlagda trafiksäkerhetsproblemet koncentrerades till bilisterna i poliskällan, medan i sjukhuskällan hade cyklisterna det största problemet. I det långsiktiga perspektivet utgjorde bilisterna den största börden för samhället och för individen själv. Trots detta, var trafiksäkerhetsproblemet inte på något sätt negligerbart bland de oskyddade trafikanterna.

Olyckstyp Oavsett tidpunkt var den genomsnittliga skadan allvarligare bland skadade i kollisioner än i singelolyckor enligt de flesta indikatorerna.

Kollisionsolyckorna bidrog till de allvarligaste omedelbara konsekvenserna för trafiksäkerheten enligt poliskällan. Detta framgick inte lika tydligt av sjukhuskällan. I ett långtidsperspektiv framstod det dock klar att kollisionsolyckorna utgjorde det stora problemet i trafiken både för samhället och individen.

Vägutformning Omedelbart efter olyckan var den genomsnittliga skadan allvarligare bland skadade på sträckor än i både korsningar och på separerade ytor. I ett månadsperspektiv uppfattades allvarligheten i skadorna som förhållandevis likartade mellan sträckor och korsningar. I ett långtidsperspektiv däremot var den genomsnittliga skadan oftast svårast i korsningarna. Allvarligheten var alltid lindrigast på separerade ytor.

Oavsett tidsperspektiv var skadeproblemet i trafiken koncentrerat till sträckorna sett både ur samhällets och den enskildes perspektiv. Olyckorna på separerade ytor bidrog i allt mindre utsträckning när tidsperspektivet ökade.

Väglag Den omedelbara genomsnittliga skadan efter olyckor på torra och våta vägbanor skiljde sig inte nämnvärt åt. Inom en månad framstod de skadade på vått underlag som de svårast drabbade, mätt i flertalet av indikatorerna. Även i ett långsiktigt perspektiv uppfattades genomsnittsskadan som mest omfattande efter olyckor på vått underlag.

Oavsett indikator och tidsperspektiv utgjorde de skadade vid torrt väglag det största totala hotet för trafiksäkerheten. Problemet var allra mest uttalat vid analysen av skadade i poliskällan.

Ljusförhållande Den omedelbara genomsnittsskadan var svårast bland skadade i mörker. I ett långtidsperspektiv var bilden av problemet i trafiken inte lika uppenbar, då allvarligheten mellan skador i mörker och i dagsljus började utjämnas.

Omedelbart efter skadan dominerades det sammantagna trafiksäkerhetsproblemet helt av skadade under dagsljusförhållanden. Detta resultat kvarstod även i ett längre tidsperspektiv.

Oskyddade och skyddade trafikanter i tätort Omedelbart efter olyckan drabbades de oskyddade trafikanterna (här fotgängare, cyklister och mopedister) av en svårare genomsnittlig skada än bilisterna. I ett långtidsperspektiv framstod emellertid bilisternas genomsnittliga skada som allvarligare både för samhället och för individen bl.a. genom sin relativt stora andel whiplashskador.

Genast efter olyckan dominerade de oskyddade trafikanterna helt skadeproblemet i tätorterna. I ett längre tidsperspektiv blev de påtagliga skillnaderna något mindre, men de oskyddade trafikanterna framstod fortfarande som mest utsatta.

Bilister på sträckor i olika hastighetsmiljöer på landsbygden Omedelbart efter olyckan drabbades bilisterna på vägar med hastighetsbegränsningen 110 km/h (motorvägarna är exkluderade i analysen) av den svåraste genomsnittliga skadan. I ett långtidsperspektiv påverkades huvudsakligen längden på sjukhusvistelsen och omfattningen på hälsoförlusterna till följd av skadan när hastighetsbegränsningen ökade.

Oavsett tidsperspektiv var de sammantagna konsekvenserna för samhälle och individ störst till följd av de skador som uppstod till följd av olyckor i hastighetsmiljöerna 90 km/h.

Cyklister i olika typer av olyckor i tätort Oavsett tidsperspektiv fick de cyklister som skadats i kollisioner med motorfordon i tätort de svåraste genomsnittliga skadorna.

Konsekvenserna av singelolyckor bland cyklister utgjorde totalt sett det allvarligast hotet mot trafiksäkerheten i tätorter. Några få mycket svårt skadade cyklister i kollisioner med bilister gav dock samhället påtagliga långsiktiga problem.

Fotgängare i singelolyckor på olika väglag i tätort Fotgängare skadade på isiga och/eller snöiga vägbanor fick svårare genomsnittlig skada än de som fallit på andra typer av väglag. I denna studie framstod emellertid skadans genomsnittliga allvarlighet som förhållandevis lindrig, då uppföljningarna längre än sex månader efter skadan inte bidrog med ny information.

Omfattningen av den totala konsekvensen för fotgängare till följd av singelolyckor (genom halka eller snubbling) i tätort dominerades helt av skador på vinterväglag.

Indikatorer som prediktorer

Att kunna rekommendera en enda indikator som den mest optimala prediktorn vore tilltalande både ur arbetsbelastnings- och ekonomisk aspekt. Den skall tillika helst kunna nås lätt och i nära anslutning till olyckan. Resultaten indikerar dock att detta inte är möjligt med den metod och de indikatorer som använts i denna studie. Därför förslås två lämpliga prediktorer, ”ISS” och ”vårdtid på sjukhus, första månaden efter olyckan”.

”ISS” visar sig vara den bästa omedelbara indikatorn att förutsäga kommande totala långsiktiga konsekvenser, medan ”vårdtid på sjukhus, första månaden efter olyckan” ganska väl kan prognostisera både den genomsnittliga skadan samt de totala trafiksäkerhetskonsekvenserna för samhället och individen.

Slutsatser

Av förklarliga skäl uppstår merparten av konsekvenserna för trafiksäkerheten nära skadetillfället, här definierat som inom de första sex månaderna. Efter det bidrar, en mindre, men mycket viktigt grupp skadade med ett långsiktigt tillskott som påtagligt påverkar de totala konsekvenserna och i vissa fall förändrar problembilden i ett långsiktigt perspektiv.

Uppgifter i poliskällan är värdefulla som komplement till uppgifter insamlade på sjukhus om de skadade. I dagsläget nås inte alla avlidna i trafiken i sjukhuskällan. Detta är allvarligt eftersom informationen om de avlidna är viktig för en rättvisande beskrivning av trafiksäkerhetsproblemet.

Värdet av sjukhuskällan ligger i dess potential att tillföra ny kunskap om både omfattningen och fördelningen av trafiksäkerhetsproblem och samtidigt erbjuds möjligheter att belysa och analysera trafikskadorna mer objektivt och mångfasetterat än vad som idag kan ske i den officiella statistiken.

De genomförda analyserna antyder att de framtagna resultaten i denna studie också bör kunna användas i trafiksäkerhetsarbetet på nationell nivå.

Avhandlingen bidrar till mer systematiserade och förbättrade kunskaper om skador i trafiken. Tillsammans med utökade kunskaper om omfattning och fördelning av trafikskador hämtade från STRADA systemet (Swedish Traffic Accident Data Acquisition), d.v.s. det nya skaderegistret som skall tas i mer allmänt bruk under år 2003 kan på sikt mer optimala åtgärder väljas för att minska trafiksäkerhetsproblemen i Sverige i framtiden.

1 Introduction

1.1 Background

The *Zero Vision* states that nobody should be killed or severely injured in road traffic accidents in Sweden (SNRA, 1996). The introduction of this concept transfers the main focus from the occurrence of road traffic accidents to their consequences and consequently creates postulations of a new paradigm for traffic safety approaches. Hence, the emphasis is moved from reducing the number of accidents to eliminating the risk of death and chronic health impairment caused by road accidents.

The expression *chronic health impairment* also indicates a more precise definition associated with long-term and/or serious loss of health rather than only the immediate consequences of an accident. *Chronic* is derived from Greek *cronos* (time) and is normally used as a term for the process of a disease with a lengthy course. Per definition, *chronic health impairment* ought to be a condition of long-term effects close to *lifelong disability*.

How do we then, in practice, define "killed" or "severely injured" in a road traffic accident? In most industrial countries, a generally established definition of "killed" in a road traffic accident is "dead within thirty days due to injuries from a road traffic accident" (SNRA, 1998). In Swedish official statistics, the definition of "severely injured" is based on injury in police-reported traffic accidents and refers to a person who has suffered a fracture, contusion, laceration, serious cut, concussion, internal injury or any other injury resulting in in-patient care. This judgement is often made by the policeman at the accident site.

Various early studies (Bunketorp, Nilsson 1986 and 1988, Thulin 1987, Berntman 1994, Berntman et al. 1995, Björnstig et al. 1995) present the difficulties attached to this task. The responsibility for the medical judgement of injuries rests with the police and ought to be questioned, especially as the accuracy varies both over time and between different parts of Sweden. Björnstig et al. (1995) suggested a more distinct definition of "severely injured" like the in-patient care at hospital or the in-patient care in combination with the Abbreviated Injury Scale (AIS)[1] Björnstig, Björnstig, 2000).

Another strictly medically defined measure, the Injury Severity Score (ISS)[2], can also be used for this purpose and contribute to information on, above all, the immediate consequences. The most severely injured, i.e.

[1] A scale used to estimate the degree of severity of an injury
[2] A measure to connect the effects of multiple injuries based on the three most severe injuries in six selected regions of the body

ISS 9 and above, (less than 10 % of all hospitalized traffic casualties according to Berntman, 1994) generate about 75 % of all cost of care during the first six months after the accident, i. e. the severe injuries often require long in-patient care.

None of these descriptions of “severely injured” explicitly expresses any considerations of the long-term outcome. Thorson (1975), on the other hand, has studied the long-term effects of road traffic accidents and found that about 50 % of the in-patients were suffering from some after-effect of the traffic injury four to five years after the accident. *Three levels of physical effects* were discerned: a moderate physical problem remaining, e.g. intermittent ache or swelling (38 %); a more serious impairment but not quite disabling symptoms, e.g. impaired walk and balance or deteriorated concentration (9 %); an even more serious symptom, e.g. restricted mobility (cannot walk without crutches) and/or continuous pain resulting in a need for care in daily activities (3 %). *The psychological effects* (about 7 %) were anxieties due to disfiguring scars or neurasthenic reactions resulting in continuous pain. *The social effects* (about 18 %) were e. g. increased costs not covered by insurance, change of jobs or spare time occupations. Accordingly, measuring these traffic accident consequences can hardly be done by routine.

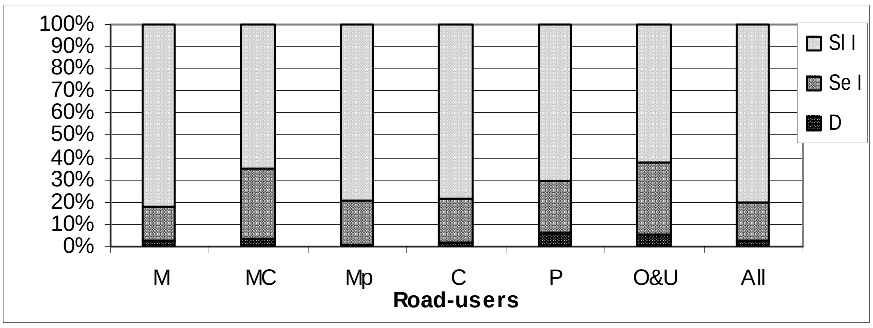
Haukeland (1991) describes the consequences of traffic accidents in Norway in both short-term (two months) and long-term (½ - 4 ½ years) perspectives. Headache, fatigue and anxiety about traffic are common inconveniences, and 57 % of the injured are still in pain after two months. A majority of the occupational workers have been on sick leave and 1/3 still are. Pain is a long-term effect of many traffic casualties. Two years after the accident, 40 % are still suffering from pain. This trouble seems to settle at that level and is not reduced. Head, neck, back and leg are most exposed. Accordingly, a large proportion of the injured have permanent health problems - of a physical as well as a mental nature which affect their ability to function in daily life and reduce their well-being and quality of life.

In a-state-of-the-art study of the psychosocial consequences of traffic accidents, Andersson and Allebeck (1997) report on a post-traumatic stress syndrome for 10 % to 15 % of the traffic casualties from a period of six months to six years after accidents.

Cedervall and Persson (1988) have used the results from Thorson (1975) to classify the severely injured (injured with in-patient care) into four subgroups from those with remaining consequences up until one year (85%) to those in need of chronic in-patient care (0.5 %). These measures form the basis of the evaluation of the costs of people who are killed, severely and slightly injured in road traffic accidents used e. g. in the present cost-benefit models to prioritize traffic safety measures and decisions on the building of new roads.

How can "traffic safety" be adequately expressed and defined? Hauer (1997) states that road safety is manifest in the occurrence of traffic accidents and the harm they cause, and suggests a wider definition of the "safety of an entity" as: *"the number of accidents (crashes), or accident consequences, by kind and severity, expected to occur on the entity during a specified period"*. Consequently risk should be regarded as an underlying stable property that has the nature of a long-term average. The term *expected* is here used as in the theory of probability and corresponds to *average in the long run*. The latter phrase is not easily interpreted, which makes statistical estimation difficult because the transport system is dynamic and conditions rarely stay the same for long periods of time.

What routine tools are then accessible for such a purpose? The official statistics of traffic injuries, for instance, present data about who, when, how and where injuries are received in the road traffic system. Some selected Swedish data from 2001 are presented below (SIKA, 2001). Motorists are most liable to suffer road traffic accidents. About two of three people killed or severely injured in road traffic accidents are motorists. Among vulnerable road users, more cyclists than pedestrians are injured (see Table B1.1 in Appendix B).

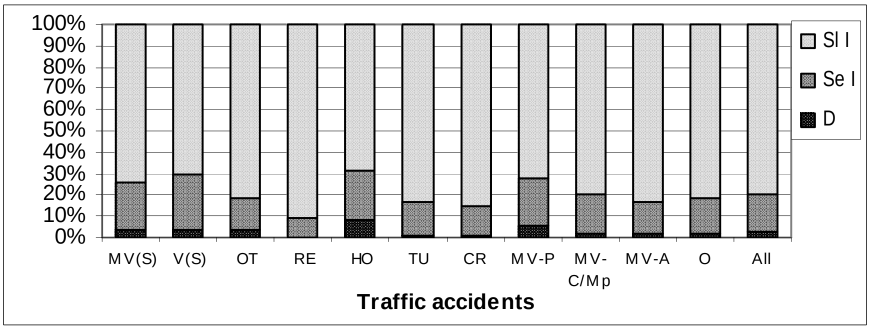


Abbreviations: M=motorists, MC=motorcyclists, Mp=mopedists, C=cyclists, P=pedestrians, O&U=others and unknown

Figure 1.1 Killed, severely and slightly injured in 2001, distributed over road users according to official statistics (SIKA, 2001)

However, the proportions of killed and severely injured road users are highest among pedestrians and motorcyclists; see Figure 1.1. The vulnerability of pedestrians is caused by their involvement in collisions, while other high kinetic energy situations also strike the motorcyclists.

Collisions, i.e. accidents involving more than one vehicle, generate the majority of injuries in road traffic accidents, or about three out of four traffic victims. A more detailed study of different types of accidents discloses, however, that single accidents with motor vehicles are the most frequent and serious road traffic accidents with personal injury, while crossing and rear-end accidents are the most frequent types of collisions leading to road traffic accidents with personal injury (see Table B1.2 in Appendix B).



Abbreviations: MV(S)=single accidents with motor vehicle, V(S)=single accidents with one vehicle involved, OT=overtaking, RE=rear-end, HO=head-on, TU=turning in junctions, same directions, CR=crossing in junctions, with or without turning, MV-P=accidents involving a motor vehicle and a pedestrian, MV-C/Mp=accidents involving a motor vehicle and a cyclist or mopedist, MV-A=accidents involving a motor vehicle and an animal, O=others

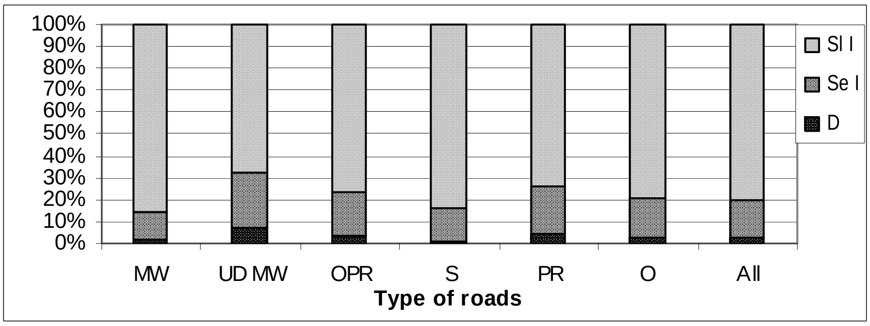
Figure 1.2 *Killed, severely and slightly injured in 2001, distributed over type of road traffic accidents*[3] *according to official statistics (SIKA, 2001)*

Victims in head-on accidents and pedestrians in collisions are more likely to be killed or severely injured (see Figure 1.2) as these types of accidents involve high kinetic energy. Rear-end, crossing and turning accidents, on the other hand, mostly result in slight injuries in a short-term perspective.

The police-reported traffic victims are rather equally distributed over urban and rural areas. The probability of being killed is higher in rural areas than in urban areas. Also, the proportion of severely injured people in road traffic accidents is somewhat higher in rural areas than in urban areas (see Table B1.3 in Appendix B).

More than half of the casualties are involved in accidents on other public roads than motorways and undivided motorways, mostly in rural areas. A large number of injuries occur in the streets (see Table B1.4, Appendix B).

[3] The definitions of the used traffic accidents are to be found in Appendix A



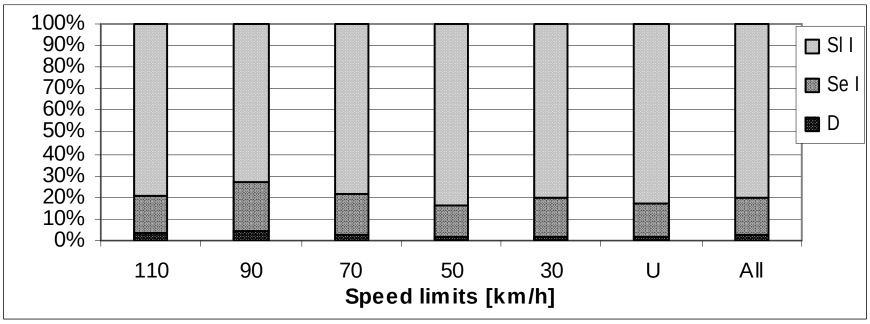
Abbreviations: MW=motorways, UD MW=undivided motorways, OPR=other public roads, S=streets, PR=private roads, O=others

Figure 1.3 *Killed, severely and slightly injured in 2001, distributed over type of roads according to official statistics (SIKA, 2001)*

The pattern of injury consequences (see Figure 1.3) is somewhat different. Undivided motorways and private roads generate a higher proportion of fatal casualties than the average road. A combination of high speed and junctions may explain the casualties on undivided motorways, while a general low geometrical standard probably contributes to the deaths on private roads. The proportion of severe injuries on other public roads is close to that on private roads. A high frequency of hazards in these road environments can be one explanation. The low injury consequences on motorways are likely to be due to the separation of oncoming traffic and the interchanges.

Two out of five are injured in streets with a speed limit of 50 km/h. The number of casualties is rather similar on roads with speed limits of 70 km/h and 90 km/h respectively (see Table B1.5 in Appendix B).

The contribution of speed to injury severity is illustrated by the roads with speed limits of 90 kph and 110 kph (Figure 1.4). However, as shown in Figure 1.3, motorways are an exception to the latter. Note the reduced proportion of fatal casualties with declining speed limits.



Abbreviation: U=Unknown

Figure 1.4 *Killed, severely and slightly injured in 2001, distributed over speed limits according to official statistics (SIKA, 2001)*

This presentation has shown the one-dimensional official image of how, where and by whom injuries are received in the road traffic system. However, the coverage of traffic accidents and traffic casualties in the official statistics is relatively poor and unevenly distributed. Two nationwide postal surveys indicate that only half of all road traffic accidents resulting in personal injury are reported to the police and that only somewhat more than one third of all traffic casualties are included in the official statistics (SCB, 1987). The coverage varies with the severity of injury, from about three out of five victims among the severely injured to one out of three victims among the slightly injured.

The latter investigation from 1982 and 1983 (SCB, 1987) also indicates different coverage among injured road users. Pedestrians involved in collisions have the highest coverage among the casualties, or somewhat more than 50 %, but due to their low numbers, the lowest degree of calculated reliability. Our knowledge of injured motorists is rather similar to that of pedestrians, while the data available about cyclists is very limited; only one out of seven casualties is included in the official statistics.

A hospital-based registration of traffic injuries in 1988 - 1989, including single accidents involving pedestrians, at Lund University Hospital (Berntman, 1994) presents a different distribution of injuries compared to that of the local official road traffic statistics (see Table B1.6 in Appendix B). The shares of injured cyclists and pedestrians are dramatically larger, and correspondingly, the share of injured motorists is smaller, and at approximately the same level as that of the cyclists. The police-reported injured people in the eight municipalities (the geographical admittance area of the hospital) display a relatively good conformity with the distribution of injured road users on the national level.

Larsson (1999) has used a nine-year time series from the National Board of Health and Welfare in-patient register to shed more light on severely[4] injured road users, the type of accidents they are involved in and the treatments they received. In 1996 the actual number of severe traffic casualties, not including pedestrians injured in single accidents, is estimated to about 12,300, a figure about three times larger than that in the official statistics. The study highlights the seriousness of the problem of cyclists, especially those in single accidents or in collisions with others than motor vehicles, thereby focusing unprotected road users (see Table B1.7 in Appendix B).

The distributions of in-patient registered traffic casualties at Lund University Hospital from the beginning of the nineties (see Table B1.8 in Appendix B) correspond rather well with those later found by Larsson (1999) in the National Board of Health and Welfare in-patient register for 1988-96. The data on injured pedestrians in single accidents was collected on the registration at the Emergency Room but is incomplete. This information about pedestrians and cyclists injured in single accidents also changes the focus regarding accident sites from a rather balanced distribution between junctions and links towards links as the crucial problem areas (see Tables B1.9 and B1.10 in Appendix B).

In spite of better knowledge about the low coverage among road users the problem found by Berntman (1994) still remains, namely that hospital-registered injured cyclists and pedestrians (mostly in single accidents) are injured in other places than those injured according to the police reports. The most significant difference between the two sources is those injured on footpaths and bicycle paths, constituting more than 10 % of all injuries the hospital data. However, an even more serious problem is the inability to collect data about the accident site in the Emergency Room situation. The percentage of casualties with unknown accident sites varied between 33 and 14 during two successive years.

Complementing the official statistics with hospital data is not sufficient, as there are traffic accidents and resulting injuries that remain unknown since i.e. medical and dental care centers do not routinely participate in these registrations. Thulin (2001) found a relation of about 4.5:1 in Skaraborg county 1998 when comparing the registration of casualties at hospitals and medical and dental care centers with that of the police. Björnstig and

[4] A severely injured person is one receiving in-patient care for an injury in a road traffic accident.

Björnstig (2000) presented a similar relation from medical care data in Umeå police district, where the share of accident victims obtaining medical treatment outside hospitals is also estimated to be about 10 %. A recent evaluation of traffic casualties registered by the hospitals and the police in Skåne county 2001 by STRADA[5] data gave a relation of about 2.3:1. Some of the reasons for not being reported by the police or the hospitals are the very low severity of the injuries, misclassification of injuries at hospitals as not being traffic-related, and the strong reduction of the traffic police force or the heavy work load in general.

The uncertainty of the actual traffic injury problems probably contributes to the difficulties of achieving the Swedish operational goals set for 2000 as a maximum of 400 killed and 3,700 severely injured [police-reported] (SNRA, 1999b). To compensate for or improve our incomplete knowledge about the actual traffic safety problems, sources supplementary to that of the police must be used. These sources must be able to deliver data from the accident and the accident site as well as the care of the injured and the consequences for their lives.

The necessity of updating our knowledge about the influence of different traffic-engineering factors on the consequences of traffic injuries, especially on severe ones is urgent, as today's valuation is based on data collected by Thorson (1975) from 1965 (children) and 1966 (adults). During three decades, the infrastructure design has been questioned, altered, and improved. At the same time vehicle performance, e.g. acceleration and speed capacity has increased. The development of active safety systems, like ABS brakes, maneuverability and visibility, in particular passive safety systems, like safety belts (Evans, 1987), air bags and helmets, has decreased the injuries received. At the same time new treatments, e.g. in surgery techniques and pharmacology, are most likely to have improved the outcome of the acquired injury (Schalén, 1992).

The lack of validity in the injury-severity measurement of the police-reported data used, the low coverage of the actual casualties in traffic accidents, especially in terms of threat to public health and the actual accident sites for non-registered traffic casualties, all stress the need for a new indicator taking both the short-term and long-term consequences of traffic injuries into account. Acquiring knowledge about how this indicator is influenced by those involved, the type of accident, and the circumstances at the accident site, is also important. The need for more sophisticated data is urgent in order to verify whether we fulfil the goals of traffic safety work or not.

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5 STRADA stands for Swedish Traffic Accident Data Acquisition, which is a joint database for traffic injuries registered by the police and hospitals initiated in 1999.

1.2 Objectives and scope

The over-arching objectives of this study are to formulate a method to describe the consequences suffered by traffic casualties, and to explain the influence of different traffic-engineering factors on these consequences for society and individuals over time.

The more detailed objectives of this study are to discuss and analyze:

- *traffic safety problems in terms of valid indicators of the consequences for society and for the individuals, both in the short-term and long-term perspectives.*

- *how the total consequences of road accidents for society are related to different traffic-engineering factors, in the short-term and long-term perspectives.*

- *how injury severity is related to different traffic-engineering factors, in the short- term and long-term perspectives.*

- *the accuracy of data on accidents and their consequences obtained by the methods currently used.*

- *if certain short-term indicators can be used to predict the total consequences of traffic injuries in the long- term perspective.*

- *the possibility to investigate the effects of single factors on traffic safety by using some examples.*

The study is aimed at creating a better understanding of the multidimensional nature of the traffic safety problem. This knowledge is needed to decide how to allocate resources and traffic safety measures, and to identify changes in traffic safety problems over time.

The study is restricted to one year’s traffic accident victims that have received treatment at hospitals. This delimitation is made deliberately in order to gain detailed information about the most severely injured in traffic, and to give a good coverage of all road users. By using hospital data, the definition of a “traffic casualty” thus makes it possible to extend the coverage to pedestrians injured in fall accidents, i.e. to give the investigation a public health approach. However, in hospital-registered data the geographical admittance area is difficult to define and does not necessarily correspond to that of the police districts, which complicates comparisons with official statistics. A sample of five hospitals is used in the study. The official statistics have been used to contribute data about fatal casualties in the assumed admittance areas of these five hospitals.

1.3 Organization

The definitions, concepts and abbreviations used are found in Appendix A. Only selected terms are presented. Most definitions are gathered from either SCB (1987) or SIKA (2001).

In *Chapter 2,* the main hypotheses are outlined together with brief underlying explanations.

C*hapter 3* describes the method of data collection as well as the basic properties of the data. A detailed account is given of the longitudinal study to emphasize the importance of the method of the data collection process for the reliability and accuracy of the data. The characteristics of the variables selected are presented together with the procedures for the enumerations based on average severity for estimating the total consequences. In this chapter the statistical tests used are also presented.

In *Chapter 4,* the hospital and police data sets are described together with the improved coverage reached by matching the two data sets and co-using supplementary information. Data are collected by means of an incidence approach. The casualties answering the health inquiries are presented.

C*hapters 5 to 8* present the results of the analyses. *Chapter 5* reports on how the 13 indicators of consequences selected are affected by the time passed after the accident. Two time perspectives are used; immediately and one month and more than one month after the accident, i.e. the short-term and long-term perspectives, respectively. In *Chapter 6,* the consequences are discussed in relation to six selected traffic-engineering factors. The issue here is how total consequences are distributed, and how average consequences vary, over the traffic system. Consequences are described by different indicators relevant for society and individuals, and in different time perspectives after the accident. In *Chapter 7,* more detailed analyses are applied. The aim here is to approach the issue of the causal influence that traffic-engineering factors may have on accident severity and total consequences. To this aim, the analyses are based on relevant subsets of data, thus controlling for potential confounding variables. *Chapter 8,* finally, examines the indicators in terms of their ability to predict more long-term consequences.

In *Chapter 9,* conclusions are drawn and recommendations are given for further research and development.

2 Hypotheses

With regard to the objectives of the study, the following hypotheses are to be tested:

- *Different traffic-engineering factors affect injury severity in different ways.*

The consequences suffered by road users, measured as injury severity, are dependent on the factors involved in the accident situations. Some factors, e.g. speed, protection and road environment planning, have a great impact on injury severity.

- *Different traffic-engineering factors affect the distribution of the total consequences in different ways.*

The total consequences are dependent on both the number of road users injured in traffic accidents and the severity of their injuries.

- *The consequences of traffic injuries change depending on when the follow-up is performed.*

Most injured people have pain and feel powerless the first days after a traffic accident. These consequences are likely to decline over time, as most minor injuries have short durations. However, the majority of the severe and critical injuries have a more lengthy recovery course. Some injuries, e.g. extensive brain damage, also have a bad recovery prognosis and result in disabilities.

- *The consequences of traffic injuries, in terms of content, extent and distribution are dependent on the data source used, e.g., as here, either the hospital or the police.*

Earlier research has established that the traffic injuries reported by hospitals differ from those reported by the police. Hence, it is likely that the consequences described in detail by medical experts will give a different view of traffic safety problems than the official statistics based on police reports.

- *Certain immediate as well as short-term indicators can be used as predictors of more long-term consequences.*

In most cases there is probably a relation between the severity of the initial injury and the care and treatment received to restore health. Most hospital-based indicators are handled by medically educated personnel in order to minimize the subjective influence on the judgments and are therefore reliable. One possible candidate for such a short-term indicator is ISS.

3 Method

3.1 Collecting the data

The methodology was chosen to contribute to a better knowledge of both the short-term and the long-term consequences of traffic injuries for victims in traffic accidents and of the relationship between injury consequences and factors related to traffic engineering.

The method is based on the needs described below**,** following the hypotheses formulated:

- to define the concepts of "traffic casualty" and "accident site"
- to choose the data source that can supply data about the defined traffic casualty as well as traffic- engineering factors
- to discuss the appropriate time period for a short-term study of the long-term consequences of a traffic injury
- to choose one tool to establish the health consequences of an injury
- to discuss the implications of generalising the results from this study based on data from a few geographical areas only.

The public health perspective results in a definition of a "traffic casualty" as*: 'a person injured in a traffic accident at a public place where at least one moving vehicle is involved or a person on foot is injured in a fall'*. The definition used for an "accident site" is *'a public place used for vehicle traffic or walking, i.e. a road, street, square, bicycle path, footpath, bus lane, bus stop, terminal, parking area or other public place'*. The latter eliminates private grounds, working premises, school yards, etc.

The hospital has been selected as the main source for supplying data about the traffic casualties. Since we had previously experienced that newly started systems of registering traffic injuries at hospitals take some time to stabilise on a certain quality level, we required that the hospitals involved should have an on-going registration of traffic victims. The Nordic Road Association (1986) recommends that these on-going registrations should include <u>all</u> casualties, i.e. not just traffic victims, to obtain a high quality. This was not always possible to fulfil when selecting the hospital sample.

The time period for the short-term effects was selected in accordance with the definition accepted by the ECE in connection with deaths in a traffic accident, i.e. 30 days (or a month). The long-term consequences are assumed to begin after one month and, in this study, are restricted to a follow-up period from six months and one year up to three years and five months for the population. This longitudinal approach was adopted in order to study additional health care costs and individual consequences, as well as whether and how these are changing the presented images of the traffic safety problem.

Based on experiences of the medical, technical, and economic disciplines it was decided at an early stage that the appraisal of the health consequences of a traffic accident must be made both by the medical profession and the victim. The selection of an index provides a tool for describing and valuing the health-related quality of life. The consequences for the health of the victims were measured with two different health indices and a “Thermometer”. These indices are somewhat differently designed, but are most often based on such common denominators as pain, discomfort and reduced mobility. However, before analysing the data it was decided to include one index only in this study in order to reduce the workload.

The number of hospitals involved had to be restricted for economic reasons to a lower number than had been judged necessary for the reliability. This had an effect on the geographical distribution of hospitals and the representation of different types of hospitals, and consequently on the possibility to generalise the results obtained.

3.1.1 Target population and data sources

The basis for the study is traffic casualties in accidents in selected geographical areas during one year. The dark framed area shown in Figure 3.1 illustrates the target population from hospitals and the police, respectively. Victims with slight injuries treated in other medical care centers than hospitals or without any injuries are not included in this study. However, the slightly injured are well represented among the hospital-registered, and even a small group of not injured is found (and included) in this hospital data set.

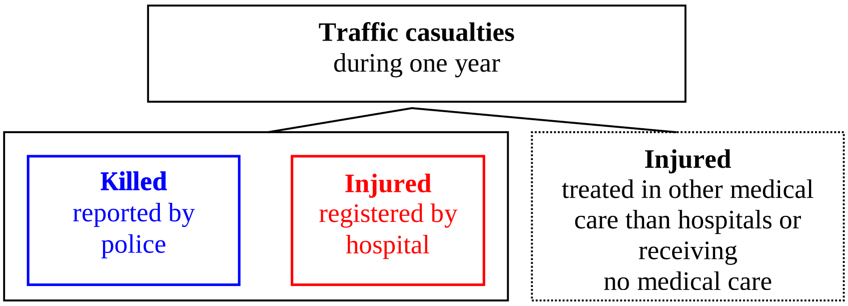


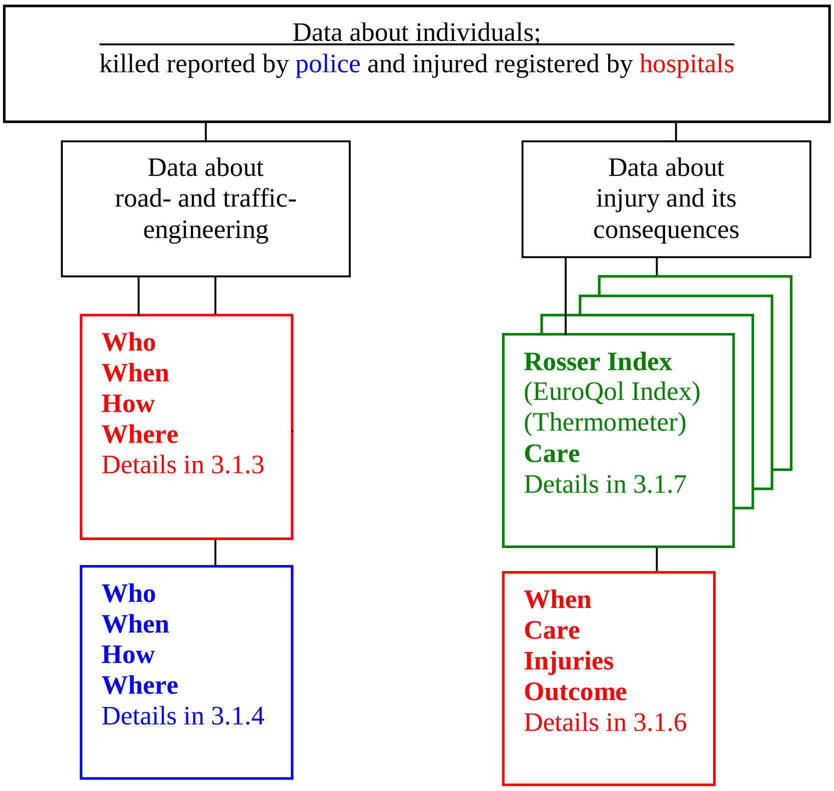
Figure 3.1 *Those killed as reported by the police (blue) and injured as registered by hospitals (red) involved in traffic accidents constitute the target population in this study*

The police-reported data were rejected as the main source of information about the casualties due to lack of reliability or low coverage (Bunketorp, 1986), (Björnstig and Björnstig, 2000) and poor validity as a measure of the severity of an injury (Berntman, 1994), (Björnstig, 1995). Instead, the hospitals were selected as the main data source to offer possibilities for a medical judgement of the severity and the location of the injury sustained, but also to shed better light on the traffic safety problems of all unprotected road users. By using hospital data we were also able to include pedestrians injured in single accidents (who are not defined in the official statistics as casualties in traffic accidents) to gain the desired public health approach to the study. One further reason for selecting hospitals as a source was to obtain data about victims in in-patient care, e.g. the most severely injured.

Hospital data, however, only provide limited information about the fatalities in traffic. The police reports, on the other hand, give a good coverage of the road users killed, especially those who died on the accident site. Accordingly, the police data are mainly used to deliver information about deaths in traffic accidents and, in the second place, to supplement the collected hospital data when shortcomings occurred. However, this support is only possible for a small part of the hospital-registered traffic casualties, i.e. the joint part. The "joint part" is a term used for victims registered both in the police and hospital data sets (for more information, see 3.1.5). The data most wanted is information about the accident site, which is hard to gain as the course of the accident is considered to contribute more to the decision about the treatment of the patient than the location. Often the patient does not remember many details about the accident site during the interview at hospital.

The Emergency Room was selected as the location for the hospital interviews. This was done in order to get in touch with the traffic victim as soon as possible after the accident. The delicate task of interviewing a traffic victim immediately after being involved in an accident requires an atmosphere of comfort and professionalism that only experienced hospital staff posses. Besides, most of the questions posed must be put to the patient by them anyway in order for them to be able to provide adequate treatment.

The sources and types of the data collected are shown in Figure 3.2.



Definition of sources: red = hospital, blue = police, green = the injured interviewed

Figure 3.2 Different sources of data about road and traffic engineering aspects and injuries and their consequences

The geographical area of the study was defined as the admittance areas of the co-operating hospitals. However, the geographical delimitation is complicated by the fact that it is often unclear, what hospital an ambulance transport is directed to from the accident site. The delivery of casualties is influenced by the severity and type of injuries but also by the distance to the nearest hospital, especially in the peripheral part of a hospital's admittance area. The staff at each hospital has assisted in defining the municipalities involved (see Map 1 in Appendix C).

A dropout analysis was carried out at only one hospital during the study, and the results were published by Berntman (1994) in a licentiate thesis.

The police reports from all road traffic accidents with personal injury were collected in a geographical area as close as possible to the respective admittance area of the hospitals, i.e. the same municipalities as the respective admittance areas of the hospitals. The police commissioners in the different police districts were informed about the traffic injury registration at the hospitals and were asked to deliver all police reports from traffic accidents with injuries in the area selected. However, the individual police officers were not made aware of the on-going study so that their normal practice would not be affected.

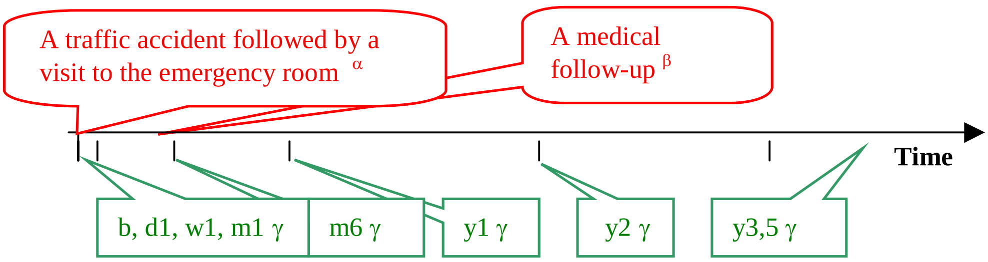
3.1.2 The longitudinal study of the injured

The method is based on a longitudinal investigation of individual traffic victims, shown in Figure 3.3. All the information was collected from the casualties either through interviews conducted by medical personnel or by questionnaires sent to them at different times after the accident.

The following three types of inquiries were performed:

- α the initial interview with the injured by medical staff
- β selected medical data collected from hospital case records by medical personnel
- γ questionnaires on several occasions answered by the injured themselves or with the help of a relative.

Events involved in the process:
Crash, post-crash



Definition of sources: red = hospital, green = the injured interviewed.
Abbreviations: b=before, d = day, w = week, m = month/s, y = year/s

Figure 3.3 The established process for different data surveys about road and traffic- engineering factors and injuries and their consequences at selected time periods among hospital-registered injured

The road- and traffic-engineering data were collected as close to the crash occasion as possible in the emergency room at the hospitals.

The periods of time for the health follow-ups were selected to find out how the consequences changed over time, and which are the crucial points of time with regard to these changes. A “short-term effect” is defined as lasting up until one month after a traffic accident. After one month, the consequences are considered as more “long-term effects”. The follow-ups, six months and later, were selected to study the duration and extent of these consequences.

The longitudinal health follow-up was carried out among all traffic casualties who had not recovered their previous health status six months, one year, two years and three years and five months after accident involvement. The health follow-up only ended when the victim gained the same health status as before being involved in the accident, or when the patient did not answer the health questionnaire after two reminders. A small sample of the injured, i.e. “remaining injured” from two hospitals had their follow-ups extended and were contacted eight to nine years after the accident in order to learn if any changes had occurred in their health conditions during these additional years. However, these results are analysed but not presented in this thesis.

A medical follow-up that started at the earliest six months after the accident was also performed. This time space was selected to obtain as much knowledge as possible about the diagnoses and most of the information about the hospital stay for most injured, on the first follow-up occasion.

3.1.3 Data from interviews with the patients at the hospitals

The initial interview took place in connection with the medical care offered at the hospital. A questionnaire prepared in advance has proved to be the only possible way to obtain the desired information, as it has been shown to be impossible to gain detailed traffic information retrospectively from hospital case records (Berntman, 1994). Especially data on accident sites and road conditions are unreliable and very random in case records. These reasons speak in favour of the technique used.

In most hospital-based studies the traffic- and road-engineering variables presented are poor (Hansson, 1974, (Tolagen, 1977, (Bunketorp, 1986, (Björnstig, 1995 and Thulin, 2000). In this study a major effort has been made to define the expected detailed level of the data collection about the injured and the accident site in advance.

The following two measures were taken to attain the established goal:

- gathering all key personnel before the start of the study for information about the purpose of the interviews and surveys and the procedures for carrying them out
- distributing a coding manual

The purpose of the interview is to collect information about the accident and the road users involved the accident site, road surface conditions and the traffic environment. All hospitals used their standard forms in the on-going registrations (one example from Lund is presented in Form I in Appendix C). During the planning of the study it was discovered that the layout and structure of the forms differed among the hospitals, but this was accepted as long as the content and the level of the collected details were the same. Only in one hospital, i.e. Lidköping, was it considered necessary to use a supplementary form. This form was distributed to the patients after the medical care to be returned by mail a month later together with the first four answered forms of the health indices.

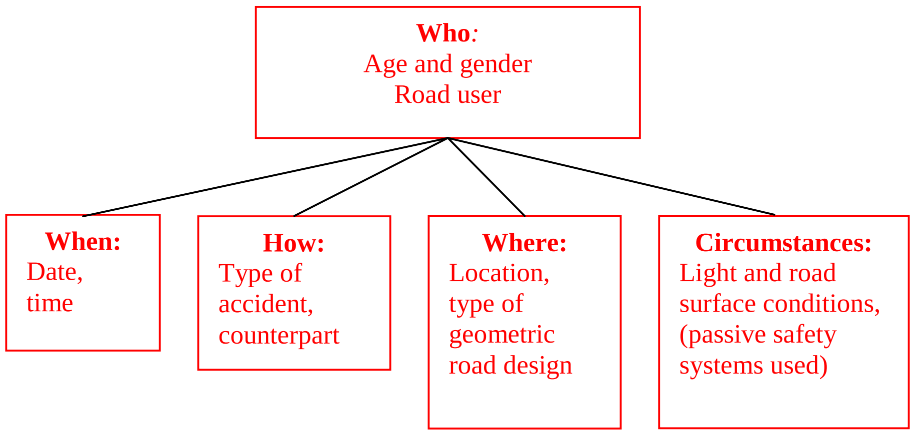


Figure 3.4 Data collected from traffic victims in interviews by medical staff at the emergency room (red = hospital)

Information on age, gender and type of road user was collected for every victim. The date and time of the accident and arrival at the emergency room were noted. The accident was described as a single accident or a collision with a specified counterpart. The standards used in the official traffic statistics influenced the decisions about the data collected at the accident site. The main information about the accident site was the address, but supplementary data about the geometric road design was collected to find out e.g. if the accident occurred in the roadway or on the footpath. Also, some additional circumstances of importance for the consequences of the accident and injury, e.g. road surface and light conditions and use of safety belt, were noted.

3.1.4 Accessible police data

The police data were initially gathered from ‘the traffic case record’, in Swedish ‘informationsunderlag’, i.e. the source of the official traffic accident statistics (see Form II in Appendix C). The information was partly collected through the value judgements filled in by the police in the records regarding e.g. surrounding traffic environment, road standard, road surface and light conditions, as well as through an essay or a sketch made by the police representing e.g. the driving direction of the road users involved before and after the accident and the road design at the accident site.

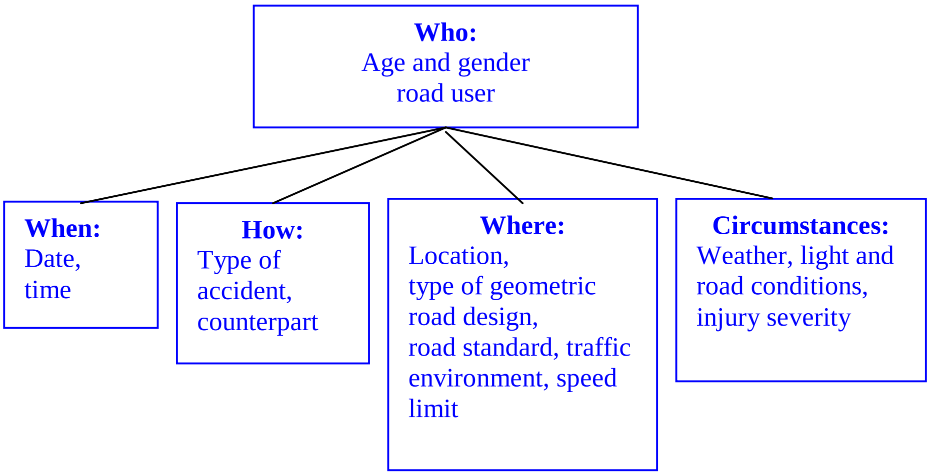


Figure 3.5 *Data collected from the police standard data form for the official traffic accident statistics (blue = police)*

Information on age, gender and type of road user was collected for every person killed or injured in a traffic accident. The information included the date and time of the accident. The accident was described as a single accident or a collision with a specified counterpart. More detailed factors contributing to the accident were available only randomly. The data about the accident site included the following: address, place and municipality, road design and road standard, surrounding road environment and speed limit. Information about such circumstances as weather, light and road surface conditions was also collected. Finally, the report contained the severity of the injury as judged by the police.

The police reports have mainly been used to supply data about those killed in traffic accidents at accident sites**.** Questions regarding road environment, road design, and road condition, have to some extent been answered by access to the police data.

3.1.5 Matching hospital and police data

The matching procedure was based on the principal parameters of age, gender and accident date, as information on the age and gender of an injured person is most often available in both hospital and police sources (Berntman, 1994). The date of the accident occurs more frequently in police reports than in hospital registration. In the latter case, admittance date to the hospital was used as a complement to the accident date. In this study the occurrence of the visit to the Emergency Room was extended up until three days after the accident. In some cases, when gender and date corresponded but age differed by one year, a manual additional check was performed, using such information as type of road user and type of accident for the matching.

Most people killed in traffic accidents are not to be found in a hospital source. Therefore, a manual procedure was developed for linking of those killed. The basis was age, gender, and accident date for all victims killed and found in the police reports. Their data were first compared with the data of everyone deceased and severely injured at hospital. The next step was to compare data on age, gender and admittance date for those deceased within 30 days from the admittance date in the hospital registration with those severely injured and found in the police reports.

3.1.6 Selected medical data from hospital care records

One medical staff at each hospital was given the responsibility to collect the requested data on treatment and outcome from the hospital case records. These records were filled out by a doctor when the patient was discharged after the visit to emergency room or at the last appointment at the hospital. All the data collected had to be related to the injury/ies from the specific traffic accident.

The medical follow-up was started at the earliest six months after the accident (see Form III in Appendix C). In order to establish a clearer image of the consequences of a traffic injury for the individual and for society, a more stringent measure than “killed”, “severely injured” and “slightly injured” used by the police, was wanted. The definition of the measure of injury severity used in this study was based on the type of injury and the assumed care. This is relevant, if judged by medical experts, but still probably not sufficient to indicate any long-term consequences. Therefore, information was also collected on diagnoses (according to WHO’s International Classification of Diseases, 1975 Revision), degrees of injury severity (according to AIS, the Abbreviated Injury Scale, 1980 Revision and ISS, the Injury Severity Score), type and length of the in-patient treatments and outcome.

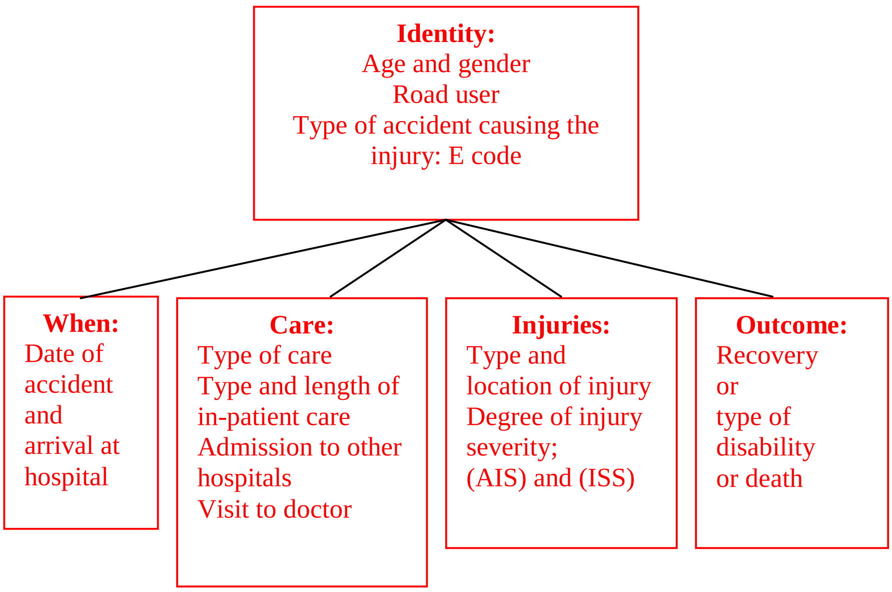


Figure 3.6 *Data collected from the hospital case records of the traffic injuries (red = hospital)*

The AIS (AAAM, 1980) is an internationally established scale to measure the severity of an individual injury. The AIS clearly distinguishes between an injury, which is coded, and the result(s) of an injury, which is not coded but which may be used to qualify the injury. Five separate criteria, namely energy dissipation, threat to life, permanent impairment, treatment period and incidence, were considered when developing the AIS. The AIS uses the following codes: 1 equals a minor, 2 a moderate, 3 a serious, 4 a severe, 5 a critical and 6 a maximum, virtually unsurvivable injury. The AIS is an injury-severity rating system, and *not* a system for coding fatalities or any other outcome. A great number of empirical studies have used the AIS all over the world.

The ISS (Baker et al., 1974) is based on the AIS and calculated as the sum of the squares of the three most severe injuries out of six body regions. An ISS of 75 is the highest possible, as only AIS from 1 to 5 is used when calculating ISS. The six body regions used in the ISS are: head or neck, face, chest, abdominal or pelvic contents, extremities or pelvic girdle and external. The ISS seems to be the most widely used indicator when it comes to multiple injury rating.

Baker et al. (1974) showed at an early stage that using the ISS increased the correlation between severity of injury and mortality, as compared to the AIS grade for the most severe injury. Age was found to have an important impact on the survival rates. The ISS also provided a numerical description of the overall severity of injury for patients with multiple injuries.

Some researchers have expressed objections about AIS and ISS. Nygren (1984) for example, showed that AIS values for some body regions did not reflect the outcome of permanent disability for individual car occupants, and Nygren, Gustafsson and Tingvall (1985) questioned the suitability of using the AIS and ISS as tools for predicting the long-term consequences of an injury. Later Bradford et al. (1994) also established that the AIS and its derivatives are not good at predicting disability risk.

However, Figure 3.7 derived from Baker et al (1974) indicates that ISS may, in some cases, be regarded as a proxy for average consequences (here mortality) for different age groups.

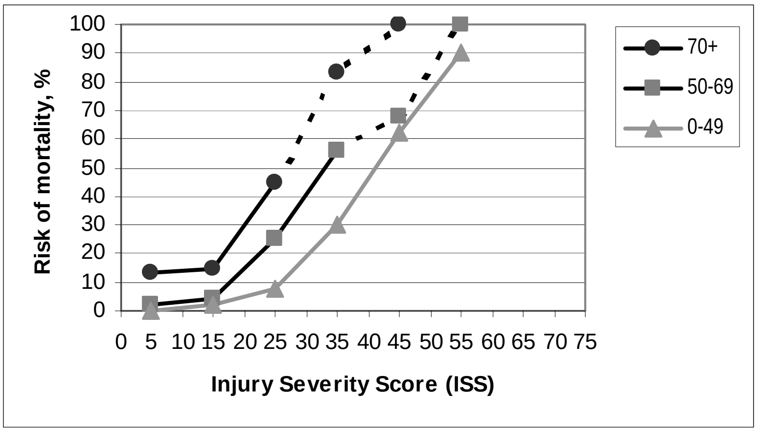


Figure 3.7 *Mortality for three age groups of trauma patients, 0-49 years [N=1,540], 50-69 years [N=316], and 70+ [N=109] by Injury Severity Score (ISS). The dotted lines connect points based on less than 10 patients.(Baker et al, 1974)*

Also from Figure 3.7 the relationship between ISS and consequences (mortality) seem to be reasonably linear in this aggregate perspective. This may justify that average ISS could be used as a measure of average consequences for groups of patients.

Additional information was collected on final outcome from the hospital case records and was expressed as types of inconvenience from the suffered traffic injury. Only hospital staff at Lund and Lidköping respectively carried out this task. However in this study, that information was only used to try to understand the divergences between how to judge the final outcome of an injury objectively by a medical specialist compared to experience it subjectively by the injured person.

The Nordic Committee for Medical Statistics (NOMESKO, 1984) has developed a system of classifying the external causes of injuries, a so-called E code. The causes of injuries in transport accidents are defined by mode of transport, road user, type of accident and counterpart. The E codes available were gathered from the hospital case records to support the data obtained from the patients in the questionnaires. However, the E codes did not supply much further information, as these variables had already been obtained by the high quality of the initial interview with the patient.

To secure validity and reliability, all the medical data collected were checked by a second medical expert.

3.1.7 Recurrent data collected about health after the traffic accident

The method is based on a longitudinal investigation of individual traffic victims from accidents up until recovery or as long as any disability lingers for at most three years and five months after the accident or when the patient does not answer the health questionnaire after two reminders.

The health follow-up began on the day following the accident. The intention was to contact the casualties at intervals during the post-crash period to ask about their health condition, the medical care they had received and their working and spare time situation. All patients, irrespective of injury severities, were asked to fill out a questionnaire containing the Rosser and EuroQol Indices and the Thermometer (see Form IV-VI in Appendix C), about their health status, four times before the accident and one day, one week and one month after the accident.

The questionnaire was handed over to the casualties by the medical staff at their departure from the emergency room/hospital and returned by mail after one month. Questions about their health condition before the accident were answered in connection with the one-month follow-up. The consistency can be influenced by this, and a misunderstanding of which questionnaires are used (although differently coloured) can sometimes arise. Nevertheless, this was found to be the best procedure.

All in-patients and all injured pedestrians, mopedists and motorcyclists who answered two out of the four health questionnaires irrespective of medical care and health status as well as the remaining out-patients who had not recovered after one month were selected to participate in the six-month health follow-up (see Form VII in Appendix C). This time the health questionnaires were distributed to a bigger sample than those who had not recovered on order to ensure a good coverage among the severely injured, but also to check if the assumption that recovered respondents stay well and are in no need of any further treatment or care later on was valid. The one-year, two-year, three-four year and, in relevant cases, eight-nine year follow-ups included only those who had still not recovered from the traffic injuries reported in the previous interview, as nearly all who were “well” stayed well and received no care.

The index used to measure health loss was originally designed to evaluate the effects of different medical treatments and not to describe health loss due to an injury. In this study the health index was used for the first time to gain knowledge about subjective health status appraisal among traffic casualties at fixed times after the accident.

Two pilot tests were carried out to identify the suitable indices but also to develop questionnaire design and routines for the survey process. Two health indices, the Index of Wellbeing (Bush et al., 1973) and the 2D Rosser (Kind et al., 1982) were used together with a simple Thermometer with a scale from 0 to 100. The evaluation showed that pain and reduced mobility were the most crucial variables in describing the consequences of a traffic injury. For these reasons the health indices used in the pilot tests were replaced by a later 3D version of the Rosser Index (Rosser et al., 1993) and a new index, the EuroQol (Brooks et al., 1991). The final questionnaire was designed as a simple list based on fixed alternatives to avoid the matrix used in the pilot test, as it created confusion and invited the respondents to produce their own alternatives.

The *3D Rosser Index* is based upon the three dimensions of disability, pain and distress (Rosser et al., 1993). These dimensions have four to eight levels, resulting in 160 different combinations.

Functional disability:
I. None
II. Slight social disability
III. Social disability
IV. Work with difficulty
V. Unable to work
VI. Confined to wheel chair
VII. Confined to bed
VIII. Unconscious

Pain:
I. None
II. Mild
III. Moderate
IV. Severe

Distress:
I. None
II. Mild
III. Moderate
IV. Severe
V. Extremely depressed

Figure 3.8 The 3 D Rosser Index (Rosser et al, 1993) (green = the injured interviewed)

Measuring the health-related quality of life is complex. Many philosophical questions can be raised in the context of such a task. The Index of Health-related Quality of Life, here called the Rosser Index, is a tool to measure social, psychological and physical adjustment and combines these different levels of aggregation on a scale of values or utility. The process of aggregating the scales into a single figure simplifies the interpretation of complex data sets. Detail is preserved due to the multilevel procedure used. The 3D classification system was obtained using the standard gamble method for states of one year´s duration.

The early version of the *EuroQol Index* was based upon six dimensions mobility, self-care, employment, family and spare time activities, pain/discomfort and anxiety/depression. Each dimension has either two or three levels, resulting in 216 different combinations. The *Thermometer* uses a scale of 0 -100 to identify the present health condition, where 0 equals the worst, and 100 the best possible health status.

Summarised assessments of health are achieved by weights which have been determined in advance. These weights should reflect a relative valuation of the different health conditions. To estimate the weights for the EuroQol Index (Brooks et al., 1991), a sample of about 1,000 Swedish subjects was used. Due to lack of Swedish weights, available British ones were used for the Rosser Index (Rosser et al., 1993).

Before analysing the data, the Rosser index was chosen for the evaluation of the health state before and after a traffic accident. The reason for this choice was that the index is based on some easily comprehensible dimensions covering a very width variety of response alternatives

The investigation of the health indices was also followed by a drop-out analysis.

3.1.8 Recurrent data about care

Information about e.g. sick-leave and visits to a doctor, a nurse or a physiotherapist was collected from the injured in a supplement to the health questionnaire, as this information may be either inadequate or sometimes even wrong in hospital case records (Berntman, 1994). Although this approach may have reduced the quantity of the sample, at the same time it improved the quality of the data.

The content of the supplement has been restricted to the most adequate data at different periods after the accident. Table 3.1 contains the supplementary data collected at different time periods.

Table 3.1 Content of supplements to health questionnaires at different times

Data sought	d1	w1	m1	m6	y1	y2	y3,5	y8,9
Other health impairments	x	x	x	x	x	x	x	x
Periods of rest	x	x	x	x	x	x	-	-
Visit to a doctor	-	-	x	x	x	x	x	x
Type and extent of employment	-	-	x	-	-	-	-	x
Sick leave	-	-	x	x	x	x	x	x
In-patient care, rehabilitation	-	-	-	x	x	x	x	x
In-patient care, nursing home	-	-	-	x	x	x	x	x
In-patient care at hospital	-	-	-	-	-	-	x	x
Visits to a nurse/physiotherapist	-	-	-	x	x	x	x	x
Reduced employment	-	-	-	x	x	x	x	x
Handicap-adjusted home	-	-	-	-	-	-	x	x
Special form of housing	-	-	-	-	-	-	x	x
Aid or care at home by a relative or friend	-	-	-	-	-	-	x	x
Aid or care at home by the municipality	-	-	-	-	-	-	x	x
Personal assistant	-	-	-	-	-	-	x	x
Early retirement pension	-	-	-	-	-	-	x	x
Type and degree of disability	-	-	-	-	-	-	x	x

Abbreviations: d1=after one day, w1=after one week, m1=after one month, m6=after six months, y1=after one year, y2=after two years, y3,5=after three years and five months, y8,9=between eight and nine years

However, some of the data collected in the questionnaires, from three years and later, are not included in the analyses in this study

3.1.9 Calculating the costs of care for society

The societal indicators selected here represent different types of care and treatment. As they cause very different burdens for society, an attempt has also been made to illustrate the more “total” costs of care for traffic casualties by calculating the sum of the costs of different types of care.

The costs per unit used to calculate these societal costs are presented in Table 3.2. Background details can be studied in Maraste et al. (2002).

Table 3.2 Costs per unit used in the calculation of selected societal care, price level of year 2000 (Maraste et a.l, 2002)

Indicators/occasions	**Costs [SEK]**
Hospital stay [day]:	
within the first 6 months	7,000*
after the first 6 months	4,400*
Visits to a doctor [number]:	
in the emergency room	1,600
within the first year	950
after the first year	670
Visits to a physiotherapist/nurse [number]	270
Sick leave [day]	1,580

* Average costs based on combinations of care

The costs for a day in hospital were estimated rather roughly, as the data collected about hospital care are based on information both from medical staff and the injured themselves. Complete information about the distribution of hospital care was found in the medical case records for the first six months after the accident. Later information, about e.g. rehabilitation and care at a nursing home, was gathered from the patients in different health inquiries and is less complete, e.g. regarding clinics. Hospital care within the first six months was therefore given a higher cost per unit than that received later, due to less expensive specialities.

Visits to a doctor were divided into three cost groups. The first visit to a doctor for all injured people was that in the emergency room. Many appointments within the first year were with specialists in the hospitals and were therefore more expensive than those later to a general practitioner. Visits to a physiotherapist or nurse and sick leave were standardized as only one cost.

3.2 Statistical methods

The investigation is based on correlational research on empirical data. Correlational research implies that there is no influence on the variables studied, i.e. they are only measured, and relations are looked for between sets of variables. Results from correlational research can only be interpreted in causal terms based on some assumed hypotheses, but correlational findings cannot conclusively prove causality.

3.2.1 Characteristics of variables

The information provided by a variable is determined by the type of measurement scale it belongs to. Depending on how the variables are measured, they are either qualitative or quantitative. Qualitative variables are classified as either nominal or ordinal, while quantitative variables can be interval or ratio.

In Tables 3.3 and 3.4 the characteristics of the variables selected are presented in two data sets, hospital and police.

Table 3.3 Characteristics of selected variables of injured/injury and road and traffic factors

Variables	**Type of variables**	**No. of levels**	**Hospital data set**	**Police data set**
Injured/injury				
Age [e]	Ratio	-	x	x
Gender [e]	Nominal	2	x	x
Type of care [r]	Nominal	3	x	-
ISS [e] or [r]	Ratio	-	x	-
Type of injury [r]	Nominal	4	x	-
Road and traffic factors				
Road users [e]	Nominal	6	x	x
Type of accident [e]	Nominal	2	x	x
Counterpart [e]	Nominal	7	x	x
Road environment [e]	Nominal	2	x	x
Road design [e]	Nominal	4	x	x
Road surface conditions [e]	Nominal	3	x	x
Light conditions [e]	Nominal	3	x	x
Speed limit [e]	Ordinal	5	-	x

Abbreviations: ISS=Injury Severity Score, r=response variable, e=explanatory variable

Table 3.4 Characteristics of selected variables of health follow-ups

Variables	Type of variables	No of levels	Hospital data set	Police data set
Health follow-ups				
Length of hospital stay[r]	Ratio	-	x	-
Visits to doctor [r]	Ratio	-	x	-
Visits to a physiotherapist/nurse [r]	Ratio	-	x	-
Length of sick leave [r]	Ratio	-	x	-
Rosser Health index [r] - functional disability - pain - distress	Ratio Nominal Ordinal Ordinal	- 8 4 5	x	-
Degree of pain [r]	Ordinal	4	x	-

Abbreviations: r=response variable, e=explanatory variable

The nominal variables can only be measured in terms of distinctively different categories. They cannot be quantified or ranked in order in those categories. Most road and traffic factors and some injured and injury-connected variables are nominal variables. The ordinal variables can be ranked, i.e. they have more or less of a certain quality. Most dimensions in the health indices used are ordinal variables, e.g. pain and distress, but a traffic factor such as speed limit also belongs to the latter category.

Among the qualitative variables, the classification principles are more or less arbitrary and therefore guided by the aim to discriminate vital information with as few levels as possible. The levels chosen are often based on earlier empirical experiences of what detailed level it is possible to obtain at hospital.

The ratio variables can be quantified and therefore allow us to compare differences between them, and they have an absolute point zero. Many variables used in the health follow-ups, e.g. length of hospital stay and visits to a doctor are ratio variables. The ISS has also been considered a ratio variable here as in many other studies. Nevertheless, Somers (1983) raised objections to using quantitative statistical methods when analyzing the AIS and ISS as “their values are not equidistant and the scale is qualitative”.

The variables can be distinguished as being either dependent, i.e. response, or independent, i.e. explanatory. In the analysis all road and traffic factors are considered explanatory variables, while the different indicators are treated as dependent variables.

Some of the variables selected above have a somewhat skewed distribution, i.e. many have a value 0 or close to 0, e.g. length of hospital stay, sick-leave and ISS. It should also be observed that the latter has a disproportionately number of observations at 1, 2^2, 3^2 etc., due to the fact that ISS is calculated as the sum of the squares of the three most severe injuries out of six body regions, and many traffic victims suffer only one single injury. Some extreme values can also be detected in the data sample, especially among variables like hospital stay, sick leave and visits to a physiotherapist/nurse. However, none of these values have been rejected as outliers. The decision about possible outliers is made on an individual basis by a medical expert. In this investigation a scatter plot has been used as a tool to identify the extreme values.

Every attempt at measurement involves errors, which determine the amount of information possible to obtain from a variable. When the reliability of hospital and police data is compared, the variables age, gender and road users are generally error-free. The police variables, e.g. type of accident and accident site, can also be regarded as reliable, while data collected on injury severity and type of injury are of good quality in a hospital data set. However, in this study no efforts have been spared on checking up, since the joint part of the police and hospital data sets only is constitutes about 20 % of the total number of injured people in the data. This could be regarded as a weakness, but is a deficiency commonly shared with other studies, either based on police or hospital data.

Missing data must be handled with care. There are two ways to address the problem, namely either casewise or pairwise deletion of these missing data. The most common solution, and the one applied in the analyses in the present study, is to use the pairwise deletion, i.e. to perform the calculations on all cases that have valid data for the variables selected. This method can be accepted when the total percentage of missing data is low, around 10 %, and they are randomly distributed between cases and variables. In the data set used in this study, missing data were not randomly distributed between cases and variables but the share of missing data was usually very low.

3.2.2 Estimations based on available data

In this study traffic safety problems are described in terms of average severity, total consequences and distribution of total consequences. To compensate for the data loss of registered individuals not participating in the longitudinal study, the total consequences have been estimated on the basis of the average severity for respondents in a given subgroup.

The estimates of consequences are proportional to the number of subjects in each subgroup in the initial data set of registrations. For each time period, further estimation is made to compensate for:

- partial non-respondents
- individuals left out from the longitudinal study, due to recovery

On the first occasion, comprising four health questionnaires, the intention was to receive answers from all respondents. Two groups responded to the survey: those who were still 'ill' and those who had recovered, the 'well'. However, not all respondents answered (unknown). They could either have been 'ill' or 'well' at the time of the follow up, and are therefore assumed to have average consequences equivalent to those answering.

On the occasion six months after the accident, the non-respondents are assumed to have average consequences equivalent to those answering this survey, while the non-respondents from the earlier occasion are now assumed to have the average consequences equivalent to all those that should have participated after six months as well as those who were 'well' after the first month.

Only the non-recovered respondents were interviewed one year after the accident (and the same applies to the occasions two years, three years and five months and eight to nine years). Some were still "ill", while some had recovered and were in the category "well". Throughout the study the non-respondents on any given occasion are assumed to be either 'ill' or 'well'. The respondent frequency decreases over the time elapsed after the traffic accident.

3.2.3 Estimations of standard errors

The accuracy of the indictors selected has been thoroughly estimated in this thesis. The method applied is based on the basic understanding that "*the number of accidents cannot be predicted, no more than a roll of a dice*" (Hauer and Gårder, 1986). Consequently Hauer and Gårder argue that the true measure of the safety for a system is the expected number of accidents during a given time period, E (λ). In this perspective, the number of accidents actually occurring, λ, is merely an estimate of the target value.

Based on the same approach, any accident or injury related indicator value computed is regarded as an *estimate* of a corresponding expected value. Each of those unknown expected values represents the target, or "true", value for a specific dimension of safety consequences. The data observed are the outcome of stochastic processes based on the expected, “true” values.

The accuracy of all the indicators has been estimated, on the basis of the overall approach that the values are to be regarded as the outcome of a stochastic process, and that they *estimate* the true expected values of that process. The method chosen has been a balance between the relevance of the stochastic model assumed on one hand, and the tractability of the computations required for the estimations of accuracy on the other hand. The estimates of accuracy relevant for the chosen approach are presented in Appendix C.

3.2.4 Test methods

In Chapters 6 and 7, analyses of the relations between different variables are performed. The frequencies for all variables are presented in Appendix E. Some interesting cross-tables have been created.

An approximate t-test, i.e. a quasi t-test, has been used when evaluating differences in average severity or in total consequences between different groups.

The hypothesis that “A” is more severe than “B” is verified by

$$T = \left| \frac{m_A - m_B}{\sqrt{se_{mA}^{\,2} + se_{mB}^{\,2}}} \right| \geq 1.64 \qquad (1)$$

where m_A and m_B are the means of the random variables A and B. se_{mA} and se_{mB} are the corresponding standard errors.

The hypothesis that “A” contributes to a greater part of traffic safety problems than “B” is verified by

$$T = \left| \frac{\Sigma C_A - \Sigma C_B}{\sqrt{se_{\Sigma C_A}^{\,2} + se_{\Sigma C_B}^{\,2}}} \right| \geq 1.64 \qquad (2)$$

where ΣC_A and ΣC_B are the total consequences of the variables A and B.

The crucial value 1.64 refers to p = 0.1 and is selected as the level of a statistical significance to represent the probability of error associated with rejecting the hypothesis of no difference between the two categories of observations in the population, when the hypothesis is true. Selecting a proper level of significance is always a balance between the risk of rejecting an actual difference or of accepting a false one. In this context a level of $p=0.1$ can be reasonable.

The χ^2-test is used to test whether an observed variation may be regarded as being random or not. This test handles relationships between categorical variables. Here the level of significance has been chosen to be 95 %, a level that involves a probability of error of 5 %, i.e. a somewhat stricter requirement than in the t-test.

In Chapters 6 and 7 the results of the t-tests are mostly commented on when the “difference is statistically significant”. The expressions “higher than”, “longer than” or “more than” followed by the p level is used, e.g. “in a short-term perspective the average hospital stay is longer for injured in rural areas than for those in urban areas ($p=0.05$)”. Some results are presented in the following way: “there is a strong tendency towards a difference between injured in two groups, A and B” (i.e. $p>0.1$ with a critical value between 1.50 and 1.63). Moreover, in a few cases a similarity is commented on where a difference could be expected.

4 Data

The police and the hospitals have contributed to the data sets in this study. The hospital data set is the main one. The admittance areas for each of the five hospitals are set as the boundaries for the hospital as well as the police data set.

4.1 Police-reported casualties from the admittance areas of five hospitals

4.1.1 Extent and distribution of injuries

During one year, 1991/92, a total of 1,722 traffic casualties were reported by the police in the admittance areas. The official statistics was the source of the police-reported data set.

In Table 4.1 the police-reported traffic victims are distributed over the admittance areas of the five hospitals (for more details about the municipalities, see Table D4.1 in Appendix D).

Table 4.1 Police-reported traffic injuries in the admittance areas of the five hospitals during one year, 1991/92 (SCB)

Municipalities inhabitants* and size of areas*	**In the areas**		
	injured		**inh.**
	No.	%	%
Karlshamn, Olofström, Sölvesborg 3 municipalities: 62,767 inh. 1,069 km^2	172	10.0	10.9
Karlskrona**, Ronneby** 2 municipalities: 88,401 inh. 1,872 km^2	213	12.4	15.3
Burlöv, Eslöv, Hörby, Höör, Kävlinge, Lomma, **Lund**, Staffanstorp 8 municipalities: 217,539 inh. 1,903 km^2	725	42.1	37.8
Essunga, Grästorp, Götene, **Lidköping**, Skara 5 municipalities: 80,579 inh. 2,034 km^2	282	16.4	14.0
Bjurholm, Nordmaling, Robertsfors, **Umeå**, Vindeln, Vännäs 6 municipalities: 126,931 inh. 9,347 km^2	330	19.2	22.0
Total: 24 municipalities: 576,217 inh.16,226 km^2	**1,722**	**100.0**	**100.0**

Abbreviations: inh.=inhabitants, No.=number
Municipalities written in bold type have hospitals participating in traffic-injury registrations.
***** The number of inhabitants and the size of the areas are taken from the official statistics, December 31 1991 (SCB, 1992).

The representation of police-reported traffic injuries in this study varied considerably among the admittance areas of the hospitals, with the largest number of accident victims in the police districts in the admittance area of Lund hospital in the southern part of Sweden. The proportions of police-reported injuries compared to that of inhabitants in the respective areas present similarities. However, the somewhat larger proportions of injured people in relation to the number of inhabitants in “Lund” as well as in “Lidköping”, can probably partly be explained by a higher share of through traffic in those areas. Further explanations of the differences observed can be found among variables like the length and standard of the road network, the mix and density of traffic, the size of the area, the population density as well as location of trade and industry, i.e. land use developments.

4.1.2 Extent and distribution of overall consequences

In Table 4.2 the police data regarding the distribution of injury consequences over different hospital areas are presented.

Table 4.2 Police reported traffic injured in the admittance areas of five hospitals during one year, 1991/92, distributed over injury severity

Injury severity	Hospital areas[25]										Total	
	Karlshamn		Karlskrona		Lund		Lidköping		Umeå			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
D	2	1.2	8	3.8	15	2.1	22	7.8	9	2.7	56	3.3
Se I	35	20.3	42	19.7	180	24.8	70	24.8	100	30.3	427	24.8
Sl I	135	78.5	163	76.5	530	73.1	190	67.4	221	67.0	1,239	72.0
Total	172	100	213	100	725	100	282	100	330	100	1,722	100

Abbreviations: No.=number, D=dead, Se I=severely injured, Sl I=slightly injured

Since there are few fatalities in most subgroups, they are therefore strongly influenced by random effects. All consequences, measured in the injury severity of the traffic accident, vary among different areas in Sweden. In this police data set, the share of fatalities is somewhat over-represented in Lidköping, while the share of severely injured is most pronounced in Umeå.

The differences among the five hospital areas regarding injury severity are statistically significant (p=.001). However when, the distribution of injury severity for the total number of injured people in this police data set was compared with that of the whole of Sweden (see Table D4.2 in Appendix

[25] The police districts within the admittance area of a hospital is called a hospital area

D), the conformity was rather good. Hence, we decided to aggregate the data in order to create images of the official traffic safety problem. Further on, these data will be presented as one police data set.

4.1.3 Extent and distribution of casualties among selected traffic-engineering factors

Six traffic-engineering factors were studied in order to describe their effect on traffic safety. The extent of the accessible data and the potential to perform more or less detailed analyses are shown in Table 4.3.

Table 4.3 Police-reported traffic injuries in the admittance areas of five hospitals during one year, 1991/92, distributed over selected traffic engineering factors

Factors	**Injured N=1,722**		**Factors**	**Injured N=1,722**	
	No.	**%**		**No.**	**%**
Road environment			**Road design**		
Rural	950	55.2	Link	933	54.2
Urban	772	44.8	Junction	681	39.5
			Separated area	103	6.0
			Others	1	.1
			Unknown	4	.2
Road users			**Road-surface conditions**		
Pedestrians	80	4.6			
Cyclists	249	14.5	Dry	1,018	59.1
Mopedists	93	5.4	Wet	472	27.4
Motor-cyclists	83	4.8	Is/snow	213	12.4
Motorists	1,202	69.8	Unknown	19	1.1
Others	15	.9			
Types of accident			**Light conditions**		
Single	583	33.9	Daylight	1,143	66.4
Collision	1,138	66.1	Dawn/dusk	125	7.3
Unknown	1	.1	Darkness	454	26.4

The completeness of the data available is the most striking in the police data set. The variables of road environment, road users and light conditions are fully known, i.e. there are no unknown factors, while the coverage of other factors such as type of accident, road design and road surface conditions is good, especially compared to the corresponding hospital data. The joint data set of police and hospital data will later be used to improve the coverage in the hospital data set.

The small size of some subgroups, e.g. injured pedestrians, mopedists and motorcyclists, makes it impossible to carry out more detailed analyses with good accuracy. According to definitions, only pedestrians involved in collisions with motor vehicles are reported as traffic injuries, which imply a need for a two-dimensional analysis level for these categories. The police- reported traffic injuries in separated areas are also few. This is because the road users injured in these sites are limited to pedestrians, cyclists and mopedists. The number of people injured in dawn/dusk is just above one hundred.

The differences between the distributions of injuries in this police data set and that in the whole of Sweden (see Table D4.2 in Appendix D) are rather apparent regarding the three traffic-engineering factors of road environment, road users, and type of accident, accessible about injuries in the official statistics. These differences can be expressed as a reverse relation between injuries in rural and urban areas, a greater share of injured cyclists and mopedists, a smaller share of injured pedestrians and a higher share of injuries in single accidents in this data set as compared to the whole of Sweden. This causes some doubts about the possibilities of generalizing when it comes to the hospital data.

4.2 Hospital-registered casualties from five hospitals

4.2.1 Extent and distribution of injuries

The hospitals in Karlshamn, Karlskrona, Lund, Lidköping, and Umeå, supplied one year’s data on 2,866 traffic victims from their on-going registrations at the Emergency Room. In order to gain a full picture of all traffic casualties, data on the fatalities were gathered from the official statistics, as only a few fatalities (seven) were found among those registered as injured in traffic at the hospitals. Here 56 fatalities were identified. When traffic injuries that had occurred abroad were excluded, the hospital data set comprised a total of 2,915 traffic victims, see Table 4.4.

Table 4.4 Traffic injuries registered at five hospitals during one year, 1991/92

Hospitals inhabitants* and size of admittance area*	**Traffic injuries**				
	In different locations of the a.a.			**All**	**% of all**
	Within	**Outside**	**Unknown**		
Karlshamn 3 municipalities: 62,767 inh. 1,069 km^2	282	11	0	293	10.1
Karlskrona 2 municipalities: 88,401 inh. 1,872 km^2	**480**	**2**	**0**	482	16.5
Lund 8 municipalities: 217,539 inh. 1,903 km^2	593	78	26	697	23.9
Lidköping 5 municipalities: 80,579 inh. 2,034 km^2	474	9	77	560	19.2
Umeå 6 municipalities: 126,931 inh. 9,347 km^2	825	27	31	883	30.3
All 24 municipalities: 576,217 inh.16,226 km^2	**2,654**	**127**	**134**	**2,915**	**100.0**

Abbreviations: inh. = inhabitants, No.=number, a.a.=admittance area
***** The number of inhabitants and the size of the areas are collected from the official statistics, December 31 1991 (SCB, 1992).

Of the 2,915 traffic victims, about 4 % were injured in locations other than the defined admittance areas. A majority of these cases were registered in Lund hospital. Some people injured in Ronneby were treated in Karlshamn hospital, although they ought to have been treated in Karlskrona hospital according to the definition of the admittance area. About 5 % of the cases registered lacked information about the accident site, mostly in Lidköping.

The initial decision to analyse only data of injuries within the admittance areas of the five selected hospitals was abandoned in favour of including all hospital-registered traffic injuries to elucidate the potential of a hospital data source.

Normally the number of registered traffic casualties increases with access to hospital data. The contributions of additional traffic injuries were largest in the admittance areas of the Umeå, Karlskrona and Lidköping hospitals and resulted in an altered picture of the traffic safety problems shown by the police data in the official statistics.

In Lund, however, both the number and the share of registered traffic injuries were reduced with access to hospital data. One likely explanation can be the rather special situation with an additional regional hospital in Malmö and three qualified medical centers in the municipalities of Eslöv, Hörby and Höör closer to the accident sites than the hospital in Lund. An evaluation by Berntman (1994) showed that according to the police the majority of severely injured victims receive treatment at the Lund hospital, while only 30 % of the slightly injured in Eslöv, Hörby and Höör were taken care of in Lund. The quality of the registration also has a significant impact on the number of traffic casualties in the hospital data set. The hospital admittance areas are marked in Map 1 in Appendix C.

4.2.2 Extent and distribution of overall consequences

Table 4.5 presents the hospital data regarding the distributions of received treatment in different hospital admittance areas.

Table 4.5 Traffic injuries registered at five hospitals during one year, 1991/92, distributed over received hospital care

Hospital care	Hospitals										Total	
	Karlshamn		Karlskrona		Lund		Lidköping		Umeå			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
D	2	0.7	8	1.7	17	2.4	22	3.9	10	1.1	59	2.0
In-p	83	28.3	103	21.4	147	21.1	171	30.5	222	25.2	726	24.9
Out-p	208	71.0	371	77.0	533	76.5	367	65.5	650	73.7	2,129	73.1
Unknown	-	-	-	-	-	-	-	-	1	.1	1	.0
Total	**293**	**100**	**482**	**100**	**697**	**100**	**560**	**100**	**883**	**100.0**	**2,915**	**100**

Abbreviations: No.=number, D=dead, In-p=in-patient care, Out-p=out-patient care

The police reports supplied most data about the fatalities in the hospital data set. Furthermore three deaths were established where the cause of the death was heart failure in a traffic environment. The shares of victims in in-patient care varied among the five hospitals and were most pronounced in Lidköping and Karlshamn. The care received seemed to be influenced not only by the severity of the injury but also by the type of hospital among other things. The differences in the care received care by traffic victims in the five hospitals were statistically significant (p=.001).

The information in Tables 4.2 and 4.5 was presented in order to give a better understanding of the differences between the collected sub-samples and the police and hospital data sets used in this study as well as of the equalizing effect that the data are subject to when combined into one larger data set.

4.2.3 Improving the coverage of selected traffic-engineering factors

Six traffic-engineering factors were selected in order to study their impact on the traffic safety problem. As mentioned earlier in Chapter 3, the police data are used to improve the coverage of these traffic-engineering factors in the hospital data; see Table 4.6.

Table 4.6 Size of known data on some selected traffic- engineering factors collected at five hospitals during one year, 1991/92, before and after support from police data

Factors	**Extent of data material**			
	Before		**After**	
	No.	%	No.	%
Road environment	2,694	92.4	2,796	95.9
Road users	2,859	98.1	2,895	99.3
Type of accident	2,772	95.1	2,834	97.2
Counterpart	1,211	88.9	1,264	92.8
Road design	2,478	85.0	2,589	88.8
Road-surface conditions	2,271	77.9	2,471	84.8
Light conditions	2,426	83.2	2,576	88.4

The hospital data about road users initially collected turned out to be reliable and have a good coverage, as the police data managed to increase the extent of the data only marginally. For other factors, e.g. type of accident, counterparts, road environment, and road design, the amount of additional information was somewhat higher, or 2-4 %. The benefit was only obvious when it came to road surface and light conditions, where the shortcomings were reduced by about 5 % or more. However, these improvements were not in proportion to the work effort. The police data accessible were also biased towards providing more information about motorists than other road users and about severe injuries than slight ones.

4.2.4 Extent and distribution of injuries among selected traffic-engineering factors

The size of the accessible data and the potential to perform more or less in detailed analyses are shown in Table 4.7.

Table 4.7 Traffic injuries registered at hospital during one year, 1991/92, distributed over selected traffic- engineering factors

Factors	Injured N=2,915		Factors	Injured N=2,915	
	No.	**%**		**No.**	**%**
Road environment			**Road design**		
Rural	1,023	35.1	Link	1,224	42.0
Urban	1,773	60.8	Junction	829	28.4
Unknown	119	4.1	Separated area	413	14.2
			Other	123	4.2
			Unknown	326	11.2
Road users			**Road-surface conditions**		
Pedestrian	320	11.0			
Cyclist	1,123	38.5	Dry	1,415	48.5
Mopedist	183	6.3	Wet	504	17.3
Motorcyclist	130	4.5	Icy/snowy	538	18.5
Motorist	1,106	37.9	Other*	14	.5
Other	33	1.1	Unknown	444	15.2
Unknown	20	.7			
Type of accident			**Light conditions**		
Single	1,556	53.4	Daylight	1,583	54.3
Collision	1,278	43.8	Dawn/dusk	325	11.1
Unknown	81	2.8	Darkness	668	22.9
			Unknown	339	11.6

* In the analyses treated as "unknown" due to slippery road surfaces other than icy/snowy

The amount of hospital data available for analysis was 70 % larger than that of the police data. In spite of the improved coverage, the internal dropout was constantly higher than that in the police data set. The variables of road user, type of accident and road environment had a good coverage in the hospital data set, while the coverage of the other factors like road design, light and road surface conditions could be regarded as highly sufficient.

A follow-up among the "unknown" of the last three variables was performed to check the bias. A comparison between the distribution of the "unknown" and the "total" gave the following results:

Road design: *Gender*: Men were somewhat fewer than expected in the category "unknown" on the basis of their share in the total data; *Age*: Young people were somewhat fewer; *Road users*: Mopedists were fewer, while there were more motorists; *Type of accident*: Injured in single accidents were somewhat fewer.

Road conditions: *Age*: The elderly were somewhat fewer; *Road users*: Pedestrians and cyclists were fewer, while there were more motorists; *Type of accident*: Injured in single accidents were fewer; *Road environment*: Injured in urban areas were fewer.

Light conditions: *Age*: The elderly were somewhat fewer; *Road users*: Pedestrians and cyclists were fewer, while there were more motorists; *Type of accident*: Injured in single accidents were fewer; *Road environment*: Injured in urban areas were somewhat fewer.

Despite the many biases presented, they are in fact not important due to the small proportion of observations in the category "unknown". Furthermore, there is a very small group of victims that lacks most traffic-engineering data. At any rate, the size of the known hospital data for all traffic-engineering factors well exceeds that in the police data set.

4.2.5 Dropout in the hospital data set

The methodology is based on the assumption that the total population of the injured are to be registered at the five hospitals. However, an early dropout analysis at the Lund hospital during a period of four years (Berntman, 1994) indicated a comparatively, low average registration coverage among people injured in traffic, only one out of three injured of whom were registered at the Lund hospital. The actual number of traffic injuries was then estimated to about 2,000 per year. No similar evaluations were performed at the other hospitals at the time, as the traffic victims per hospital corresponded rather well to the numbers previously registered over the years. However, in a later study by Bylund et al. (1999) the number of injuries in 1998 is presented as about 1,760, which also indicates a low coverage, or about one out of two injured people, in the registration in Umeå hospital; this was mainly due to a high dropout rate among pedestrians injured in single accidents.

Later evaluation of hospital data in Swedish Traffic Accident Data Acquisition (STRADA) in Skåne 1999 (Berntman & Modén, 2000) indicated a number closer to 1,500 traffic injuries in Lund, which would correspond to a coverage of about one out of two injured people in the hospital data from Lund.

4.2.6 Injured people participating in different follow-ups

Table 4.8 presents the numbers of traffic casualties at different time periods and the distribution of selected variables for those people that have, or should have, participated in the health inquiries over a short-term (within one month) or a long-term (six months) period.

Table 4.8 Registered traffic casualties participating in the health inquiries within one month and 6 months after the accident, distributed over different variables

Variables	All injured N=2,915		Health inquiries					
			Answering within 1 m. N=1,833		Mostly not well at 1 m. N=1,177		Answering at 6 m. N=812	
	No.	%	No.	%	No.	%	No.	%
Care								
Killed	59	2.0	-	-	-	-	-	-
In-patient	726	24.9	473	25.8	411	34.9	317	39.0
Out-patient	2,129	73.1	1,359	74.1	765	65.0	495	61.0
Unknown	1	.0	1	.1	1	.1	-	-
ISS								
9-	235	8.1	105	5.7	92	7.8	75	9.2
4-8	849	29.1	575	31.4	464	39.4	345	42.5
1-3	1,785	61.2	1,126	61.4	613	52.1	387	47.7
0	40	1.4	23	1.3	7	.6	5	.6
Unknown	6	.2	4	.2	1	.1	-	-
Gender								
Male	1,597	54.8	933	50.9	591	50.2	402	49.5
Female	1,318	45.2	900	49.1	586	49.8	410	50.5
Age								
1-24	1,336	45.8	777	42.4	410	34.8	300	36.9
25-64	1,239	42.5	808	44.1	567	48.2	371	45.7
65-	339	11.6	247	13.5	199	16.9	141	17.4
Unknown	1	.1	1	.1	1	.1	-	-
Road users								
Pedestrians	320	11.0	211	11.5	185	15.7	149	18.3
Cyclists	1,123	38.5	709	38.7	389	33.1	252	31.0
Mopedists	183	6.3	111	6.1	102	8.7	74	9.1
Motorcyclists	130	4.5	82	4.5	74	6.3	62	7.6
Motorists	1,106	37.9	682	37.2	401	34.1	260	32.0
Others	33	1.1	24	1.3	17	1.4	9	1.1
Unknown	20	.7	14	.8	9	.8	6	.7
Road environment								
Rural	1,023	35.1	609	33.2	380	32.3	262	32.3
Urban	1,773	60.8	1,161	63.3	756	64.2	523	64.4
Unknown	119	4.1	63	3.4	41	3.5	27	3.3
Type of accident								
Single	1,556	53.4	945	51.6	607	51.6	427	52.6
Collision	1,278	43.8	838	45.7	540	45.9	367	45.2
Unknown	81	2.8	50	2.7	30	2.5	18	2.2
Road design								
Link	1,224	42.0	754	41.1	471	40.0	316	38.9
Junction	829	28.4	570	31.1	371	31.5	264	32.5
Separated area	413	14.2	274	14.9	184	15.6	128	15.8
Others	123	4.2	74	4.0	51	4.3	41	5.0
Unknown	326	11.2	161	8.8	100	8.5	63	7.8
Road-surface conditions								
Dry	1,415	48.5	923	50.4	576	48.9	409	50.4
Wet	504	17.3	318	17.3	217	18.4	158	19.5
Icy/snowy	536	18.4	374	20.4	237	20.1	142	17.5
Unknown	459	15.8	218	11.9	147	12.5	103	12.6
Light conditions								
Daylight	1,583	54.3	1,057	57.7	662	56.2	477	58.7
Dawn/dusk	325	11.1	214	11.7	140	11.9	90	11.1
Darkness	668	22.9	391	21.3	262	22.3	166	20.4
Unknown	339	11.6	171	9.3	113	9.6	78	9.7

At the end of the first month after the traffic accident 1,833 victims, or about 63 % of all registered, had answered one or more health inquiries. Among these, 1,177 were victims who had either not recovered one month after the accident or who belonged to a small control group of recovered patients asked to describe their health status six months after accident. About 69 % responded to this request.

When we compared those answering any health inquiry within a month with all the traffic casualties registered, we found a rather good correspondence according to most distributions. However, some minor differences were detected, e.g. a smaller proportion of the most severely victims, fewer males, somewhat more adults and elderly people, a larger proportion of injuries in urban areas, in collisions, in junctions, on dry road surfaces, and in daylight conditions among those who answered within a month than among all traffic casualties.

Those who answered the health inquiries and stated their health status six months after the accident were very similar to those who had not recovered when it came to the distribution of the selected traffic-engineering factors selected. However, they deviated somewhat in having a higher proportion of people in in-patient care, and of severely injured people. However, neither of these deviations should severely bias the results of the analyses.

In Table 4.9 the respondents in the longitudinal health inquiries and some data from the medical care records are presented in terms of different indicators.

Table 4.9 Traffic casualties registered at five hospitals during one year, 1991/92, and participating in the initial registration as well as contributing information in health inquiries at different times after the accident

Time after the accident	**Indicators**	$\mathbf{N_{resp}}$	$\mathbf{N_{meas}}$	**Comments**
Immediately	ISS $^{\alpha}$ Care $^{\alpha}$	2,909 2,914	2,909 2,914	
1 month	Hospital stay*	732	2,913	52 dead and 2,129 in outpatient care ⇒ 0 days.
	Health inquiry (N=1,625) Visits to a doctor Sick leave Health loss	 1,457 747 1,580	 1,518 1,594 1,708	764 are retired, students, etc. ⇒ 0 sick leave (work day). The health loss, due to 59 dead, fully known and calculated separately throughout the study.
6 months	Hospital stay*		1,295	104 in rehab+19 in nursing home
	Health inquiry (N=812) Visits to a doctor Visits to a physiotherapist/nurse Sick leave Health loss	 728 635 431 787	 1,308 1,214 1,320 1,395	
1 year	Hospital stay*		1,195	11 in rehab+1 in nursing home
	Health inquiry(N=304) Visits to a doctor Visits to a physiotherapist/nurse Sick leave Health loss	 277 235 173 296	 1,241 1,204 1,233 1,292	41 of the 277 answered the inquiry after 1.5 years.
2 years	Hospital stay*		1,164	17 in rehab+1 in nursing home
	Health inquiry(N=221) Visits to a doctor Visits to a physiotherapist/nurse Sick leave Health loss	 199 175 109 217	 1,219 1,197 1,192 1,245	41 of the 199 answered the inquiry after 1.5 years
3-4 years	Hospital stay*		1,114	10 in rehab
	Health inquiry(N=150) Visits to a doctor Visits to a physiotherapist/nurse Sick leave Health loss	 127 118 132 144	 1,177 1,168 1,188 1,212	

Abbreviations: N_{resp}=respondents at a given time perspective, N_{meas}=population contributing, i.e. either by answering the question or recovered, N=respondents that returned the postal questionnaires

$^{\alpha}$ Medical care records that contributed data

* Health inquiries and medical care records that contributed data

The data about the immediate consequences, injury severity (ISS) and the care received were nearly complete. The data one month after the accident about the in-patient care at the primary hospital were also total. However, the data collected from the health questionnaires were more or less complete for various reasons, e.g. the data collecting technique chosen. The number of respondents, N_{resp}, refers to those answering the questions at a given time and for whose answers were computed. The numbers of all injured, N_{meas}, refers to those contributing data and provides the basis for later enumeration. One month after the accident between 50 % and 60 % of the injured people contributed data. The share of contributors is reduced to about 40 % in the very long-term perspective of more than three years. The reliability is very much dependent on the numbers and the proportions among the respondents in the health inquiries within the first month, since the coverage decreases gradually in the prolonged follow-up period.

5 Consequences related to the time after the traffic accident

In models for determining the priority of traffic safety measures and for decisions to build new roads, the consequences of traffic accidents are assessed according to the damage inflicted on society and individuals. The purpose of this study is to contribute to a deeper knowledge and understanding of the consequences of injuries in traffic by using some selected indicators, and to show how these are related to the time elapsed after the accident. Some were used routinely, while finding others required special studies.

Whereas the Zero Vision mainly focuses on the number of deaths and severe injuries in traffic, this thesis wants to high light the progress of the consequences. To illustrate the impact of this, three specific points in time were used, namely immediately after the accident, a short-term perspective (within one month after the accident), and several long-term perspectives (within six months or more after the accident). The traffic safety problems were expressed in terms of the following indicators: the Injury Severity Score (ISS), hospital stay, visits to a doctor or physiotherapist/nurse, sick leave and health loss (the Rosser Index). The indicators selected were assessed in terms of their validity, reliability and effect on society as well as on individuals. The standard error was displayed to indicate the range where the true expected value of the indicators selected would be found, with a chosen degree of certainty.

In this chapter the following hypotheses are to be investigated:

√ The picture of the consequences of traffic injuries changes depending on when the consequence follow-up is performed.

√ The consequences of traffic injuries, in terms of content, extent and distribution, are dependent on the data source used, e.g. as here, either hospitals or the police.

5.1 Consequences immediately after the accident – different data sources

The immediate consequences are described by data from both the police and the hospitals.

In Table 5.1 the problem traffic injuries is described in total numbers. More detailed information is to be found in Table E5.1 in Appendix E.

Table 5.1 Traffic injuries and people injured per total number of inhabitants, police data and hospital data from five hospital admittance areas, 1991/92

Registered	**Police data**	**Hospital data**
Total no. of injuries (s e) TOT/inhabitants (s e)	1,722 (42) $3.0*10^{-3}$	2,915 (54) $5.1*10^{-3}$
Total no. of inhabitants		576,217

Abbreviations: TOT=total no. of injured people

The official statistics, based on police data, mainly reflect the problems of the motorists and people who are injured in collisions with motorists.

By using hospital data, a more comprehensive image was gained, and the total number of registered victims increased from about 1,700 to 2,900 or 70 % more than in the official statistics. The hospitals contributed to documenting a more extensive traffic safety problem than the police. To some extent this could be explained by the broadened definition of “traffic injury”, where pedestrians injured in single accidents were included, but especially by the improved methods of registering cyclists involved in single accidents, resulting in a more complete documentation of the problems of unprotected road users.

In order to elucidate the reliability of the measured numbers and, later, the estimated numbers, the standard errors were calculated. In the tables in Chapters 5-8, all values are presented with standard errors to give information about the accuracy of the measured or estimated numbers. In the discussion about the reliability of the estimated consequences, expressed in means and totals, the magnitude of standard errors is used. The 90 % confidence limit, illustrated in figures in Chapters 6 and 7, was calculated on the basis of the standard errors; concerning the number of 1,722 injured in the police data, for example, the accuracy on the 90 % or 0.10 level is within $\pm 1.64*42$ or 1,650-1,790.

The number of casualties per inhabitants can be used to calculate a rate, without consideration to through-traffic, for comparing traffic problems in different areas. In the geographical area covered by the data sets, the number of inhabitants was just above half a million, and traffic resulted in 3 injured people per 1,000 inhabitants according to the police data and 5 according to the hospital data.

In Table 5.2 traffic safety problems are described by applying the official definition of “injury severity” to the injuries reported in the police data compared to the care that injured people received as reported in the hospital data.

Table 5.2 Traffic injuries in the five hospital admittance areas, 1991/92, distributed over injury severity (police data) and received care (hospital data)

Police			Hospital		
Injury severity	**No.**	**%**	**Care**	**No.**	**%**
Killed (s e)	56 (7)	3.3 (.4)	Dead* (s e)	52 (7)	1.8 (.3)
Severely injured (s e)	427 (21)	24.8 (1.0)	In-patient (s e)	733 (27)	25.2 (.8)
Slightly injured (s e)	1,239 (35)	72.0 (1.1)	Out-patient (s e)	2,129 (46)	73.0 (.8)
Nt (t=total)	1,722 (42)	100.0	Nt(t=total)	2,914 (54)	100.0

* Including 49 deaths at accident site, here without information from the forensic medicine report
Abbreviations: No.=number of injured, s e = standard error

The number of people reported killed in the police and hospital data sets differs depending on knowledge available about the time of death. The official definition of "killed" in a traffic accident is employed by the police, and results in 56 deceased within 30 days, while the number of 52 deceased in the hospitals refers to the fatalities at the accident site, in the Emergency Room (E.R.), or in the operating theatre.

The number of severe injuries in the police data set (about 400) differs considerably from the victims in in-patient care in the hospital data set (about 700), i.e. a difference of about 70 %. One interesting observation is that the share of severely injured people in the police data set, about 25 %, differs very little from the overall share of victims receiving in-patient care in the hospital data set. However, detailed analysis disclosures a discrepancy between estimated injury and received care for the individuals.

Most traffic victims, about 1,200, are reported by the police as slightly injured, while about 2,100 are registered at the hospitals as out-patients. The latter number in particularly may seem surprising, as the hospitals are primarily expected to receive the most severely injured people. Here too, the increase in injured people is about 70 %.

In Table 5.3 the average injury severity and sum of the ISS are presented for all categories of injured people including those who died immediately.

Table 5.3 *Average and sum of the Injury Severity Score (ISS) among injured people at five hospitals, 1991/92, distributed over received care*

ISS	**Dead**	**In-patient care**	**Out-patient care**	**Total**
Mean (s e)	34.3* (.7)	6.5 (.2)	1.7 (.03)	3.5 (.1)
std dev.	4.8	6.1	1.4	5.7
Sum (s e)	1,782 (250)	4,747 (240)	3,666 (101)	10,195 (362)
% of Sum (s e)	17.5 (2.1)	46.5 (1.7)	36.0 (1.3)	100.0
Nt (t=total)	52	733	2,124	2,909
% of Nt	1.8	25.2	73.0	100.0

Abbreviations: s e = standard error, std dev.=standard deviation
* An average injury severity score of ISS 34 is assumed for those killed in traffic at the accident site and where forensic medicine data are lacking

The average injury has a severity of ISS 3.5. Many observations have low ISS values. The relation between the average injury for victims in in-patient and out-patient care is about 4:1. The accuracy of the measured ISS values measured can be regarded as good.

The total ISS, i.e. the combined collective severity burden of all the traffic injuries registered, amounts to 10,195. This indicator takes into account both the number of injured people and the severity of their injuries, which can be of great value when comparing the consequences of different traffic-engineering factors. The distribution of the ISS sum among the dead and the in-patients respectively indicates the heavy burden for society caused by these two categories as compared out-patients.

The greatest advantages of a hospital data set are that we can be sure to get the in-patient care actually received as well as an objective medical judgement of the injury severity. The ISS makes possible a valid numerical description of the overall severity for those injured victims who have sustained injury to more than one part of the body. It has to be kept in mind that the ISS is not a continuous scale, as the formula is based on the sum of the squares of up to three injuries in different body parts.

The relation between hospital care and the Injury Severity Score (ISS) is presented in Figure 5.1.

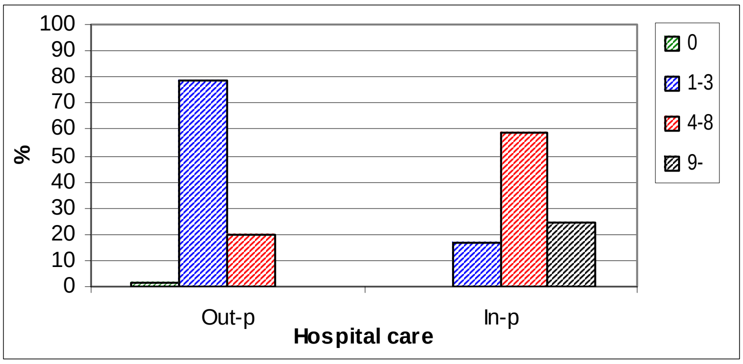


Figure 5.1 *Injuries assigned different injury severity (four ISSintervals) distributed over received care; data from five hospitals, 1991/92*

The majority of out-patients, or about 80 %, have minor injuries (ISS 1-3). Only a minority have moderate injuries (ISS 4-8). Among the in-patients most injured people have moderate or severe injuries (ISS 9 -), but a small group with minor injuries is also found. The latter are usually only kept under observation during a limited period. The relation between hospital care and injury severity is quite complicated, as the probability of being an in-patient increases with injury severity, number of diagnoses and age.

Summary
Immediate consequences for society

Indicators used	**Official Statistics**	**Hospital data**
Number of injured *(s e)*	1,722 *(42)*	2,915 *(54)*
Number and (share) of deaths	56 (3.3 %)	52 (1.8 %)
Number and (share) of severely injuries	427 (24.8 %)	
Number and (share) of injured people in in-patient care		733 (25.2 %)
Mean of ISS *(s e)*		3.5 *(.1)*
Sum of ISS *(s e)*		10,195 *(101)*

5.2 Consequences within one month after the accident

The main task of the official statistics is to give an immediate picture of the current traffic safety situation but also to follow up and provide information about changes and trends. Most data are collected at the accident site. The demand for high rapidity explains the limit of 48 hours to deliver the report of the accident. The low rate of missing data among the variables selected here also indicates a good accuracy. The only supplementary detail is the follow-up of people who died within 30 days after the traffic accident.

The hospital data cannot compete with the rapid accessibility of the police data, as some variables were not available until the injured patient had died or been discharged. In this study the case records have been the main source of diagnoses, injury severity, and type of hospital care as well as of controlling some demographic data, e.g. age and gender. It was only in the year 1994 that the National Board of Health and Welfare required the County Councils to deliver information about the causes of trauma and the injuries sustained at an individual level of people in in-patient care, thus considerably simplifying health-status follow-ups.

5.2.1 Consequences for society

Hospital data provide the possibility of gaining an additional insight into the consequences for society by presenting the hospital care generated by the sustained injuries. The average and total length of the hospital stay are presented in Table 5.4.

Table 5.4 Average and sum of hospital stay within the first month after the accident distributed over received hospital car;, data from five hospitals, 1991/92

Hospital stay	**Dead**	**In-patient care**	**Out-patient care**	**Total**
Mean (s e)	.6 (.4)	5.8 (.3)	0 (.0)	1.5 (.1)
std dev.	2.9	7.9	0	4.7
Sum (s e)	37 (23)	4,240 (264)	0 (0)	4,277 (266)
% of Sum (s e)	.9 (.5)	99.1 (3.1)	0 (0)	100.0
N	59	726	2,129	2,914
% of N	2.0	24.9	73.1	100.0

Abbreviations: s e = standard error, std dev.=standard deviation, N=numbers measured at given time

The average length of a hospital stay is very short and inaccurate for the dead, as most of them were killed at the accident site. Only seven are treated at the hospitals, and then during a limited period. The average length of a hospital stay among those treated as in-patients is shorter than a week during the first month. Accordingly, the average stay for all traffic casualties is low, or less than two days including the estimated variation of the true value. Note that a large proportion of hospital stays, about 50 %, include one to two days´ observation of the sustained injury, e.g. a concussion.

The total sum of hospital stays is recorded as 4,277 days. During the first month after the accident the traffic victims in the five hospital areas consequently generate a need for hospitalisation corresponding to 11.7 years. The size of the error indicates a good accuracy.

Visits to a doctor and lengthy periods of sick leave are other consequences of traffic injuries related to health care and of interest for society; see Tables 5.5 and 5.6.

Table 5.5 *Average number and sum of visits to a doctor within the first month after the accident distributed over received care; data from five hospitals, 1991/92*

Visits to a doctor [1)]	**Dead**	**In-patient care**	**Out-patient care**	**Total**
Mean (s e)	.1 (.04)	2.3 (.1)	1.8 (.03)	1.9 (.04)
std dev.	.3	2.1	1.1	1.5
Sum (s e)	**7 (3)**	**1,641 (100)**	**3,875 (109)**	**5,523 (148)**
% of Sum (s e)	**.1 (0)**	**29.7 (1.4)**	**70.2 (1.4)**	**100.0**
N(m1)	59	365	1,093	1,517
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

1) The first visit to E. R. is included in the records presented
Enumerated numbers are written in **bold letters**
Abbreviations: s e = standard error, std dev.=standard deviation, N=numbers measured at given time, m1=within one month

On average each traffic victims consults a doctor twice (including the first visit to the E.R.) to seek care during the first month after the accident. The average number of visits to a doctor is a little higher among the in-patients than the out-patients. The accuracy is consistently good for these means.

The total number of visits to a doctor is estimated at about 5,500 during the first month after the accident. The out-patients generate the majority of those visits. The errors in the enumerated sums indicate good consistencies in the measured numbers of visits to a doctor.

Table 5.6 *Average length and sum of sick leave [in working days] among all injured people within the first month after the accident distributed over received car; data from five hospitals, 1991/92*

Length of sick leave [1)]	**Dead**	**In-patient care**	**Out-patient care**	**Total**
Mean (s e)	.2 (.2)	6.3 (.4)	2.9 (.2)	3.7 (.2)
std dev.	1.8	8.2	5.7	6.5
Sum (s e)	**14 (14)**	**4,539 (346)**	**6,157 (384)**	**10,710 (514)**
% of Sum (s e)	**.1 (.1)**	**42.4 (2.4)**	**57.5 (2.5)**	**100.0**
N(m1)	59	390	1,144	1,593
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

1) The length of sick leave is based on 251 working days per year.
Enumerated numbers are written in **bold letters**
Abbreviations: s e = standard error, std dev.=standard deviation, N=numbers measured at given time, m1=within one month

The calculated average length of sick leave for all traffic victims, irrespective of age and type of occupation, is about four working days, which corresponds to an average length of about seven working days among those employed. The in-patients account for the longest sick leave on average, or about six days with an uncertainty of the true value of nearly one day.

The total sick leave among the traffic casualties is estimated at about 10,700 working days. Thus, during the first month after the accident the traffic victims in the five hospital areas generate a need for a total time for recovery (sick leave) corresponding to about 42.6±4.0 years.

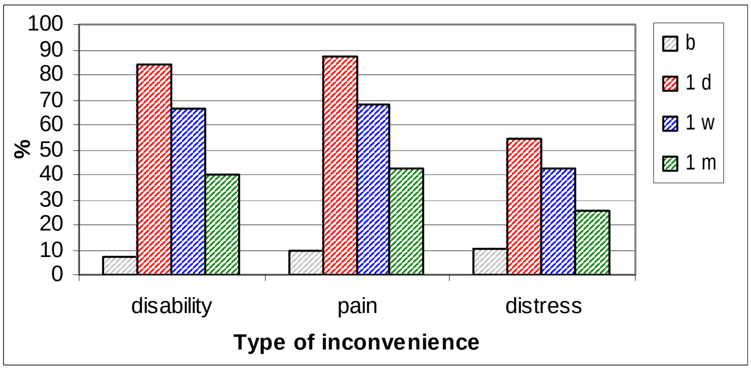
Of those injured participating in the health inquiry in the first month, 47 % refer to themselves as “employed”. The main part, about 70 %, works full time, while an additional 10 % have a part-time position of 75 % or more. Although there was almost no gender difference among those injured, the females dominate among the victims with part-time positions.

The shortcomings caused by low coverage are handled by enumerations. Note that the population contributing data varies for the different indicators.

5.2.2 Consequences for individuals

In order to gain knowledge about how health is affected by a traffic accident, the injured people are asked to describe their health condition by means of a health index. The Rosser Index, the only one presented here, is based upon the three dimensions of functional disability, pain and distress. In the following, these dimensions are first presented separately and are then combined in an attempt to describe the total health loss experienced by an individual. The purpose of using a health index is to reflect the extent of the inconveniences the involvement in a traffic accident implies for the victims.

The results in Figure 5.2 refer to a total of 1,832 victims who answered one or more of four postal questionnaires during the first month after the accident. The presentation focuses on the problems they experienced with comments on some possible explanatory factors such as, age, gender and injury severity.



Abbreviations: b=before, 1 d=one day, 1 w=one week, 1 m=one month

Figure 5.2 The functional disability, pain and distress experienced, related to time after the accident; before, one day, one week and, one month

As expected, most road users state that they are as well before their involvement in an accident. Only a few are affected, mostly with slightly reduced capacity. The skewed age distribution in this latter group, which contains nearly 40 % 65 years and older and few children and young people, contributes to this fact.

The pattern that most injured, about 85 %, is affected one day after the accident, and that the effect of the injury wears off to a level of two out of three injured people within a week may seem logical. After one month about 40 % were still experiencing consequences, e.g. difficulties to perform skilled work, study or do domestic work. The relatively high share, i.e. more than 55 %, of moderate and severe injuries could explain these conditions.

Close to 10 % state that they were in pain before accident. However, the ones affected, had mostly experienced slight pain. Also in this respect the age group 65 years and older is over-represented, accounting for 35 % as compared to about 15 % among the respondents in general. Even normal ageing seems to have a strong impact on the health condition of a population.

Most traffic victims, or nearly 90 %, are affected by pain one day after the accident. One week later, about 70 % are still suffering from pain. The fact that only 60 % had fully recovered after one month is more serious. Of those still in pain, one third have moderate, or even intense, pain that cannot be reduced by ordinary pain medicines. Age in combination with a high injury severity might serve to explain this.

About 10 % are affected mostly by slight distress before the accident. The degree of distress increases with age, and is somewhat more pronounced among females than males. About half of these 10 % are distressed by the experience of the accident one day after it occurred. One week later, about 40 % are still affected. With one month's perspective, 25 % are still reminded of the incident, and one fifth experience moderate or severe emotional distress and feel that they have had little or no support by relatives and friends. The distress increases with injury severity. The distress among females with minor and moderate injuries is more distinct than among males, with a contrary effect among the severely injured. Two in-patients even question the meaning of life after being involved in a traffic accident.

The health loss is here presented as lost days with full health. The average and the sum of health loss within the first month are presented in Table 5.7.

Table 5.7 Average and sum of health loss among injured people within the first month after the accident distributed over hospital care received; data from five hospitals, 1991/92 (lost days with full health)

Health loss	**Dead**	**In-patient care**	**Out-patient care**	**Total**
Mean (s e)	29.9 (.06)	4.9 (.1)	2.7 (.06)	3.8 (.1)
std dev.	.4	3.7	2.6	6.1
Sum (s e)	**1,762 (182)**	**3,542 (139)**	**5,768 (149)**	**11,072 (371)**
% of Sum (s e)	**15.9 (1.8)**	**32.0 (1.2)**	**52.1 (1.3)**	**100.0**
N(m1)	59	471	1,359	1,889
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

Enumerated numbers are written in **bold letters**
Abbreviations: s e = standard error, std dev.=standard deviation, N=numbers measured at given time, m1=within one month

The average health loss within the first month is nearly four days, including about one day within the first week, see Table E5.1 in Appendix E. The average health loss for those killed is very high, as most of them die at the accident site. The care received has a great impact on the experienced average health loss.

The total health loss during the first month is estimated at about 11,000 days, with a loss within the first week estimated at nearly 3,400 days. Thus, during the first month after accident the traffic victims in the five hospital areas generate a total health loss corresponding to about 30±2 years (9±.5 years within a week). The contributions of the fatalities and the in-patients are high in relation to their numbers.

Summary
Consequences for society, 1 month

Indicators used	**Hospital data**
Mean of hospital stay [days] *(s e)*	1.5 *(.1)*
Sum of hospital stay [days] *(s e)*	4,277 *(266)*
Mean of visits to a doctor *(s e)*	1.9 *(.04)*
Sum of visits to a doctor *(s e)*	5,523 *(148)*
Mean of sick leave [working days] *(s e)*	3.7 *(.2)*
Sum of sick leave [working days] *(s e)*	10,710 *(514)*

Consequences for individuals, 1 month

Indicators used	**Hospital data**
Share of injured with functional disability	40 %
Share of injured in pain	42 %
Share of injured in distress	26 %
Mean of health loss [days] *(s e)*	3.8 *(.1)*
Sum of health loss [days] *(s e)*	11,072 *(371)*

5.3 Consequences within six months and longer after the accident

The existing knowledge about the long-term consequences of traffic victims is limited. In this study, facts about the prevailing conditions are supplied at some chosen points in time, and the ambition has been to describe the accumulated consequences. Great attention has been paid to selecting the relevant times and the appropriate intervals for the follow-ups. The final decision was to start the long-term follow-ups six months after the traffic accident, and then return annually for new follow-ups. For practical and economic reasons we were obliged to resort to only four follow-ups.

Mainly, the same indicators are used to verify the long-term consequences of the traffic accidents as those used in short-term perspective. However, from the socio-economic point of view we have added data about visits to a physiotherapist/nurse as from one month on.

5.3.1 Consequences for society

Two more persons who were still in hospital after one month died from their head injuries. The accumulated average and total length of hospital stay during six months and longer after the accident are presented in Table 5.8. Data within six months are collected from the hospitals' case records, while it is mainly the health questionnaires that contribute data for the longer follow-ups.

Table 5.8 Cumulative average and total sum of hospital stay within six months and longer after the accident distributed over hospital care received; data from five hospitals, 1991/92

Length of hospital stay	Dead	In-patient care	Out-patient care	Total
m6				
Mean (s e)	.6 (.4)	18.3 (1.7)	.06 (.03)	4.6 (.5)
Sum (s e)	**37 (23)**	**13,308 (1,305)**	**128 (64)**	**13,472 (1,461)**
% of Sum (s e)	**.3 (.5)**	**98.8 (1.1)**	**1.0 (.5)**	**100.0**
y1				
Mean (s e)	.6 (.4)	21.2 (2.1)	.08 (.03)	5.4 (.6)
Sum (s e)	**37 (23)**	**15,398 (1,558)**	**170 (73)**	**15,606 (1,700)**
% of Sum (s e)	**.2 (.2)**	**98.7 (1.0)**	**1.1 (.5)**	**100.0**
y2				
Mean (s e)	.6 (.4)	26.0 (2.8)	.1 (.05)	6.6 (.7)
Sum (s e)	**37 (23)**	**18,861 (2,084)**	**277 (105)**	**19,175 (2,183)**
% of Sum (s e)	**.2 (.2)**	**98.4 (.9)**	**1.4 (.6)**	**100.0**
y3,5				
Mean (s e)	.6 (.4)	30.0 (3.6)	.2 (.07)	7.6 (.9)
Sum (s e)	**37 (23)**	**21,715 (2,684)**	**490 (157)**	**22,242 (2,708)**
% of Sum (s e)	**.2 (.1)**	**97.6 (1.0)**	**2.2 (.7)**	**100.0**
N(m6)	59	354	941	1,295
N(y1)	59	303	892	1,195
N(y2)	59	285	879	1,164
N(y3,5)	59	262	852	1,114
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: s e =standard error, N=numbers measured at given time, m6=within six months, y1=within one year, y2=within two years, y3,5= within three years and 5 months

When the follow-up period increased from one to six months, the average length of the hospital stay more than tripled for the in-patients. The seriously injured victims required very different lengths of hospital stay. Some out-patients were also back in hospitals, for minor operations, which led to some in-patient care. The estimations of the average length correspond to between four and five days. Thus, all traffic victims registered in the five hospitals generate a need for hospitalisation corresponding to about 37±8 years during the first six months after the accident.

During the first year, the average length of hospital care corresponds to about five days. The total length of hospital stays increases by nearly six years, up to about 43±9 years within the first year after the accident.

During the second year, when the in-patients are even fewer than before, the average length of hospital stay still increases to about seven days, which results in an additional ten years of hospitalisation during this year, or a total length of hospital stay of 53±12 years within the first two years.

The prolongation of the hospital stays declines somewhat during the period following the second year. The average hospital stay for a traffic victim is about eight days in a long-term perspective of more than three years, and the corresponding total length of hospital stays is about 61±14 years.

During the first six months many traffic victims contributed to the total length of hospital stay. However, in a long-term perspective (i.e. more than three years) only about 60 % of the “total” hospital length is accumulated within the first six months. In order to gain reliable knowledge, a longer follow-up period is desirable, as some of the most severely patients need recurrent specialized hospital care, such as plastic surgery, psychiatric care and advanced rehabilitation. Moreover, a few injured people with permanent disabilities even need more or less permanent care at nursing homes and thus continue to generate days of hospitalisation.

The average and total number of visits to a doctor within six months and longer after the accident are presented in Table 5.9.

Table 5.9 Cumulative average and total sum of visits to a doctor six months and longer after the accident distributed over hospital care received; data from five hospitals, 1991/92

Visits to a doctor [1)]	**Dead**	**In-patient care**	**Out-patient care**	**Total**
m6				
Mean (s e)	.1 (.04)	3.7 (.2)	2.3 (.1)	2.6 (.1)
Sum (s e)	**7 (3)**	**2,708 (148)**	**4,918 (205)**	**7,633 (250)**
% of Sum (s e)	**.1 (0)**	**35.5 (1.7)**	**64.4 (1.7)**	**100.0**
y1				
Mean (s e)	.1 (.04)	4.3 (.2)	2.5 (.1)	2.9 (.1)
Sum (s e)	**7 (3)**	**3,151 (166)**	**5,216 (218)**	**8,374 (270)**
% of Sum (s e)	**.1 (0)**	**37.6 (1.7)**	**62.3 (1.8)**	**100.0**
y2				
Mean (s e)	.1 (.04)	5.3 (.3)	2.6 (.1)	3.2 (.1)
Sum (s e)	**7 (3)**	**3,841 (237)**	**5,578 (229)**	**9,426 (323)**
% of Sum (s e)	**.1 (0)**	**40.7 (2.0)**	**59.2 (2.0)**	**100.0**
y3,5				
Mean (s e)	.1 (.04)	5.9 (.4)	2.8 (.1)	3.5 (.1)
Sum (s e)	**7 (3)**	**4,291 (286)**	**6,025 (258)**	**10,323 (372)**
% of Sum (s e)	**.1 (0)**	**41.6 (2.1)**	**58.4 (2.1)**	**100.0**
N(m6)	59	315	934	1,308
N(y1)	59	292	890	1,241
N(y2)	59	287	873	1,219
N(y3,5)	59	258	860	1,177
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

1) The first visit to the E. R. is included in the records presented
Enumerated numbers are written in **bold letters**
Abbreviations: s e =standard error, N=numbers measured at given time, m6=within six months, y1=within one year, y2=within two years, y3,5= within three years and 5 months

When the follow-up period is extended from one to six months, the average number of visits to a doctor increases for all injured people by nearly one visit to 2.6 visits. The increase is most pronounced among the in-patients. The total visits to a doctor are estimated at about 7,600, i.e. an increase of about 40 % during the additional five-month time span, where the contribution is higher among in-patients than out-patients.

During the following six months up to one year, the average number of visits increases to nearly three, but at a slower rate, as fewer injured people need treatments. After the first year, the total number of visits to a doctor reaches 8,300, or only about 10 % more than during the first six months

However, the follow-ups after the second and the third years establish that 8 % and 5 % respectively of the traffic victims have not fully recovered, as they are still treated by their doctors. The average number of visits to a doctor and the total sums display a slight increase, the former from just above 3 to 3.5 visits, and the latter from 9,400 to 10,300 visits. The initial in-patients constitute with a greater proportion, the longer the time spans. In order to gain a better knowledge of the after-care given by doctors a longer period than two years is recommended.

The accumulated average and total sum of visits to a physiotherapist/nurse six months and longer after the accident are presented in Table 5.10. The data are collected in the health questionnaires from six months and further on.

Table 5.10 Cumulative average and total sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over hospital care received; data from five hospitals, 1991/92

Visits to a physiotherapist/nurse	Dead	In-patient care	Out-patient care	Total
m6				
Mean (s e)	0 (0)	7.1 (1.1)	1.4 (.2)	2.8 (.3)
Sum (s e)	**0 (0)**	**5,140 (786)**	**2,874 (430)**	**8,014 (857)**
% of Sum (s e)	**0 (0)**	**64.1 (5.0)**	**35.9 (5.0)**	**100.0**
y1				
Mean (s e)	0 (0)	10.0 (1.2)	2.2 (.3)	4.1 (.4)
Sum (s e)	**0 (0)**	**7,245 (892)**	**4,641 (669)**	**11,887 (1,072)**
% of Sum (s e)	**0 (0)**	**61.0 (4.6)**	**39.0 (4.6)**	**100.0**
y2				
Mean (s e)	0 (0)	12.4 (1.4)	2.9 (.4)	5.2 (.4)
Sum (s e)	**0 (0)**	**9,031 (1,025)**	**6,068 (751)**	**15,099 (1,208)**
% of Sum (s e)	**0 (0)**	**59.8 (4.1)**	**40.2 (4.2)**	**100.0**
y3,5				
Mean (s e)	0 (0)	17.8 (1.6)	3.7 (.5)	6.4 (.5)
Sum (s e)	**0 (0)**	**10,709 (1,149)**	**7,941 (1,015)**	**18,650 (1,459)**
% of Sum (s e)	**0 (0)**	**57.4 (4.2)**	**42.6 (4.2)**	**100.0**
N(m6)	59	284	871	1,214
N(y1)	59	276	869	1,204
N(y2)	59	273	865	1,197
N(y3,5)	59	258	851	1,168
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

Enumerated numbers are written in **bold letters**
Abbreviations: s e =standard error, N=numbers measured at given time, m6=within six months, y1=within one year, y2=within two years, y3,5= within three years and 5 months

The traffic victims consulted a physiotherapist/nurse for treatment on average nearly three times during the first six months. The average number of visits is higher among in-patients than out-patients.

The total sum of visits to a physiotherapist/nurse is estimated to be about 8,000 during the first six months after the accident. The in-patients generate a pronounced majority of those. The variability in the enumerated sums is relatively large in comparison with the indicators presented earlier, e.g. hospital stays and visits to a doctor. One reason may be that the physiotherapists provide more prolonged treatments than doctors, e.g. “a package of 10 to 14 visits”, which leads to great variations among the patients in terms of treatment.

During the first year, the average number of visits increases to about four among all injured people, but at a slower rate as fewer traffic victims need treatment. The first year's total number of visits to a physiotherapist/nurse is estimated at 11,800, or about 50 % more than during the first six months.

The follow-ups after the second and the third years show that 6 % and 4 % respectively of the traffic victims have not fully recovered, as they are still under treatment by a physiotherapist/nurse. However, the average numbers and the total sums of visits increase slowly, the former from just above 5 to about 6.5 visits, and the latter from 15,100 to 18,600 visits. The in-patients still contribute the largest share, but it is the contribution of out-patients that increases the most over time, e.g. for diagnoses like fractures to the upper limbs and whiplash. In order to gain a better knowledge about this type of after-care, a period of at least two years is needed, but is probably not enough for the diagnoses mentioned.

The average length and total sum of sick leave for periods six months and longer after the accident are presented in Table 5.11.

Table 5.11 Cumulative average length and total sum of sick leave [in working days] among all injured people six months and longer after the accident distributed over hospital care received; data from five hospitals, 1991/92

Length of sick leave [1)]	**Dead**	**In-patient care**	**Out-patient care**	**Total**
m6				
Mean (s e)	.2 (.2)	14.9 (1.4)	5.0 (.4)	7.4 (.5)
Sum (s e)	**14 (14)**	**10,833 (1,026)**	**10,671 (939)**	**21,517 (1,368)**
% of Sum (s e)	**.1 (.1)**	**50.3 (3.3)**	**49.6 (3.4)**	**100.0**
y1				
Mean (s e)	.2 (.2)	18.1 (1.6)	5.9 (.5)	8.8 (.5)
Sum (s e)	**14 (14)**	**13,126 (1,208)**	**12,593 (1,095)**	**25,733 (1,595)**
% of Sum (s e)	**.1 (.1)**	**51.0 (3.3)**	**48.9 (3.3)**	**100.0**
y2				
Mean (s e)	.2 (.2)	23.5 (2.2)	7.3 (.7)	11.2 (.7)
Sum (s e)	**14 (14)**	**17,094 (1,618)**	**15,627 (1,569)**	**32,735 (2,179)**
% of Sum (s e)	**0 (0)**	**52.2 (3.6)**	**407.7 (3.6)**	**100.0**
y3,5				
Mean (s e)	.2 (.2)	32.1 (3.6)	9.8 (1.1)	15.2 (1.2)
Sum (s e)	**14 (14)**	**23.286 (2,631)**	**20,864 (2,382)**	**44,165 (3,393)**
% of Sum (s e)	**0 (0)**	**52.7 (4.1)**	**47.2 (4.2)**	**100.0**
N(m6)	59	320	941	1,320
N(y1)	59	288	886	1,233
N(y2)	59	269	864	1,192
N(y3,5)	59	267	862	1,188
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

1) The length of sick leave is based on 251 working days per year.
Enumerated numbers are written in **bold letters**
Abbreviations: s e =standard error, N=numbers measured at given time, m6=within six months, y1=within one year, y2=within two years, y3,5= within three years and 5 months

When the follow-up period is extended from one to six months, the average length of sick leave doubles for all injured people and increases even more for the inpatients. The estimations of these true values are about one working day to just below three working days. Thus, during the first six months after the accident, traffic victims in the five hospitals generate sick leave corresponding to about 86±11 working years. The moderately and severely injured victims represent the clear majorities of these sick leaves. Females generate more than half the total sick leave days, although they are only about 45 % of the traffic victims.

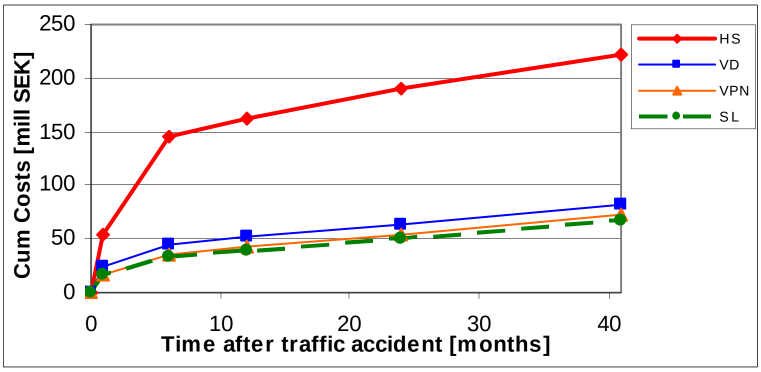
During the first year after the accident the traffic victims need an average length of sick leave corresponding to nine working days. The total length of sick leaves increases by nearly 17 years, and adds up to about 103±12 working years during the first year after the accident. Only 3 % of the traffic victims are in need of sick leave during the last six months. The variability in the enumerated sums after one year is relatively high.

The follow-ups after the second and the third years establish that about 3% and 2 % respectively of the traffic victims have not fully recovered, as they are still on longer or shorter sick leaves. The average lengths and the total sums of the sick leave increase steadily, the former from just above 11 to about 15 working days, and the latter from 130±17 to 176±26 working years.

The female victims are in greater need of sick leave the longer the time period (68 % during the second year and 86 % during the "third" year). A longer follow-up also reveals that an initially minor injury, i.e. ISS 1, e.g. whiplash, generates a larger share of the total length of the sick leave than their proportion in numbers, and so do the severely injured victims, i.e. ISS 9- .

Note that the production losses resulting from fatalities in traffic as well as early retirement pensions are not included in the above calculations. The reason for this is that we have not performed a total follow-up of all victims involved in this respect.

The impact of the time after the accident on the relations of the combined costs for hospital stays, visits to a doctor and/or a physiotherapist/nurse and sick leave is presented in Figure 5.3. The costs per unit used to calculate these combined societal costs are found in Table 3.2. Since no discount rate is applied, all consequences – immediate as well as long-term – are added up and assumed to contribute equally to loss of welfare. However, the follow-up is limited to three years and five months after the accident. Thus, for consequences occurring after that period, in a sense a very high discount rate has been applied.



Denominations: H S=hospital stay, V D=visits to a doctor, V PN=visits to a physiotherapist/nurse, S L=sick leave

Figure5.3 Combined costs (x 10^6 SEK) for hospital stay (H S), visits to a doctor (V D), visits to a physiotherapist or nurse (V PN) and sick leave (S L) at five selected time perspectives for registered traffic victims at five hospitals, 1991/92

Different time perspectives have been applied to give a better understanding of the long-term costs. Approximately 65 % of the “full costs” calculated here are generated within six months after the accident, (“full costs”= all health care measured during the period of following up consequence in this study). The two indicators “hospital stay” (H S) and “sick leave” (S L) contributed most to these costs, or between 85 % and more than 90 % depending on the long-term perspective. The hospitalised victims generated the largest share, mainly due to the definition of “sick leave” in this study. Nevertheless the visits to a doctor or a physiotherapist are of interest, as these indicators represent an alternative form of medical care (an alternative out-patient care) for the patients.

In the analysis in Chapter 8, the costs of all health care are one of two target indicators selected.

5.3.2 Consequences for individuals

The health index reflects some of the inconveniences for traffic casualties. The analyses deal with the number of lost days with full health (days). In the calculations performed the fatalities by traffic victim definition are included as well the in-patients and the out-patients. The fatalities in particular have a great impact on the result of the analyses.

Average and total sum of health loss, during six months and longer after the accident are presented in Table 5.12.

Table 5.12 Cumulative average and total sum of health loss among injured people six months and longer after the accident distributed over hospital care received; data from five hospitals, 1991/92

Health loss	Dead	In-patient care	Out-patient care	Total
m6				
Mean (s e)	181.8 (.1)	18.1 (.9)	7.8 (.3)	13.9 (.8)
Sum (s e)	**10,727 (1,181)**	**13,161 (739)**	**16,626 (677)**	**40,514 (2,578)**
% of Sum (s e)	**26.5 (2.7)**	**32.5 (1.5)**	**41.0 (1.5)**	**100.0**
y1				
Mean (s e)	364.8 (.01)	28.7 (1.5)	11.1 (.4)	22.7 (1.4)
Sum (s e)	**21,524 (1,836)**	**20,835 (1,156)**	**23,652 (958)**	**66,011 (4,175)**
% of Sum (s e)	**32.6 (3.1)**	**31.6 (1.5)**	**35.8 (1.4)**	**100.0**
y2				
Mean (s e)	729.8 (.01)	48.0 (2.9)	16.6 (.7)	38.8 (2.7)
Sum (s e)	**43,059 (3,351)**	**34,847 (2,226)**	**35,234 (1,600)**	**113,139 (7,920)**
% of Sum (s e)	**38.1 (3.5)**	**30.8 (1.6)**	**31.1 (1.4)**	**100.0**
y3,5				
Mean (s e)	1,257.8 (.01)	70.8 (4.8)	22.4 (1.6)	59.4 (4.3)
Sum (s e)	**74,211 (5,261)**	**51,363 (3,575)**	**47,624 (2,306)**	**173,199 (12,734)**
% of Sum (s e)	**42.8 (3.7)**	**29.7 (1.7)**	**27.5 (1.4)**	**100.0**
N(m6)	59	348	988	1,395
N(y1)	59	310	923	1,292
N(y2)	59	284	902	1,245
N(y3,5)	59	268	885	1,212
Nt (t=total)	59	726	2,129	2,914
% of Nt	2.0	24.9	73.1	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: s e =standard error, N=numbers measured at given time, m6=within six months, y1=within a year, y2=within two years, y3,5= within three years and 5 months

When the follow-up perspective is expanded from one (see table 5.7) to six months, the average health loss for all victims increases to about 14 days of full health. The increase is especially substantial for the fatalities. Thus, the traffic victims in the five hospitals generate a total health loss corresponding to about 111±14 years of full health during the first six months after the accident. The victims killed generate about 30 of those lost years of health, where the males contribute about 60 %.

During the first year after the accident, the traffic victims lose an average length of health corresponding to about 22 days. The total health loss increases from that after six months by about 70 years, adding up to about 182±23 years during the first year after the accident. More than 25 % of the traffic casualties are still suffering after-effects from their injuries. The variability in the enumerated sums after a year is relatively low.

The follow-ups after the second and third years show that about 22 % and 17 % respectively of the traffic casualties are still not fully recovered. Therefore, the average and the total health loss increase steadily, the former from just above 39 to about 59 days, and the latter from 310±43 to 475±68 years. The accuracy in the enumerated sums after two and more than three years respectively seems to decrease. The fatalities constitute a larger share as the follow-up is prolonged. The slightly injured victims still contribute quite a large share, or about the same as the severely injured victims. Thus, it seems difficult to recommend a period of following up consequences with good accuracy.

Summary

Consequences for society, 6 months

Indicators used	**Hospital data**
Mean of hospital stay [days] *(s e)*	4.6 *(.5)*
Sum of hospital stay [days] *(s e)*	13,472 *(1,461)*
Mean of visits to a doctor*(s e)*	2.6 *(.1)*
Sum of visits to a doctor *(s e)*	7,633 *(250)*
Mean of visits to a physiotherapist/nurse *(s e)*	2.8 *(.3)*
Sum of visits to a physiotherapist/nurses*(s e)*	8,014 *(857)*
Mean of sick leave [working days] *(s e)*	7.4 *(.5)*
Sum of sick leave [working days] *(s e)*	21,518 *(1,368)*

Consequences for society, 1 year

Indicators used	**Hospital data**
Mean of hospital stay [days] *(s e)*	5.4 *(.6)*
Sum of hospital stay [days] *(s e)*	15,606 *(1,700)*
Mean of visits to a doctor*(s e)*	2.9 *(.1)*
Sum of visits to a doctor *(s e)*	8,374 *(270)*
Mean of visits to a physiotherapist/nurse *(s e)*	4.1 *(.4)*
Sum of visits to a physiotherapist/nurse *(s e)*	11,887 *(1,072)*
Mean of sick leave [working days] *(s e)*	8.8 *(.5)*
Sum of sick leave [working days] *(s e)*	25,733 *(1,595)*

Consequences for society, 2 years

Indicators used	**Hospital data**
Mean of hospital stay [days] *(s e)*	6.6 *(.7)*
Sum of hospital stay [days] *(s e)*	19,175 *(2,183)*
Mean of visits to a doctor*(s e)*	3.2 *(.1)*
Sum of visits to a doctor*(s e)*	9,426 *(322)*
Mean of visits to a physiotherapist/nurse *(s e)*	5.2 *(.4)*
Sum of visits to a physiotherapist/nurse *(s e)*	15,099 *(1,208)*
Mean of sick leave [working days] *(s e)*	11.2 *(.7)*
Sum of sick leave [working days] *(s e)*	32,735 *(2,179)*

Consequences for society, 3 years and 5 months

Indicators used	**Hospital data**
Mean of hospital stay [days] *(s e)*	7.6 *(.9)*
Sum of hospital stay [days] *(s e)*	22,242 *(2,708)*
Mean of visits to a doctor*(s e)*	3.5 *(.1)*
Sum of visits to a doctor*(s e)*	10,323 *(371)*
Mean of visits to a physiotherapist/nurse *(s e)*	6.4 *(.5)*
Sum of visits to a physiotherapist/nurse *(s e)*	18,650 *(1,459)*
Mean of sick leave [working days] *(s e)*	15.2 *(1.2)*
Sum of sick leave [working days] *(s e)*	44,165 *(3,393)*

Summary

Consequences for individuals, 6 months

Indicator used	**Hospital data**
Mean of health loss [days] *(s e)*	13.9 *(.8)*
Sum of health loss [days] *(s e)*	40,514 *(2,578)*

Consequences for individuals, 1 year

Indicator used	**Hospital data**
Mean of health loss [days] *(s e)*	22,7 *(1.4)*
Sum of health loss [days] *(s e)*	66,011 *(4,175)*

Consequences for individuals, 2 years

Indicator used	**Hospital data**
Mean of health loss [days] *(s e)*	38.8 *(2.7)*
Sum of health loss [days] *(s e)*	113,139 *(7,920)*

Consequences for individuals, 3 years and 5 months

Indicator used	**Hospital data**
Mean of health loss [days] *(s e)*	59.4 *(4.3)*
Sum of health loss [days] *(s e)*	173,199 *(12,734)*

6 Estimating the traffic safety situation due to the consequences of traffic injuries

The following sections deal with the separate influence of some factors on different indicators of the consequences for society and individuals immediately after the accident, and in a short-term and long-term perspective respectively. The factors selected are road environment, road users, type of accident and counterpart, road design, road surface conditions, and light conditions.

In this chapter the following hypotheses will be investigated:
- √ Different traffic-engineering factors affect injury severity in different ways.
- √ Different traffic-engineering factors affect the distribution of the total consequences in different ways.
- √ The consequences of traffic injuries change depending on when the follow-up is performed.
- √ The consequences of traffic injuries, both in terms of content, extent and distribution, are dependent on the data source used.

6.1 Road environment

6.1.1 Consequences for society

Number and severity of injuries. Traffic victims in rural and urban areas, in the police data set in the hospital data set respectively, are presented in Figure 6.1 (see Table E6.1 in Appendix E).

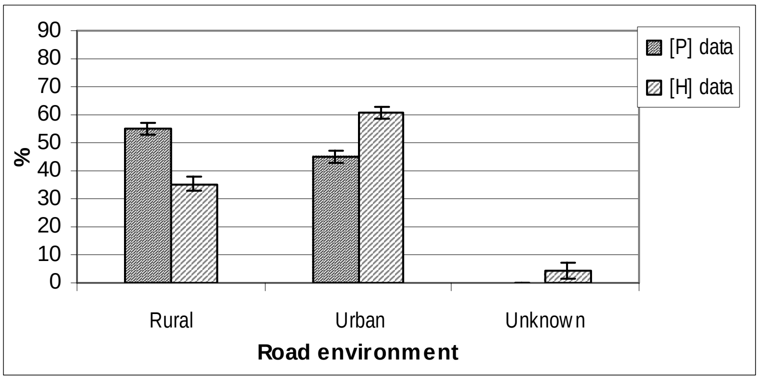
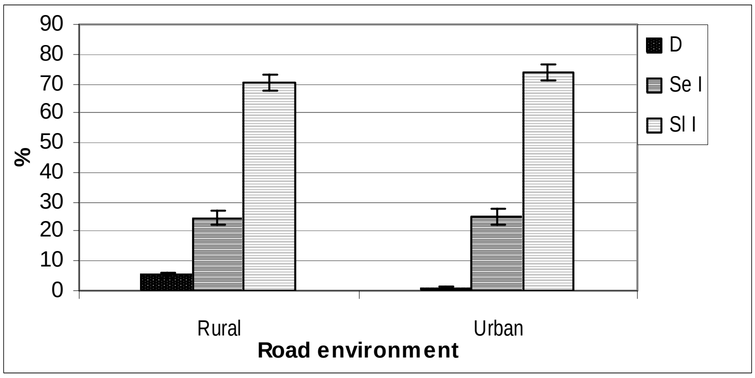


Figure 6.1 Proportions of injured people distributed over road environment, police data [P] (N=1,722) and hospital data [H] (N=2,915) from five hospital admittance areas, 1991/92

The distribution of injuries in rural and in urban areas differs in the police data set (the majority, 55 %, in rural areas) and in the hospital one (the majority, 60 %, in urban areas). However, the number of injured victims in rural areas is nearly identical in both data sets. In urban areas, the number of hospital-registered casualties is more than double that reported by the police. The additional new data in urban areas mostly contain injured cyclists and pedestrians

The distribution of injury severity in rural and urban areas in the police data set is presented in Figure 6.2 (see Table E6.2 in Appendix E).

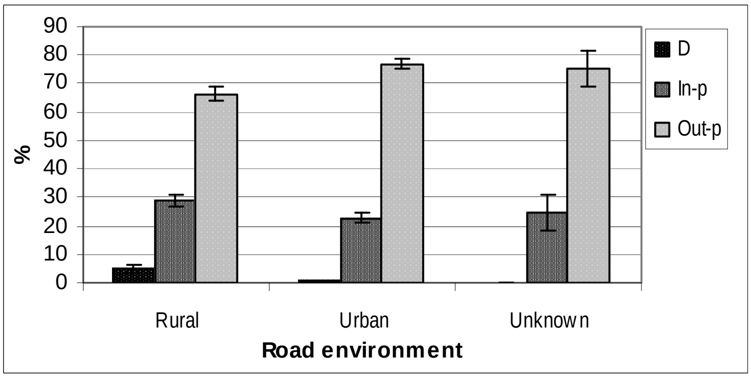


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 6.2 *Injury severity distributed over people injured in different road environments, police data (N=1,722) from five hospital admittance areas, 1991/92*

Most people killed receive their injuries in rural areas. The number of severely injured victims is higher in rural than in urban areas, while the magnitude of the shares is the same. According to police data, the traffic victims suffer most severe injuries in rural areas.

The distribution of severity in the hospital data set among people injured in rural and urban areas is presented in Figure 6.3 (see Table E6.2 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 6.3 *Received care distributed over injuries in different road environments, data (N=2,914) from five hospitals, 1991/92*

The number of fatalities is significantly higher in rural than in urban areas. The share of in-patients is also higher among people injured in rural areas than in urban ones, even though the in-patients in the urban area rank highest in number. The distributions of severity in terms of road environment correspond rather well in the hospital and police data, while the victims severely injured in urban areas outnumber those in rural areas.

In Figures 6.4 and 6.5 present the average injury severity and sum of the ISS, of all injured victims including the deceased, distributed over different road environments (see Table E6.3 in Appendix E).

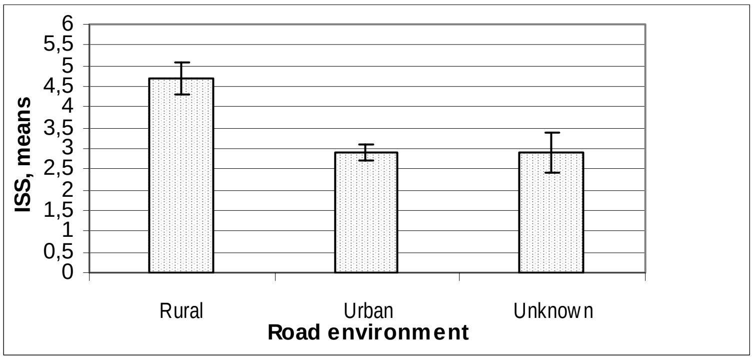


Figure 6.4 *Average Injury Severity Score (ISS) distributed over people injured in different road environments, data (N=2,909) from five hospitals, 1991/92*

The average injury in rural areas is more severe (p=.001) than that in urban areas when the ISS is used as the indicator. Many fatalities in rural areas contribute to a greater spread in the average injury severity here than in urban areas. There is a great similarity between the average injury in urban areas and in unknown areas. However, the uncertainty in of the injury sustained in unknown areas is somewhat more pronounced.

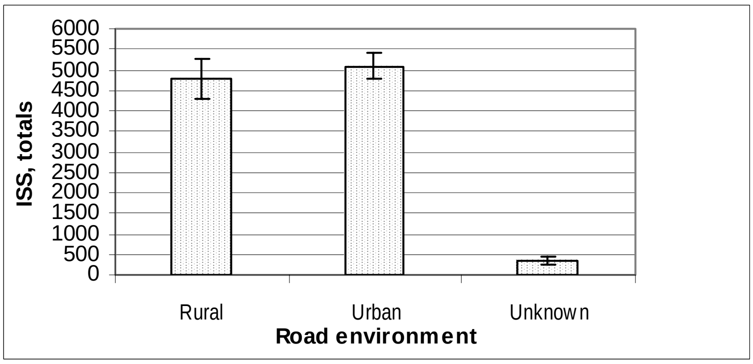


Figure 6.5 *Sum of Injury Severity Score (ISS) distributed over people injured in different road environments, data (N=2,909 including the deceased) from five hospitals, 1991/92*

The total burden for society, expressed in ISS, is not statistically significantly different for casualties in urban and rural areas, in spite of a great difference in numbers in the two environments. Victims injured in unknown areas contribute very little to the total sum of ISS due to their small number.

Hospital stay. In Figures 6.6 and 6.7 the average and total length of hospital stay are displayed for different road environments (see Table E6.4 in Appendix E).

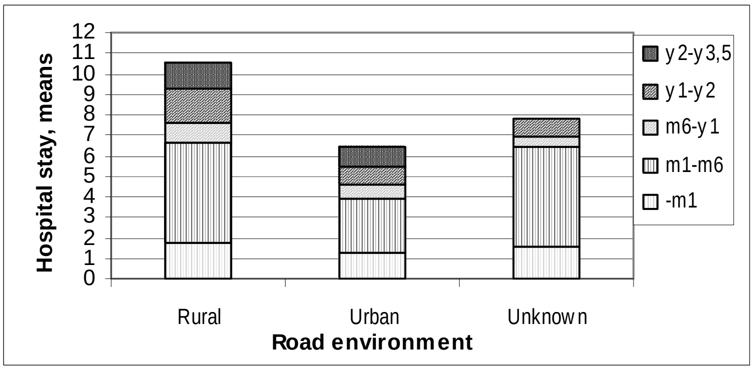


Figure 6.6 *Cumulative average length of hospital stay on five selected occasions after the traffic accident distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92*

In the one-month perspective, those injured in rural areas are on average treated longer (p=.02) in hospital than those injured in urban areas. The same thing (p=.05) is valid in a perspective of six months. Few traffic victims are treated at hospital six months and later after the accident, which results in a low average contribution to the total hospital stay in a long-term perspective. However, an average hospital stay in a long-term perspective of more than three years is more than 50 % longer (p=.05) for people injured in rural areas than in urban areas.

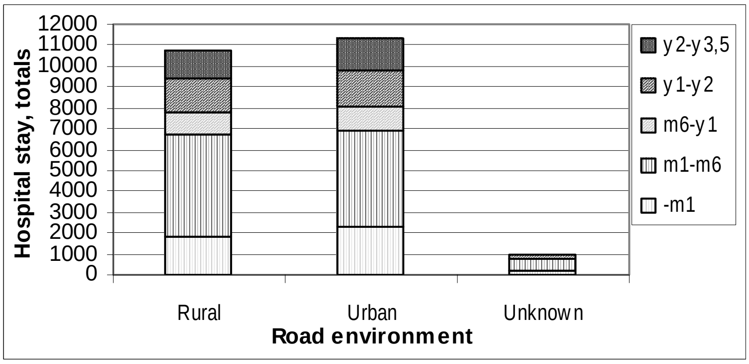


Figure 6.7 Total length of hospital stay on five selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92

In the one-month perspective, the total length of the hospital stay is longer (p=.05) for those injured in urban areas rather than in rural areas, which is due to a larger number of injuries in the former category. However, in a long-term perspective, the difference becomes smaller.

Visits to a doctor. The number of visits to a doctor is another indicator related to health care, here used for describing the consequences of traffic injuries of interest to society in Figures 6.8 and 6.9 (see Table E6.5 in Appendix E).

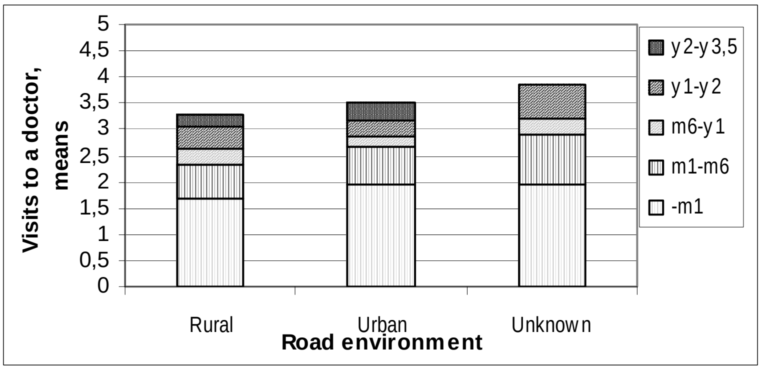


Figure 6.8 *Cumulative average visits to a doctor on five selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92*

The average number of visits to a doctor is higher (p=.001) during the first month after the accident among victims injured in urban areas than in rural ones. The longer the time after the accident the fewer average visits to a doctor. Taking into account the accuracy of the collected data into account, the average visits are rather similar from one year after the accident and onwards.

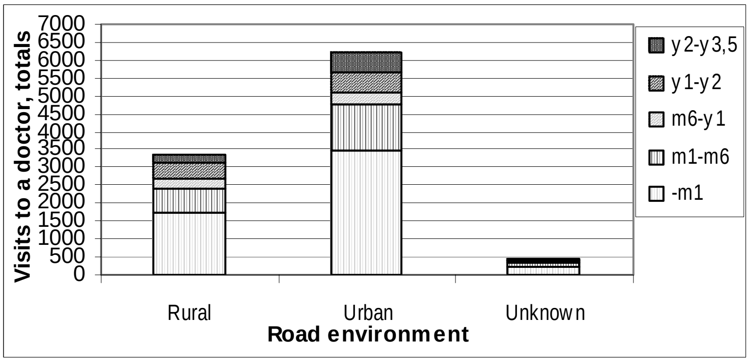


Figure 6.9 *Total number of visits to a doctor on five selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92*

The total number of visits to a doctor is larger (p=.001) for people injured in urban than in rural areas, irrespectively of the time perspective applied. One month after the accident, the total number of visits needed among victims injured in urban areas is twice that of those injured in rural areas. In a long-term perspective of more than three years, the total number of visits to a doctor among people injured in urban areas is still almost double that of those injured in rural areas.

Visits to a physiotherapist or a nurse. The number of visits to a physiotherapist or a nurse is another indicator used to describe the consequences of traffic injuries. In Figures 6.10 and 6.11**,** both the average and the total number of visits to a physiotherapist or a nurse are presented. Note that the time perspectives differ from those applied to other indicators, as the first follow-up only starts six months after the accident, and consequently includes only four periods (see Table E6.6 in Appendix E).

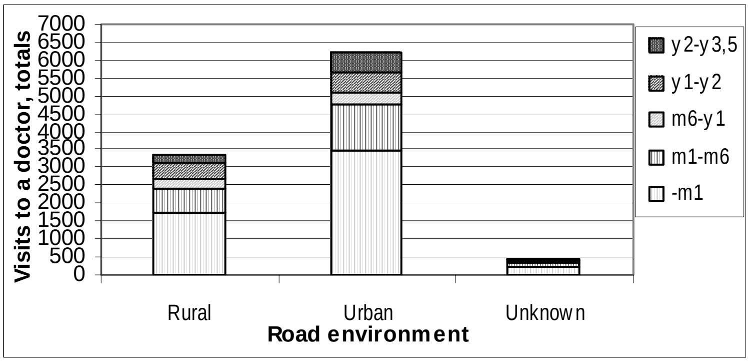


Figure 6.10 Cumulative average number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92

Irrespectively of the time perspective, the average number of visits to a physiotherapist or a nurse shows no statistically significant differences between casualties in urban areas compared to rural areas. However, in the longer time perspective of between six months and two years, there is a tendency towards somewhat more treatments among victims injured in rural areas than in urban ones. Due to the small population of injuries in unknown areas, the uncertainty of this information is pronounced.

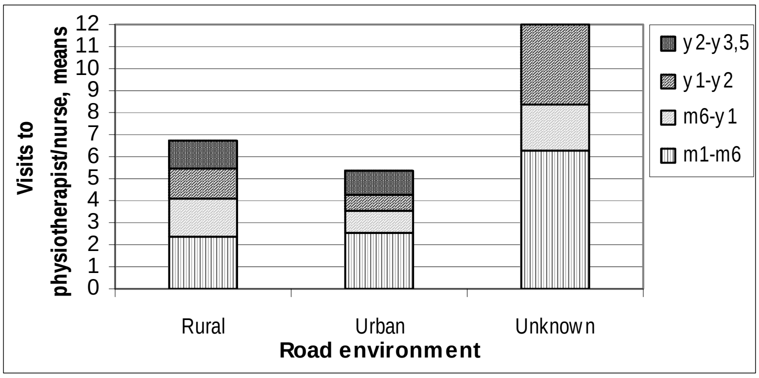


Figure 6.11 Total number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92

In all long-term perspectives, i.e. from six months up until more than three years, the total number of visits to a physiotherapist or a nurse is more frequent (p=.01 - .1) among casualties in urban areas than in rural areas. However, the difference is most pronounced (p=.01) six months after the accident when the total period of treatment among people injured in urban areas are nearly twice as long as those for rural areas. The sum of visits in a long-term perspective for victims injured in unknown areas corresponds to almost 10 % of the total visits due to high average number of visits.

Sick leave. The sick leaves for the five follow-up periods are presented in Figures 6.12 and 6.13 (see Table E6.7 in Appendix E).

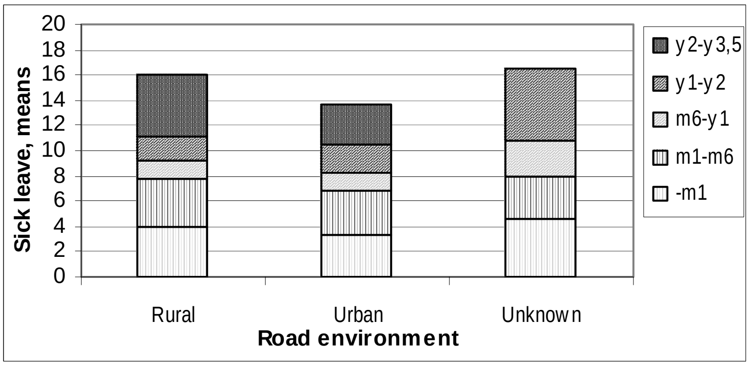


Figure 6.12 Cumulative average length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92

In the one-month perspective, the average length of sick leave has a tendency to be longer (p=.2) for casualties in rural areas than in urban areas. In a long-term perspective, i.e. more than three years, victims injured in rural areas on average need about 20 % longer sick leave to recover than those injured in urban areas. However, a difference of this magnitude is not statistically significant. Due to a small number, the uncertainty of the collected information on the average sick leave among traffic victims in unknown areas two years after the accident cannot be established as statistically significantly any more than that for people injured in either urban or rural areas.

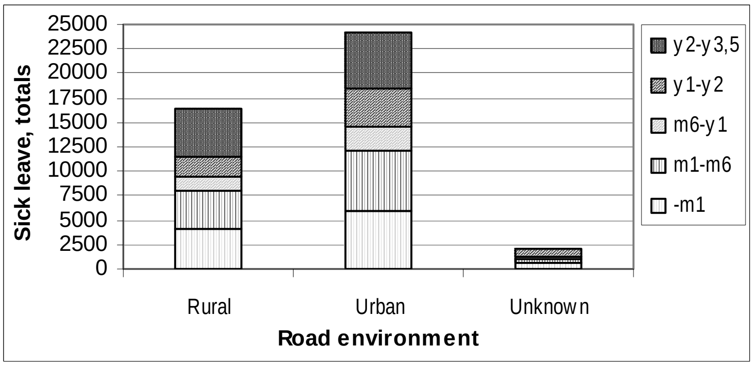


Figure 6.13 Total length of sick leave [in working days] on five selected occasions after the traffic accident distributed over injuries in different road environments, data (N=2,915) from five hospitals [5H], 1991/92

Irrespectively of the time perspective applied, the total sick leave is longer (p=.001 - .02) for casualties in urban areas than in rural areas. In a long-term perspective of more than three years, the total sick leave is about 50 % longer (p=.02) for victims injured in urban areas than in rural areas. Although the casualties in the unknown areas have a long average sick leave, the total length corresponds to only about 5 % of the total sick leave.

6.1.2 Consequences as perceived by the individuals

Health loss. The following presentation is based on the Rosser health index used in the questionnaire with the deceased included in the estimated health loss. Only five follow-up periods out of a total of seven, are presented in Figures 6.14 and 6.15, (see Table E6.8 in Appendix E).

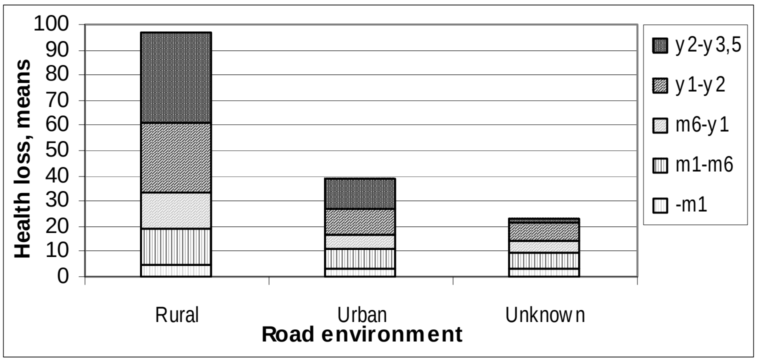


Figure 6.14 Cumulative average health loss [lost days] on five selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92

Irrespectively of the period of time after the accident, the average health loss is bigger (p=.001) for the casualties in rural areas than in urban ones. The average consequences are about 40 % higher in a short-term perspective, only to increase by about 150 % in a long-term perspective of more than three years. These health losses are heavily influenced by the impact of the fatalities in traffic, as the number of deaths in rural areas is four times higher than that in urban areas. If the people killed are excluded, the differences between the average health losses in rural and urban areas are nearly negligible in the long-term perspective. The average health loss among people injured in unknown areas corresponds rather well with that of those injured in urban areas up until one year after the accident.

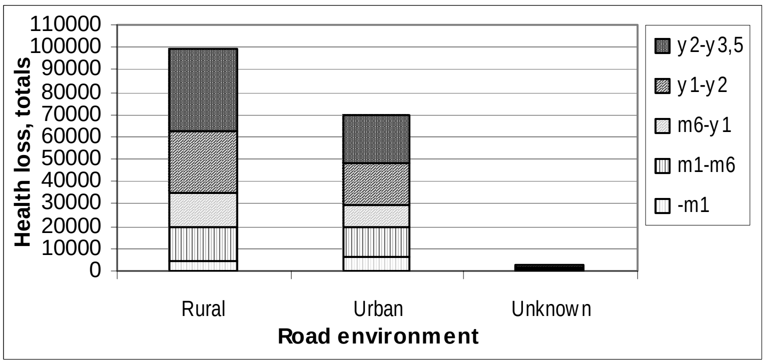


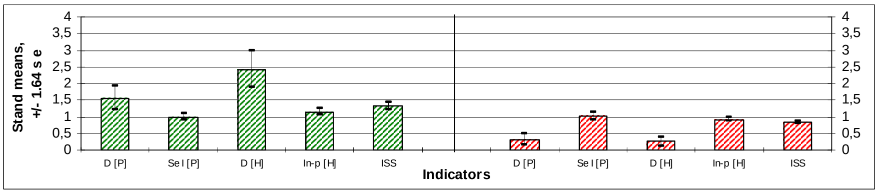
Figure 6.15 Total health loss [lost days] on five selected occasions after the traffic accident, distributed over injuries in different road environments, data (N=2,915) from five hospitals, 1991/92

In the one-month perspective, the total health loss among casualties in urban areas is greater (p=.001) than among those injured in rural areas. In a long-term perspective, the consequences defined as health losses become more pronounced (p=.1- .001) among people injured in rural areas. However, six months after the accident, the total health loss among casualties in the two categories is rather similar. The contribution from the victims in unknown areas is nearly negligible.

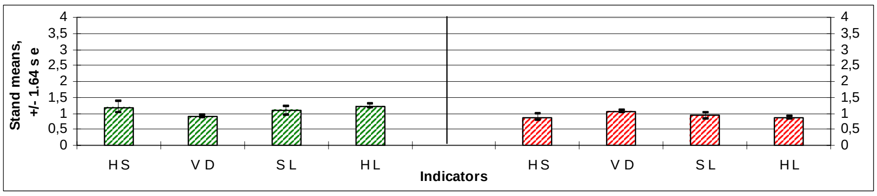
Summary *of the influence of road environment on average injury severity in different time perspectives*

Denominations: rural areas = green, urban areas = red

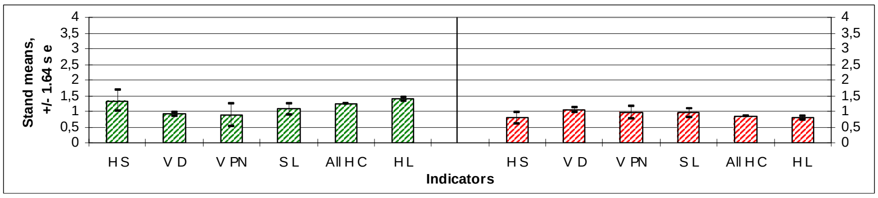
I. Immediately after the accident (five standardized indicators)



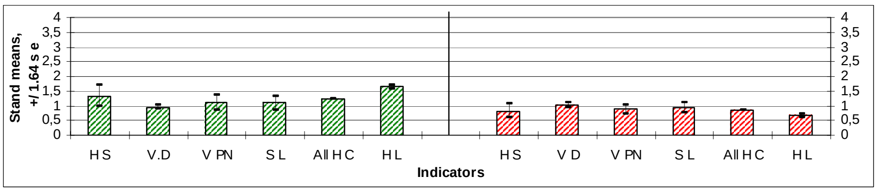
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

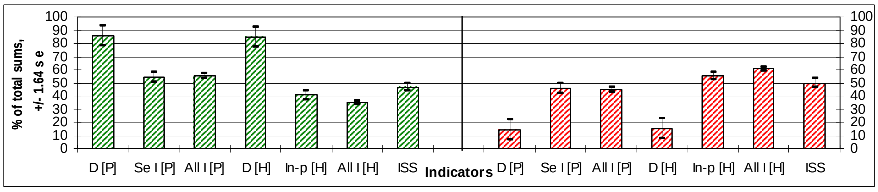
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here, were divided by the average mean of that indicator

According to the two data sets, the average injury due to a traffic accident seems to be more severe in rural areas than in urban areas measured by all indicators except for visits to a doctor. This relationship holds for the consequences of the injuries in all the time presented here, i.e. the immediate, the short-term and the long-term ones.

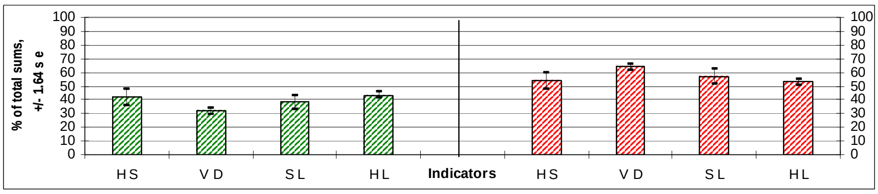
The influence of road environment on the proportions of the totals of different indicators in different time perspectives

Denominations: rural areas = green, urban areas = red

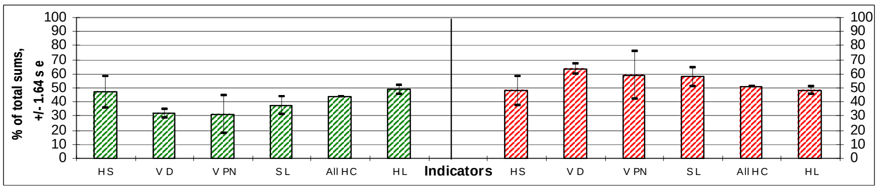
I. Immediately after the accident (seven standardized indicators)



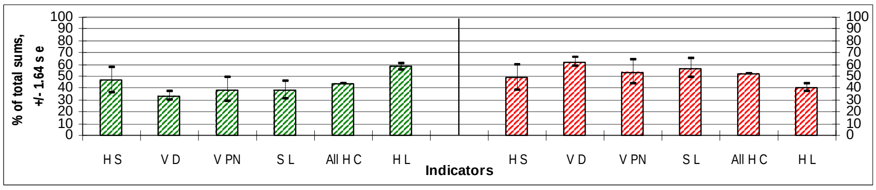
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

The immediate traffic safety problem seems to be more critical among people injured in rural areas in the police data, while the opposite, if not so distinctly, is valid in the hospital data. One month after the accident the majority of the safety problems are found among the casualties in urban areas. In a long-term perspective, most indicators identify those injured in urban areas as the greater burden for society, while it is the individuals injured in rural areas who suffer most health loss.

6.2 Road users

6.2.1 Consequences for society

Number and severity of injuries. The proportions of injured road users in the available police and hospital data sets respectively, are shown in Figure 6.16 (see also Table E6.9 in Appendix E).

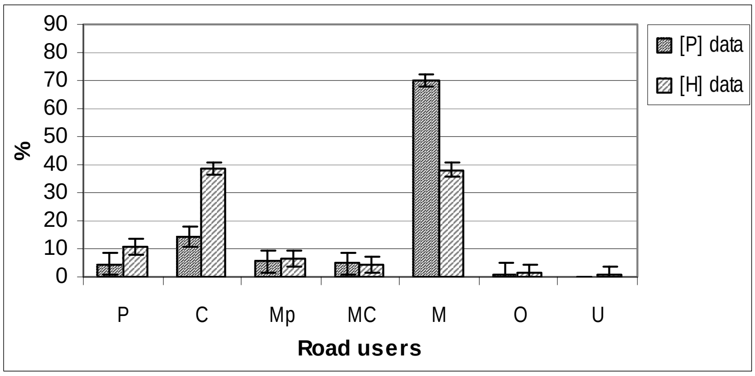
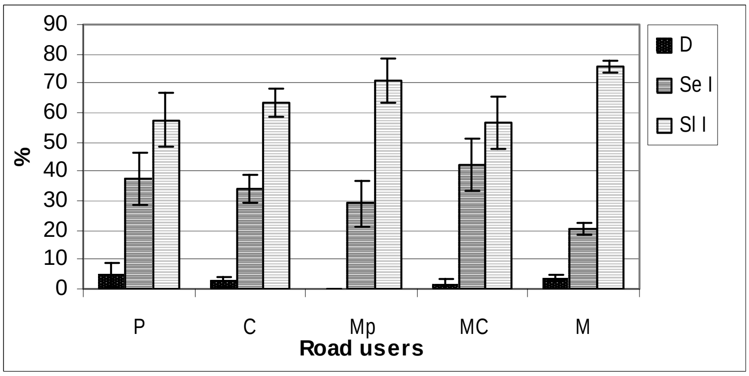


Figure 6.16 Proportions of injured road users, police data [P] (N=1,722) and hospital data [H] (N=2,915) from five hospital admittance areas, 1991/92

Whereas there is a primary injury problem for motorists in the police data, the main problem in the hospital data seems to be rather equal for cyclists and motorists. The numbers of injured cyclists and pedestrians increase about four to five times when the hospital data are accessed. However, the number of injured motorists is nearly independent of the sources used. Even the traffic problems among motordriven unprotected road users like mopedists and motorcyclists increase in numbers with access to hospital data.

There are relatively few other and unknown road users in both data sets. They are therefore not commented on any further in the text and figures, but data about them can be found in the tables in Appendix E.

The distribution of injury severity among road users in the police data set is presented in Figure 6.17 (see Table E6.10 in Appendix E).

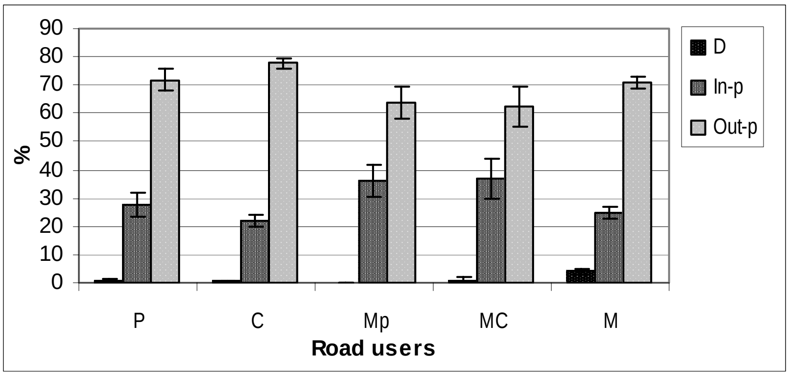


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 6.17 *Injury severity distributed over injured road users, police data (N=1,722) from five hospital admittance areas, 1991/92*

The proportion of fatalities is higher among motorists and pedestrians (low accuracy due to high uncertainty) than among motorcyclists and mopedists. More than 40 % of the injured motorcyclists are either killed or severely injured. About the same magnitude is valid for the pedestrians. However, since motorists represent more than half of the severely injured population, they are the most vulnerable defined in number in the police data.

The distribution of injury severity among road users in the hospital data set is presented in Figure 6.18 (see Table E6.10 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 6.18 *Received care distributed over injured road users, data (N=2,914) from five hospital admittance areas, 1991/92*

The number of deaths among motorists is significantly higher than among other road users in the hospital data. The shares of in-patients are highest among the injured motorcyclists and mopedists (about 35 %), even though the numbers of in-patients among motorists and cyclists are high. Both in terms of share and number, the out-patients are the most frequent category among the injured cyclists.

In Figures 6.19 and 6.20 the average injury severity and sum of the ISS (see Table E6.11 in Appendix E) are distributed over injured road users and presented for all, including the deceased.

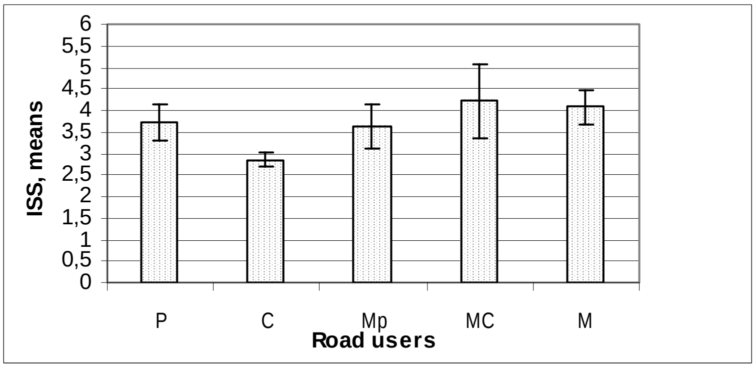


Figure 6.19 Average Injury Severity Score (ISS) distributed over injured road users, data (N=2,909 including the deceased) from five hospitals, 1991/92

The average injured cyclist receives a less severe injury than the average injured motorcyclist (p=.01), motorist (p=.02) or pedestrian (p=.02). Among motorists, the average injury severity increases from about ISS 3 to about ISS 4 due to the many fatalities.

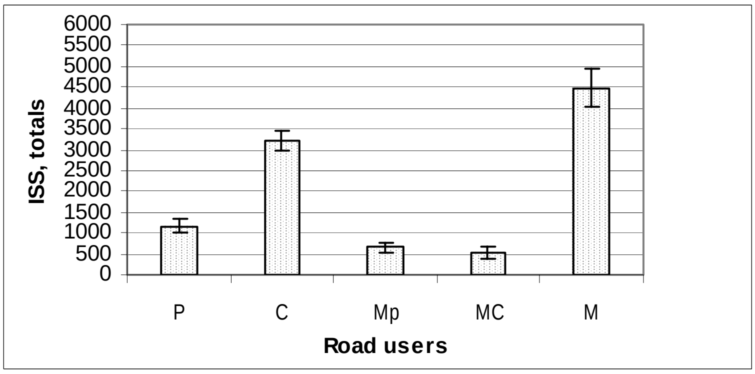


Figure 6.20 Sum of Injury Severity Score (ISS) distributed over injured road users, data (N=2,909 including the deceased) from five hospitals, 1991/92

Motorists display the highest (p=.001) total injury severity, expressed in ISS. The contribution of the fatalities is substantial. Cyclists are the most exposed categories among the unprotected road users.

Hospital stay. In Figures 6.21 and 6.22 the average and total length of hospital stay are displayed for different categories of road users (see Table E6.12 in Appendix E).

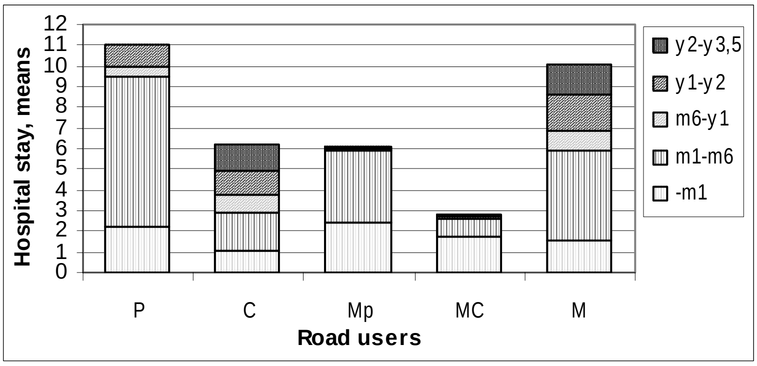


Figure 6.21 *Cumulative average length of hospital stay [days] on five selected occasions after the traffic accident distributed over injured road users; data (N=2,915) from five hospitals, 1991/92*

In the one-month perspective, injured pedestrians are on average treated longer than injured cyclists (p=.001) and motorists (p=.1) are. In the long-term perspective of six months, the average length of hospital stay is even more pronounced among pedestrians, due to their higher age, than among other injured people (MC p=.001; C p=.01; M p=.1; Mp p=.2). Few injured victims, mostly motorists, cyclists and pedestrians, are treated at hospital one year and later after the accident. The long-term average hospital stay of injured pedestrians (p=.1) or motorists (p=.1) is longer than that of cyclists.

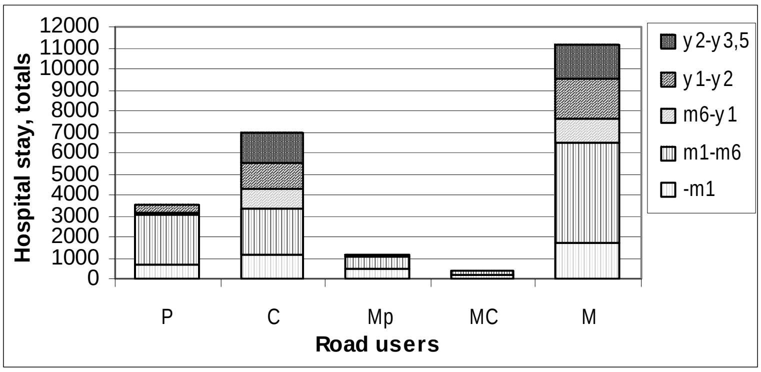


Figure 6.22 *Total length of hospital stay [days] on five selected occasions after the traffic accident distributed over injured road users, data (N=2,915) from five hospitals, 1991/92*

Within one month, the total length of hospital stay for motorists is larger (C p=.01 and for the others p=.001) than for any other categories of road users. In the long-term perspective of two years and later after the accident, the hospital stay of motorists corresponds to about 45 % of the total ones. The injured pedestrians contribute much more and the cyclists much less to the total hospital stay than would be expected judging by their proportions of the population of victims. The higher average age of the injured pedestrians may explain the former observation.

Visits to a doctor. In Figures 6.23 and 6.24 the average and total number of visits to a doctor are displayed for different categories of road users (see Table E6.13 in Appendix E).

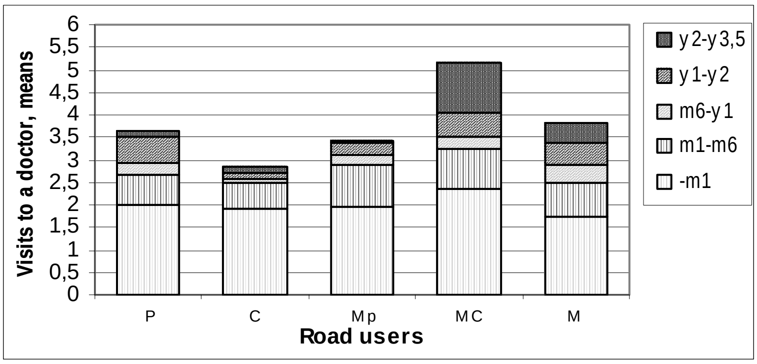


Figure 6.23 *Cumulative average number of visits to a doctor on five selected occasions after the traffic accident distributed over injured road users, data (N=2,915) from five hospitals, 1991/92*

In the short-term perspective of one month, the average numbers of visits to a doctor among injured pedestrians (p=.05), cyclists (p=.1) and motorcyclists (p=.001) are higher than among injured motorists. In the long-term perspective of six months and longer, only the average number of visits to a doctor among injured motorcyclists is constantly higher than among most other road users, and nearly twice that of the cyclists (p=.02 - .01).

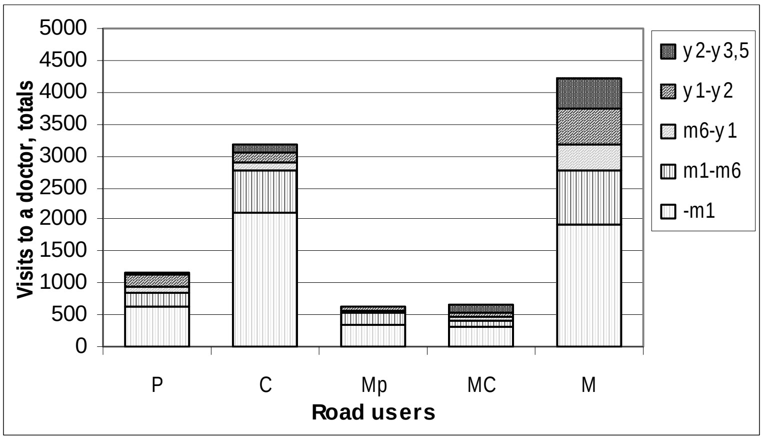


Figure 6.24 *Total number of visits to a doctor on five selected occasions after the traffic accident distributed over categories of injured road users, data (N=2,915) from five hospitals, 1991/92*

In the short-term perspective of one month, the total number of visits to a doctor among injured cyclists is much higher than among other categories of casualties (P, Mp, MC p=.001) except for motorists (p=.2). Within six months after the accident, the total number of treatments by a doctor among injured motorists increases to about the same number as among injured cyclists. In the long-term perspective of more than three years, the total number of visits to a doctor among injured motorists is higher (p=.001) than for any other category, and corresponds to more than their proportion of the entire population.

Visits to a physiotherapist or a nurse. Figures 6.25 and 6.26 present the average and total number of visits to a physiotherapist or a nurse for different categories of road users (see Table E6.14 in Appendix E).

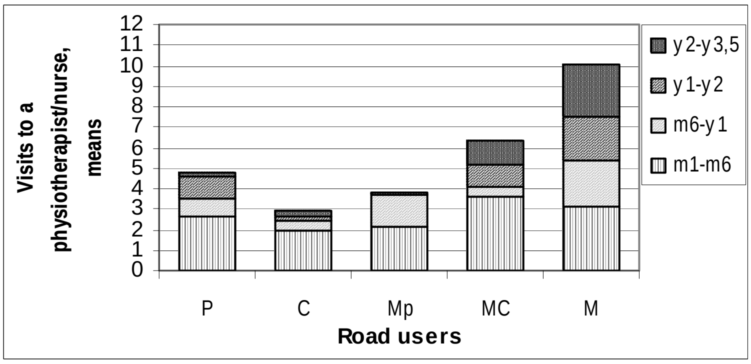


Figure 6.25 Cumulative average visits to a physiotherapist or a nurse at four selected occasions after the traffic accident distributed over injured road users, data (N=2,915) from five hospitals, 1991/92

In the six-month perspective, however, the average number of visits to a physiotherapist or a nurse among injured motorcyclists is nearly twice as high as that of cyclists. However, there is only a tendency towards a difference, as the accuracy is far lower among the former. On average, injured motorists receive more treatment (p=.1) than do injured cyclists. During the long-term follow-up period of more than three years, injured motorists pay on average about two times more visits (p=.001) to a physiotherapist than pedestrians, and three times more than cyclists.

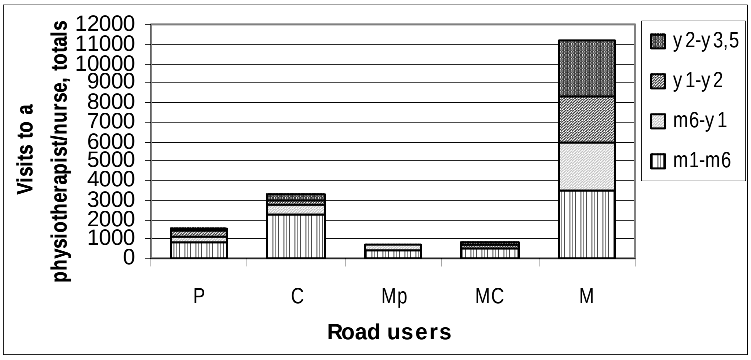


Figure 6.26 Total number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over categories of injured road users; data (N=2,915) from five hospitals, 1991/92

In any long-term perspective, from six months and onwards, there is a considerably higher number (p=.1-.001) of total visits to a physiotherapist or a nurse for injured motorists than for other injured road users. During six months motorists accumulate more visits to a physiotherapist than cyclists do in the long-term perspective of more than three years. Hence, many motorists have still not recovered after the accident at the last follow-up and may need further treatment by a physiotherapist.

Sick leave. The follow-ups of the sick leave are presented Figures 6.27 and 6.28 (see Table E6.15 in appendix E).

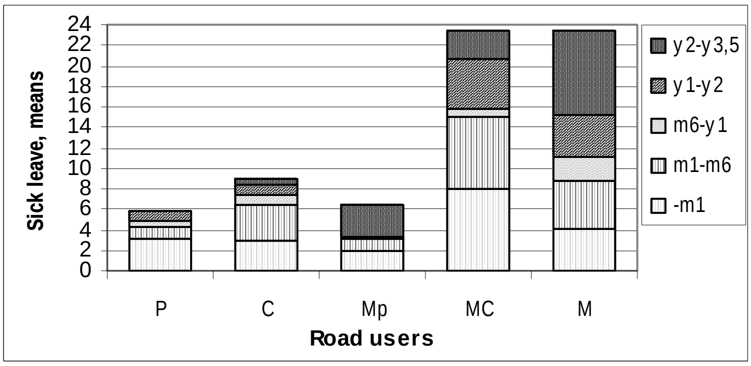


Figure 6.27 Cumulative average length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over categories of injured road users, data (N=2,915) from five hospitals, 1991/92

In the short-term perspective of within one month, the average period of sick leave is far longer for injured motorcyclists than for other injured road users. The average sick leave period for injured motorcyclists is more than twice that of cyclists (p=.001) and three times that of pedestrians (p=.001). In a short-term perspective as well, injured motorists need a longer average sick leave than do injured pedestrians (p=.05) and cyclists (p=.01). It is only in the long-term perspective of more than tree years that injured motorists end up with an average sick leave as long as that of injured motorcyclists.

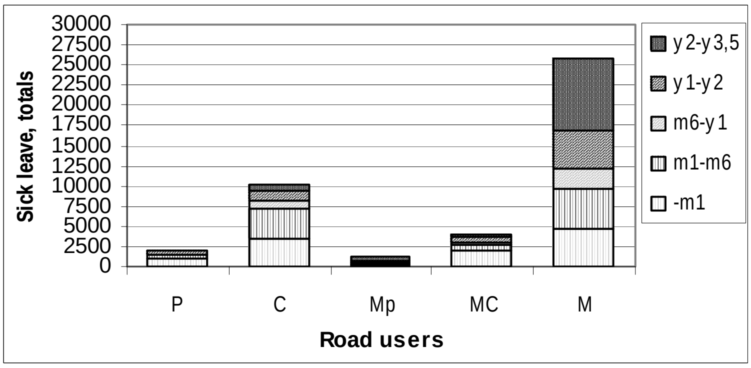


Figure 6.28 *Total length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over categories of injured road users; data (N=2,915) from five hospitals [5H], 1991/92*

Irrespectively of the time perspectives applied, the total sick leave is longest (p=.1- .001) for injured motorists, and after more than three years it corresponds to more than 60 % of all sick leaves. In the short-term perspective of one month, the length of the sick leave for injured cyclists is close to 75 % (p=.01) of that for motorists. In a long-term perspective the total length of sick leave among pedestrians is extremely low, mainly due to a high proportion of retired people among these traffic victims.

6.2.2 Consequences as perceived by the individuals

Health loss. Five occasions from the health loss evaluation are presented in the Figures 6.29 and 6.30 (see Table E6.16 in Appendix E).

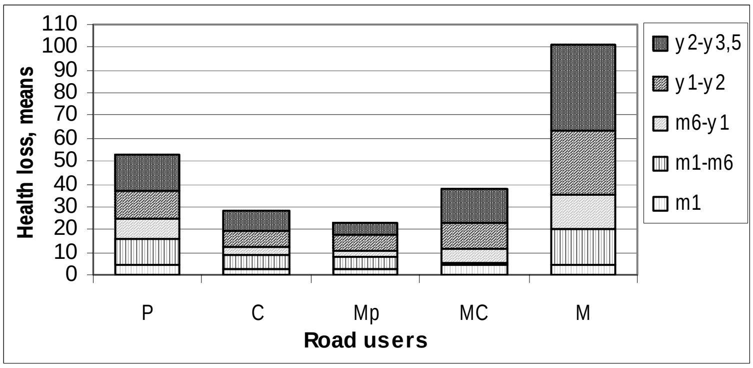


Figure 6.29 *Cumulative average health loss [lost days] on five selected occasions after the traffic accident, distributed over categories of injured road users, data (N=2,915) from five hospitals, 1991/92*

Within the perspective of one month, the average health loss among injured motorists is greater (p=.001) than among all other categories. However, the average health loss among pedestrians is also greater (p=.001) than among injured cyclists and mopedists. In the long-term perspective of more than three years, the average health loss among motorists is about twice (p=.001) that of injured pedestrians. Especially in a long-term perspective, the average health loss among motorists is affected by the impact of the fatalities.

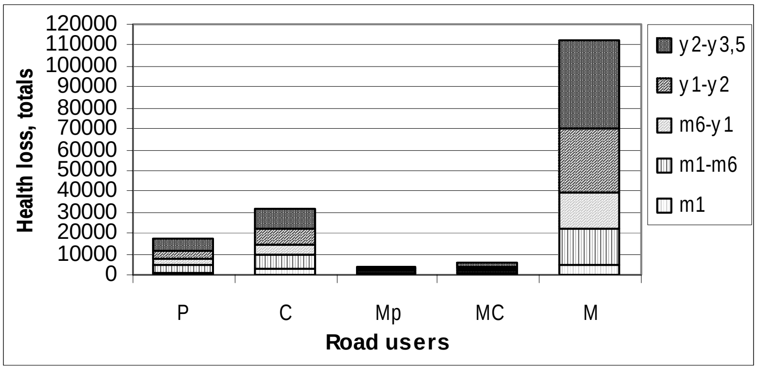


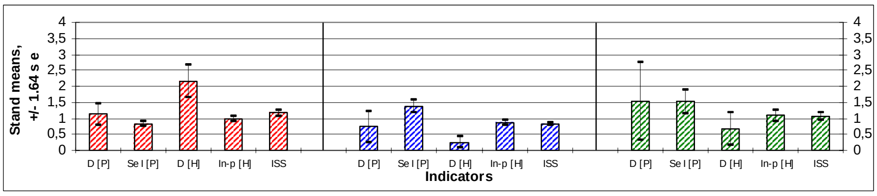
Figure 6.30 *Total health loss [lost days] on five selected occasions after the traffic accident, distributed over categories of injured road users, data (N=2,915) from five hospitals, 1991/92*

Irrespectively of the time perspectives applied, the total health loss among injured motorists is longer (p=.001) than among any other categories of road users. The contribution to the total health loss of the injured motorists increases gradually with the increasing length of the follow-up. In a long-term perspective, injured motorists contribute to 65 % of all health loss.

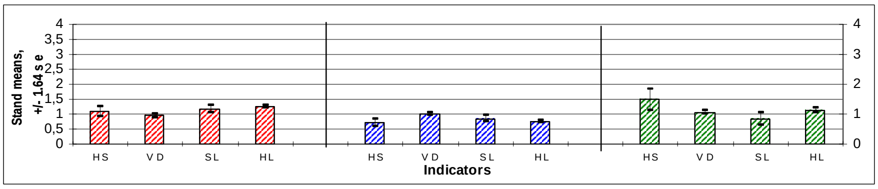
***Summary** of the influence of road users on average injury severity in different time perspectives*

Denominations: motorist = red, cyclist = blue, pedestrian = green

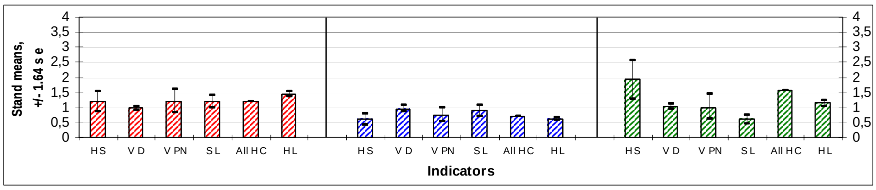
I. Immediately after the accident (five standardized indicators)



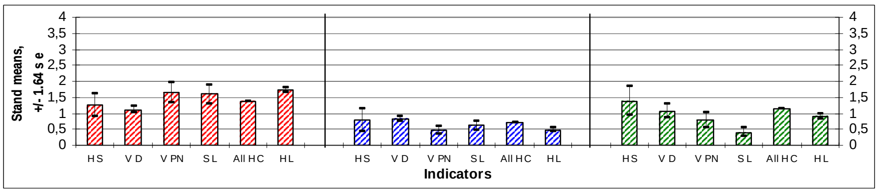
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

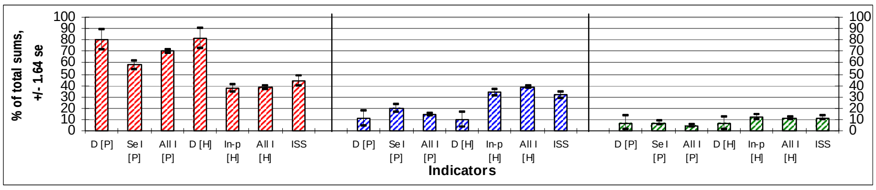
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

Immediately after the accident, the average injury severity is higher among motorists than among cyclists and pedestrians. In a long-term perspective, the average injury severity is usually higher among motorists than among pedestrians. The average injury severity among cyclists is constantly lower.

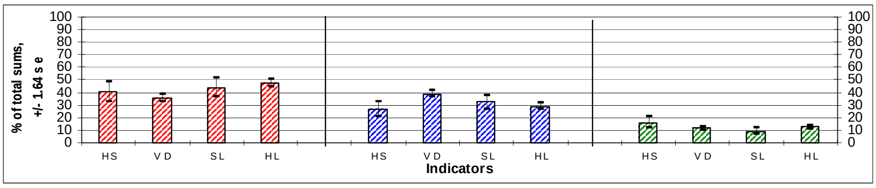
The influence of road users on the proportions of the totals of different indicators in different time perspectives

Denominations: motorist = red, cyclist = blue, pedestrian = green

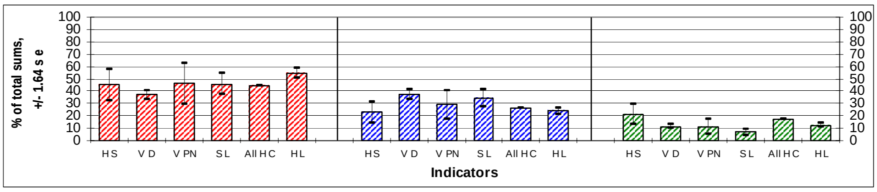
I. Immediately after the accident (seven standardized indicators)



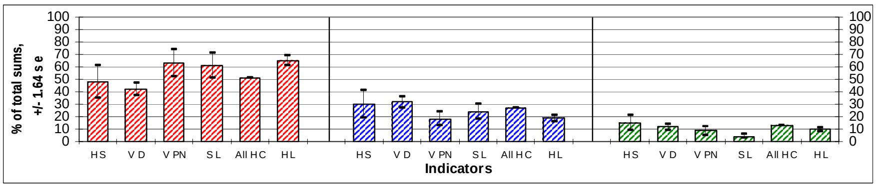
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

The immediate traffic safety problem is focused on the motorists when indicators related to police data are used. With access to hospital data, the image becomes less distinct due to the cyclists. However, in a long-term perspective the injured motorists are the principal burden both to the society and to individuals. Nevertheless the traffic safety problems among unprotected road users are not negligible.

6.3 Type of accident and counterpart

6.3.1 Consequences for society

Number and severity of injured. The traffic victims injured in single accidents and collisions and registered in the police and hospital data sets respectively, are presented in Figure 6.31 (see Table E6.17 in Appendix E).

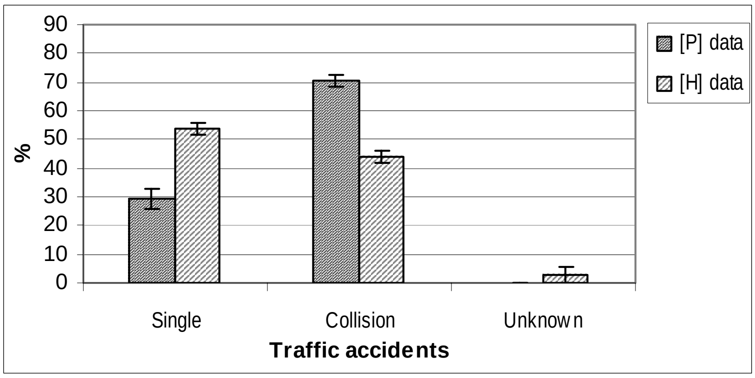


Figure 6.31 Proportions of injured people distributed over type of traffic accident; police data [P] (N=1,722) and hospital data [H] (N=2,915) from five hospital admittance areas, 1991/92

The distribution of victims injured in single accidents differs in the police and hospital data. The problem about single accidents is pronounced in the hospital data. The number of people injured in single accidents nearly triples with access to this data, while the number of victims injured in collisions increases only slightly. The high number of injuries among cyclists in single accidents is explained by a higher coverage of falls from bicycles and among pedestrians by a modified definition of "injured in traffic" due to falls on slippery road surfaces or uneven pavements. The number of people injured in accidents with game is low; see Tables 6.1 and 6.2, where they are included in "collisions".

The distribution of injury severity among casualties in different types of accidents in the police data is illustrated in Figure 6.32 (see Table E6.18 in Appendix E).

Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 6.32 *Injury severity distributed over different typed of traffic accidents; police data (N=1,722) from five hospital admittance areas, 1991/92*

Table 6.1 *Injury severity among people injured in collisions with some selected counterparts, police [P] data*

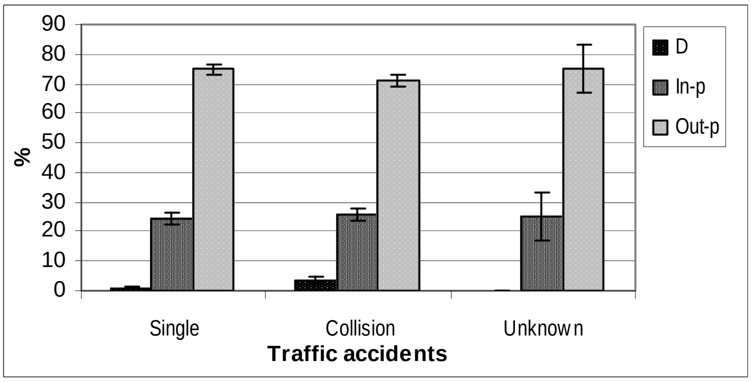
Injury severity	**Counterparts***					
	Cycle	**Moped**	**Car**	**Lorry**	**Bus**	**Game**[1]
Dead	3 (2.0)	0 (0)	26 (3.5)	8 (10.4)	0 (0)	1 (1.6)
Severely injured	59 (40.1)	12 (24.5)	124 (16.7)	17 (22.1)	0 (0)	6 (9.8)
Slightly injured	85 (57.8)	37 (75.5)	591 (79.8)	52 (67.5)	5 (100.0)	54 (88.5)
N	147	49	741	77	5	61

* Note that the table supplies information about the counterparts involved in the collision, and not about injured road users

[1] "Game" does not include domestic cloven-footed animals and consequently stands for an elk, a moose, a deer or a reindeer.

The share of people killed is higher in collisions than in single accidents, especially when the counterpart is a lorry. The share of severely injured victims is somewhat higher in single accidents than in collisions. Note that the share of severe injuries is small in collisions with game.

The distribution of injury severity among different types of accidents in the hospital data is illustrated in Figure 6.33 (see Table B6.18 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 6.33 Received care distributed over different types of traffic accidents; data (N=2,914) from five hospital admittance areas, 1991/92

Table 6.2 Received care among people injured in collisions with some selected counterparts; hospital data

Injury severity/care	Counterparts*					
	Cycle	**Moped**	**Car**	**Lorry**	**Bus**	**Game**
Dead	0 (0)	0 (0)	25 (3.0)	12 (19.4)	0 (0)	1 (1.5)
In-patient cared	27 (20.)	9 (23.7)	225 (27.2)	16 (25.8)	5 (25.0)	16 (23.9)
Out-patient cared	108 (80.0)	29 (76.3)	577 (69.8)	34 (54.8)	15 (75.0)	50 (74.6)
N	135	38	827	62	20	67

* Note that the table supplies information about the counterparts involved in the collision, and not about injured road users

The number of people killed in collisions is nearly four times that in single accidents. The share of in-patients among victims injured in collisions and single accidents is about the same, or close to 25 %. In the hospital data set, information about the type of accident is missing for about 3 % of the casualties. The proportions among the in-patients and out-patients correspond well with those of the other data set.

In Figures 6.34 and 6.35 the average injury severity and sum of the ISS, of all traffic victims including the deceased are distributed over different types of accidents (see Table E6.19 in Appendix E).

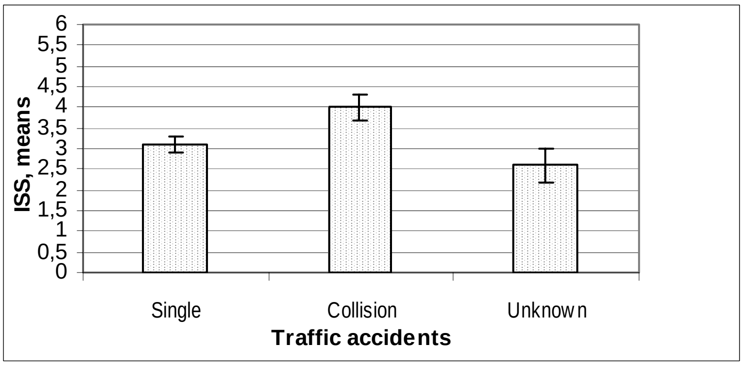


Figure 6.34 Average Injury Severity Score (ISS) distributed over different types of traffic accident; data (N=2,909, including the deceased) from five hospitals, 1991/92

Table 6.3 Average injury score, ISS, among people injured in collisions with some selected counterparts

ISS	Counterparts*					
	Cycle	**Moped**	**Car**	**Lorry**	**Bus**	**Game**
Mean (s e)	2.2 (.2)	2.9 (.4)	4.2 (.3)	9.6 (1.7)	5.0 (2.1)	3.2 (.7)
std dev	1.9	2.5	7.4	13.3	9.2	5.4
N	135	38	827	62	20	67

* Note that the table supplies information about the counterparts involved in the collision and not about injured road users

People injured in collisions receive on average a moderate injury, ISS 4, while those injured in single accidents receive on average a minor injury, ISS 3. The difference is statistically significant (p=.001). People injured in a collision with a lorry receive on average a major injury, and victims injured in accidents of an unknown type suffer on average a less severe injury (p=.05) than those injured in single accidents.

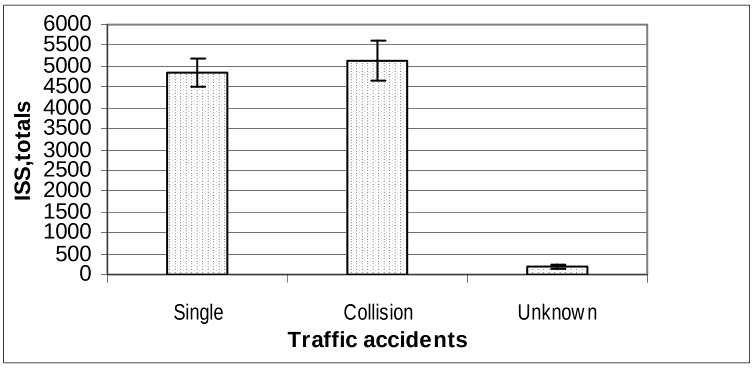


Figure 6.35 Sum of Injury Severity Score (ISS) distributed over different types of traffic accident; data (N=2,909 including the deceased) from five hospitals, 1991/92

The total burden for society, expressed in ISS, is not statistically significantly different when victims in collisions and single accidents are compared. The number of injuries in collisions with a lorry accounts for 6 % of the subpopulation, while their proportion of the total injury severity is twice as high. Victims injured in accidents with game represent less than 5 % of the total injury severity of injuries in collisions.

In what follows, the counterparts will not be commented upon, as most of these subgroups are too small to allow a reliable assessment of their influence.

Hospital stay. In Figures 6.36-6.37 the average and total length of hospital stay are displayed for injured in different types of accidents (see Table E6.20 in appendix E).

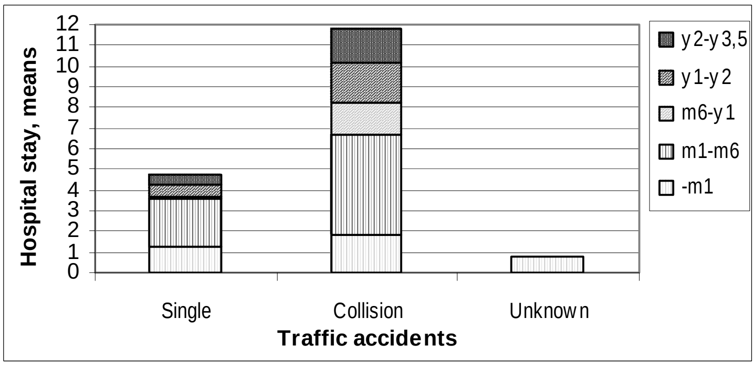


Figure 6.36 Cumulative average length of hospital stay [days] on five selected occasions after the traffic accident distributed over different types of traffic accident; data (N=2,915) from five hospitals, 1991/92

In the one-month perspective, victims of collisions are on average hospitalised longer (p=.01) than those injured in single accidents. However, elderly people injured in single accidents, mostly pedestrians, are on average treated longer at hospital than younger people injured in motor-vehicle accidents. In any long-term perspective, victims of collisions are in-patients longer (p=.01-.001) than those injured in single accidents. People injured in accidents of an unknown type are on average in-patients for a shorter period (S p=.1; C p=.001) than those injured in other accidents. Moreover, people injured in accidents of an unknown type do not receive any hospital stay after the first month, probably due to an average slight injury.

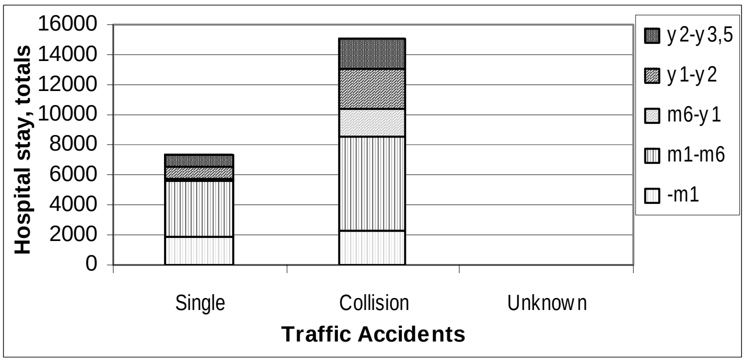


Figure 6.37 Total length of hospital stay [days] on five selected occasions after the traffic accident, distributed over different types of traffic accidents; data (N=2,915) from five hospitals, 1991/92

In the short-term perspective of one month, the total length of hospital stay among people injured in collisions is longer (p=.2) than among those in single accidents. However, in the long-term perspective of six months and more, the accumulated length of hospital stay increases fastest among victims injured in collisions. In the long-term perspective of more than three years, people injured in collisions need about twice as long a hospital stay (p=.01) to recover as those injured in single accidents.

Visits to a doctor. In Figures 6.38- and 6.39 the average and total numbers of visits to a doctor are displayed for different types of accidents (see Table E6.21 in appendix E).

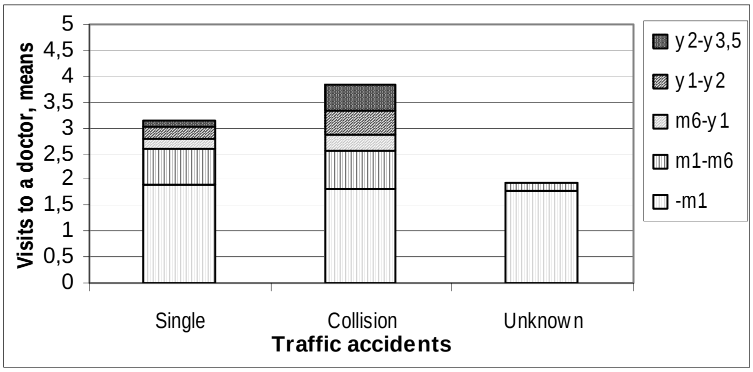


Figure 6.38 Cumulative average visits to a doctor on five selected occasions after the traffic accident, distributed over different types of traffic accidents; data (N=2,915) from five hospitals, 1991/92

In the short-term perspective of one month, the average number of visits to a doctor is rather similar among victims injured in single accidents and in collisions. I t is only in the long-term perspective of more than three years, that the visits to a doctor are more frequent among those injured in collisions (p=.01) than in single accidents. In the short-term perspective, i.e. within the first month, people injured in unknown types of accidents visit a doctor as frequently as the other categories.

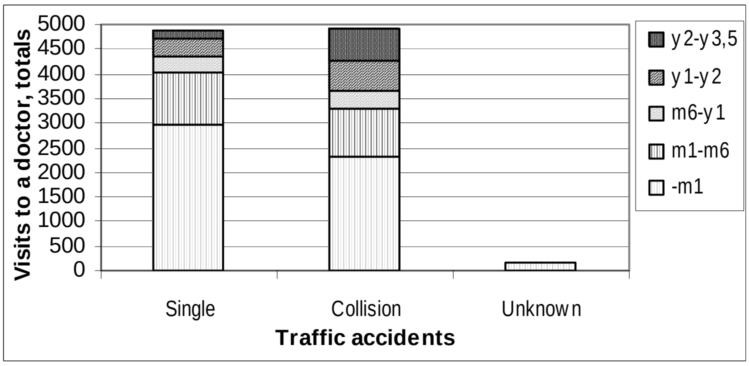


Figure 6.39 *Total number of visits to a doctor on five selected occasions after the traffic accident, distributed over different types of traffic accidents; data (N=2,915) from five hospitals, 1991/92*

Within one month, the total number of visits to a doctor among casualties injured in single accidents is nearly 50 % higher (p=.01) than among those injured in collisions. In the long-term perspective of one year and later after the accident, the traffic victims injured in collisions are in need of more visits to a doctor (p=.01) than are those injured in single accidents. Consequently the difference between the two categories in the total number of visits to a doctor disappears.

Visits to a physiotherapist or a nurse. In Figures 6.41 and 6.42 the numbers of visits to a physiotherapist or a nurse are described, both on average and as totals (see Table E6.22 in appendix E).

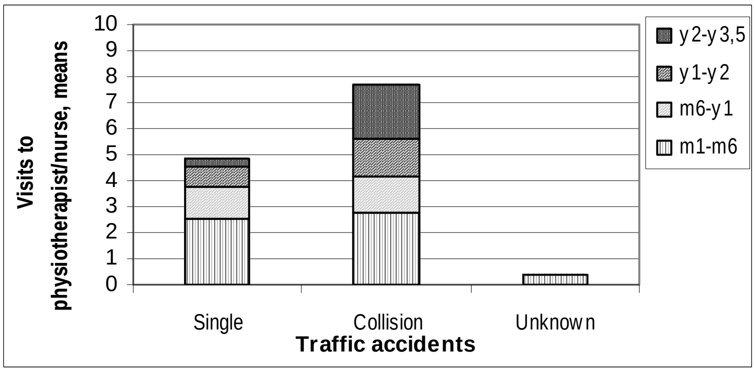


Figure 6.41 *Cumulative average number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident distributed over different types of traffic accidents, data (N=2,915) from five hospitals, 1991/92*

Within six months, the average number of visits to a physiotherapist or a nurse is about the same among people injured in single accidents and those injured in collisions. However, after three years the number of treatments is more pronounced among victims injured in collisions (p=.01) than in single accidents. The motorists involved in collisions with minor and moderate injuries are in the majority among those who contribute to the large average number of visits to a physiotherapist.

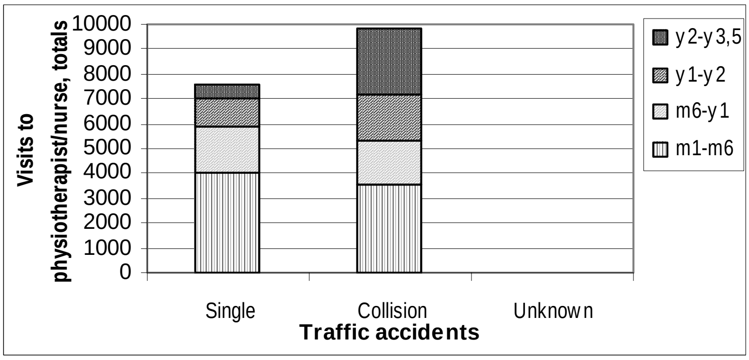


Figure 6.42 Total number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over different types of traffic accident;, data (N=2,915) from five hospitals, 1991/92

After two years, the total number of visits to a physiotherapist or a nurse is about the same for people injured in single accidents and in collisions. In a long-term perspective, however, there is a strong tendency among traffic victims injured in collisions (p=.2) to generate more visits to a physiotherapist or a nurse than those injured in single accidents. People injured in collisions with cars contribute most to the visits to a physiotherapist.

Sick leave. The follow-ups of the sick leave are presented in Figures 6.43 and 6.44 (see Table E6.23 in appendix E).

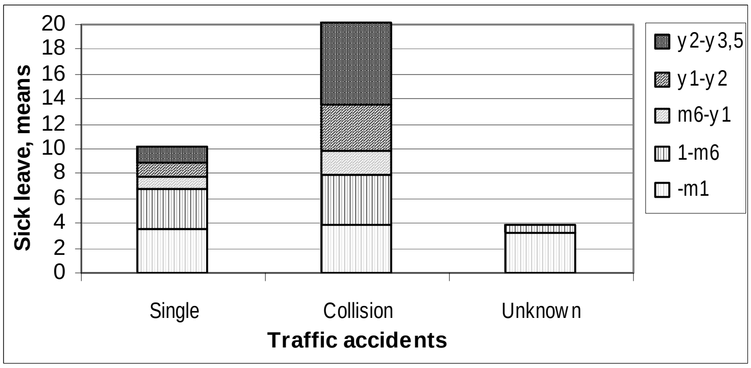


Figure 6.43 Cumulative average length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over different types of traffic accidents, data (N=2,915) from five hospitals, 1991/92

Within one month, the average length of sick leave is rather similar for all categories of injured people irrespectively of the type of accident. In the long-term perspective one years and longer, people injured in collisions require on average longer (p=.05) absences from work than those injured in single accidents. More than half of those injured in collisions, who are on sick leave six months after their accident, initially sustained minor injuries only.

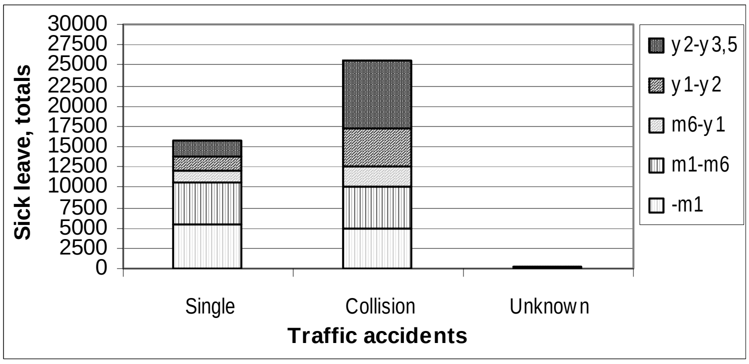


Figure 6.44 Total length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over different traffic accident;, data (N=2,915) from five hospitals, 1991/92

In the short-term perspective of one month, the total length of sick leave for people injured in single accidents is of the same magnitude as among those injured in collisions. It is only in the long-term perspective of more than two years (p=.2) and longer (p=.01), that the total sick leave among victims of collisions exceeds that of those injured in single accidents.

Motorists injured in collisions with other cars contribute vastly to the high total length of sick leave in the long-term perspective.

6.3.2 Consequences as perceived by the individuals

Health loss. The results from the evaluation of the health loss on five different occasions are presented in the Figures 6.45 and 6.46, (see Table E6.24 in appendix E).

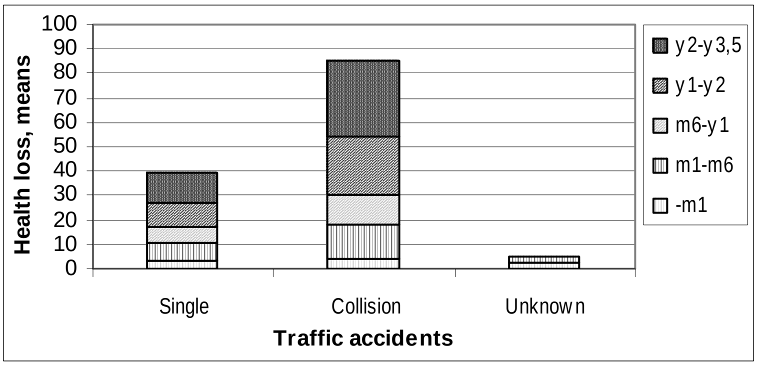


Figure 6.45 Cumulative average health loss [lost days] on five selected occasions after the traffic accident, distributed over different types of traffic accident, data (N=2,915) from five hospitals, 1991/92

In the one-month perspective, the average health loss is greater (p=.001) among people injured in collisions and single accidents. Six months after the accident, the average health loss among casualties of collisions is 50 % greater (p=.001) than among those injured in single accidents. In the long-term perspective of more than three years, the average health loss is more than twice as large (p=.001) among people injured in collisions than in single accidents.

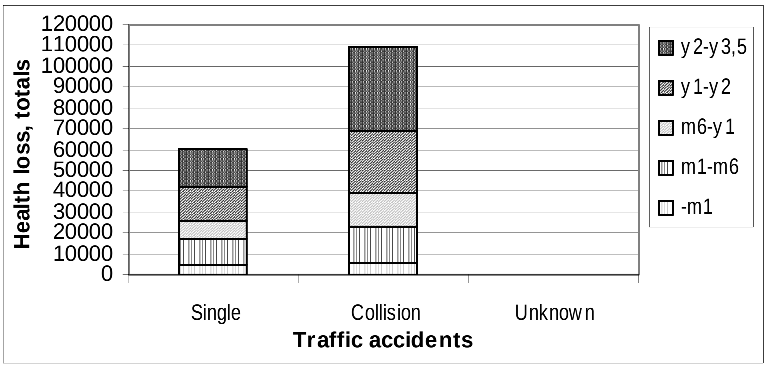
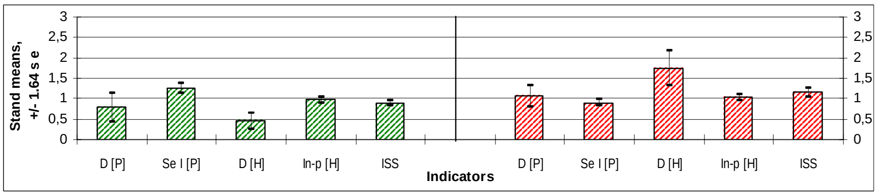


Figure 6.46 Total health loss [lost days] on five selected occasions after the traffic accident, distributed over different types of traffic accidents, data (N=2,915) from five hospitals, 1991/92

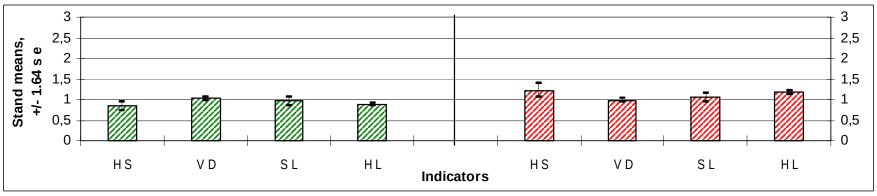
In the short-term perspective of one month, the total health loss is greater among traffic victims in collisions (p=.1) than in single accidents. When the length of the follow-up is extended, the total health loss among casualties injured in collisions increases steadily (p=.001) compared to that among those injured in single accidents. More than three years after the accident, people injured in collisions contribute to about 65 % of the total health loss. The contribution to the total health loss of those injured in an unknown type of accident is negligible.

Summary *of the influence of different types of traffic accidents on average injury severity in different time perspectives*
Denominations: single accidents = green, collisions = red

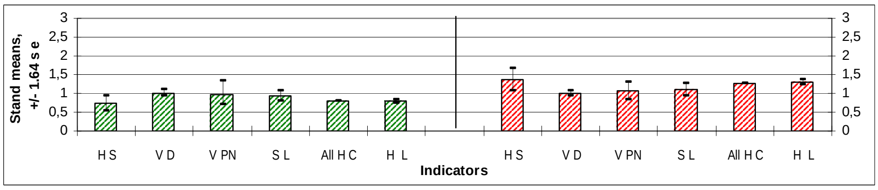
I. Immediately after the accident (five standardized indicators)



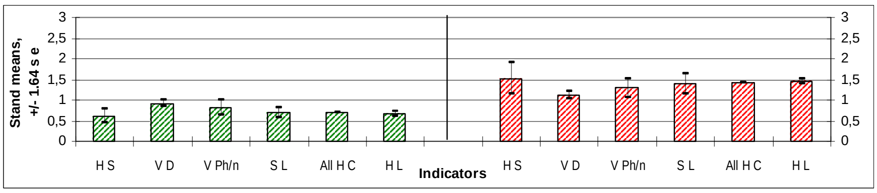
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)

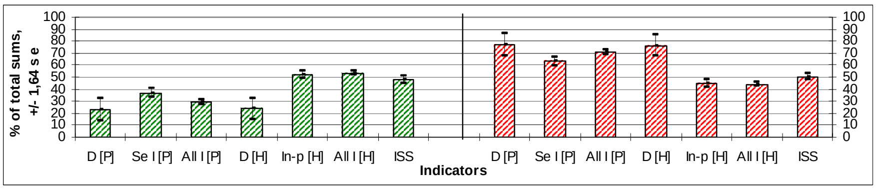


Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

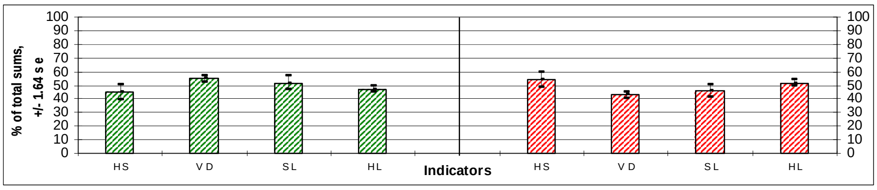
Irrespectively of the time perspective applied, the average injury severity is higher for collisions than for single accidents according to the most used indicators.

The influence of different types of accidents on the proportions of the totals of different indicators in different time perspectives
Denominations: single accidents = green, collisions = red

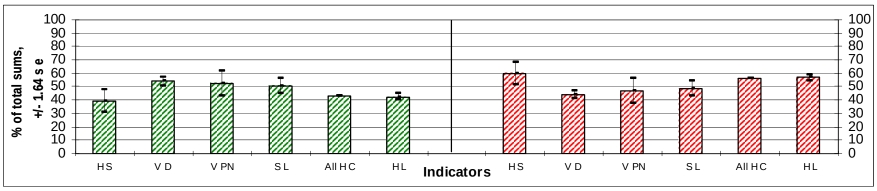
I. Immediately after the accident (seven standardized indicators)



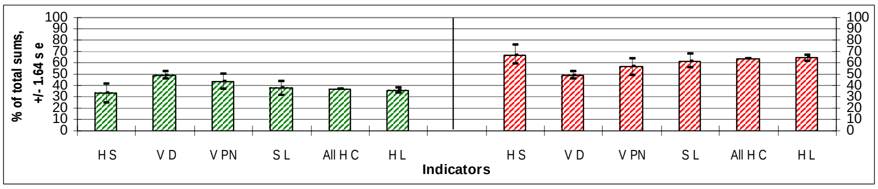
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

The immediate traffic safety problem can be described as mainly that for people injured in collisions. However, with access to hospital data, the difference becomes less distinct but does not disappear. In a long-term perspective the people injured in collisions impose the greatest burden both on society and on the individuals.

6.4 Road design

6.4.1 Consequences for society

Number and severity of injured. Traffic victims injured in different types of road design, and registered in the police data set and in the hospital data set respectively are shown in Figure 6.47 (see Table E6.25 in Appendix E).

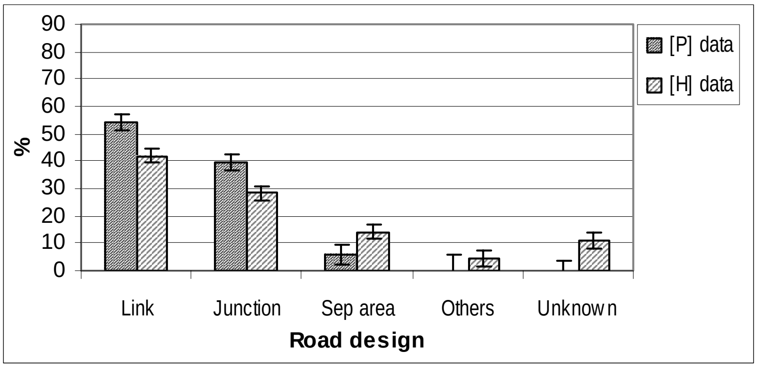
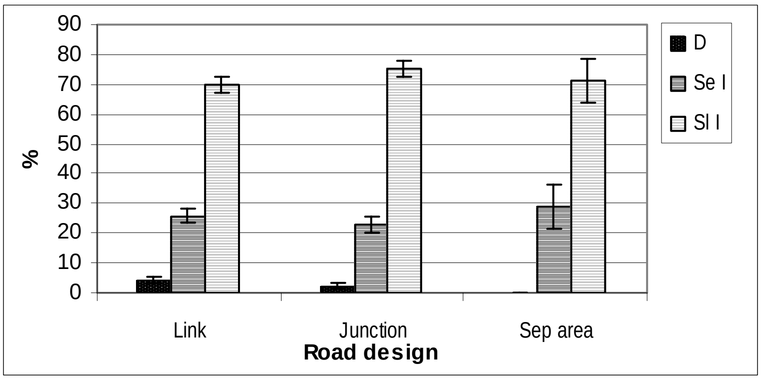


Figure 6.47 Proportions of injuries distributed over type of road design, as registered in the police data [P] (N=1,722) and the hospital data [H] (N=2,915) from five hospital admittance areas, 1991/92

The distribution of injuries shows a similar pattern in the two data sets with a concentration of injuries to links and junctions. However, the number of victims is about 20 – 30 % larger in the hospital data set than in the police data. There are few injured people in the police data set in separated areas. The high proportion of casualties in separated areas among the hospital-registered victims can mainly be explained by reference to cyclists and pedestrians, especially those involved in single accidents. Those injured in accident sites with unknown road design constitute a rather large proportion, probably due to difficulties in classifying the road design.

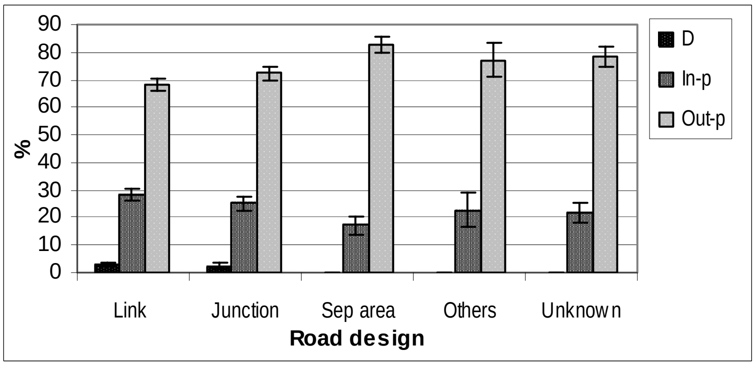
The distribution of injury severity among people injured on different road designs as registered in the police data is presented in Figure 6.48 (see Table E6.26 in Appendix E).



Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 6.48 *Injury severity distributed over different types of road designs, police data, (N=1,722) from five hospitals admittance areas, 1991/92*

The share of fatalities is higher on links than at junctions, while the shares of severely injured victims are rather similar. No fatalities are reported in separated areas, but the share of severely injured people is high in separated areas (e.g. pedestrian and bicycle paths, or designated zebra crossings), mainly due to collisions between vulnerable road users. More than 70 % of the fatalities and about 55 % of all the severe injuries occur on the links.



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 6.49 *Received care distributed over people injured in/on different road designs; data (N=2,914) from five hospital admittance areas, 1991/92*

The proportion of in-patients is close to 30 % among victims injured on links as compared to about 25 % at junctions. However, the proportion of in-patients is smaller for separated areas. In 325 cases information about the road design at the accident site is missing. In this group, cyclists and mopedists are over-represented compared to the total population, and so are victims involved in single accidents.

In Figures 6.50 and 6.51 the average injury severity and sum of the ISS of all injured people including the deceased are distributed over different types of road design (see Table E6.27 in Appendix E).

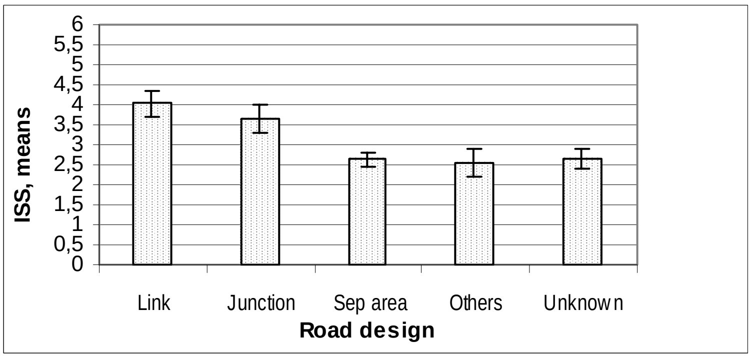


Figure 6.50 Average Injury Severity Score (ISS) distributed over different types of road design; data (N=2,909, includes the deceased) from five hospitals, 1991/92

On average, traffic victims injured on links are more severely injured (p=.2) than those injured at junctions. The deceased contribute to the observation of more severe injuries. People injured in separated areas suffer less severe injuries (p=.001) compared to those injured at both links and junctions.

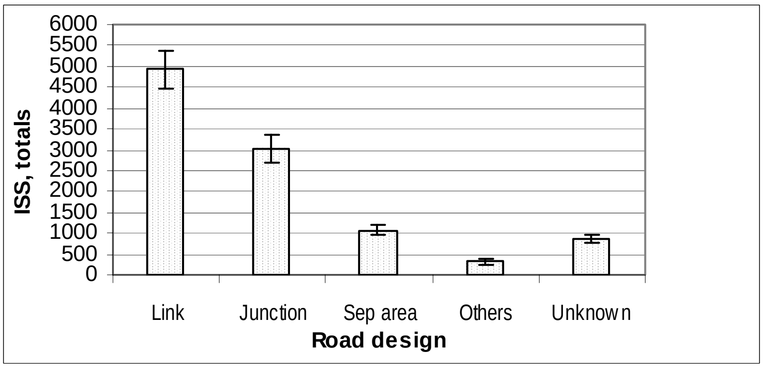


Figure 6.51 Sum of Injury Severity Score (ISS) distributed over different types of road designs; data (N=2,909, includes the deceased) from five hospitals, 1991/92

The total injury severity, in ISS, on links is 60 % higher (p=.001) than at junctions. Injured in separated areas have a smaller share of the total ISS than of the total population of injured. Total injury severity among injured in unknown accident sites is nearly of the same magnitude as among injured in separated areas. This emphasises the need to find knowledge about those accident sites.

Hospital stay. Figures 6.52 and 6.53 illustrate the average and total lengths of hospital stay for traffic victims injured on different types of road designs (see Table E6.28 in Appendix E).

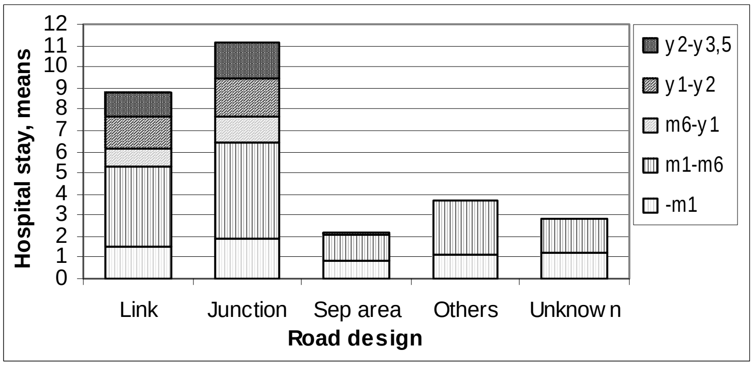


Figure 6.52 Cumulative average length of hospital stay [days] on five selected occasions after the traffic accident distributed over different road designs, data (N=2,915) from five hospitals, 1991/92

Within the one-month perspective, victims injured in junctions are hospitalised longer (p=.2) than those injured on links. However, in the long-term perspective of six months and onwards, the differences are no longer statistically significant. Both in the short-term and long-term perspectives people injured in separated areas have the shortest average hospital stay (mostly p=.001) when compared with casualties in junctions and on links). Few are treated at hospital six months and later after the accident.

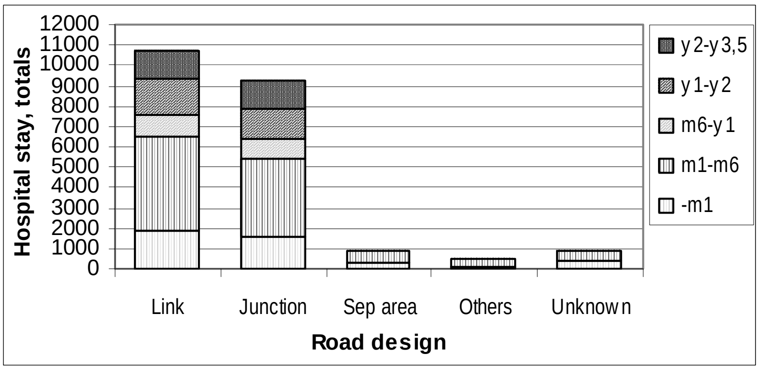


Figure 6.53 Total length of hospital stay [days] on five selected occasions after the traffic accident distributed over different road designs, data (N=2,915) from five hospitals, 1991/92

In the short-term perspective of one month, the total length of the hospital stay for people injured on links is longer by about 20 % (p=.2) than for those injured at junctions. In a long-term perspective (after one month) the differences between the total lengths of hospital stay for victims injured in these two design categories are not longer statistically significant. Irrespective of the time perspectives, the total length of hospital stay among people injured in separated areas is low and can be explained partly by the low percentage of hospitalisation, and partly by the short length of hospital stay among the in-patients. However, the elderly injured in separated areas contribute to the total hospital stay more than their share due to longer treatments.

Visits to a doctor. In Figures 6.54 and 6.55 the average and total numbers of visits to a doctor are displayed for victims injured in different types of road designs (see Table E6.29 in Appendix E).

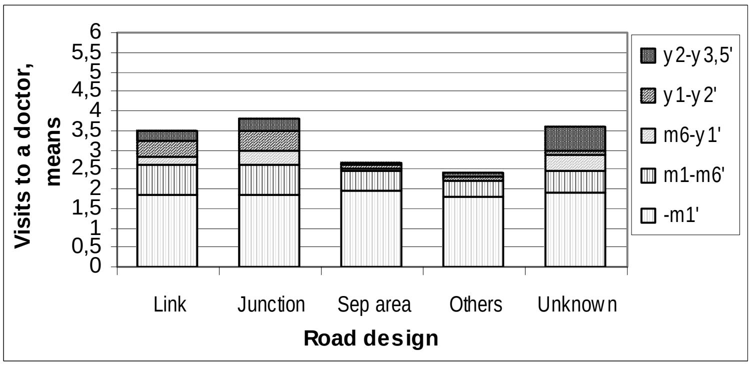


Figure 6.54 Cumulative average visits to a doctor on five selected occasions after the traffic accident distributed over different types of road design; data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspectives applied, the average numbers of visits to a doctor among people injured on links and at junctions are quite similar. In the time perspectives of one month and six months, victims injured in separated areas need as many visits to a doctor as those injured on links and at junctions. Their shorter average hospital stay could probably explain the need to visit a doctor when anxious. In both the short-term and long-term perspectives, victims injured in unknown accident sites need on average a rather similar number of visits to a doctor as the average injured.

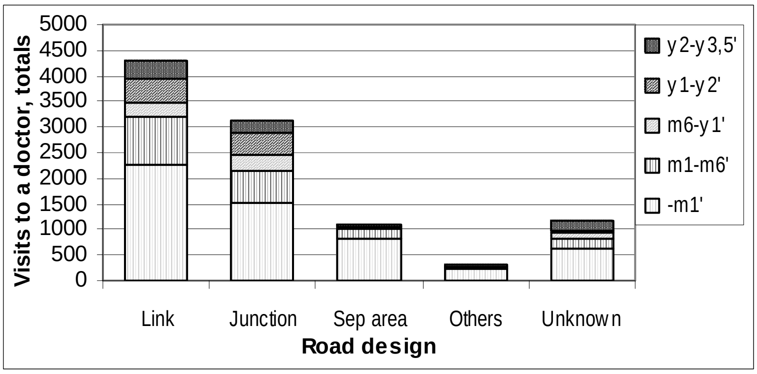


Figure 6.55 Total number of visits to a doctor on five selected occasions after the traffic accident distributed over different road designs, data (N=2,915) from five hospitals, 1991/92

In the one-month perspective, the total number of visits to a doctor among people injured on links is higher (p=.001) than among those injured at junctions, i.e. about 50 %. Even in a long-term perspective, after one month there are more total visits to a doctor among victims injured on links (p=.001). In the long-term perspective, the total number of visits to a doctor among people injured in/on unknown road designs is about the same as among those injured in separated areas.

Visits to a physiotherapist or a nurse. In Figures 6.56-6.57 the average and total visits to a physiotherapist or a nurse are illustrated (see Table E6.30 in Appendix E).

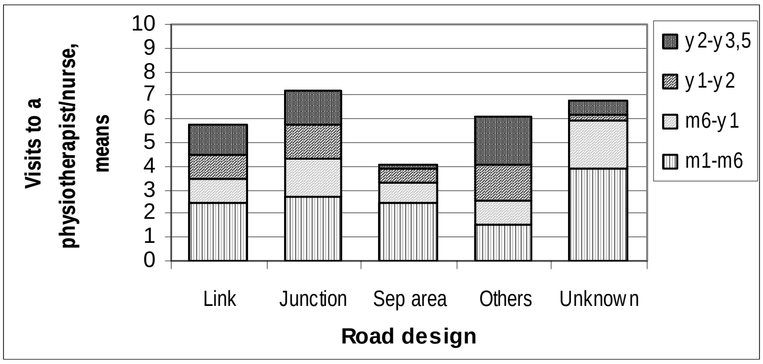


Figure 6.56 Cumulative average visits to a physiotherapist or a nurse on four selected occasions after the traffic accident distributed over different types of road design, data (N=2,915) from five hospitals, 1991/92

Within six months after the accident, the average number of visits to a physiotherapist or a nurse is rather similar among all injured traffic victims irrespective of accident site. However, only in one long-term perspectives, i.e. within two years, do people injured at junctions need more treatments (p=.2) than those on links, but often more (after two years p=.1; after more than three years p=.01) than people injured in separated areas. A few people injured in unknown accident sites receive very long treatments and hence cause the large average number of visits.

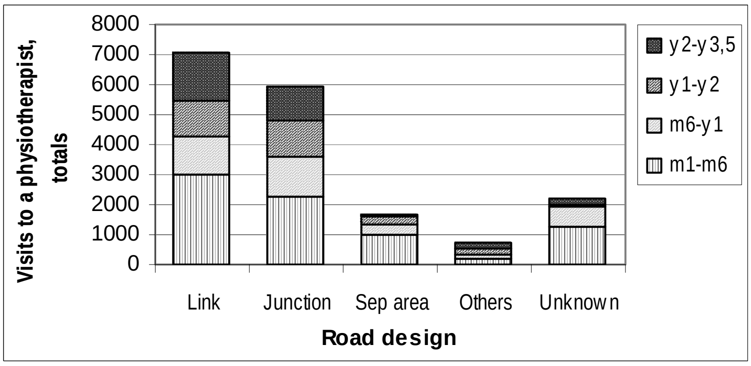


Figure 6.57 Total number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over different types of road design, data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspective applied, the differences between the total number of visits to a physiotherapist or a nurse among victims injured on links and those injured at junctions are not statistically significant. The same observation is valid for the comparisons with people injured in separated areas and people injured in unknown accident sites. Within the first six months after the accident, mopedists and motorcyclists injured in unknown accident sites contribute to a great proportion of the visits to a physiotherapist.

Sick leave. The follow-ups of the sick leave illustrated in Figures 6.58 and 6.59 include all five occasions (see Table E6.31 in Appendix E).

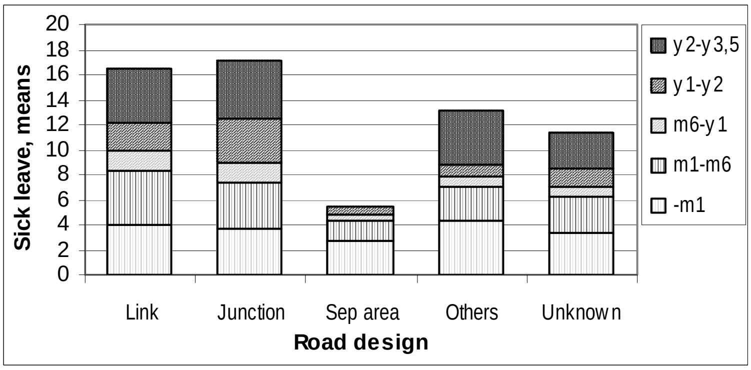


Figure 6.58 Cumulative average length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over different types of road designs, data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspective applied, the average length of sick leave among victims injured on links is rather similar to that of those injured at junctions. In all time perspectives, people injured in separated areas have a shorter average sick leave than those injured on links (p=.01 - .001) and at junctions (p=.1-001). The higher proportions of elderly retired who are injured in separated sites contribute to this.

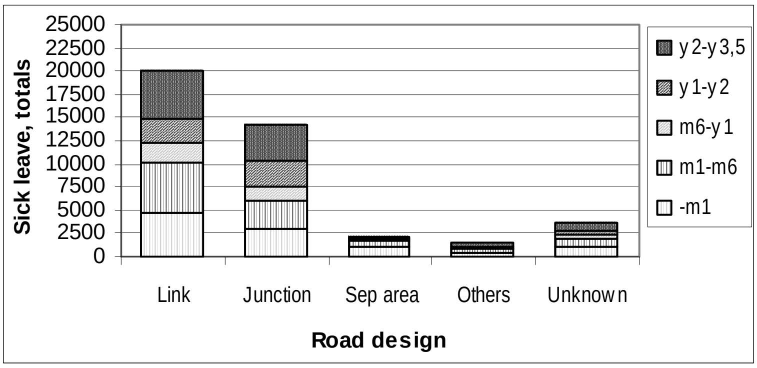


Figure 6.59 *Total length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over different types of road design, data (N=2,915) from five hospitals, 1991/92*

In the short-term perspective of one month, the total length of sick leave for traffic victims injured on links is longer (p=.001) than for those injured at junctions, i.e. about 60 %. The sick-leave periods are longer for those injured on links (p=.001-.1) in the long-term follow-up as well, with the exception of the second year after the accident. Injured motorists account for 80-90 % of the total length of sick leave on links in the long-term perspective.

6.4.2 Consequences as perceived by the individuals

Health loss. Five occasions from the health-loss evaluation have been selected and are presented in Figures 6.60 and 6.61, (see Table E6.32 in appendix E).

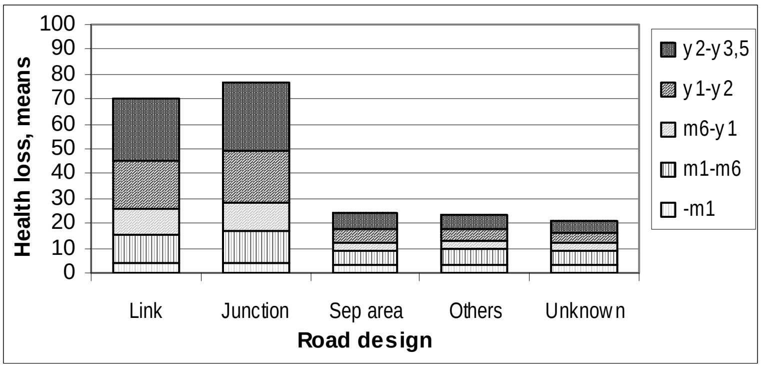


Figure 6.60 *Cumulative average health loss [lost days] on five selected occasions after the traffic accident distributed over different types of road design, data (N=2,915) from five hospitals, 1991/92*

Within one month after the accident, the average health loss is estimated to be rather similar for victims injured on links and at junctions. However, in any long-term perspective, the average health loss is longer (p=.2 -.1) for those injured at junctions than on links, in spite of a smaller number of fatalities. The motorists accounts for almost all the health loss caused by accidents on links and at junctions. The average experienced health loss among people injured in separated areas is always lower (p=.001) than among those injured in mixed traffic.

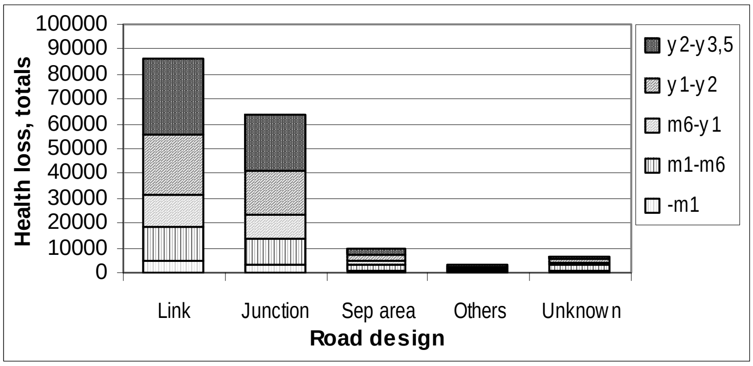
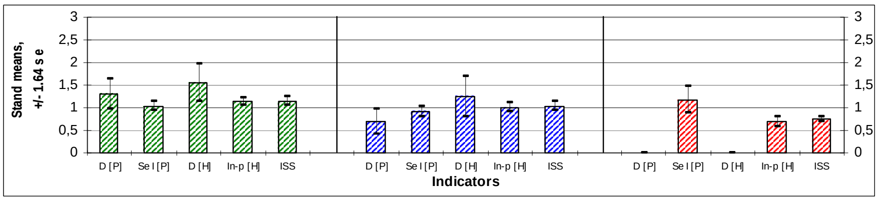


Figure 6.61 *Total health loss [lost days] on five selected occasions after the traffic accident distributed over different types of road design, data (N=2,915) from five hospitals, 1991/92*

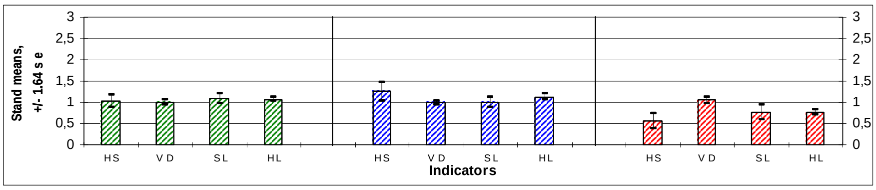
Irrespective of the time perspective applied, casualties injured on links experience more (p=.001) total health loss than those injured at junctions. In the long-term perspective of more than three years, the total health loss among victims injured on links is about 35 % greater than that among those injured at junctions. The contribution to the total health loss from the victims injured in separated areas is low, or about 5 %.

Summary *of the influence of different types of road design on average injury severity in different time perspectives*
Denominations: links = green, junctions = blue, separated areas = red

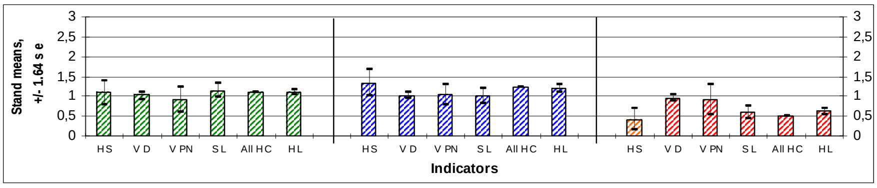
I. Immediately after the accident (five standardized indicators)



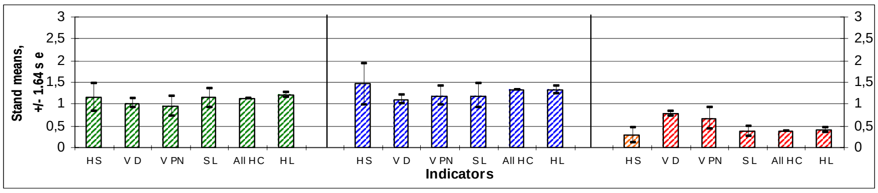
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



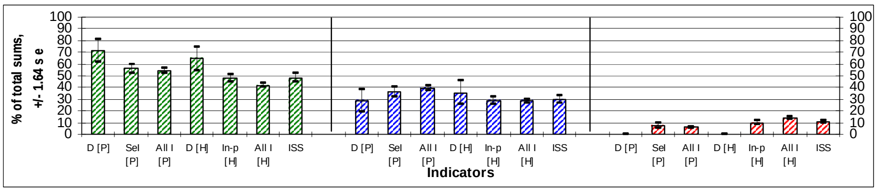
Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L =Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

Immediately after the accident, the average injury severity is higher among victims injured on links than at junctions and in separated areas. Within one month, the average injury severity for those injured on links and at junctions is rather similar. However, in a long-term perspective, the average severity is usually greater among people injured at junctions than on links. The average injury severity among people injured in accidents in separated areas is constantly lower.

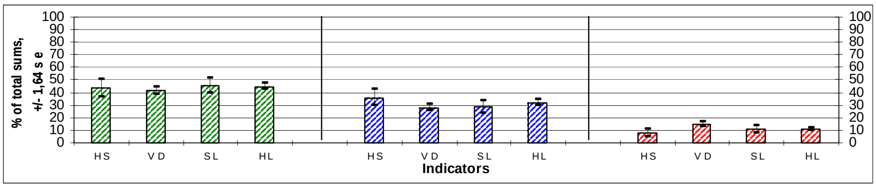
The influence of different types of road design on the proportions of the totals of different indicators in different time perspectives

Denominations: links = green, junctions = blue, separated areas = red

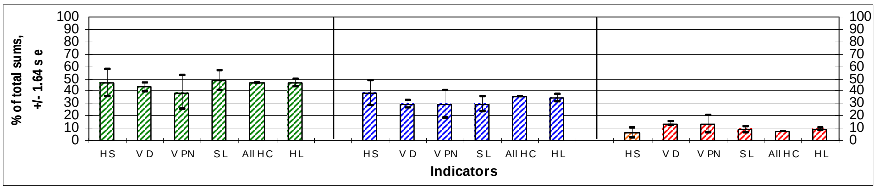
I. Immediately after the accident (seven standardized indicators)



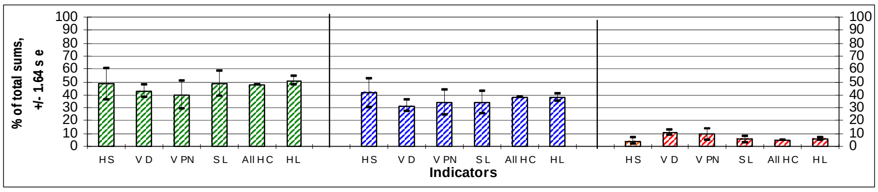
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

The immediate traffic safety problem is focused on traffic victims injured on links, irrespective of the indicators and data sources used. In the long-term perspective as well, the victims injured on links impose the greatest burden both on the society and on individuals. The proportions of traffic safety problems connected with people injured on separated areas seem to decline over time.

6.5 Road-surface conditions

6.5.1 Consequences for society

Number and severity of injuries. Traffic victims injured in different types of road-surface conditions, and registered in the police data set and in the hospital data set are shown in Figure 6.62 (see Table E6.33 in Appendix E).

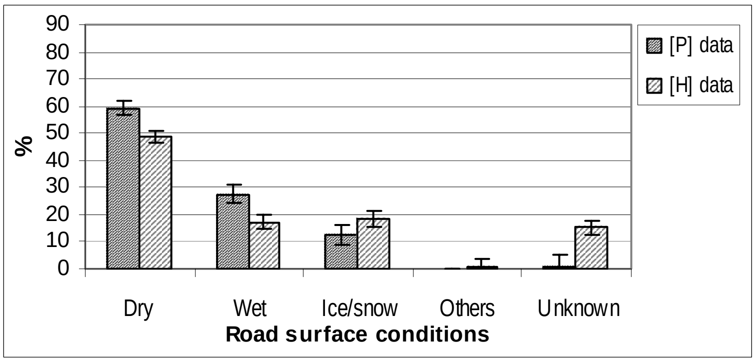
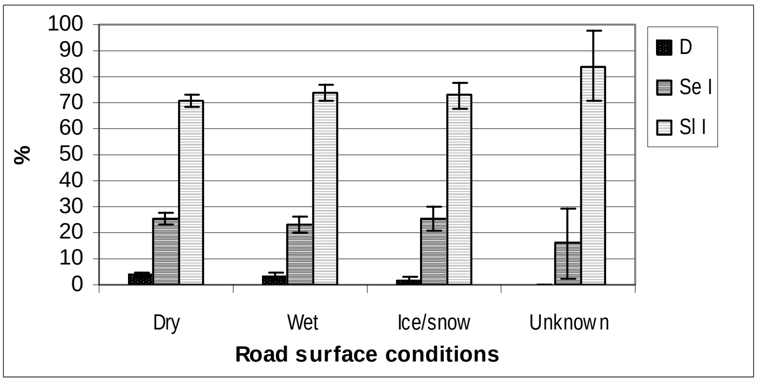


Figure 6.62 Proportions of injuries distributed over road-surface conditions, police data [P], (N=1,722) and hospital data [H], (N=2,915) from five hospital admittance areas, 1991/92

The number of victims injured on dry road surfaces in the hospital data supplies knowledge about 40 % more injured people than the police data, while further information about people injured on wet roads is more limited. The higher proportion and the greater number of victims injured on icy/snowy surfaces among hospital-registered casualties are explained by the greater number of pedestrians and cyclists injured in single accidents. The prevailing road-surface conditions are not known in a rather large number of cases, or about 15 %. About half of these are injured between October and March, when most injuries on icy/snowy roads occur.

The distribution of injury severity over different road-surface conditions in the police data is presented in Figure 6.63 (see Table E6.34 in Appendix E).

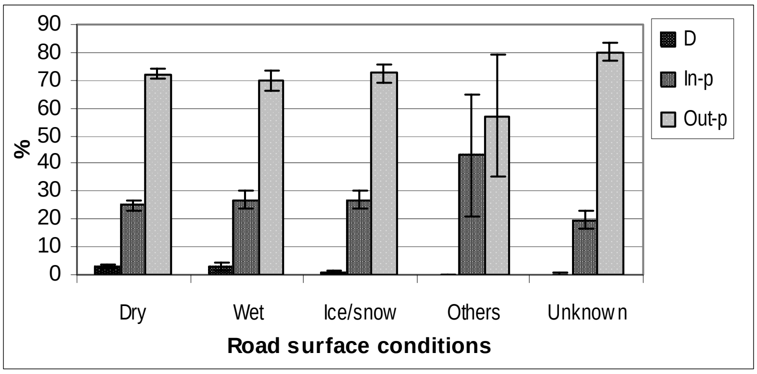


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 6.63 *Injury severity distributed over different road-surface conditions, police data (N=1,722) from five hospital admittance areas, 1991/92*

The share of fatalities is higher on dry and wet roads than on icy/snowy roads, while the share of severe injuries is about the same on icy/snowy roads as on dry roads, i.e. 25 %. According to this comparison, dry roads impose the heaviest safety problems on society with about 70 % of the fatalities and 60 % of all severe injuries.

The distribution of injury severity over different types of road-surface conditions in the hospital data is illustrated in Figure 6.64 (see Table E6.34 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 6.64 *Received care distributed over victims injured in different road-surface conditions; data (N=2,914) from five hospital admittance areas, 1991/92*

Of the seven victims hospitalised for a shorter period and later dead, three are injured on dry and three on wet roads. The shares of in-patients are about the same, about 25 %, among people injured on dry, wet and icy/snowy roads. However, about 50 % of all in-patients are injured on dry roads. In a total of nearly 450 cases, information about the road-surface condition at the accident site is missing. The proportion of in-patients is smaller in this category than among those injured on dry and wet roads. This can be explained with reference to the greater proportion injured in urban areas, and in single accidents, which can cause some bias.

In Figures 6.65 and 6.66 the average injury severity and sum of the ISS of all injured, including the deceased, are distributed over different types of road condition (see Table E6.35 in Appendix E).

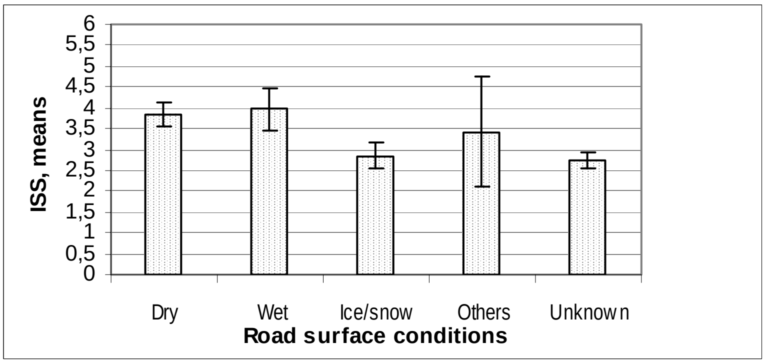


Figure 6.65 Average Injury Severity Score (ISS) distributed over different road-surface conditions; data (N=2,909, including the deceased) from five hospitals, 1991/92

Traffic victims injured on wet (p=.001) or dry (p=.01) roads receive on average a more severe injury than those injured on icy/snowy roads. The higher number of fatalities in dry and wet road conditions can partly explain this, as they increase the average injury severity score by about 25 %. The average injury severity in unknown surface conditions is rather similar to that on icy/snowy surfaces.

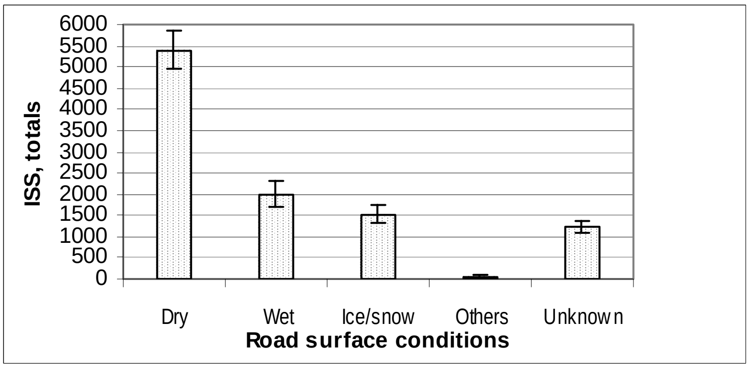


Figure 6.66 Sum of Injury Severity Score (ISS) distributed over different road-surface condition; data (N=2,909, including the deceased) from five hospitals, 1991/92

The total sum of injury severity in ISS for those injured in dry road-surface conditions is more than twice as high (p=.001) as for those injured in wet surface conditions. The total injury severity among people injured on wet road surfaces is greater (p=.05) than among those injured on icy/snowy surfaces. The total sum of injury severity among casualties injured on unknown road surfaces is lower (p=.05) than among those injured on icy/snowy surfaces. This emphasises the need to acquire more complete knowledge about the circumstances of those accidents.

The rather large proportion of injuries in unknown road-surface conditions, i.e. about 15 %, deserves special mention, while injuries registered in “other” road-surfaces conditions, e.g. slippery leaves, loose gravel, are few. However, the constantly high average injury severity, irrespective of indicators used, is probably a random effect of one severely injured mopedist. The subgroup is presented in the figures, but will not be further commented upon.

Hospital stay. In Figures 6.67 and 6.68 the average and total lengths of hospital stay are displayed for victims injured in different road conditions (see Table E6.36 in Appendix E).

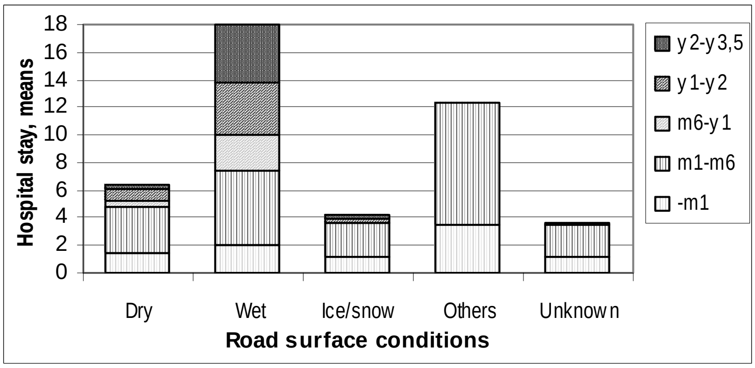


Figure 6.67 Cumulative average length of hospital stay [days] on five selected occasions after the traffic accident distributed over different road-surface conditions, data (N=2,915) from five hospitals, 1991/92

In the short-term perspective of one month, people injured in wet road-surface conditions are on average hospitalised longer (p=.1) than those injured on dry road surfaces, while, on the other hand, the latter are hospitalised longer (p=.02) than casualties injured in icy/snowy road-surface conditions.

However, as a consequence of injuries sustained on icy/snowy surfaces the average hospital stay of pedestrians is more than double compared to that of all injured victims. In the longer perspective of six months and onwards, the differences between victims injured in wet and in dry road-surface conditions remain (p=.2-.01).

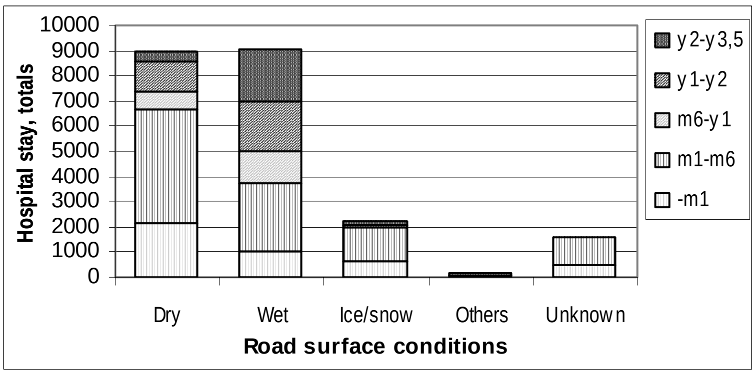


Figure 6.68 Total length of hospital stay [days] on five selected occasions after the traffic accident, distributed over different road-surface conditions, data (N=2,915) from five hospitals, 1991/92

Within one month, the total length of the hospital stay for those injured on dry road surfaces is about twice as long (p=.001) as for those injured in wet road-surface conditions. During the same time period, the total length of the hospital stay for people injured in unknown surface conditions is rather similar to that for those injured in icy/snowy road-surface conditions. Three years after the accident, the total length of hospital stays is similar for victims injured on wet and on dry road surfaces.

Visits to a doctor. In Figures 6.69 and 6.70 the average and total numbers of visits to a doctor are presented for victims injured in different road-surface conditions (see Table E6.37 in Appendix E).

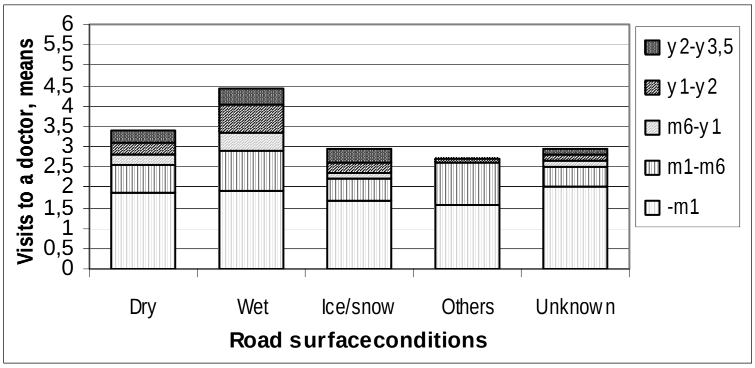


Figure 6.69 Cumulative average number of visits to a doctor on five selected occasions after the traffic accident, distributed over different road-surface conditions; data (N=2,915) from five hospitals, 1991/92

Within one month, the average numbers of visits to a doctor among people injured in dry and wet road surface-conditions are quite similar, while, after one month, the average number is lower (p=.2-.02) among victims injured on dry roads than among those injured on wet ones. Irrespective of the long-term perspective, people injured on icy/snowy surfaces pay fewer (p=.01-.001) visits to a doctor than those injured on wet surfaces. Within one month, casualties injured in unknown road-surface conditions need on average more visits to a doctor (p=.01) than those injured on icy/snowy roads.

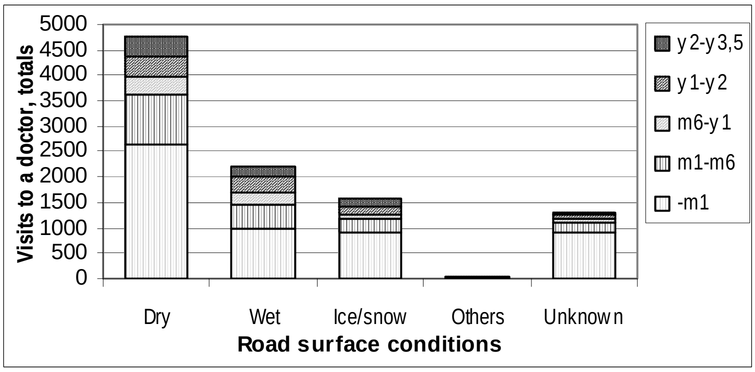


Figure 6.70 Total number of visits to a doctor on five selected occasions after the traffic accident distributed over different road-surface conditions; data (N=2,915) from five hospitals, 1991/92

One month after the accident, the total number of visits to a doctor among people injured in dry road-surface conditions is very predominant (p=.001), and of the same magnitude as that of all other injured people taken together. After one month, those injured on wet roads need on average more visits to a doctor, but the difference in the total number of visits to a doctor (p=.001) remains about the same for people injured in the two types of surface conditions.

Visits to a physiotherapist or a nurse. Figures 6.71 and 6.72 illustrate the average and total numbers of visits to a physiotherapist or to a nurse for traffic victims injured in different road-surface conditions (see Table E6.38 in Appendix E).

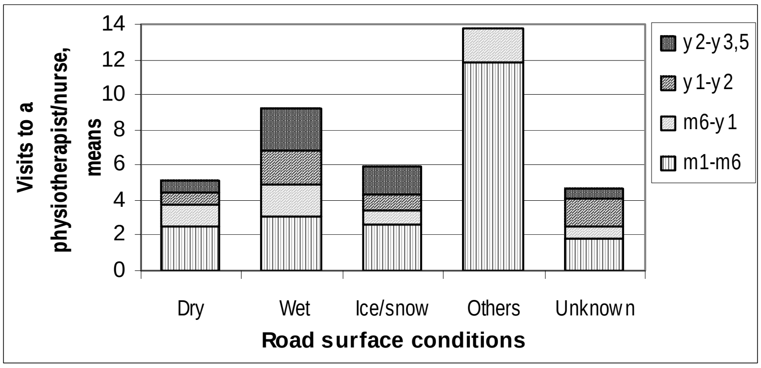


Figure 6.71 Cumulative average numbers of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over different road-surface conditions, data (N=2,915) from five hospitals, 1991/92

Within six months after the accident, the average numbers of visits to a physiotherapist or a nurse are not statistically significantly different among people injured in various road-surface conditions. In a longer perspective, the average number of treatments increases more people injure on wet roads than among those injured on other surfaces. Two years and later after the accident, visits to a physiotherapist or a nurse are more frequent (p=.1-.01) among victims injured on wet surfaces than among those injured under other circumstances.

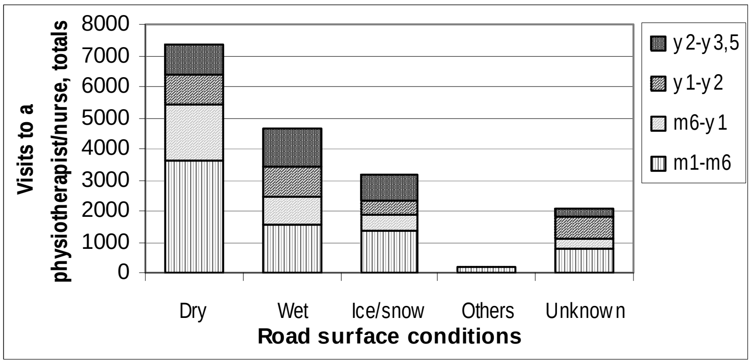


Figure 6.72 Total number of visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over different road-surface conditions; data (N=2,915) from five hospitals, 1991/92

Within the first six months after the accident, the total number of visits to a physiotherapist or a nurse is higher (p=.01 -.001) for victims injured in dry road-surface conditions and of about the same magnitude as all visits paid by people injured in wet, icy/snowy or unknown road-surface conditions taken together. However, within more than three years, additional visits to a physiotherapist or a nurse decrease among casualties on dry roads, as the proportion of young road users is high, and they recover faster than other victims.

Sick leave. The follow-ups of the sick leave are presented in Figures 6.73 and 6.74 (see Table E6.39 in Appendix E).

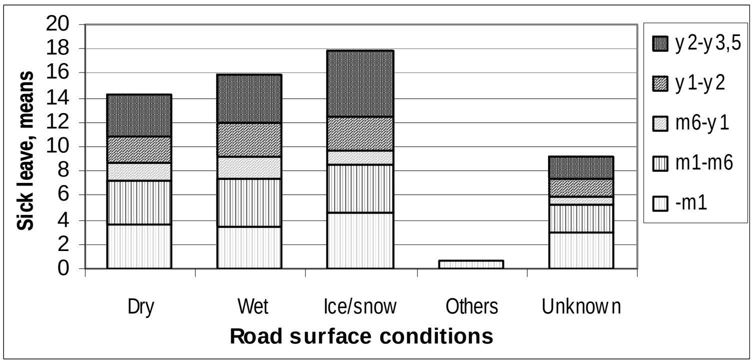


Figure 6.73 Cumulative average length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over different road-surface conditions; data (N=2,915) from five hospitals, 1991/92

Within one month, the average period of sick leave is longer (p=.05) for people injured on icy/snowy roads than for those injured in other surface conditions, which is partly due to a higher proportion of injuries in the age-group between 25 and 64 years. However, after one month the average length of sick leave among victims injured under known surface conditions is rather similar. After one month, people injured in unknown road-surface conditions have shorter (p=.2 -.05) average sick leave periods than those injured in known surface conditions. A high proportion of elderly retired victims may contribute to this.

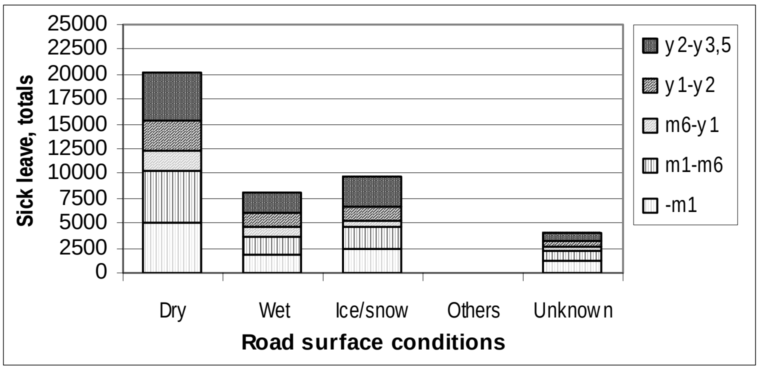


Figure 6.74 Total length of sick leave [in working days] among all people injured on five selected occasions after the traffic accident, distributed over different road-surface conditions, data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspective, the total length of sick leave for victims injured on dry roads is about half of that for all casualties (p=.001).

In the long-term perspective, injured motorists account for between 50 % and 60 % of the total sick leave in dry road-surface conditions.

6.5.2 Consequences as perceived by the individuals

Health loss. Five occasions have been selected from the health loss evaluation and are presented in Figures 6.75 and 6.76, (see Table E6.40 in Appendix E).

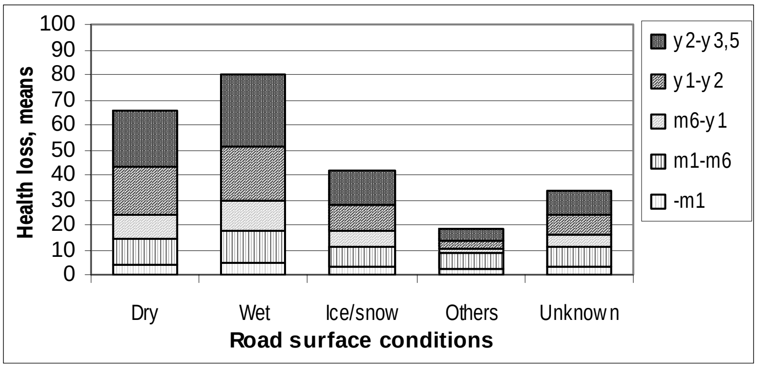


Figure 6.75 Cumulative average health loss [lost days] on five selected occasions after the traffic accident, distributed over different road-surface conditions; data (N=2,915) from five hospitals, 1991/92

In both the short-term and long-term perspectives, the average health loss is estimated as more severe (p=.001-.01) among casualties injured in wet road-surface conditions than among those injured in dry ones. When people injured on dry roads are compared to those injured on icy/snowy roads, the differences between the average health losses experienced increase (p=.01-.001) over time. The average health loss of motorists is greater than that of all other injured victims. The average health loss among pedestrians injured on dry, wet or icy/snowy road conditions is greater mainly in a short-term perspective.

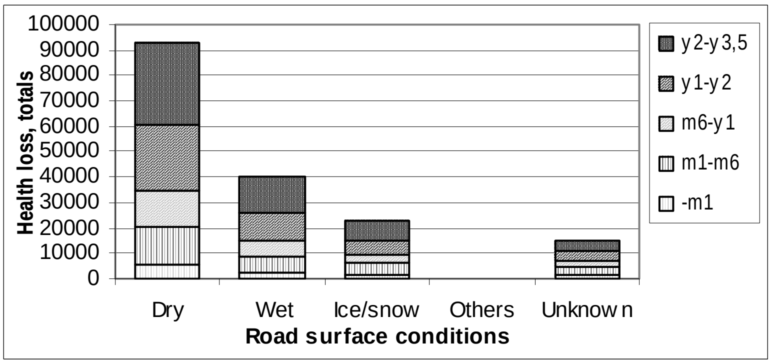
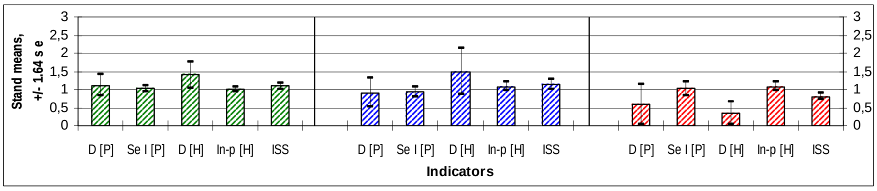


Figure 6.76 Total health loss [lost days] on five selected occasions after the traffic accident, distributed over different road-surface conditions; data (N=2,915) from five hospitals, 1991/92

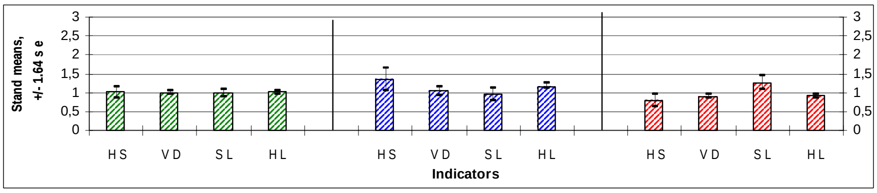
The victims injured in dry road-surface conditions experience a steadily increasing (p=.001) total health loss compared to those injured in other types of road-surface conditions. However, in the long-term perspective the fatalities on dry roads accrue a health loss corresponding to about 55 % of the total health loss for people injured in this type of road-surface condition. The contribution to the total health loss from people injured in unknown road-surface conditions is about 10 %, which motivates finding the road-surface information for these injured people.

Summary of the influence of road-surface conditions on average injury severity in different time perspectives
Denominations: dry = green, wet = blue, ice/snow = red

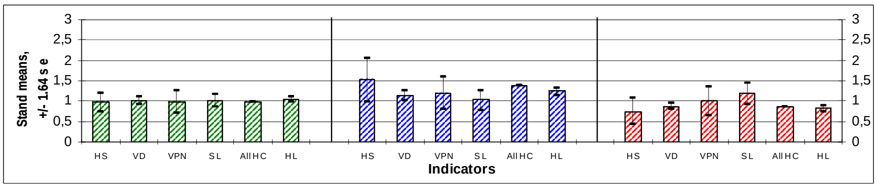
I. Immediately after the accident (five standardized indicators)



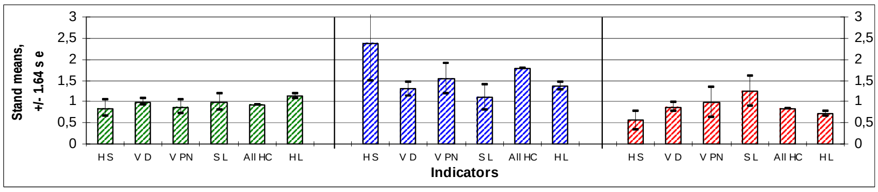
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)

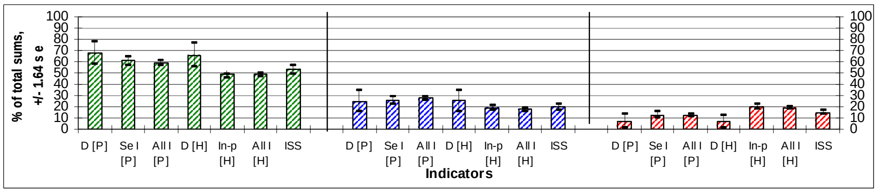


Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L =Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

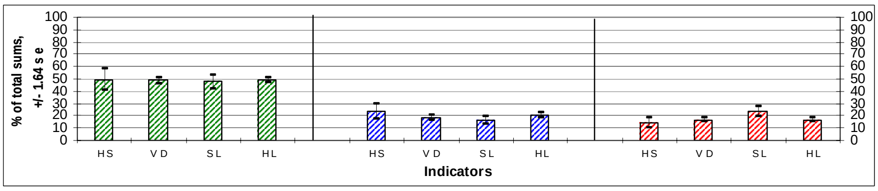
The immediate average injury severity does not differ very obviously between casualties on dry and wet roads. Within one month, the average severity for people injured on wet roads is higher than for those injured on dry roads when measured by most indicators. In a long-term perspective, the average severity remains greater among traffic victims on wet roads.

The influence of road-surface conditions on the proportions of the totals of different indicators in different time perspectives
Denominations: dry = green, wet = blue, ice/snow = red

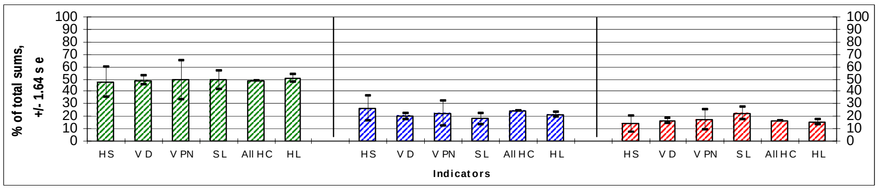
I. Immediately after the accident (seven standardized indicators)



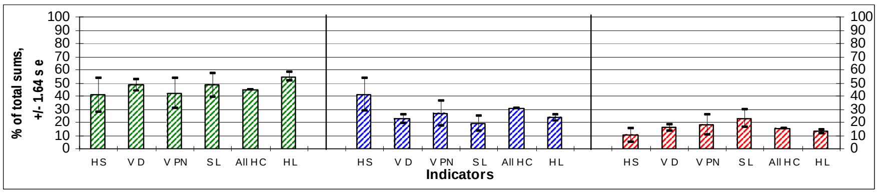
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

Immediately after the accident, victims injured in dry road-surface conditions seem to completely dominate the traffic safety problem independently of the indicator chosen. Their traffic safety problems as defined by indicators from the police data are especially severe. In all long-term perspectives, people injured on dry roads are still the main traffic safety problem.

6.6 Light conditions

6.6.1 Consequences for society

Number and severity of injured. Traffic victims injured under different light conditions and registered in the police data set and in the hospital data set, are presented in Figure 6.77 (see Table E6.41 in Appendix E).

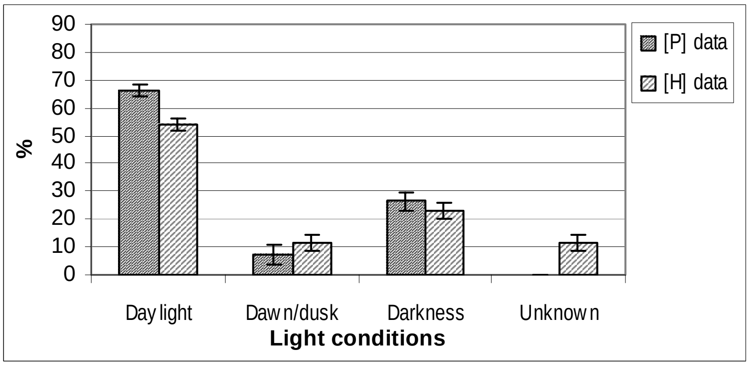
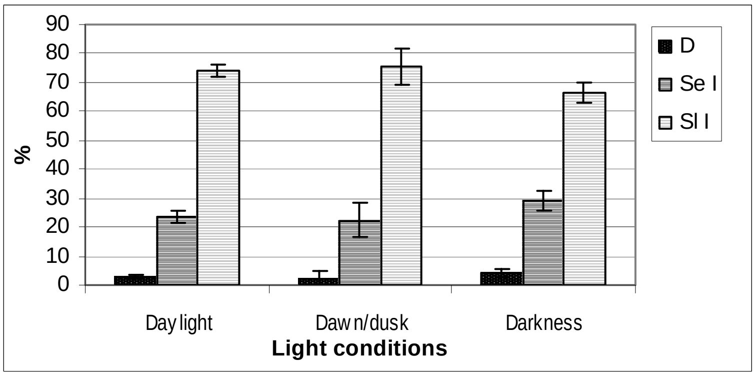


Figure 6.77 Proportions of injured people distributed over different light conditions, police data [P], (N=1,722) and hospital data [H], (N=2,915) from five hospital admittance areas, 1991/92

Most victims are injured during daylight and in darkness. The proportions of people injured in those light conditions are constantly lower in the hospital data set than in the police data set. The proportions of victims injured at dawn or dusk are comparatively low, while the proportion of casualties injured in unknown light conditions in the hospital data set is rather high, or close to 12 %. The number of cases where information about the light conditions at the accident site is missing is nearly 350.

The distribution of injury severity over different light conditions in the police data is presented in Figure 6.78 (see Table E6.42 in Appendix E).

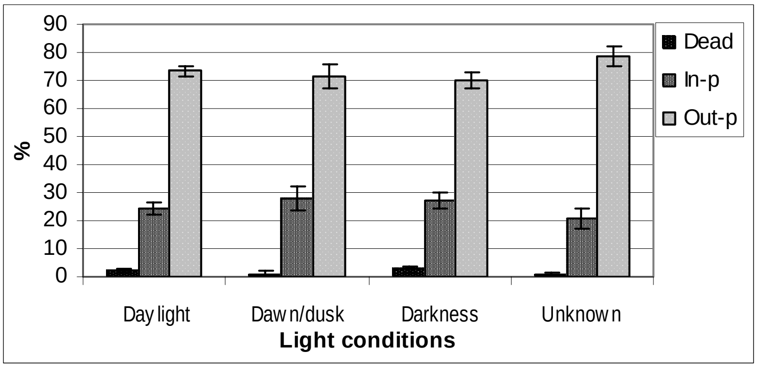


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 6.78 Injury severity distributed over different light conditions, police data (N=1,722) from five hospital admittance areas, 1991/92

The main part of the traffic safety problem, due to light conditions is presented by the victims injured during daylight, or about 60 % of both the fatalities and the severely injured people. However, the injury severity among the casualties injured during darkness is more pronounced than among those injured during daylight (p=.02).

The distribution of injury severity over different light conditions in the hospital data is presented in Figure 6.79 (see Table E6.42 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 6.79 Received care distributed over different light conditions, data (N=2,914) from five hospitals, 1991/92

The proportion of in-patients is about the same among the casaulties irrespective of light conditions, i.e. around 25 %. The proportion of in-patients among people injured in daylight is about 55 %**.**

In Figures 6.80 and 6.81 the average injury severity and sum of the ISS of all people injured, including the diseased, are distributed over different light conditions (see Table E6.43 in Appendix E).

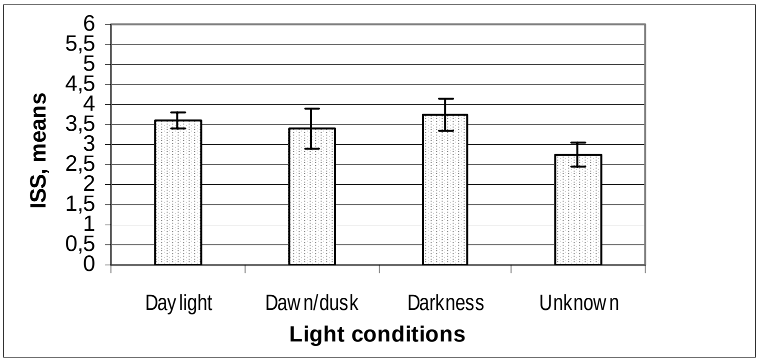


Figure 6.80 Average Injury Severity Score (ISS) distributed over different light conditions, data (N=2,909, including the deceased) from five hospitals, 1991/92

Traffic victims injured in daylight, at dawn or dusk, and in darkness, receive on average a similarly severe injury. However, those injured in unknown light conditions sustain less severe injuries (p=.1-.001) than the others, which might cause some bias.

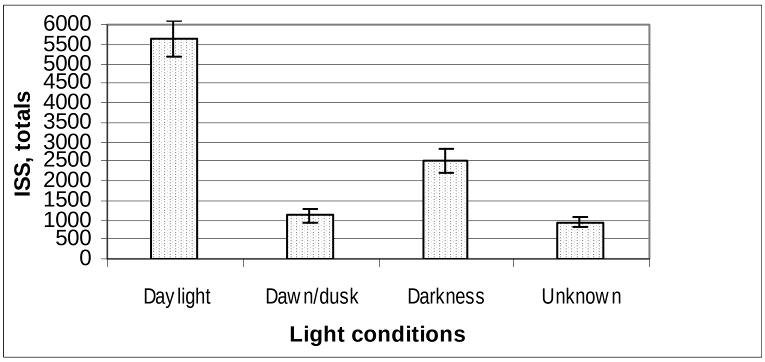


Figure 6.81 Sum of Injury Severity Score (ISS) distributed over different light conditions, data (N=2,909, including the deceased) from five hospitals, 1991/92

The total injury severity, in ISS, among victims injured in daylight is more than twice (p=.001) that among people injured in darkness. The total injury severity among people injured in unknown light conditions is of about the same magnitude as for those injured at dawn or dusk, which motivates gaining more knowledge about injuries in these circumstances.

The proportion of people injured in unknown light conditions, about 12 %, sometimes justifies comments on this group even further on.

Hospital stay. In Figures 6.82 and 6.83 the average and total lengths of hospital stay are displayed for people injured in different light conditions (see Table E6.44 in Appendix E).

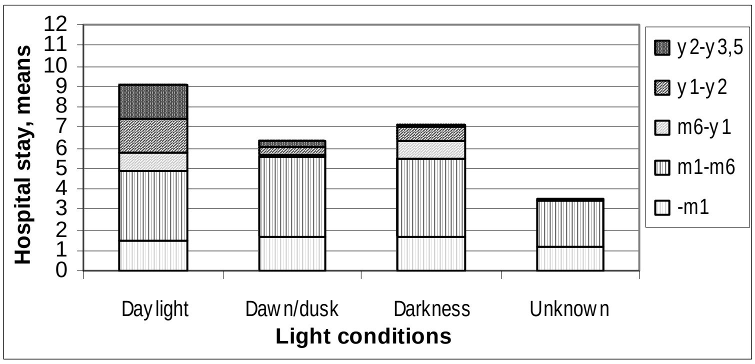


Figure 6.82 Cumulative average length of hospital stay [days] on five selected occasions after the traffic accident, distributed over different light conditions; data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspective applied, the average length of hospital stay shows no statistically significant difference when victims injured in darkness are compared to those injured in daylight. Also concerning all other comparisons between other light conditions there are no statistically significant differences.

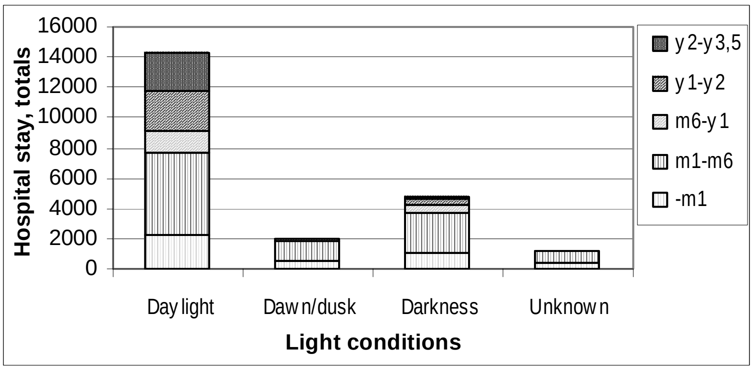


Figure 6.83 Total length of hospital stay [days] on five selected occasions after the traffic accident distributed over different light conditions, data (N=2,915) from five hospitals, 1991/92

Within the first month after the accident, the total length of hospital stay for victims injured in daylight is about twice (p=.001) as that of people injured in darkness. In a long-term perspective, i.e. up to more than three years, the total hospital stay among people injured in the daytime increases further (p=.01 -.001) as compared to those injured in darkness. Irrespective of the time perspective, the total hospital stay among victims injured in unknown light conditions is not statistically significantly lower than that among those injured at dawn or dusk.

Visits to a doctor. Figures 6.84 and 6.85 illustrate the average and total number of visits to a doctor for people injured in different light conditions (see Table E6.45 in appendix E).

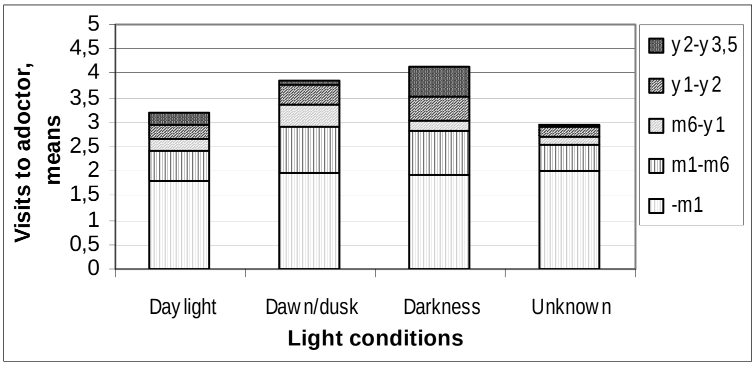


Figure 6.84 *Cumulative average visits to a doctor on five selected occasions after the traffic accident distributed over different light conditions, data (N=2,915) from five hospitals, 1991/92*

Within one month, the average number of visits to a doctor among the traffic victims is rather similar, irrespective of the light conditions at the accident site. In a long-term perspective of up to more than three years, the average number of visits to a doctor is lower (p=.2 -.05) among people injured in daylight than in darkness. Irrespective of the time perspective applied, the average number of visits to a doctor is higher (p=.2 -.05) among casualties injured at dawn or dusk than in daylight.

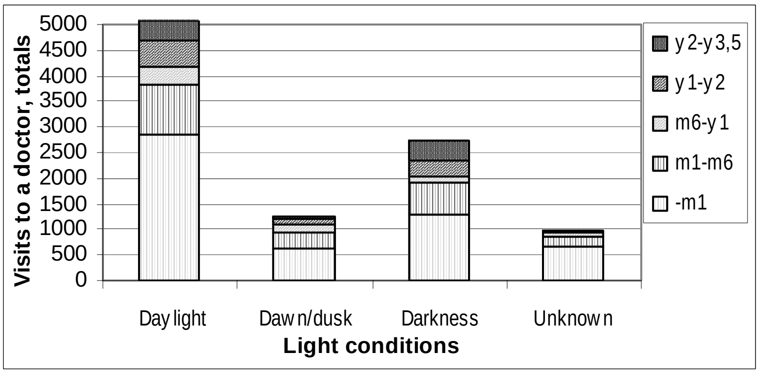


Figure 6.85 Total number of visits to a doctor on five selected occasions after the traffic accident distributed over different light conditions, data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspective applied, the total number of visits to a doctor among victims injured in daylight is the largest (p=.001), and of about the same magnitude as for all other injured people taken together. The relations between visits to a doctor for people injured at dawn/dusk, in darkness and in daylight respectively are almost constantly 1:2:4.

Visits to a physiotherapist or a nurse. Figures 6.86 and 6.87 present the average and total numbers of visits to a physiotherapist or to a nurse for people injured in different light conditions (see Table E6.46 in Appendix E).

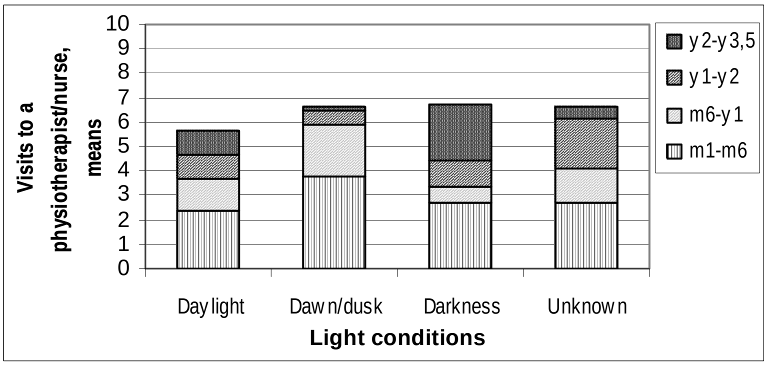


Figure 6.86 Cumulative average visits to a physiotherapist or a nurse on four selected occasions after the traffic accident distributed over different light conditions; data (N=2,915) from five hospitals, 1991/92

Irrespective of the time perspective adopted, the average numbers of visits to a physiotherapist or a nurse are rather similar for people injured in different light conditions.

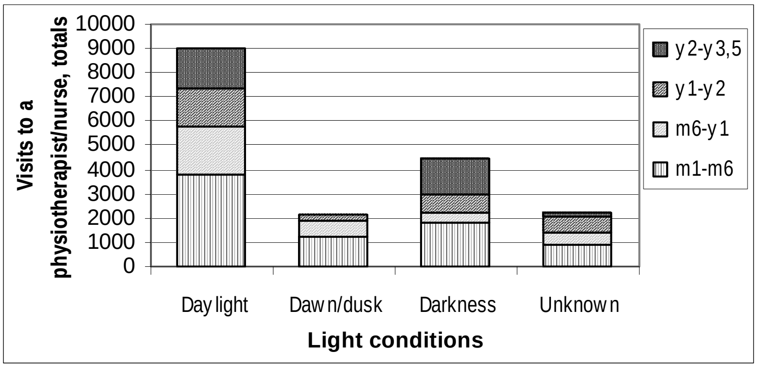


Figure 6.87 Total visits to a physiotherapist or a nurse on four selected occasions after the traffic accident, distributed over different light conditions, data (N=2,915) from five hospitals, 1991/92

Both in the short-term and long-term perspectives, the total number of visits to a physiotherapist or a nurse is higher (p=.001) for traffic victims injured in daylight, and of about the same magnitude as the total number of visits for all victims injured in other light conditions. In the longer perspective of two years and more, the number of visits to a physiotherapist or a nurse among those injured at dawn or dusk diminishes over time as opposed to those injured in darkness, whose need for treatment increases over time. The total number of visits to a physiotherapist or a nurse among people injured in unknown light conditions is of the same magnitude as for those injured at dawn or dusk.

Sick leave. The follow-ups of the sick leave are presented in Figures 6.88 and 6.89 and include all five occasions selected (see Table E6.47 in Appendix E).

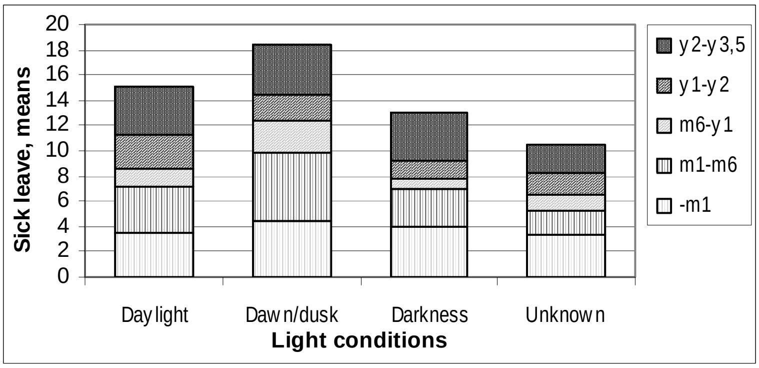


Figure 6.88 *Cumulative average length of sick leave [in working days] on five selected occasions after the traffic accident, distributed over different light conditions; data (N=2,915) from five hospitals, 1991/92*

Within one month, the average period of sick leave is shorter (p=.1) among traffic victims injured in daylight than among those injured at dawn or dusk. In a long-term perspective, up until within one year, the average sick leave period is longer (p=.2 -.1) for people injured at dawn or dusk than for those injured in daylight. In longer time perspectives, the average sick leave is about equally long for victims injured in known light conditions. After one month, those injured in unknown light conditions have an average sick leave (p=.05-.2) that is shorter than for those injured at dawn or dusk. A high proportion of elderly victims injured may serve to explain this.

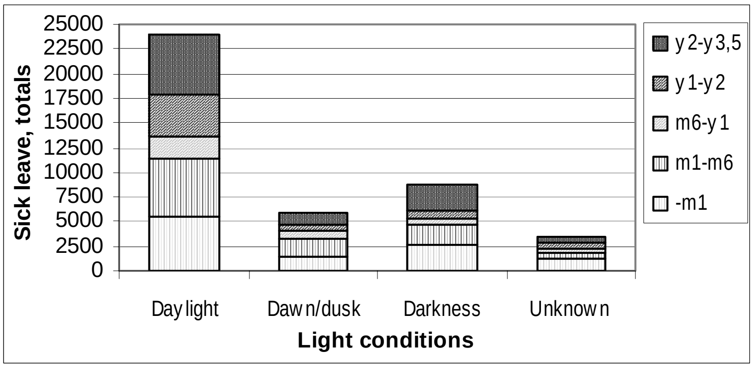


Figure 6.89 *Total length of sick leave [in working days] on five selected occasions after the traffic accident distributed over different light conditions; data (N=2,915) from five hospitals, 1991/92*

Within one month, the total length of sick leave is greater (p=.001) for victims in daylight than for those injured in other light conditions. In a long-term perspective, the total length of sick leave among people injured in daylight increases steadily as compared to those injured in other light conditions. Injured motorists account for between 50 % and 60 % of the total length of these sick-leave periods.

6.6.2 Consequences as perceived by the individuals

Health loss. Five occasions from the health-loss evaluation have been selected and are presented in Figures 6.90 and 6.91 (see Table E6.48 in Appendix E).

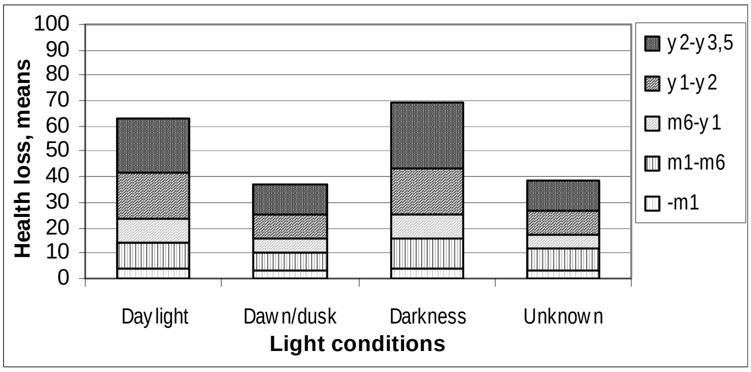


Figure 6.90 Cumulative average health loss [lost days] on five selected occasions after the traffic accident distributed over different light condition;, data (N=2,915) from five hospitals, 1991/92

Within one month, the average health loss is greater among traffic victims injured in darkness (p=.05) than among those injured in daylight and at dawn or dusk. In a long-term perspective, the average health loss perceived by people injured in darkness is greater (p=.001) than among those injured at dawn or dusk, and increases from about 50 % to close to 90 % more. Especially in a long-term perspective, the contribution made by motorists to the average health loss is greater than that of all other categories of injured victims combined.

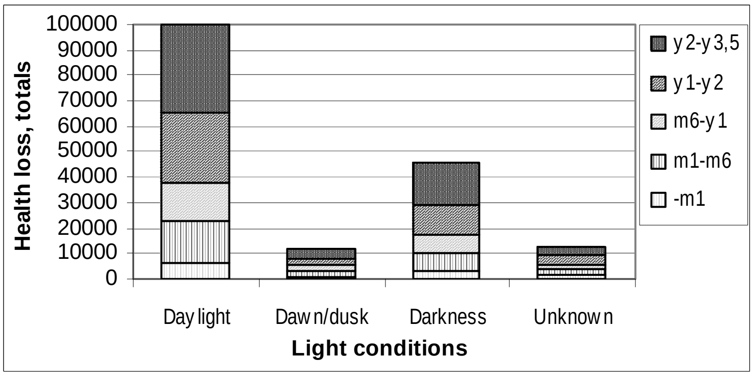
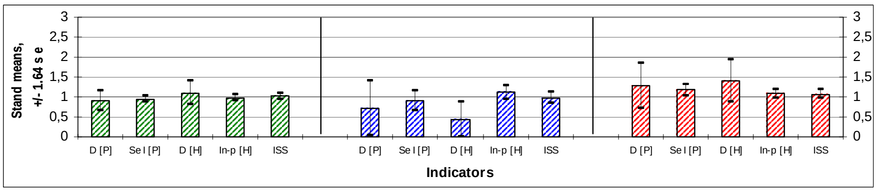


Figure 6.91 Total health loss [lost days] on five selected occasions after the traffic accident, distributed over different light conditions; data (N=2,915) from five hospitals, 1991/92

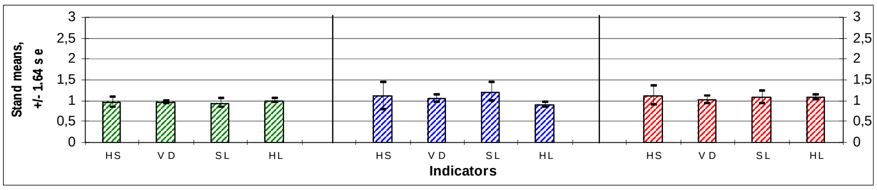
Victims injured in daylight experience a steadily increasing total health loss (p=.001) compared to those injured in other light conditions. In the long-term perspective, victims killed in daylight accumulate a health loss corresponding to about 45 % of the total health loss for people injured in these light conditions. The contribution to total health loss from traffic victims injured in unknown light conditions is of about the same magnitude as from those injured at dawn or dusk, and is consequently not negligible.

Summary *of the influence of light conditions on average injury severity in different time perspectives*
Denominations: dry = green, wet = blue, ice/snow = red

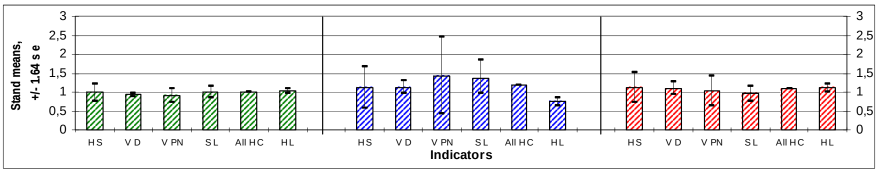
I. Immediately after the accident (five standardized indicators)



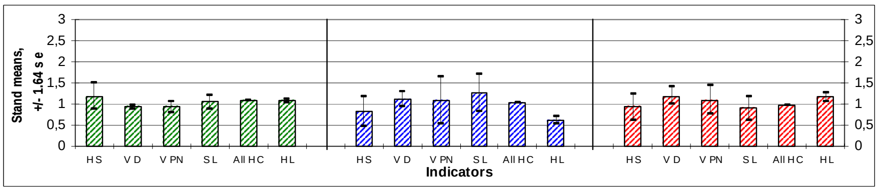
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)

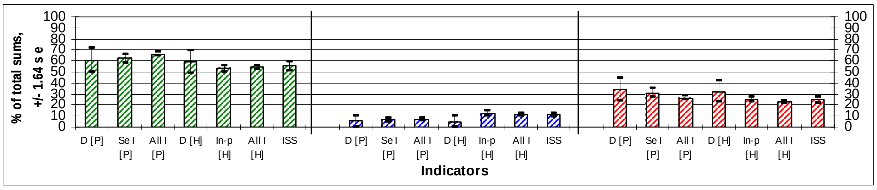


Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L =Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

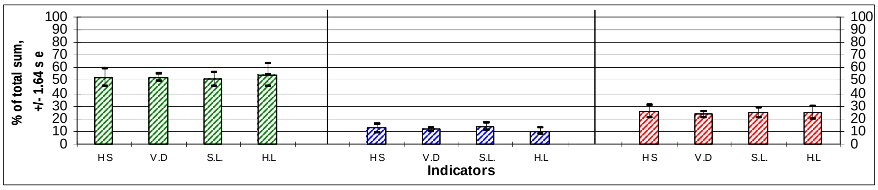
The immediate average injury severity seems to be highest among people injured in darkness. However, in a long-term perspective the differences in the average severity for different light conditions are not altogether clear. More than three years after the accident, the average injury severity among people injured in accidents in darkness seems to be a little higher than among those injured in daylight.

The influence of light conditions on the proportions of the totals of different indicators in different time perspectives
Denominations: dry = green, wet = blue, ice/snow = red

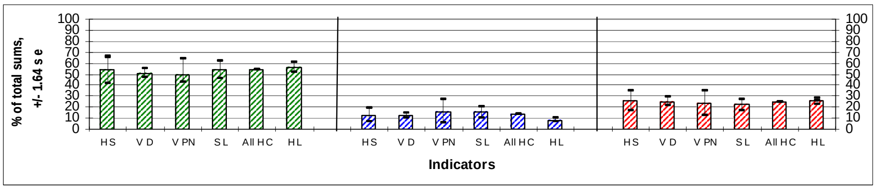
I. Immediately after the accident (seven standardized indicators)



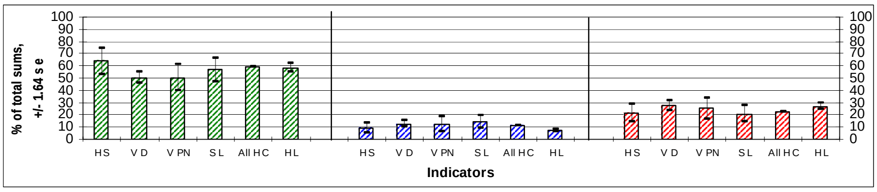
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

Immediately after the accident, victims injured in daylight conditions seem to completely dominate the traffic safety problems independently of the indicator chosen. In any long-term perspective, people injured in daylight still constitute the main traffic safety problem.

7 Potential areas for traffic safety measures – Four examples

7.1 Samples and procedures for analyses

Chapter 6 focused on describing traffic safety problems and accident consequences, and how they are distributed over the traffic system. Such descriptions constitute relevant information for decision-makers, supporting them in, for example, making fair and efficient allocations of public funds for traffic safety improvements. They are also relevant for continuous monitoring and identification of changes in traffic safety trends.

However, the analysis in Chapter 6 is less suitable for identification of causal relations between traffic safety consequences (aggregate or individual ones), and traffic-engineering factors. The main reasons for this are that the relation between traffic characteristics, traffic engineering and traffic safety is very complex, and that many variables involved are highly intercorrelated. One can solve this problem by estimating multivariate relationships between the relevant variables, thereby allowing for conclusions about the marginal effects of specific variables on the consequences. Such conclusions are relevant for example, in selecting efficient traffic safety measures.

In this chapter, another approach is taken to the identification of causal relationships between accident consequences and traffic-engineering factors. Here, the analyses are based on disaggregated subsets of data. These allow for increased comparability so that the problem of confounding variables may be reduced by fixing the values of such variables in the subset of data. The combinations selected for the subsets are presented in Table 7.1.

The following hypotheses are investigated:

- √ Different traffic-engineering factors affect injury severity in different ways.
- √ Different traffic-engineering factors affect the distribution of the total consequences in different ways.
- √ The consequences of traffic injuries change depending on when the follow-up is performed.

Table 7.1 Selected two-factor comparisons performed on subsets of data on traffic injuries from five hospitals, 1991/92

Chapter 7.2

Road users	**Road environment**	
	Rural areas	**Urban areas**
P		
C		
Mp		
M		
MC		

Chapter 7.3

Speed	**Road environment/ road design**		
	Rural areas		Urban areas
	L	J	
50			
70			
90			
110			
Unknown			

Chapter 7.4

Road users	**Road environment/ type of accidents**			
	Rural areas	**Urban areas**		
		S	**Co unpr**	**Co mv**
P				
C				
Mp				
MC				
M				

Chapter 7.5

Road surface conditions	**Road environment/ type of accidents**		
	Rural areas	**Urban areas**	
		S	Co
Dry			
Wet			
Ice/snow			
Unknown			

Abbreviations: P=pedestrians, C=cyclists, Mp=mopedists, MC=motorcyclists, M=motorists, S=single accidents, Co=Collisions, Co unpr=Collisions with an unprotected road user, Co mv =Collisions with a motor vehicle, L=Links, J=Junctions

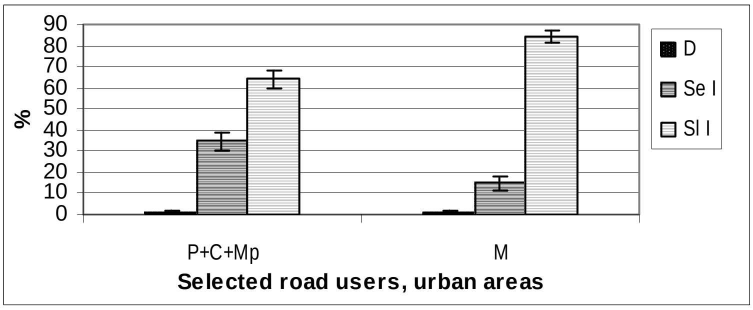
The four examples were selected among traffic safety measures that could be efficient in areas, which might be of interest in forming safety strategies, and they concern different road environments, road users, types of accidents, and/or road-surface conditions. The comparisons in sections 7.2 - 7.4 are performed between different subgroups indicated in grey in Table 7.1. The influence of the traffic-engineering factors chosen as measured by the indicators used previously is presented in a similar manner to that used in the summaries in Chapter 6, i.e. degrees of injury severity and proportions of the total sum in four time perspectives. More detailed information is accessible in Appendix E. In the two examples in sections 7.4 and 7.5, the “unknown” cases represent a proportionately great share. However, no efforts have been made to analyse the possible bias caused by this.

7.2 Unprotected v. protected road users in urban areas

7.2.1 Number and severity of injuries

In the Swedish official statistics (SCB, 1992), a slight majority of traffic injuries, or 55 %, are reported in urban areas by the police, while the opposite is true in the police data set of this study. However, in the hospital data set people injured in urban areas are in the majority, at 61 %, as compared to 35 % in rural areas; see Figure 6.1. The number of traffic victims in urban areas is also more than doubled with access to hospital data (see Table E7.1 in Appendix E), mainly due to a nearly quadruple number of injured unprotected road users. Hence it is, the number of casualties, not the expected average injury severity that is the main reason for comparing the consequences for unprotected and protected road users in urban areas.

The distribution of injury severity, according to an official definition used by the police is illustrated in Figure 7.1 for the 346 pedestrians, cyclists and mopedists and 374 motorists in urban areas (see Table E7.2 in Appendix E).

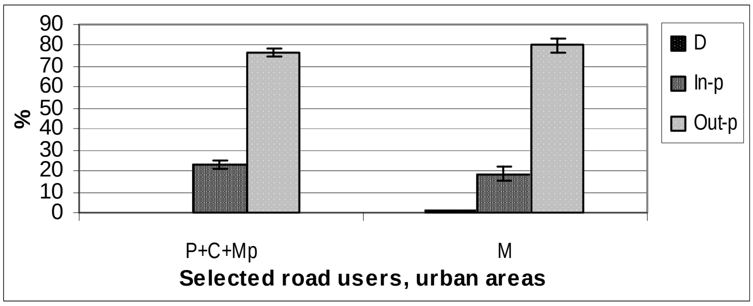


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 7.1 *Injury severity distributed over unprotected (N_{P+C+Mp}=346) and protected (N_M=374) road users in urban areas; police data from five hospitals admittance areas, 1991/92*

While the proportions of fatalities are similar in these two categories of road users, the unprotected victims are severely injured in urban areas much more frequently than the motorists, 35 % and 15 % respectively. The main reason is the high share of bicyclists and pedestrians injured in collisions according to the official definition of a person injured in road traffic.

In the hospital data set consisting of 1,304 pedestrians, cyclists and mopedists and 382 motorists, injury severity can be presented in terms of care received in connection with initial injuries, as in Figure 7.2 (see Table E7.2 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 7.2 *Received care distributed over unprotected (N_{P+C+Mp}=1,304) and protected (N_M=382) road users in urban areas; data from five hospitals, 1991/92*

Here the proportion of fatalities is lower for pedestrians, cyclists and mopedists than for motorists. The total share of in-patients is higher among the unprotected road users than among the motorists. The total number of in-patients among the unprotected victims is rather close to that of all motorists injured in urban areas.

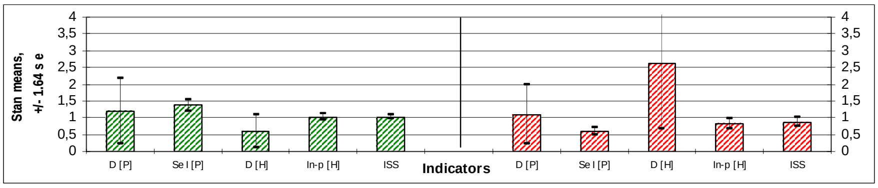
7.2.2 Average injury consequences

The influence on the average injury severity of two categories of road users in urban areas is described in terms of selected indicators in four time perspectives. More information about consequences related to intervening time periods and to other road users is to be found in Tables E7.3 -E7.8 in Appendix E. Table E7.9 illustrates the results from the t-tests performed among the selected categories of road users.

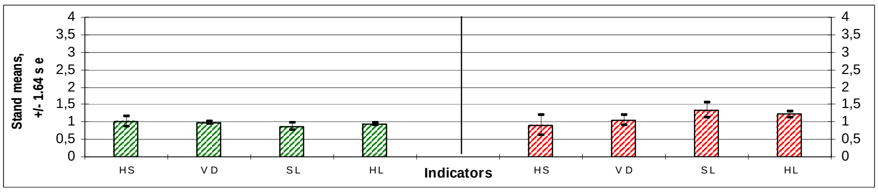
The comparisons are presented in standardized averages of the respective indicators in Figure 7.3.

Denominations: Pedestrians, cyclists and mopedists = green, motorists = red

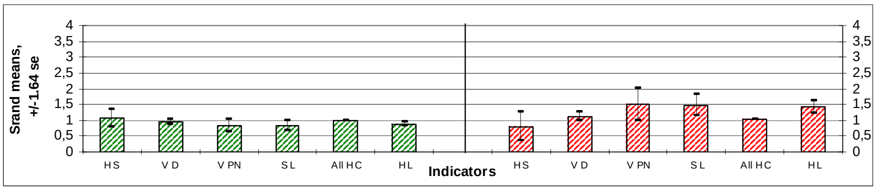
I. Immediately after the accident (five standardized indicators)



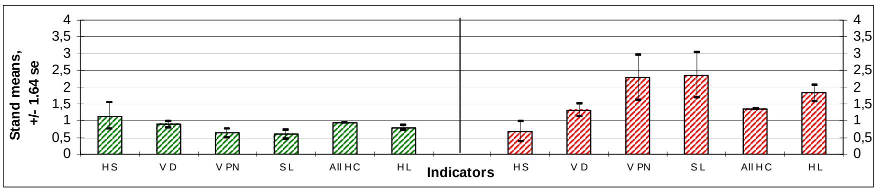
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L =Health loss, All HC=all health care costs calculated here.

Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

Figure 7.3 *Average injury consequences in different time perspectives measured by selected indicators among unprotected (P+C+Mp) and protected (M) road users in urban areas; data from five hospitals, 1991/92*

Immediately after the accident, the pedestrians, cyclists and mopedists as a group are, on average, more affected by the traffic injuries in urban areas than the motorists.

However, within one month the motorists in urban areas are, on average, somewhat more affected by the consequences of their traffic injuries than the pedestrians, cyclists and mopedists, in spite of their slighter average initial injuries.

With a prolonged follow-up time of six months after the accident, nearly all the indicators used display, on average, increasing consequences for motorists as compared to unprotected road users in urban areas.

Within more than three years, the effects of motorists in urban areas on the indicators seem, on average, mainly to result in longer periods of treatment (especially visits to a physiotherapist and/or sick leave) and more health loss than for unprotected road users. Nearly all motorists that suffer from these long-term problems, mostly women, have been diagnosed with whiplash.

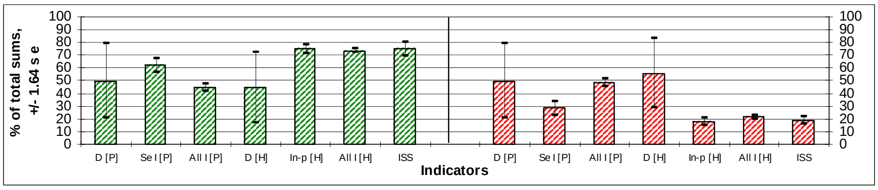
7.2.3 Total injury consequences

The differences between the selected categories of road users in urban areas are studied with regard to the total consequences of traffic injuries in four time perspectives. More information about consequences related to intervening time periods and other road users is to be found in Tables E7.3-E7.8 in Appendix E. In Table E7.10 illustrates the results from the t-tests performed among the selected road users.

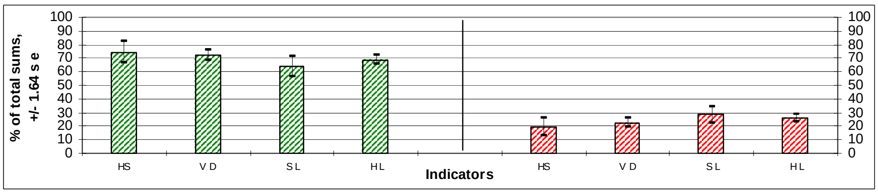
The comparisons are presented in terms of proportions of the total number or sum of the indicators in Figure 7.4. Motorcyclists, other road users and unknown road users are treated as missing data in these analyses.

Denominations: Pedestrians, cyclists and mopedists = green, motorists = red

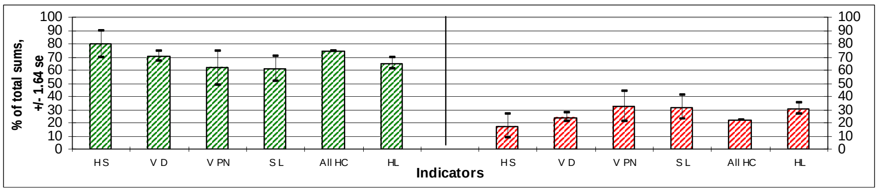
I. Immediately after the accident (seven standardized indicators)



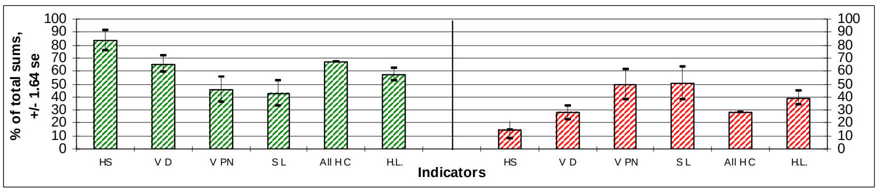
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

Figure 7.4 Proportions of the total injury consequence in different time perspective measured by selected indicators among unprotected (P+C+Mp) and protected (M) road users in urban areas, data from five hospitals, 1991/92

Immediately after the accident, the indicators D [P], All I [P], D [H] indicate that the consequences are rather similar for the unprotected road users and the motorists in urban areas. The other indicators reveal a greater traffic safety problem among the unprotected road users.

Within one month, the unprotected road users dominate the picture of traffic safety problems in urban areas irrespective of the indicators used for the measurement.

Within six months after the accident, the unprotected road users still dominate the picture of traffic safety problems in urban areas irrespective of the indicators used for the measurement.

Within more than three years, the selected indicators offer a more heterogeneous and complicated picture of the traffic safety problems in urban areas when unprotected road users are compared with motorists. The problem seems most profound for the unprotected road users in urban areas when the indicators “length of hospital stay”, “number of visits to a doctors”, and “health loss” are used, while the indicators of “visits to a physiotherapist/nurse” and “sick leave” result in the opposite conclusions.

However, traffic safety problems in urban areas are still most serious for the unprotected road users.

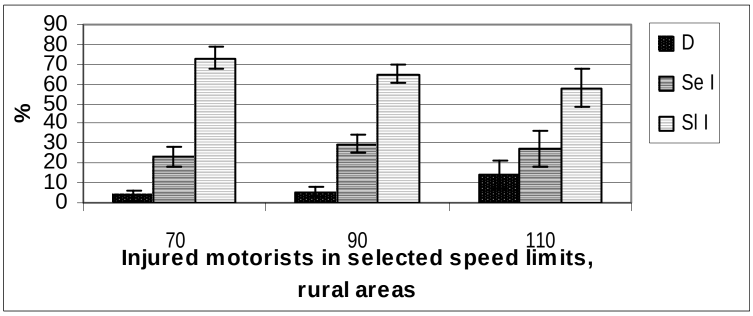
7.3 Motorists in different speed-limit zones on links in rural areas

7.3.1 Number and severity of injuries

According to the official statistics of Sweden (SCB, 1992) motorists represent a majority about 75 % of the injured road users. They also account for about 90 % of traffic injuries in the rural areas. In general, the injured motorists in the police data set used in this study amount to about the same proportions as in the official statistics, while the corresponding proportion of motorists is much lesser in the hospital data set, or 38 % (see Figure 6.16). The motorists are, however, in majority, about 70 %, in rural areas irrespective of the data sets used.

This analysis is restricted to motorists on links in two-lane roads. Motorways were excluded, partly because the speed limit on the motorway network involved was reduced to 90 km/h for environmental reasons during this study. Data about the speed limits are exclusively collected from the police-reported traffic accidents. The information is complete for nearly all injured motorists reported by the police. However, due to the method of collecting data chosen, the coverage of speed limits in the hospital data set is only about 65 %, or 332 jointly registered among the traffic victims. Most motorists are injured where a speed limit of 90 km/h applies. Since very few motorists in rural areas are injured on links at 50 km/h, they have been excluded from the further analyses. Further information about traffic victims injured where the speed limit is 50 km/h and where speed limit is unknown is only found in Appendix E.

The distribution of injury severity according to the official definition is illustrated in Figure 7.5 for 526 people injured in selected speed-limit zones in rural areas. Three casualties in zones where the speed limits are unknown have been excluded from the figure below.

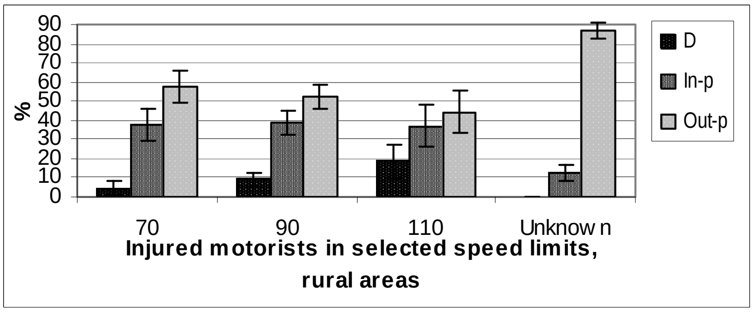


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured

Figure 7.5 Injury severity distributed over motorists injured on links at selected speed limits in rural areas; police data (N=526)

The proportions of fatalities increase from 4 % to 15%, when speed limits increase from 70 km/h to 110 km/h. Similarly, the proportions of slightly injured motorists decrease with increasing speed limits. The speed limit chosen has a statistically significant impact (see Table E7.19 in Appendix E) on injury severity of injured motorists on links in rural areas.

In the hospital data set, the care received 499 injured motorists in connection with their initial injuries is presented in Figure 7.6. Hospital-registered casualties in zones with unknown speed limits are in-patients to a lower extent than those injured in areas of known speed limits. The high proportion of out-patients, i.e. about 85 %, can probably be explained by the on average lower ISS among victims injured in zones with unknown speed limits (see Table E7.12 in Appendix E).



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 7.6 *Received care distributed over motorists injured on links at selected speed limits in rural area; data (N=499) from five hospitals, 1991/92*

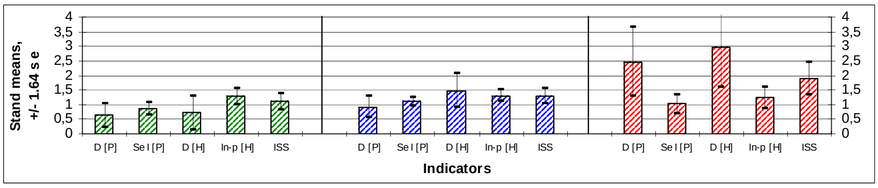
The proportions of fatalities increase with increasing speed limits. At a speed limit of 110 km/h, the proportions are about four times those at 70 km/h, or 19 to 4 %. The proportions of in-patients are high and very similar, or around 38 %, irrespective of speed limits. These results indicate the possibility of a higher proportion of out-patients among motorists injured on links in rural areas when the speed limit is lowered.

7.3.2 Average injury consequences

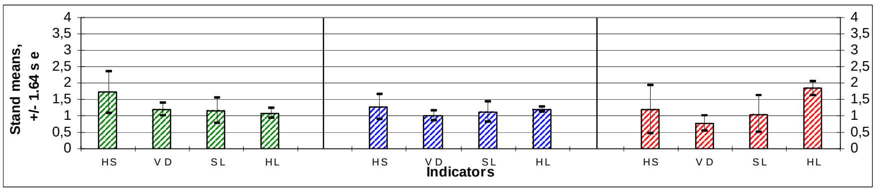
The influence exerted by the speed limits on links in rural areas on the average injury severity suffered by motorists is described in the context of selected indicators in four time perspectives in Figure 7.7. More information about the consequences related to intervening time periods and to other speed limits is to be found in Tables E7.13 – E7.18 in Appendix E. In Table E7.19 the results from the t-tests performed on the selected speed limits are illustrated. The comparisons are presented in Figure 7.7 in terms of standardized averages of the respective indicators.

Denominations: Injured motorists in 70 km/h = green, in 90 km/h = blue, in 110 km/h = red

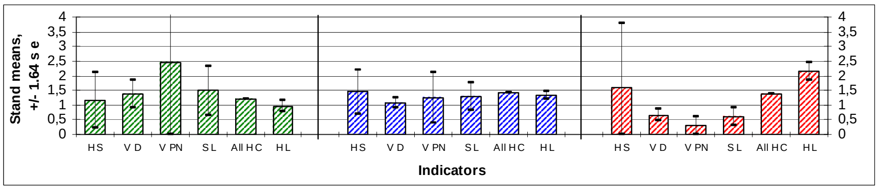
I. Immediately after the accident (five standardized indicators)



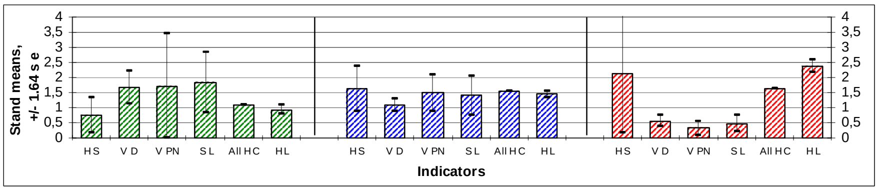
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

Figure 7.7 *Average injury consequences in different time perspectives measured by selected indicators among motorists injured on links at three selected speed limits in rural areas; data from five hospitals, 1991/92*

Immediately after the accident, motorists on links in rural areas in

110 km/h zones are more affected by traffic injuries than motorists injured in the other speed-limit zones.

Within one month, motorists on links in rural areas are, on average, more affected by their initial traffic injuries in the highest speed-limit zones only when the consequences are measured in health loss.

In a prolonged follow-up time up to six months after the accident, motorists on links in rural areas display, on average, an increased health loss with increasing speed limits, while the consequences measured in terms of visits to a doctor or a physiotherapist/nurse and sick leave, on average, decrease for the injured motorists as the speed limits increase.

Within more than three years after the accident, the periods of hospital stay and health loss among the motorists injured in rural areas increase with increasing speed limits. The indicators “visits to a doctor or a physiotherapist/nurse” or “length of sick leave” show the reverse results. One conclusion can be that, in spite of some motorists being very seriously injured at 110 km/h, the prognoses on recovery are better for most of them, if they survived the first month after the accident. The results also indicate the need to provide a larger data set for future research into the impacts of speed on traffic-injury consequences.

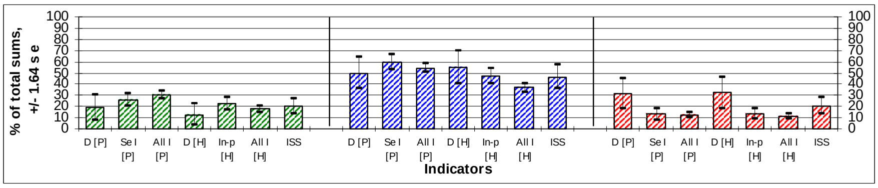
7.3.2 Total injury consequences

The motorists injured in selected speed-limit zones on links in rural areas have also been studied with regard to the total consequences due to traffic injuries in four time perspectives. More information about consequences related to intervening time periods and to other speed limits is to be found in Tables E7.13- E7.18 in Appendix E. In Table E7.20 the results from the t-tests performed on the selected speed limits are illustrated.

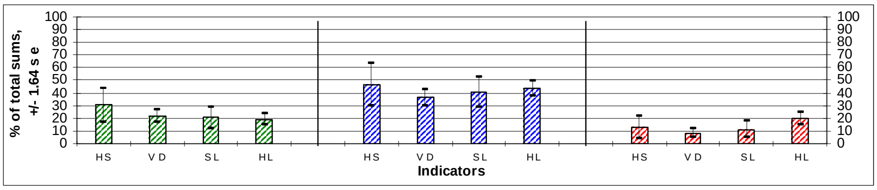
The comparisons are presented as proportions of the total number or sum of the indicators in Figure 7.8. The group of traffic victims injured in speed- limit zones of 50 km/h is treated as missing data.

Denominations: Injured motorists in 70 km/h = green, in 90 km/h = blue, in 110 km/h = red

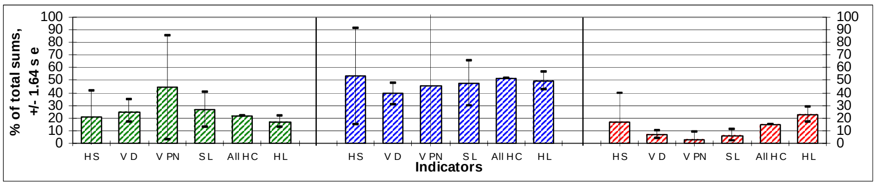
I. Immediately after the accident (seven standardized indicators)



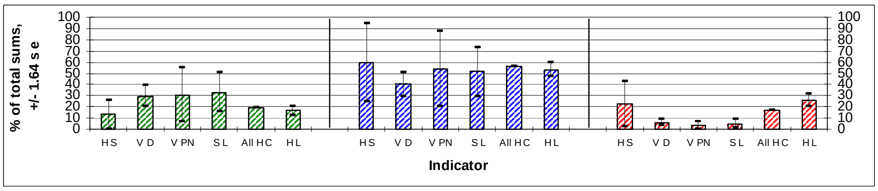
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

Figure 7.8 Proportions of the total consequence in different time perspectives, measured by selected indicators among motorists injured on links in three selected speed limits in rural areas; data from five hospitals, 1991/92

Immediately after the accident, all indicators point out the consequences as being most serious among motorists injured on links in rural areas in the speed-limit zones of 90 km/h.

Within one month, the five selected indicators still indicate that the main traffic safety problem for motorists on links in rural areas is in the speed limit zone of 90 km/h.

Within six months after the accident, the motorists injured in the 90 km/h speed-limit zone dominate the picture of traffic safety problems as measured by nearly all indicators. However, the motorists injured in 70 km/h speed-limit zones pay almost as many visits to a physiotherapist/nurse.

Within more than three years, the indicators selected create a rather homogeneous picture of the traffic safety problems for motorists on links in rural areas as primarily located to the 90 km/h speed-limit zones. The problems seem to be most serious for motorists when measured by the indicators “hospital stay”, “visits to a physiotherapist/nurse” and “health loss”.

The traffic safety problems of motorists on links are focused on the speed-limit zones of 90 km/h, irrespective of the time perspective applied. However, as a relatively large group of casualties injured in unknown speed-limit zones with an average lower injury-severity score are excluded from this analysis, further research is recommended.

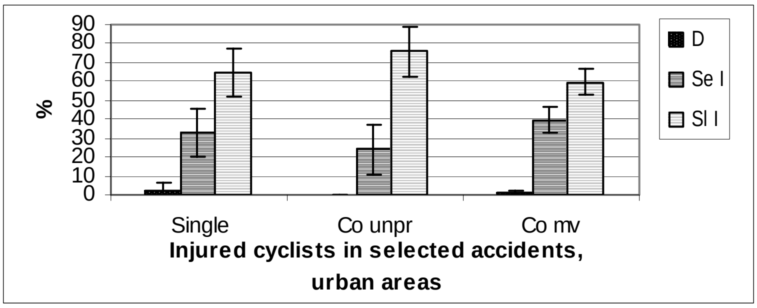
7.4 Cyclists in single accidents and collisions in urban areas

7.4.1 Number and severity of injuries

According to official statistics of Sweden (SCB, 1992), cyclists only represent about 10 % of all traffic casualties reported by the police, while their share of all people injured in urban areas is about twice as high. In the police data set used in this study, the cyclists injured account for about 15 %, and in the hospital data set nearly 40 % (Figure 6.16). The cyclists represent just above half of the 1,773 hospital-registered casualties in urban areas. Most of the injured cyclists receive their injuries in single accidents, i.e. no collisions. With regard to cyclists injured in collisions, the share of collisions with motor vehicles is about the same as the share of collisions with other unprotected road users, i.e. pedestrians, other cyclists and mopedists. As for the selected variables "road environment", "type of accident" and "counter-part" the hospital data set has a good coverage, or about 95 % or more.

The number of cyclists injured in urban areas increases from 214 in the police data to 909 in the hospital data, mainly due to a heavy increase of victims registered in single accidents. In the police data set, most cyclists in urban areas, about 70 %, are injured in collisions with motor vehicles, while the opposite is true in the hospital data set, where about 65 % are injured in single accidents. There is a striking shift of the focus of the safety problem. It is important to notice that the hospital-registered cyclists injured in collisions with pedestrians, cyclists or mopedists are more than four times those reported by the police, although they represent about the same proportion.

The distribution of injury severity among 212 cyclists in urban areas injured in selected types of accidents according to official definition is illustrated in Figure 7.9.

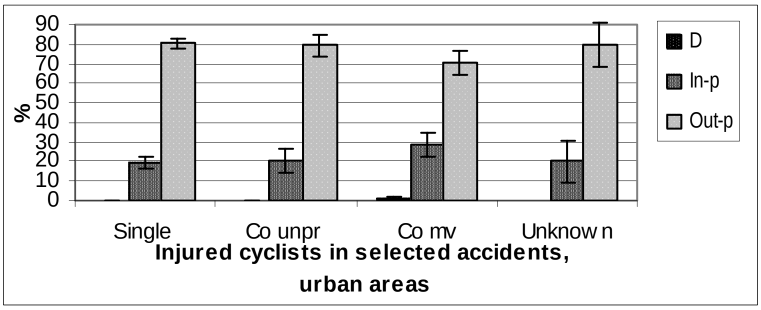


Abbreviations: D=dead, Se I=severely injured, Sl I=slightly injured, Co unpr=Collisions with an unprotected road user, Co mv =Collisions with a motor vehicle

Figure 7.9 *Injury severity distributed over cyclists injured at selected types of accidents in urban area; police data (N=212) from five hospital admittance areas, 1991/92*

There were two reported fatalities among cyclists in urban areas – one in a single accident and one in a collision with a motor vehicle. The proportions of severely injured cyclists increase from about 25 % among those injured in collisions with unprotected road users to 40 % among those injured in collisions with motor vehicles. The counterpart in a collision has a statistically significant impact on the injury severity suffered by the cyclists injured in urban areas.

The cyclists injured in unknown types of accidents show similar proportions of received care as those injured in single accidents or in collisions with unprotected road users, which may indicate an overrepresentation of these in the unknown types of accidents. Further information about people injured in accidents of the unknown type or in collisions with other vehicles may only be found in Appendix E.



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care
Co unpr=Collisions with an unprotected road user, Co mv =Collisions with a motor vehicle

Figure 7.10 Received care distributed over cyclists injured in selected types of accidents in urban areas; data (N=909) from five hospitals, 1991/92

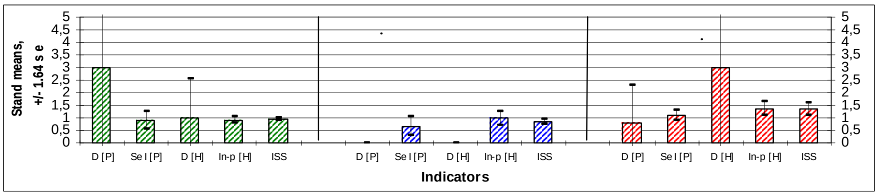
The proportion of in-patients among cyclists injured in collisions with motor vehicles is close to 30 % and 20 % among cyclists injured in other types of accidents. The somewhat higher proportion among the former category can probably be explained by there on average higher ISS (see Table E7.23 in Appendix E).

7.4.2 Average injury consequences

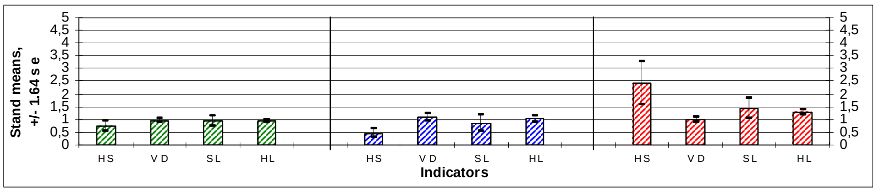
The influence on the average injury severity of the cyclists according to the type of accidents in urban areas is described in the context of selected indicators in four time perspectives. More information about consequences related to intervening time periods and to other types of accidents is to be found in Tables E7.23 - E7.28 in appendix E. In Table E7.29 the results from the t-tests performed on the selected types of accidents are illustrated. The comparisons are presented in standardized averages of the respective indicators in Figure 7.11.

Denominations: Injured in single accidents = green, in collisions with unprotected road users = blue, in collisions with motor vehicles = red

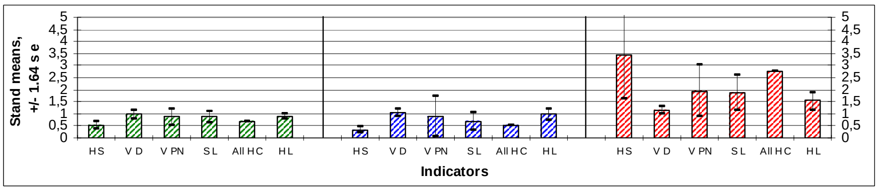
I. Immediately after the accident (five standardized indicators)



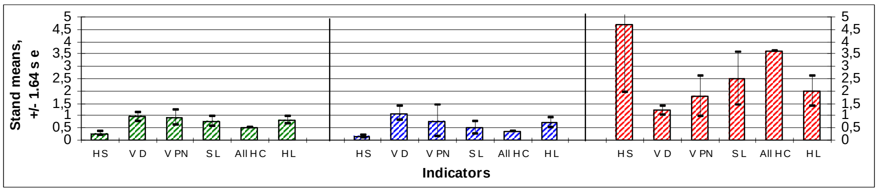
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L =Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

Figure 7.11 Average injury consequences among injured cyclists in three types of accidents in urban areas in different time perspectives, measured by selected indicators; data from five hospitals, 1991/92

Both immediately after the accident and within one month after the accident, the cyclists involved in collisions with motor vehicles in urban areas suffer, on average, the most severe consequences, according to nearly all of the nine indicators selected.

Within six months after the accident, the cyclists injured in accidents with motor vehicles in urban areas experience more severe consequences of their injuries than those injured in the other two types of accidents, as measured by the selected indicators.

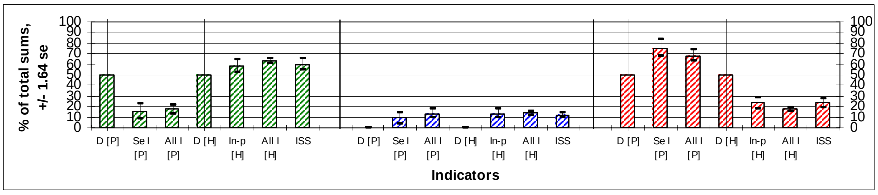
In the long-term perspective of more than three years after the accident, all indicators show an increased injury severity for cyclists in collisions with motor vehicles in urban areas. The differences between this group of injured and those injured in other types of accidents are most pronounced for “hospital stay” and “sick leave”, and “health loss”. One additional conclusion is that the consequences for cyclists involved in single accidents are on a par with those for cyclists involved in collisions with unprotected road users. This is the case in spite of the fact that single accidents occur more often in mixed traffic areas, whereas collisions with other unprotected road users occur mainly in separated areas.

7.4.3 Total injury consequences

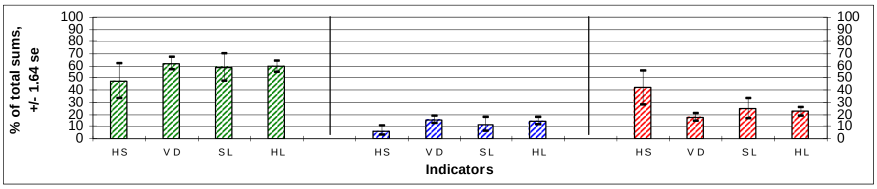
The differences among cyclists injured in the three selected types of accidents in urban areas are also studied with regard to the total consequences due to traffic injuries in four time perspectives and are presented in Figure 7.12. More information about consequences related to intervening time periods and to other types of accidents is to be found in Tables E7.23 - E7.28 in appendix E. The comparisons are presented as proportions of the total number or sum of the indicators. The group of cyclists injured in collisions with “others” is treated as missing data.

Denominations: Injured in single accidents = green, in collisions with unprotected road users = blue, in collisions with motor vehicles = red

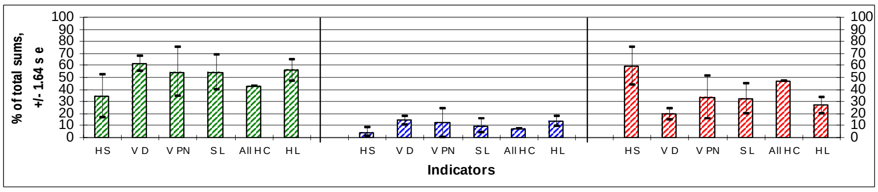
I. Immediately after the accident (seven standardized indicators)



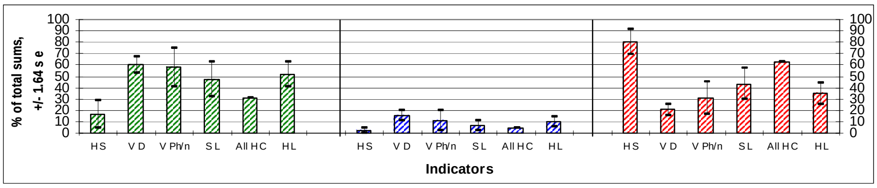
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

Figure 7.12 Proportions of the total consequences among cyclists injured in three types of accidents in urban areas in different time perspectives, measured by selected indicators; data from five hospitals, 1991/92

Immediately after the accident, injuries in collisions with motor vehicles are defined as the primary traffic safety problem for cyclists in urban areas according to the police data source. However, the indicators "total number of in-patients", "total number of hospital-registered casualties" and the ISS, all emphasize the injuries in single accidents instead.

Within the one-month perspective, all indicators emphasize that the main traffic safety problem of cyclists in urban areas is single accidents.

Within six months after the accident, the cyclists injured in single accidents dominate the picture of traffic safety problems for cyclists in urban areas as measured in terms of the indicators “visits to a doctor”, “visits to a physiotherapist/nurse”, “sick leave”, and “health loss”. However, measured in total length of hospital stay and total costs of health care, the cyclists injured in collisions with motor vehicle have greater problems.

In the long-term perspective of more than three years after the accident, the traffic safety problems for cyclists in urban areas are concentrated on injuries in single accidents, as measured by the indicators “visits to a doctor”, “visits to a physiotherapist/nurse”, “sick leave”, and “health loss”. However, in this long-term perspective the victims injured in collisions with motor vehicles have extended their hospital stay, and hereby also cause a large increase in the total costs of the total health care.

Irrespective of the time perspective applied, single accidents are the main problem for cyclists injured in urban areas according to most indicators. However, the few cases where cyclists collide with motor vehicles result in very severe injuries and cause substantial long-term effects for society.

7.5 Pedestrians in single accidents in different road-surface conditions in urban areas

7.5.1 Number and severity of injuries

According to the official statistics of Sweden (SCB, 1992) pedestrians account for about 7 % of all casualties reported in traffic. Their share of the injured victims is somewhat higher in urban areas, or about 11 %. However, these victims involved in road traffic accidents do not include pedestrians injured in single accidents, which what this chapter deals with, i.e. a public health approach was adopted.

Of the 1,773 traffic victims registered in urban areas in this hospital data set, pedestrians represent just above 15 %. Those injured in single accidents are in a majority among pedestrians injured in urban areas, representing more than 70 %. Regarding the selected variables "road environment", "type of road user" and "type of accident" the hospital data set has good coverage, i.e. about 98 % or more, while the knowledge available about the road-surface conditions at the accident site of pedestrians injured in single accidents is more limited, or just 65 %.

Figure 7.13 shows the 201 hospital-registered pedestrians involved in single accidents in urban areas. Note that only hospital data are presented, as this category of injured victims is only accessible in this data set.

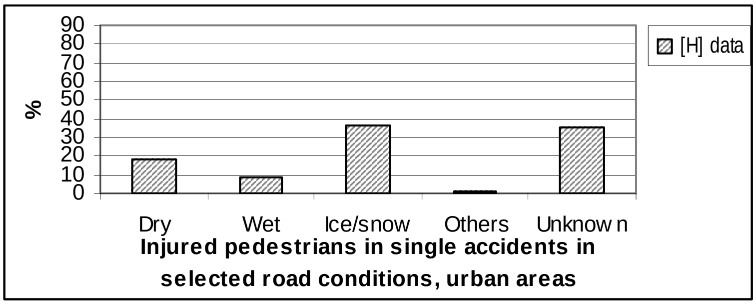
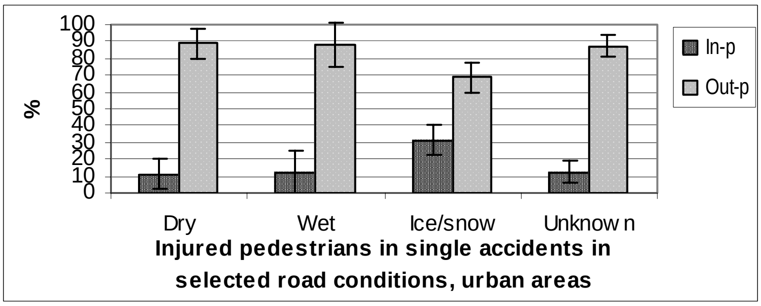


Figure 7.13 Pedestrians injured in single accidents in urban areas, distributed over road-surface conditions; data (N=201) from five hospitals, 1991/92

More than half of the pedestrians injured under known road conditions have fallen on slippery surfaces. Taking the total time of ice or snow on all road surfaces during one year into account, this share is extensive. About half of these casualties are registered at Umeå hospital, where the winter season is longer than in the middle or the south of Sweden. About 65 % of the injuries in unknown road-surface conditions occur during the period of

November to March, which may indicate a high share of injuries on slippery surfaces for this category as well.



Abbreviations: D=dead, In-p=in-patient care, Out-p=out-patient care

Figure 7.14 *Received care distributed over pedestrians injured in single accidents under different road-surface conditions in urban areas; data (N=201) from five hospitals, 1991/92*

There are no fatalities among the pedestrians injured in single accidents and registered in urban areas. The proportion of in-patients among pedestrians injured on slippery surfaces is just above 30 % compared to about 10 % among those injured in other types of road-surface conditions. This difference in hospital treatment is statistically significant. Note that since the proportion of out-patients among people injured in unknown road conditions is high, this probably causes a slight bias.

Further information about the victims injured in other or unknown road-surface conditions may be found in Tables E7.33-E7.38 in appendix E.

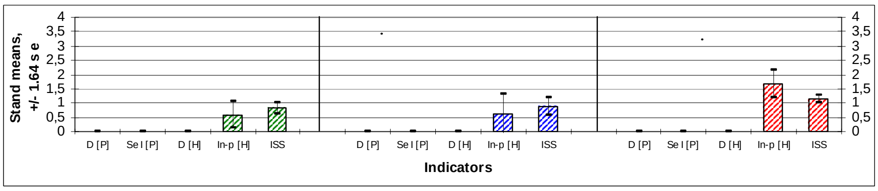
7.5.2 Average injury consequences

The influence on the average injury severity exerted by pedestrians involved in single accidents in urban areas under different road-surface conditions is described in the context of selected indicators in four time perspectives. More information about consequences related to intervening time periods and to other road-surface conditions is to be found in Tables E7.33 - E7.38 in Appendix E. In Table E7.39 the results from the t-tests performed on the selected road-surface conditions are illustrated.

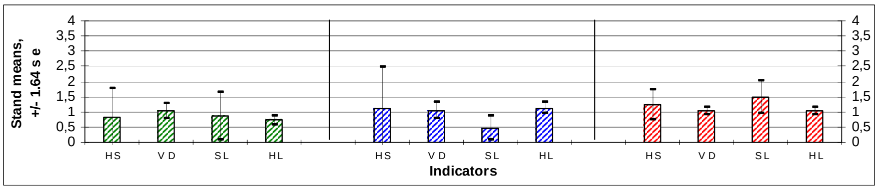
The comparisons are presented in standardized averages of the respective indicators in Figure 7.15.

Denominations: Injured in dry road conditions = green, in wet road conditions = blue, in icy and snowy road conditions = red

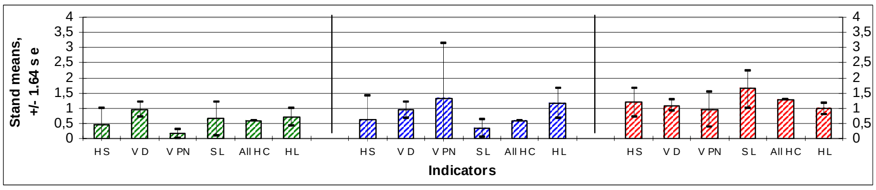
I. Immediately after the accident (five standardized indicators)



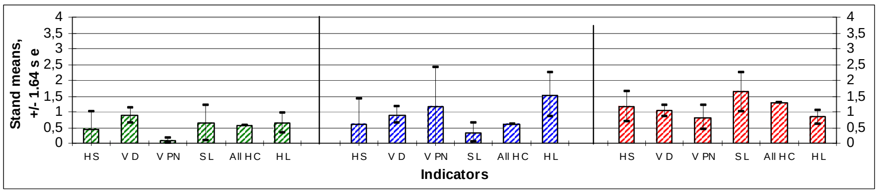
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L =Health loss, All HC=all health care costs calculated here.
Definition: A standardized indicator implies that the calculated average means of one indicator for each subgroup of the traffic-engineering factor presented here were divided by the average mean of that indicator

Figure 7.15 Average injury consequences in different time perspectives among pedestrians injured in single accidents in three types of road-surface conditions in urban areas, measured by selected indicator; data from five hospitals, 1991/92

Immediately after the accident, the pedestrians injured in single accidents on slippery road surfaces in urban areas are, on average, more affected by the consequences of their injuries than those injured on the other road surfaces.

Within one month, the pedestrians injured in single accidents in icy and snowy conditions in urban areas experience, on average, the most severe injury consequences as measured by the indicators “length of hospital stay” and “sick leave”.

Within six months after the accident, pedestrians injured in single accidents in icy and snowy road conditions in urban areas experience more severe consequences of their injuries than those injured in dry road conditions as measured in terms of “hospital stay”, “visits to a doctor”, “sick leave” and “all health care costs”.

When the period following up the consequence is prolonged to beyond six months for pedestrians, this not seem to yield much additional information, which indicates a relatively low severity of the long-term injury consequences for pedestrians in single accidents.

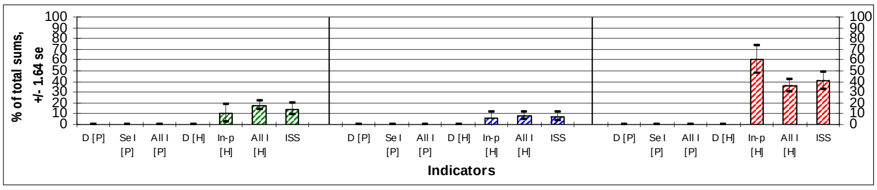
7.5.3 Total injury consequences

The differences among pedestrians injured in single accidents in selected road-surface conditions in urban areas are studied with regard to the total consequences due to traffic injuries in four time perspectives. More information about consequences related to intervening time periods and to other road-surface conditions is to be found in Tables E7.33-E7.38 in Appendix E.

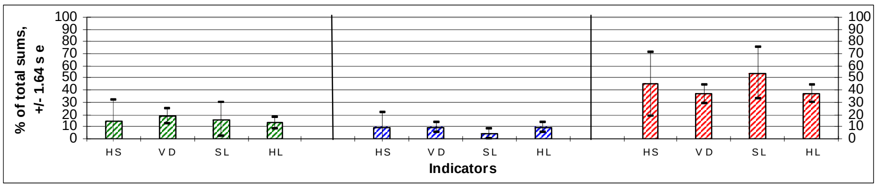
The comparisons are presented as proportions of the total number or sum of the indicators in Figure 7.16. The group of traffic victims injured in other road-surface conditions is treated as missing data.

Denominations: Injured in dry road conditions = green, in wet road conditions = blue, in icy and snowy road conditions = red

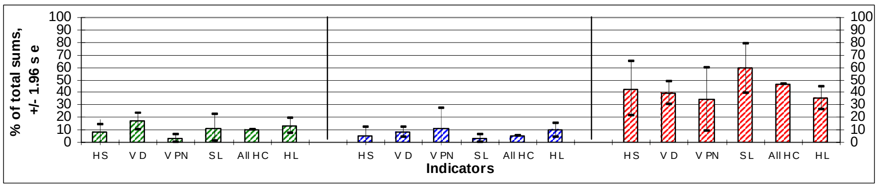
I. Immediately after the accident (seven standardized indicators)



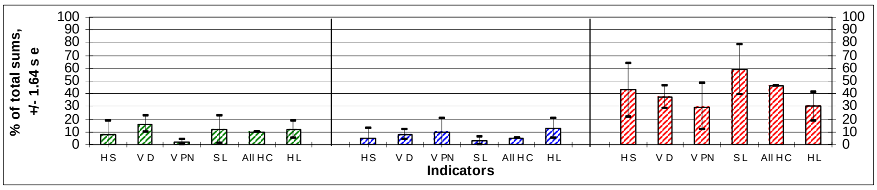
II. One month after the accident (four standardized indicators)



III. Six months after the accident (six standardized indicators)



IV. Three years and five months after the accident (six standardized indicators)



Abbreviations: D [P]=dead, police data; Se I [P]=severely injured, police data; All I [P]=all injured, police data; D [H]=dead, hospital data; In-p [H]=in-patient care, hospital data; All I [H]=all injured, hospital data; ISS=Injury Severity Score, H S= hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist/nurse, SL= sick leave, H L=Health loss, All HC=all health care costs calculated here.

Figure 7.16 Proportions of the total consequences among pedestrians injured in single accidents in three types of road-surface conditions in urban areas, measured by selected indicators in different time perspectives; data from five hospitals, 1991/92

Immediately after the accident, all indicators point out the consequences for pedestrians injured in single accidents serious in icy and snowy road conditions in urban areas as the most serious ones. However, the effects from the indicators are somewhat different.

Within one month, all indicators emphasize icy and snowy road conditions as the main public-health problem for pedestrians injured in single accidents in urban areas.

Even in the long-term perspective from six months to more than three years, the indicators selected all highlight icy and snowy road conditions as the main problem for pedestrians injured in single accidents.

8 Choosing indicators to predict long-term consequences of traffic injuries

Hitherto the indicators selected have been used to describe the injury severity of the traffic victims and to illustrate how different road and traffic factors influence the picture of traffic safety problems. In this chapter, however, the indicators are used to obtain a basis for a discussion about how a suffered injury severity and an actual traffic safety problem best can be predicted by, preferably, one indicator arrived at in a short-term perspective. The target indicators are derived from the follow-up study performed more than three years after the accident, here defined as “long-term effects”.

In this chapter the following hypotheses will be investigated:

√ The consequences of traffic injuries change depending on when the follow-up is performed.

√ Certain immediate as well as short-term indicators can be used as predictors of more long-term consequences.

8.1 Technique

8.1.1 Applications

The recommended indicator should preferably be useful for forecasting the most severely injured subgroup as well as pinpointing the main targets for traffic safety measures. The technique is applied on the two categories:

- Injury severity; expressed in standardized mean to make it possible to compare similarities or differences
- Extent of the traffic injury problem; expressed in % of totals

8.1.2 Target indicators

The target indicators are needed to optimally describe the total consequences for society and for individuals. The longest time perspective of three years and five months after the accident, i.e. the total follow-up period of all injured registered at five hospitals has been applied in order to give an understanding of the long-term consequences. At the same time the workload has to be minimized, which motivates using a few target indicators only.

The target indicators selected are defined as follow:

For society

- Combined costs of hospital stay, visits to a doctor and/or a physiotherapist/nurse and sick leave after three years and five months.

For individuals

- Health loss, i.e. lost days of full health according to the Rosser Index after three years and five months.

The target indicator for society (All H C) is based on all information about costs for medical care and sick leave available. The prices used to calculate these costs are presented in Table 3.2 in Section 3.1.9.

The suffering of individuals is expressed in terms of the combined loss of health, according to the Rosser Index (H L), based on the variables of “functional disability”, “pain” and “distress”. More details about this health index are found in Section 3.1.7.

8.1.3 Procedure

The choice of the most appropriate indicators is based on their ability with regard to size and direction to correspond to the two target indicators selected.

The following procedure is used to obtain a basis for the choice of ‘best’ or ‘most appropriate’ indicator/s:

1. Select targets for the comparison, i.e. the category with the largest values of each of the two target indicators for injury severity and % of total sum respectively.

2. Calculate five intervals for the qualitative scale. The scale intervals are selected to cover 0.25 units (degree of severity) or 10 units (% of total sum), which roughly corresponds to about 20 % of the comparable value.

3. Assess each indicator according to the following ordinal scale:

0	conformity, i.e. compared value within the centre interval
+, ++	a positive (→) skewness, i.e. compared value is higher
-, --	a negative (←) skewness, i.e. compared value is lower.

4. Consider numbers obtained for ‘0’, ‘+’and ‘–‘ or ‘++’ and ‘--‘. A ‘0’ indicates a defined correspondence, while ‘+’ and ‘-‘indicate smaller deviations from the selected target indicator. The ‘++’ and ‘--‘are larger deviations, and are valued as such in the rough estimate of best indicator/s.

5. Recommend the “best” indicator according to each target indicator. The six basic analyses in Chapter 6 primarily contribute to the recommendation. The four special analyses in Chapter 7 are only used to support the given choice made.

An example of the problems for the traffic injured in rural and urban areas is presented here to clarify the procedure used. Initially, the group of traffic victims lacking information about the road environment of the accident sites is excluded from the sum of all indicators in different time perspectives. This results in new calculated percentages of all sums which are presented in Table F8.11 in Appendix F. Only one of the target indicators, “cost for all medical care and sick leave” (All H C), is examined in the example below.

1. Selection of the target for the comparison.
   The target indicator All H C is larger in urban areas than in rural areas, 55 %. The group “injured in urban areas” is therefore selected as the target for the analysis.

2. Calculation of the five intervals of the scale.
   The value 55 % is the ‘centre value’ on the scale. Each of the five intervals on the scale is given a width of 10 units. The middle interval, 51-60 %, is distributed around the 55 %-value. The four other intervals are -40, 41-50, 61-70, and 71- respectively. These intervals are found below the Table F8.11 in Appendix F.

3. Assessment according to the scale selected.
   All indicators irrespectively of time perspectives are assessed according to this scale. The results are presented as symbols related to direction, --, -, 0, +, ++, in Table F8.11 in Appendix F. The sum of injury severity (ISS) among the injured in urban areas amounts to 52 % of the total injury severity. This indicator shows a good conformity compared to the target (55 %) e.g. a ‘0’. Other immediate indicators i.e. the shares of police reported severely injured (Se I [P]) and all hospital registered injured (All I [H]) in urban areas are either lower (45 %←’-‘) or higher (63 %→’+’) than the target. Also Hospital stay (H S) is found to be a good

indicator, constantly ‘0’ irrespectively of time perspectives after the accident.

4. Analyses of the results
   Fourteen of indicators show a good conformity ‘0’ to predict the relative long-term consequences in urban areas. Five indicators underestimated somewhat, ‘-‘, and two rather much, ‘--‘, the size of the long-term consequences measured as costs, while nine indicators overestimated it. These results are presented in Table 8.9.

The points 1-4 above, all relate to the analysis of the distribution over road environment originally presented in Section 6.1.The final recommendations of the best predictor for the target indicator All H C is based on the capacity of the indicator to forecast this target in the six basic analyses (primary); see Sections 6.1-6.6, and the four special analyses (secondary); see Sections 7.2-7.5. The immediate indicators and those accessible within the first month are the most interesting to use as predictors.

The final outcome of these analyses may of course depend on the exact definition of the five intervals (point 2 of the procedure). In Appendix G presents a sensitivity analysis in this respect. The overall conclusion of this analysis is that the recommendations in Section 8.3 are largely independent of choice of limits for the five intervals.

8.2 Results

8.2.1 Comparable values (injury severity)

The targets used for the comparisons, i.e. the main standardized means of injury severity for the road and traffic factors in the six basic analyses, are presented in Table 8.1. The standardized means for the target indicators and other selected indicators are shown in Tables F8.1 – F8.6 in Appendix F. The original means for all indicators at different time perspectives can be found in Appendix E.

Table 8.1 Targets, i.e. the standardized means from the six basic analyses, for selecting an indicator to forecast average injury severity consequences

Target indicators	Road and traffic engineering factors					
	Road environment	**Road user**	**Type of accident**	**Road design**	**Road conditions**	**Light conditions**
All H C, y35	R=1.24	M=1.36	Co=1.43	J=1.33	W=1.77	Dl=1.09
H L, y35	R=1.65	M=1.71	Co=1.46	J=1.32	W=1.36	Dn=1.17

Abbreviations: All H C=cost for all medical care and sick leave, H L=health loss, y35=within an average time perspective of 3 years and 5 months, R=rural areas, M=motorists, Co=collisions, J=junctions, W=wet road surfaces, Dl=daylight, Dn=darkness

The targets used for the supporting comparisons, i.e. the main standardized means of injury severity for the road and traffic factors in the four special analyses, are presented in Table 8.2. The standardized means for the target indicators and other selected indicators are shown in Tables F8.7 – F8.10 in Appendix F. The original means for all indicators at different time perspectives can be found in Appendix E.

Table 8.2 Targets, i.e. the standardized means from the four special analyses, for selecting an indicator for forecasting average injury severity consequences

Target indicators	Measures for traffic safety improvements			
	Unpr-Pr, urban areas	**M, speed limit zones, links in rural areas**	**C, accidents, urban areas**	**P, single accidents, urban areas**
All H C, y35	Pr=1.33	110 km/h=1.61	Co Pr=3.64	I=1.27
H L, y35	Pr=1.82	110 km/h=2.39	Co Pr=2.01	W=1.53

Abbreviations: All H C=cost for all medical care and sick leave, H L=health loss, Unpr=unprotected road-users, Pr=protected road-users, M=motorists, C=cyclists, P=pedestrians, Co Pr=collisions with protected road-users, I=icy/snowy roads, W=wet roads, y35=within an average time perspective of 3 years and 5 months

8.2.2 Review of indicators for assessing injury severity based on six basic analyses

Table 8.3 The ability to measure average health care costs for traffic casualties by using standardized means from six basic analyses for selected indicators. Target indicator = All H C, y35 (All health costs within three years and five months after the accident)

Road- and traffic factors	Indicators, immediately					Indicators, in different time perspectives																						
	Police		Hospital			Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	D	In-p	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
Road environment	+	-	++	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	+	+	+
Road users	-	--	++	-	-	-	-	-	0	0	--	--	-	-	-	-	0	+	+	-	-	0	0	+	0	0	+	+
Traffic accident	-	--	+	--	-	-	0	0	0	0	--	--	--	-	-	-	-	-	-	--	-	-	-	0	-	-	0	0
Road design	--	--	0	-	-	0	0	0	0	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Road conditions	--	--	-	--	--	--	-	0	+	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Light conditions	-	-	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0

Abbreviations: All H C=cost for all medical care and sick leave, D=dead, Se I=severely injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: The 'ISS' and 'In-p' are the best early indicators to forecast the average cost of health care in a longer time perspective. However, the reliability is not too good, as correspondence only occurs for two out of six factors. For four factors, both indicators constantly underestimate the average cost. For some factors these underestimations are considerable.

Within one month after the accident: 'H S, m1'and 'H L, m1' display a rather good correspondence with health care costs in a long-term perspective. They are even somewhat more accurate than ISS. 'H S, m1' is easy to obtain.

Within six months after the accident: 'H S, m6' and 'H L, m6' are better or equivalent predictors than those presented within a month. However, the former is preferable because it has better accuracy and is obtainable more easily. H S, y1' is the best indicator when it comes to forecasting later combined average health care costs, which is logical. It cannot be recommended, however, as the intention was to select an early indicator.

"Light conditions" seems to be the factor where a majority of indicators manage to forecast the long-term average costs with good accuracy, while, on the other hand, the long-term costs for the factor "road surface conditions" are hardest to forecast.

Table 8.4 The ability to measure average health loss for traffic casualties by using standardized means from six basic analyses for selected indicators. Target indicator = H L, y35 (Health loss according to the Rosser Index within three years and five months after the accident)

Traffic-engineering factors	Indicators, immediately					Indicators, in different time perspectives																						
	Police		Hospital			Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	D	In-p	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
Road environ-ment	0	--	++	--	-	--	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-	-	0
Road users	--	--	++	--	--	--	--	--	--	--	--	--	--	--	--	--	-	-	0	--	--	-	-	0	--	-	0	0
Type of accident	--	--	+	--	-	-	0	0	0	0	--	--	--	--	-	--	-	-	-	--	-	-	-	0	-	-	0	0
Road design	--	--	0	-	-	0	0	0	0	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Road conditions	--	--	+	-	-	0	+	++	++	++	-	-	-	0	0	-	0	0	+	--	-	-	-	-	-	0	0	0
Light conditions	0	0	+	0	0	0	0	0	-	-	-	0	0	0	0	-	-	-	0	0	-	-	-	-	0	0	0	0

Abbreviations: H L=health loss as defined by the Rosser Index, D=dead, Se I=severely injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: 'ISS' is still the best indicator immediately accessible in order to forecast average health loss in a longer time perspective. However, the reliability is low, as the indicator almost constantly underestimates the health loss.

Within one month after the accident: ‘H S, m1’ displays a rather good correspondence to long-term health loss. One objection could be its tendency to underestimate the health loss.

Within six months after the accident: ‘H S, m6’ indicates later average health loss well. One objection might be that ‘H S, m1’is obtainable earlier.

“Light conditions” still seems to be the factor where a majority of indicators manage to forecast the long-term average health loss with good accuracy, while the health loss for the factor “road environment” seems hardest to forecast in a longer perspective.

8.2.3 Review of indicators for assessing injury severity based on four special analyses

Table 8.5 *The ability to measure average health care costs for traffic casualties by using standardized means from four special analyses for selected indicators. Target indicator = All H C y35 (All health costs within three and five months after the accident)*

Traffic-engineering factors	Indicators, immediately					Indicators, in different time perspectives																						
	Police		Hospital			Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	D	In-p	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
P+C+Mp-M, urban	-	--	++	--	--	--	--	--	--	--	-	-	-	-	0	+	+	++	++	0	+	+	++	++	0	0	+	++
M, speed, rural	++	--	++	-	+	--	0	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	+	++	++	++
C, acc, urban	--	--	--	--	--	--	-	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
P, r c, s, urban			--	++	-	0	0	0	0	0	-	-	-	-	-	-	--	--	--	+	+	+	+	+	-	-	-	--

Abbreviations: All H C=cost for all medical care and sick leave, D=dead, Se I=severely injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: None of the immediate indicators are really good at forecasting the average health care costs on a more detailed level.

Within one month after the accident: ‘H S, m1’ and ‘H L, m1’ are the two indicators best at forecasting the long-term average health care costs, among the early accessible indicators. In spite of some rather large underestimations, ‘H S, m1’ is to be preferred as it is easier to access.

Within six months after the accident: 'H S, m6' is the indicator that is best at forecasting the long-term average health care costs among the indicators accessible somewhat later.

'H S' shows a good ability to forecast average health care costs for pedestrians injured in single accidents in urban areas distributed over different road conditions. However, no indicators can be used for forecasting the long-term costs among cyclists in urban areas injured in different types of accidents.

Table 8.6 The ability to measure average health loss for traffic casualties by using standardized means from four special analyses for selected indicators. Target indicator = H L y35 (Health loss according to the Rosser Index within three years and five months after the accident)

Traffic-engineering factors	Indicators, immediately					Indicators, in different time perspectives																						
	Police		Hospital			Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	D	In-p	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
P+C+Mp-M, urban	--	--	++	--	--	--	--	--	--	--	--	--	--	--	--	-	-	0	++	--	-	-	+	++	--	--	-	0
M, speed, rural	0	--	++	--	--	--	--	+	0	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-	0	0
C, acc, urban	--	--	++	--	--	++	++	++	++	++	--	--	--	--	--	0	-	-	-	--	0	0	+	++	--	--	-	-
P, r c, s, urban			--	--	--	--	--	--	--	--	--	--	--	--	--	-	0	-	--	--	--	--	--	--	--	--	-	-

Abbreviations: H L=health loss as defined by the Rosser Index, D=dead, Se I=severely injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: Nearly all indicators immediately accessible strongly either underestimate or overestimate the average health loss in a longer perspective.

Within one month after the accident: No indicator has the ability to forecast any future health loss.

Within six months after the accident: 'V PN', m6', but also 'S L, m6', are rather good at forecasting the average health loss in a longer perspective, in spite of some underestimations.

The indicators selected here are, with a few exceptions, not good at forecasting long-term average health loss with good accuracy.

8.2.4 Comparable values (extent of the traffic safety problem)

The targets used for the comparisons of the total traffic safety problems according to six road and traffic factors are presented in Table 8.7. The percentages of sums for the target indicators and the other indicators are shown in Tables F8.11 – F8.16 in Appendix F, while the original sums for all indicators estimated at different time perspectives can be found in Appendix E.

Table 8.7 *Targets for selecting an indicator to forecast the distribution of the total consequences of traffic injuries from the six basic analyses*

Target indicators	Traffic engineering factors					
	Road environment	**Road users**	**Type of accident**	**Road design**	**Road conditions**	**Light conditions**
All H C, y35	U=55	M=56	Co=63	L=52	D=49	Dl=64
H L, y35	R=59	M=69	Co=64	L=54	D=60	Dl=63

Abbreviations: All H C=cost for all medical care and sick leave, H L=health loss, y35=within an average time perspective of 3 years and 5 months, U=urban areas, R=rural areas, M=motorists, Co=collisions, L=links, D=dry road surfaces, Dl=daylight

The targets used for the comparisons of the total traffic safety problems according to four special analyses are presented in Table 8.8. The percentages of sums for the target indicators and the other indicators are shown in tables F8.17 – F8.20 in Appendix F, while the original sums for all indicators estimated at different time perspectives can be found in Appendix E.

Table 8.8 *Targets for selecting an indicator to forecast the distribution of the total consequences of traffic injuries from the four special analyses*

Target indicators	Traffic safety measures			
	Unpr-Pr, urban areas	**M, speed limit zones, links in rural areas**	**C, accidents, urban areas**	**P, single accidents, urban areas**
All H C, y35	Unpr=70	90 km/h=60	Co Pr=64	I=76
H L, y35	Unpr=59	90 km/h=56	S Pr=54	I=55

Abbreviations: All H C=cost for all medical care and sick leave, H L=health loss, Unpr=unprotected road-users, Pr=protected road-users, Co Pr=collisions with protected road-users, I=icy/snowy roads, y35=within an average time perspective of 3 years and 5months

8.2.5 Review of indicators for assessing the extent of traffic safety problems based on six basic analyses

Table 8.9 The ability to measure total health care costs for traffic casualties by using standardized sums from six basic analyses for selected indicators. Target indicator = All H C y35 (All health costs within three years and five months after the accident)

Traffic-engineering factors	Indicators, immediately							Indicators, in different time perspectives																						
	Police			Hospital				Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/ nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	All I	D	In-p	All I	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
Road environ-ment	--	-	-	--	0	+	0	0	0	0	0	0	+	+	+	+	+	+	0	0	0	0	0	+	+	0	0	-	-	-
Road users	++	+	++	++	-	-	-	-	-	-	-	0	--	-	-	-	-	0	0	+	+	-	0	0	0	+	0	0	+	+
Type of accident	+	0	+	+	--	--	-	-	0	0	0	0	--	--	--	--	-	--	--	-	-	--	--	-	-	0	-	-	0	0
Road design	++	+	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0
Road conditions	++	+	+	++	+	+	+	+	0	0	0	-	+	+	+	+	+	+	+	0	0	0	+	+	+	0	+	+	+	+
Light conditions	0	0	0	0	-	0	0	-	-	0	0	+	0	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0

Abbreviations: All H C=cost for all medical care and sick leave, D=dead, Se I=severely injured, All I=all injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: ‘ISS’ and ‘In-p’ are the immediately accessible indicators that are best at forecasting the costs of health care for total traffic problems in a long time perspective. The reliability can be considered good for the ‘ISS’, and rather satisfactory for ‘In-p’. The latter can also be said about the hospital indicator ‘All I’.

Within one month after the accident: Most indicators are rather good at forecasting the health care costs at an early stage. ‘H L, m1’ is the very best one, but ‘H S, m1’ is preferable due to its easy obtainability.

Within six months after the accident: ‘H S, m6’ is a rather good indicator of long-term costs

“Road design” seems to be the factor where a majority of indicators manage to forecast the long-term total costs with good accuracy, while, on the other hand, the long-term costs for different “types of traffic accidents” are the hardest one to forecast.

Table 8.10 The ability to measure total health loss for traffic casualties by using standardized sums from six basic analyses for selected indicators. Target indicator = H L y35 (Health loss according to the Rosser index within three years and five months after the accident)

Traffic-engineering factors	Indicators, immediately							Indicators, in different time perspectives																						
	Police			Hospital				Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/ nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	All I	D	In-p	All I	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
Road environ-ment	++	0	0	++	--	--	-	-	-	-	-	-	--	--	--	--	--	--	--	-	--	--	--	--	--	--	-	-	-	0
Road users	+	0	+	+	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-	0	0	--	--	-	-	0	--	-	-	0
Type of accident	+	0	+	+	--	--	-	-	0	0	0	0	--	--	--	--	--	--	--	-	-	--	--	-	-	0	-	-	0	0
Road design	++	0	0	+	0	0	0	0	0	0	0	0	-	0	0	0	0	-	-	-	-	0	0	0	0	0	0	0	0	0
Road conditions	+	0	0	+	0	0	0	0	-	-	-	--	0	0	0	0	0	-	0	-	-	-	0	0	-	-	0	0	0	0
Light conditions	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-	-	-	-	-	0	-	-	0	0	0	0	0	0	0	0

Abbreviations: H L= health loss as defined by the Rosser Index, D=dead, Se I=severely injured, All I=all injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: The immediately accessible indicator 'Se I' is outstandingly at forecasting the total health loss in a long-term perspective. Although the police do not report all severely injured victims, and their assessment of a severe injury is not objective, the data actually collected corresponds well with the total health loss. The police-reported indicator 'All I' is also more suitable for the purpose of forecasting the total health loss than the 'ISS'. Nevertheless, the reliability of the 'ISS' is good.

Within one month after the accident: 'S L, m1', but also 'H S, m1' and 'V D, m1', all display a good capacity to forecast the total health loss.

Within six months after the accident: The indicator 'H L, m6' shows a good conformity, and so do 'S L, m6' and 'H S, m6'. However, neither 'H L, m6' nor 'S L, m6' are easy to obtain regularly.

"Road design" seems to be the factor where a majority of indicators manage to forecast the long-term average health loss with good accuracy, while, on the other hand, the health loss in a longer perspective seems hardest to forecast for the factor "road environment".

8.2.6 Review of indicators for assessing the extent of traffic safety problems based on four special analyses

Table 8.11 The ability to measure total health care costs for traffic casualties by using standardized sums from four special analyses for selected indicators. Target indicator = All H C y35 (All health costs within three years and five months after the accident)

Traffic-engineering factors	Indicators, immediately							Indicators, in different time perspectives																							
	Police			Hospital				Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/ nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	All I	D	In-p	All I	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
P+C+Mp-M, urban	--	0	--	--	+	+	+	+	+	+	+	+	+	0	0	0	0	0	-	-	--	0	0	-	--	--	0	0	-	-
M, speed, rural	-	0	0	-	0	0	-	-	0	-	0	0	-	-	-	-	-	-	-	0	0	0	0	-	-	0	-	-	0	0
C, acc, urban	-	+	0	-	--	--	--	--	0	+	+	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
P, r c, s, urban				--	0	--	-	-	0	0	0	0	--	-	--	--	--	-	-	0	0	0	0	0	0	0	-	--	--	--

Abbreviations: All H C=cost for all medical care and sick leave, D=dead, Se I=severely injured, All I=all injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident Among the immediate indicators, the hospital-related 'In-p' is best at forecasting the health care costs in a longer perspective, while 'ISS' and 'All I' can be considered as satisfactory.

Within one month after the accident: 'S L, m1' is a very good indicator for forecasting the total health care costs in a longer perspective. 'H L, m1' can also be considered satisfactory.

Within six months after the accident: 'H S, m6' is the best indicator of all at forecasting the long-term health care costs, but is accessed a little late.

'H S' and 'S L' show a good ability to forecast health care costs for pedestrians injured in single accidents in urban areas due to road conditions. However, there are few indicators that can be used for forecasting the long-term costs among cyclists in urban areas injured in different types of accidents.

Table 8.12 The ability to measure total health loss for traffic casualties by using standardized sums from four special analyses for selected indicators. Target indicator = H L y35 (Health loss according to the Rosser Index within three years and five months after the accident)

Traffic-engineering factors	Indicators, immediately							Indicators, in different time perspectives																						
	Police			Hospital				Hospital stay (H S)					Visits to a doctor (V D)					Visits to a physiotherapist/ nurse (V PN)				Sick leave (S L)					Health loss (H L)			
	D	Se I	All I	D	In-p	All I	ISS	m1	m6	y1	y2	y35	m1	m6	y1	y2	y35	m6	y1	y2	y35	m1	m6	y1	y2	y35	m1	m6	y1	y2
P+C+Mp-M, urban	-	+	-	--	++	++	++	++	++	++	++	++	++	++	+	+	+	+	0	0	-	+	+	0	-	-	+	+	+	0
M, speed, rural	-	0	0	0	0	0	0	0	0	0	0	+	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
C, acc, urban	0	--	--	0	+	+	+	-	--	--	--	--	+	+	+	+	+	0	0	0	0	+	0	0	0	-	+	0	0	0
P, r c, s, urban				--	++	0	+	+	++	++	++	++	0	+	+	+	+	++	+	++	++	++	++	++	++	++	+	+	0	0

Abbreviations: H L= health loss as defined by the Rosser Index, D=dead, Se I=severely injured, All I=all injured, In-p=inpatient care, ISS=Injury Severity Score, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

Immediately after the accident: 'All I' and 'ISS', collected from the hospital data, are the best indicators immediately accessible after the accident when it comes to forecasting health loss in a longer time perspective. However, the reliability is not too good.

Within one month after the accident: 'V D, m1' and 'S L, m1', but also 'H S, m1', are able to forecast health loss in a longer perspective.

Within six months after the accident: 'H L, m6' or 'S L, m6' are indicators good at forecasting later health loss. This implies a decision earlier than three years when the long-term individual consequences can be established.

Note, that most indicators manage well to forecast the long-term health loss for motorists injured in rural areas in different speed limit zones.

8.3 Recommendations

In the reviews, some indicators have been commented upon as possible predictors for forecasting injury severity or the total of traffic safety problems. Among the immediate indicators are 'ISS' and 'In-p', as well as, 'H S, m1', which is available somewhat later.

The most attractive alternative in term of workload and economy is to be able to recommend <u>one</u> indicator that can be measured with satisfactory reliability and that can be easily collected soon after the traffic accident. As that does not seem possible, 'ISS' and 'H S, m1' are both proposed as predictors. The 'ISS' has proved to be the most consistent immediate indicator throughout the review of the total traffic safety problems, while the 'H S, m1' is useful in forecasting the average injury severity and the total traffic safety problems for society as well as for individuals.

There are however, a number of issues concerning the validity of these recommendations. The following are some of these:

- the consequences of using the same strategy for choosing the interval widths of the special analyses as of the basic ones, since different sizes of data samples indicate a lower accuracy in the special analyses and thus call for wider intervals; such attempts could be worthwhile, since the special analyses gave results surprisingly different from those of main analyses.

- the effect of a follow-up period of about three years; information acquired in a later follow-up from two out of five hospitals indicates that most injured people with long-term consequences at the three-year and five-month follow-ups are still affected by their traffic injuries 8-9 years after the accident. This indicates that the choice of three years would be appropriate.

- the difficulty of achieving conformity for the selected target indicators in both the analyses of injury severity (m_v) and the total problem ($n*m_v$) is probably caused by a large and quite skewed variability for the mean severity.

9 Conclusions

9.1 Contributions to science

This thesis has focused on the consequences of injuries due to traffic accidents and on the influence of different traffic-engineering factors on these injuries. The thesis is based on a main data set of traffic victims registered as killed, inpatients and outpatients in hospitals. The consequences are described over time and distributed over indicators representing the aspects of both society and individuals. The study reveals that most consequences occur during the first six months after the accident. After that, mostly a small but important group of victims are still suffering from their injuries and contribute considerably to the total accident consequences.

Such indicators, as hospital stay and sick leave have a high explanatory potential for the consequences, as each constitutes great parts of the defined total consequences for society. The consequences of traffic injuries are described, as well as their impact on both society and individuals. Such a distinction ought to be preserved, as the results indicate that there are complicated relations between these two aspects. When the consequences for society and individuals are examined, quite large differences are sometimes revealed.

By estimating the average health loss (in days) for the fatally injured, the inpatients and the outpatients, and describing the consequences in different time perspectives enable us to understand the impact of the traffic victims who have not recovered better than before. The results have to be seen in the perspective that full knowledge is obtained about the extent of the dead in traffic, while the knowledge about the severely and slightly injured casualties is based on estimations of their populations. However, the results indicate that the consequences among the severely injured may be somewhat underestimated and the consequences among the slightly injured somewhat overestimated compared with the results from earlier studies based on expert opinions from professionals, e.g. physicians and medical students, and not on those of the traffic victims themselves. The explanations of these differences can probably be related to the combined effect of, on the one hand, the fact that a too limited sample of severely injured people participated in the first health inquiry compared to a fairly good representation of the long-term effects of the slightly injured, and to the construction of the health index and the weights used (also based on views from professionals) on the other.

The study showed that pain, distress and the impact on daily life are very subjective issues and therefore hard to categorize, but they must still be included in order to strengthen the validity of the method applied.

In the study the influence of different traffic-engineering factors on the injuries and on the picture of the traffic safety problems was examined. In the perspective of six months, the main burden imposed on both society and individuals is caused by injuries in collisions, on links, in dry road surface conditions, and in daylight conditions. The victims injured in rural and urban areas impose a rather similar burden on society and individuals, while health loss is most pronounced among motorists and costs of care among unprotected road users. In the perspective of more than three years, the differences between the societal and individual approaches are more obvious. The greater impact on health loss of the fatally injured in traffic may result in a redistribution of the problems towards those injured in rural areas, motorists and dry road conditions. More pronounced problems for society are found among the injured in urban areas, among unprotected road users and in non-dry road conditions.

Early retirement pensions and the influence of the traffic injuries on life expectancy were both excluded from the indicator sick leave for the purpose of simplifying the data collection process. This may contribute to some bias and to a reduction of the correlation between health loss and sick leave. In further studies such delimitations should be avoided.

A rather accurate picture of the traffic safety problems has been established on a comprehensive level, using the two accessible sources. In a short-term perspective, the effects of different traffic and road engineering factors on the average severity of injuries are now better understood than before.

One objective of the thesis was to identify indicators, which can be estimated for injuries in the short-term and which can be used in predicting the long-term consequences of the injuries. Some short-term indicators, ‘ISS’ and ‘length of hospital stay within one month after the accident’ gave promising results which however, have insufficient reliability. With the support of information about traffic-engineering factors, the indicators ISS and hospital stay can predict with reasonable accuracy the long-term consequences of traffic injuries on an aggregate level. These two indicators are better adapted to predicting the total consequences than the average consequences. Also, their capacity seems to be directed more towards predicting the consequences for society than the individual ones.

The injury data reported by the police are valuable as a supplement to the hospital data, as information about people fatally injured in traffic can never be fully obtained by hospital data alone. Despite the rarity of the fatalities, they are essential for the characterization of the total traffic safety problem according to the results of this thesis. The police reported injury data was also shown to be valuable in predicting the long-term health losses, by performing better than e.g. the ISS.

A health index, here the Rosser Index, is used for the first time on a larger scale for estimating health loss as a consequence of a traffic injury. The experiences from using the Rosser Index were promising and its use in this way should be pursued.

9.2 Possibilities for generalization

The main data set was based on traffic casualties from five hospitals in different geographical regions of Sweden. The casualties from the southern region dominate, as about half of the registered cases were collected here. The differences observed between the proportions of fatally injured, severely and slightly injured victims as registered by the five hospitals could partly be explained by the properties of the admittance areas of the hospitals. The admittance areas of the various hospitals differed with regard to the distribution of the standard of the road network, the road users and also the climate that directly influenced the road surface and light conditions. The hospital-registered victims were injured in areas with a population of almost 0.6 million people, or about 7 % of that in the whole of Sweden. We found that the overall distribution of the consequences, i.e. people killed, severely and slightly injured in the police-reported data corresponds rather well to that in Sweden in 1991. Neither is the deviation concerning the observed factors too obvious. Hence, the estimated consequences for the casualties registered at hospitals can only be used on a national level with some reservation. However, with access to hospital data only, the total traffic safety problem cannot be fully described. A large number of fatalities are not brought to hospitals at all. The majority of the slightly injured victims are treated at public or private medical care centers, and consequently do not appear in the hospital data either.

The aspects mentioned above limit the possibilities to fully apply the results on other regions or municipalities. Regions and municipalities with access to police-reported data only as a basis for their traffic safety work can, however, utilise the conclusions from this thesis. Their traffic safety work is very likely to underestimate the importance of urban areas, unprotected road users in single accidents and in icy/snowy road conditions, and motorists in high speed-limit zones in rural areas.

However, the on-going implementation of STRADA (Swedish Traffic Accident Data Acquisition, i.e. the new Swedish accident injury registration system from 2003) can be used to verify any divergence in the distributions of studied variables. If the differences are small, the results could probably be used in estimating the consequences for society and individuals even today. The changes in injury severity due to improved passive safety-protection equipment and to hospital care strategies during the years after the data for this study were collected may affect the usability of the results of this thesis to some extent.

9.3 Implications for implementation

The Zero Vision strongly emphasizes the responsibility for eliminating the risk of death and chronic health impairment in traffic. The importance of having a better understanding and a deeper knowledge becomes obvious when the goals are to be achieved. The fatalities in traffic are defined and relatively easy to form an opinion of, although during later years the number of deaths in traffic due to illness, about 10 %, has given rise to debate. In this research, the Rosser Index showed that the fatalities are the largest contributor to the total health loss for individuals in the long-term perspective. With a definition of a “severely injured” casualty as an inpatient, and a “slightly injured” one as an outpatient, the long-term individual consequences of the severely and slightly injured victims seem astonishingly similar. The conclusions must be that chronic health impairment due to traffic accidents can be caused by relatively slight initial injuries, and also that a lack of coverage of the critically injured among the inpatients can influence the proportions of the long-term total health loss between severely and slightly injured casualties.

One immediately accessible indicator, i.e. the number of “severely injured” as classified by the police, is outstanding in forecasting the total health loss in a long-term perspective. This finding is, at first sight, both contradictory and perverse, since efforts had been made to find more objective indicators. Although the police do not report all severely injuries and although their assessments of what is a “severe injury” are not objective, the data actually collected offer a good picture of the health loss for individuals. The conclusion for the moment must be to support the police force in maintaining their present standard when collecting data on casualties in traffic and evaluating injury severity.

It is important that the hospital section of the STRADA system can utilize the ISS and data on hospital care for predicting more long-term consequences. To improve the quality of STRADA, the inpatient register formed by the National Board of Health and Welfare also ought to deliver data about the length of the hospital stay. The forensic medicine reports attached to the Average Statement should also contribute the confirmed diagnoses about the deceased. The improved knowledge about the consequences presented here and the increased knowledge of the extent and the distribution of the injuries available in the STRADA system could be used in selecting the optimal measures to reduce traffic safety problems on a detailed level in the future.

9.4 What could have been done differently?

The question is legitimate, as a self-evaluation can contribute to improving future research and development. The project was given a multi-disciplinary approach with researchers from civil engineering, economics and medicine participating, all of them answering more or less for their own field of expertise. Consequently most of the following proposals concern the data collection and analyses, which were and are my responsibility and constitute my major interest.

One important challenge is to reach all traffic victims and motivate them to participate in the trauma registration when they contact the emergency room to receive treatment for their injuries. Experience shows that medical professionalism is not always enough to perform the delicate task of requesting patients to supply data about the course of the accident. Both the registration method and the interview sites ought to be adapted in order to obtain the initial information about the most severely injured traffic victims. Co-operation with ambulance personnel has proven valuable and must be maintained to guarantee a high and consistent quality of registrations, especially among those severely injured. The registration of all patients at the hospital extended to the course of the visit to the Emergency Room, as in the Skåne model of the STRADA, is the best source in order to continuously control the quality of the traffic-injury register.

Improvements of the road and traffic data initially collected at hospitals are vital, since data shortage is noted in the areas e.g. detailed road design, detailed type of accident, road surface and light conditions, and since the police-reported data can mainly support information about motorists. This can be achieved in terms of more practical support to the respondents when they fill in the questionnaires, as well as fast feed-back when data is missing. In longitudinal research studies it may also be necessary to oblige hospitals to deliver data continuously, in order to reveal the shortages and to be able to recommend quicker adjustments in the data collection procure.

Following up the medical data was a challenge in itself, as no computer-based case records existed at the hospital at that time. The patients referred from the county hospitals caused a heavy workload, which could probably, have been avoided if there had been medical collaborators at the regional hospital during the planning phase. The follow-ups among the police-reported fatalities could have been simplified by an established collaboration with the forensic medicine experts during the early stages of the study. Thereby we would not have had to assume the ISS values, and lack the diagnoses for the fatally injured.

This research project has been characterized by a longitudinal approach and a management group consisting of researchers with shared responsibilities. Later experiences indicate the benefit of appointing one co-ordinator for the study and having this person play an active role during the whole process, and not only during the planning phase. The collaborators at the hospitals must also perform the task they have undertaken and give notice when problems arise that can lead to deviations from the method agreed upon. United efforts during the planning phase, the start-up meeting, and telephone and letter exchanges are not always enough. A network with the hospital personnel during an on-going study, i.e. frequent periodical meetings, is absolutely essential for maintaining the standard of quality.

9.5 Further research and development

This study highlights the following tasks for future research and development:

- √ to improve health-loss data by an analysis of the EuroQol Index to evaluate the validity of the used the Rosser Index used as a tool to estimate health loss as the consequence of traffic injuries;

- √ to build upon the short-term indicators with prediction potential now identified in order to find improved and more sensitive indicators for predicting long-term consequences;

- √ to take into account the possibilities offered by the STRADA data, in order to further develop the short-term indicators;

- √ to select some hospitals, in different parts of Sweden, as research and development centres for traffic injuries;

√ to set up a board for investigating severely injured traffic victims in all transport modes, as such an investment could add valuable knowledge to the existing average statements;

And finally, but probably most importantly,

√ to improve the method used by further evaluating and developing the indicators selected and their relations to some of the factors studied here.

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Appendix A

Definitions, concepts and abbreviations

The definitions are based on either SCB (1985) or SIKA (2001).
Used abbreviations have been put in brackets.

Traffic and road engineering expressions

Cyclist (C); a rider or a passenger of a bicycle.
Collision; an accident with two or more (motor) vehicles involved, named after the primary manoeuvre causing the accident; like overtaking ***(OT),*** rear-end ***(RE),*** head on ***(HO),*** turning in the junction with the vehicles in the same or opposite directions ***(TU)*** or crossing the junction with or without turning ***(CR)***. But also an accident between a motor vehicle and a pedestrian ***(MV-P),*** a cyclist/mopedist ***(MV-C/Mp)*** or an animal ***(MV-A)***.
Mopedist (Mp;) a rider or a passenger of a moped.
Motor-cyclist (MC); a rider or a passenger of a motor-cycle.
Motorist (M) or Vehicle occupant (Vo)**;** a driver or a passenger of a car, a truck or a bus.
Motor vehicle (MV)**;** a car, a truck or a motor-cycle.
Pedestrian (P); a person on foot, or using roller skaters etc.
Public place; a road, a street, a foot path, a bicycle path, a bus stop, a square, a parking place, a platform etc open to public traffic.
Public road (PR)*;* a road open to public traffic.
Road design**;** a general term for the design of a street and a road like a junction or a link, and a separated area like a foot path, a bicycle path or a tunnel.
Road environment; a public space used for traffic in either an urban area or a rural area.
Road-user; a pedestrian, a cyclist, a mopedist, a motor-cyclist, a motorist, etc.
Single accident; either a police reported accident where one motor vehicle is involved ***(MV(S))*** or one vehicle is involved **(*V(S))*** or an accident where a pedestrian is injured when falling on a slippery road or stumbling on bare ground ***(S)***.
Unprotected road-user; a pedestrian, a cyclist, a mopedist or a motor-cyclist
Urban area; an area where the speed limit is 50 kph or lower due to the extent of buildings and their influence on traffic conditions or where the speed limit is higher than 50 kph but the extent of buildings and their influence on traffic conditions is similar as above.

Traffic injured or road traffic accident expressions

Hospital registered traffic injured; a person injured in a public space, by stumbling, falling (in slippery or non-slippery road surface conditions) or in a road traffic accident receiving care in the Emergency Room at a hospital.
Killed in a road traffic accident; a person dead within thirty days due to injuries acquired in the traffic accident (ECE definition).
Road traffic accident; an accident in a public space with at least one vehicle involved.
Severely injured in a road traffic accident; a person acquiring a fracture, contusion, laceration, severe cut, concussion, internal injury or any other injury resulting in in-patient care. The type of injury can be considered an indirect measure, while the care is a direct measure (ECE definition).
Slightly injured in a road traffic accident; a person receiving other injuries than those given above.
Traffic injured with non-fatal injuries; a person with injuries, and still alive thirty days after the traffic accident.

Medical and follow-up expressions

Absence from work; like sick-leave or sick-allowance, stated by the injured in a questionnaire. Early retirement is not included in the analyses.

Degree of severity; used to objective grade injuries based on injury scales and scores; here AIS and ISS. Abbreviated Injury Scale ***(AIS)*** is an internationally established scale to measure the severity of an individual injury. Five separate criteria, energy dissipation, threat to life, permanent impairment, treatment period and incidence, were considered when developing the AIS. The AIS uses the following codes; 1 equals a minor, 2 a moderate, 3 a serious, 4 a severe, 5 a critical and 6 a maximum, virtually an unsurvivable injury. In order to be coded AIS-6, specific knowledge of the severity of the injury must be available, not merely knowledge that death occurred.

To gain an effective tool to measure overall severity either maximum AIS ***(MAIS)*** or Injury Severity Score ***(ISS)*** (Baker et al, 1974) is possible to use for good reliability. The MAIS is the highest single AIS code in a victim with multiple injuries. The ISS is a mathematically derived code number adding the squares of the highest AIS codes in each of the three most severely injured of six body regions. An ISS of 75 is the highest ISS possible. Injuries coded AIS-6 are automatically assigned as ISS of 75. The six body regions used in the ISS are: head or neck, face, chest, abdominal or pelvic contents, extremities or pelvic girdle and external.

Following ISS-intervals are selected for and applied in this study: ISS 1-3 minor injuries, ISS 4-8 moderate injuries, ISS 9- severe injuries.

International Classification of Diseases (ICD8); used for the location of the injury on the body.

Prospective technique; a technique where trained personnel gather in advanced selected data using a specially designed questionnaire.

Retrospective technique; a technique using existing data, originally collected for other purposed (here: adequate treatment for an acquired injury), in a new context.

Type and quantity of care; either collected by medical personnel using hospital case records during the medical follow-up, and defined as treatment at a certain clinic (in days), number of visits to the Emergency Room or a hospital clinic, or as stated by the injured in a questionnaire, and defined as length of hospital stay, number of visits to a doctor, a nurse and/or a physiotherapist.

Type of treatment; "in-patient care" or "out-patient care". These terms are often considered equivalent with "severely" and "slightly" injured as used by the police for the official traffic statistics.

Health Indices expressions

EuroQol; an index to measure quality of life and health. Six dimensions are used: mobility, self-care, usual activities, social relations, pain and anxiety/depression. The dimensions consist of either two or three levels.

Loss of health; measured by three different indices: EuroQol, Rosser and Thermometer and can be expressed in QALY. ***QALY;*** stands for Quality Adjusted Life Year and is a year of life with full health. In this study only the lost days have been estimated.

Rosser; an index to measure quality of life and health. Three dimensions are used: disabilities, distress and pain. The different dimensions consist of four to eight levels.

Thermometer; a scale from 0 to 100 ranging from "worst imaginable health state" to "best imaginable health state".

Appendix B

Table B1.1 *Killed and injured in police reported road traffic accidents, Sweden, 2001, distributed over road users (SIKA, 2001)*

	Killed		**Severely injured**		**Slightly Injured**		**All**	
Road users	No.	%	No.	%	No.	%	No.	%
Motorists	399	68	2,724	67	13,950	76	17,073	75
Motorcyclists	38	7	298	7	622	3	958	4
Mopedists	9	2	213	5	853	5	1,075	5
Cyclists	43	7	431	11	1,734	10	2,208	10
Pedestrians	87	15	347	9	1,029	6	1,463	6
Others or unknown	7	1	45	1	84	0	136	1
Total	583	100	4,058	100	18,272	100	22,913	100

Table B1.2 *Killed and injured in police reported road traffic accidents, Sweden, 2001, distributed over type of accident (SIKA, 2001)*

	Killed		**Severely injured**		**Slightly injured**		**All**	
Type of accident	No.	%	No.	%	No.	%	No.	%
MV (S)	187	32	1,203	30	3,997	22	5,387	24
V (S)	21	4	166	4	455	3	642	3
Overtaking (OT)	27	5	115	3	612	3	754	3
Rear-end (RE)	9	2	274	7	2,917	16	3,200	14
Head on (OH)	138	24	367	9	1,078	6	1,583	7
Turning in the junction (TU)	17	3	336	8	1,787	10	2,140	9
Crossing (CR)	25	4	387	10	2,307	13	2,719	12
MV – P	81	14	345	9	1,090	6	1,516	7
MV-C/Mp	34	6	447	11	1,894	10	2,375	10
MV – A	16	3	136	3	741	4	893	4
Others	28	5	282	7	1,394	8	1,704	7
Total	583	100	4,058	100	18,272	100	22,913	100

Table B1.3 *Killed and injured in police reported road traffic accidents, Sweden, 2001, distributed over road environment (SIKA, 2001)*

	Killed		**Severely injured**		**Slightly injured**		**All**	
Road environment	No.	%	No.	%	No.	%	No.	%
Urban areas	180	31	1,881	46	19,074	55	12,135	53
Rural areas	403	69	2,177	54	8,198	45	10,778	47
Total	583	100	4,058	100	18,272	100	22,913	100

Table B1.4 Killed and injured in police reported road traffic accidents, Sweden, 2001, distributed over type of roads (SIKA, 2001)

	Killed		**Severely injured**		**Slightly injured**		**All**	
Type of roads	No.	%	No.	%	No.	%	No.	%
Motorways	30	5	243	6	1,610	9	1,883	8
Undivided motorways	9	2	34	1	89	0	132	1
Other public roads	426	73	2,487	61	9,700	53	12,613	55
Streets	92	16	1,145	28	6,271	34	7,508	33
Private roads	13	2	60	2	206	1	279	1
Others	13	2	89	2	396	2	498	2
Total	583	100	4,058	100	18,272	100	22,913	100

Table B1.5 Killed and injured in police reported road traffic accidents, Sweden, 2001, distributed over speed limits (SIKA, 2001)

	Killed		**Severely injured**		**Slightly injured**		**All**	
Speed limits [km/h]	No.	%	No.	%	No.	%	No.	%
110	50	9	225	6	1,075	6	1,350	6
90	203	35	989	24	3,186	17	4,376	19
70	152	26	1,116	28	4,496	25	5,764	25
50	141	24	1,449	36	8,043	44	9,633	42
30	7	1	61	1	269	2	337	2
Unknown	30	5	218	5	1,203	7	1,451	6
Total	583	100	4,058	100	18,272	100	22,913	100

Table B1.6 Police reported traffic injured compared to hospital registered traffic injured, distributed over road users (Berntman, 1994)

	Police Sweden, 1989-1990		**Police 8 municipalities two years**		**Hospital 8 municipalities two years**	
Road users	No.	%	No.	%	No.	%
Motorists	33,619	70	1,014	67	435	40
Motorcyclists	2,257	5	90	6	64	6
Mopedists	1,747	4	45	3	45	4
Cyclists	5,735	12	226	15	394	37
Pedestrians	3,976	8	75	5	111	10
Others	370	1	62	4	17	2
Unknown	-	-	2	0	11	1
Total	47,704	100	1,514	100	1,077	100

Table B1.7 Injured in road traffic accidents treated in-patients, Sweden, 1996 respectively 1988-96, distributed over road users (Larsson, 1999)

	1996		**1988-96**	
Road users	No.	%	No.	%
Motorists	4,558	37	46,352	38
Motorcyclists	1,043	8	11,257	9
Mopedists	458	4	5,782	5
Cyclists	4,458	36	41,668	34
Pedestrians	787	6	9,406	8
Others or unknown	1,001	8	8,038	7
Total	12,305	99	122,503	101
Severely injured according to official statistics [1]	3,837		43,054	

[1] (SIKA, 2001)

Table B1.8 Traffic injured registered at Lund University Hospital when treated as in-patients or out-patients, 1988-1989, distributed over road users (Berntman, 1994)

	In-patient care[1]		**Out-patient care**		**All**	
Road users	No.	%	No.	%	No.	%
Motorists	131	44	301	39	432	40
Motorcyclists	28	9	36	5	64	6
Mopedists	11	4	34	4	45	4
Cyclists	84	28	310	40	394	37
Pedestrians	34	11	75	10	109	10
Others	8	3	9	1	17	2
Unknown	5	2	5	1	10	1
Total	301	101	770	100	1,071	100

[1]The dead are excluded

Table B1.9 Traffic injured registered at Lund University Hospital when treated as in-patients or out-patients, 1988-1989, distributed over type of accident (Berntman, 1994)

	In-patient care[1]		**Out-patient care**		**All**	
Type of accident	No.	%	No.	%	No.	%
Single accidents	133	44	373	48	506	47
Collisions	153	51	369	48	522	49
Unknown	15	5	28	4	43	4
Total	301	100	770	100	1,071	100

[1]The dead are excluded

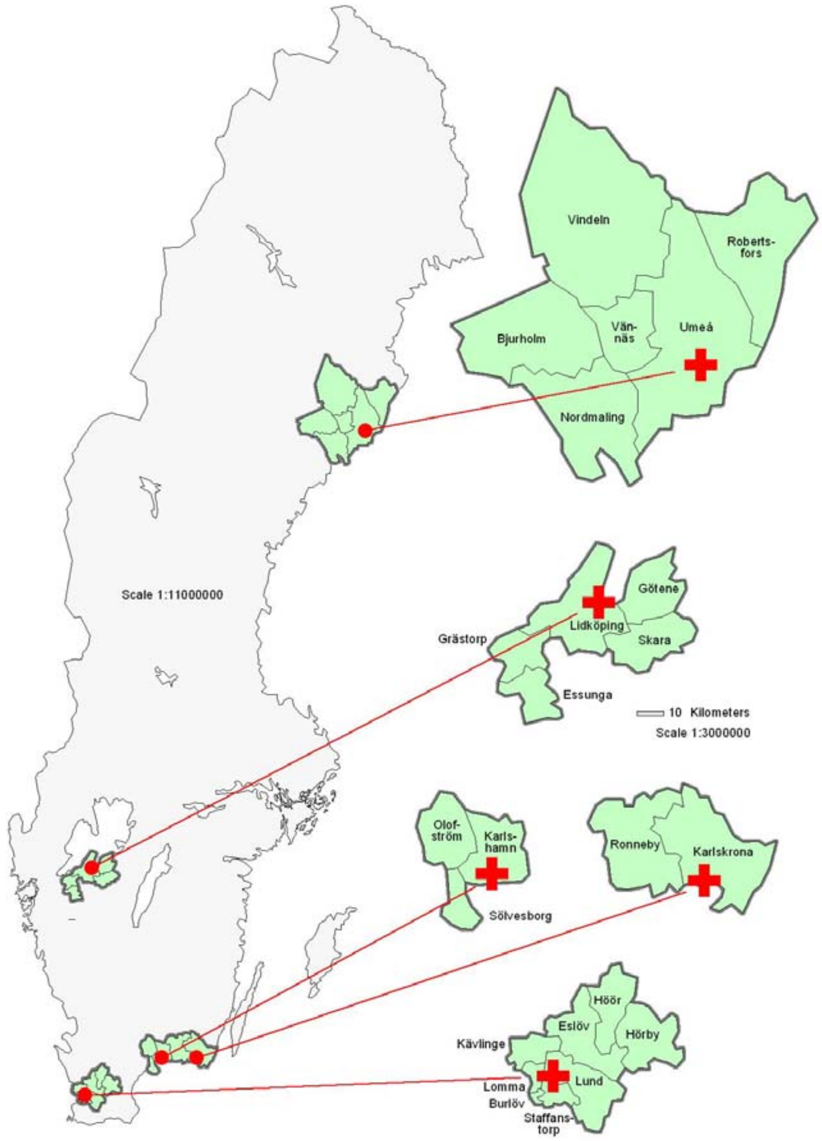
Table B1.10 Traffic injured registered at Lund University Hospital when treated as in-patients or out-patients, 1988-1989, distributed over different road design (Berntman, 1994)

	In-patient care[1]		**Out-patient care**		**All**	
Road design	No.	%	No.	%	No.	%
Junctions	68	23	220	29	288	27
Links	141	47	362	47	503	47
Others	8	3	29	4	37	3
Unknown	84	28	159	21	243	23
Total	301	100	770	100	1,071	100

[1]The dead are excluded

Appendix C

Map 1 *The five participating hospitals and their admittance areas (24 municipalities) in Sweden. (Daniel Nilsson, Region Skåne, 2003)*



Form I

TRAFIKSKADEJOURNAL för alla patienter som skadats i trafiken (dvs alla skadade i olyckor utanför tomtmark/arbetsplats inkl fotgängare som ramlar och cyklister som välter)

Patient inlagd på sjukhus ☐ Ja ☐ Nej Idnr ☐☐☐☐☐

Behandlad på klinik/er
☐ Kirurgi
☐ Ortopedi
☐ Annan klinik. Vilken ______

Införd av
☐ Ambulans
☐ Polis
☐ Annan transport

Patient kom till akutmottagningen
Datum ☐☐☐☐☐☐ **Klockslag** ☐☐☐☐

Olyckan inträffade
Datum ☐☐☐☐☐☐ **Klockslag** ☐☐☐☐

Under resa
☐ till arbete/skola
☐ från arbete/skola
☐ i arbete/under skoltid
☐ under fritid

Yttre omständigheter
Ljusförhållanden
☐ Ljust
☐ Gryning/skymning
☐ Mörkt

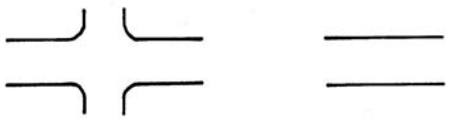
Väglag
☐ Torrt
☐ Vått/fuktigt
☐ Is/snö

Olycksplats (ange så detaljerat som möjligt)
Namn och Nr på gata/väg (gator/vägar i korsning) i skissen nedan:

1. ______

2. ______

Markera med x var olyckan har inträffat och ange färdriktning med pil.
Korsning **Sträcka**

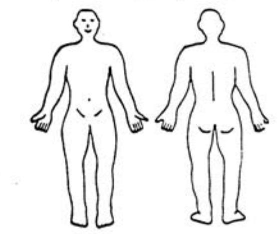


Olyckan hände på/i
☐ Gata/väg
☐ Cykelbana, cykelväg
☐ Trottoar, gångbana
☐ Tunnel/gångbro
☐ Övergångsställe för cyklister
☐ Övergångsställe för fotgängare
☐ Allmän plats, t ex P-plats, torg
☐ Annan plats, ange vad ______

Beskriv hur olyckan gick till ______

Persondata:

Skador (markeras i figuren)



Inblandad i
☐ Singelolycka
☐ Kollisionsolycka

Vid olyckan var patienten:
Själv:
☐ Fotgängare
☐ Cyklist med fotbroms
☐ Cyklist utan fotbroms
☐ Mopedist
☐ Mc-förare
☐ Mc-pass
☐ Bilförare
☐ Bilpass, fr
☐ Bilpass, bak
☐ Buss/spårvagnspass
☐ Annat, vad ______

I kollision med:
☐ Fotgängare
☐ Cykel
☐ Moped
☐ Mc
☐ Personbil
☐ Lastbil
☐ Buss
☐ Annat, vad ______

Skyddsutrustning
☐ Ej aktuell
☐ Ingen
☐ Broddar
☐ Bilbälte
☐ Nackstöd
☐ Barnstol
☐ Barnkudde
☐ Barnvagnsin-sats
☐ Hjälm
☐ Mc-ställ

Ifyllt av ______

Form II

INFORMATIONSUNDERLAG
Vägtrafikolycka

51 Polismyndighet, arbetsenhet, telefon

52 Polisens diarienummer

A

53 Polismyndighetskod	54 Kommun	**55 Tid-punkt för olyckan**	**År**	**Mån**	**Dag**	**Kl**	Väghållarkod

56 Olycksplats (ange gatu-/vägnamn/vägnr, ev husnr samt avstånd till närmaste korsning mellan allm vägar)

Namn på stadsdel/kommundel/ort el dyl

57 Skiss, på vilken anges gatu- och vägnamn, vägbredd, åtföljd av bokstav A rsp B enl avsnitt B nedan. Vid inritat fordon anges fordonsslag (pb, lb, etc), **registeringsnumret samt ett trafikelement-** (vägtrafikant-) **nummer 1, 2, 3 osv, vilket nr skall vara identiskt med det nr vederbörande vägtrafikant åsatts i trafikmålsanteckningar** (RPS 411.20)

Norrpil

58 Kortfattad beskrivning av händelseförloppet, siktförhållanden m m

B Väg- och Trafik

		Väg A	Väg B
59 Vägnummer			
60 Högsta tillåtna hastighet			
61 Vägtyp			
Motorväg	1		
Motortrafikled	2		
Annan allm väg	3		
Gata	4		
Enskild väg	5		
Övr väg, torg etc	6		

Trafikanvisningar*)		Väg A	Väg B
Huvudled	1		
Ej huvudled	2		
63 Trafikreglering*)			
Förb m v-sväng	1		
Stopplikt	2		
Väjningsplikt	3		
64 Trafiksignal*)			
I funktion	1		
Ur funktion	2		
Gult blinkande	3		
Saknas	4		

C Väderlek, väglag, belysning

65 Väderleksförhållanden		
Uppehållsväder	1	
Dis/dimma	2	
Regn	3	
Snöblandat regn	4	
Snöfall	5	
66 Väglag		
Vägbanan torr	1	
Vägbanan våt/fuktig	2	
Tjock is/packad snö	3	
Tunn is (vägb synlig)	4	
Lös snö/snömodd	5	

67 Trafikmiljö		
Tättbebyggt område	1	
Ej tättbebyggt område	2	
68 Ljusförhållanden		
Dagsljus	1	
Mörker	2	
Gryning/skymning	3	
Om 68:2 eller 3 förkryssats		

69 Gatu-/vägbelysning		Väg A	Väg B
Tänd	1		
Släckt	2		
Saknas	3		

D Trafikelement

E Inblandade personer

70 Trafikelement Nr	Trafikelement (t.ex. pb, lätt/tung lb, lätt/tung mc, cykel, gående enl. 4 § VTK, vilt/djur)	Registreringsnr (anges för motor- och släpfordon). För utländskt fordon, nationalitet	Totalt antal pers. i fordonet	Övnings-körning** Trafik-skola	Övnings-körning** Privat	**71 Personnummer** Obligatoriskt för förare och instruktör samt dödade och skadade personer	**72 trafikant** Förare el. elev som kör Ange F/E	Passagerare/ instruktör Fram	Passagerare/ instruktör Bak	Passagerare/ instruktör Okänt eller övrigt	**73 Personskada** Död	Svårt skadad	Lindrigt skadad	74 Misstänkt påverkad av alkohol/ annant ämne (förare) Ange J/N

Fordon skyltat för transport av farligt gods inblandat. Ange elementnr:

Ort och datum

Uppgiftslämnare

50 Statistiska uppgifter till: SCB / Lokal vägmynd.het

Datum och sign

75 Undersökningsledarens beslut

- Fu inleds ej
- Ej spaningsresultat
- Brott kan ej styrkas
- Misstänkt oskyldig
- Gärningen ej brott
- Fu nedlagd
- Misstänkt ej fyllt 15 år
- Misstänkt avliden
- Rapporteftergift

Beslutsdatum

Undersökningsledarens namnteckning/sign

*) Kontrolleras   **) Med övningskörning avses enbart de fall då eleven framfört fordonet, alltså ej då instruktören kört.

Form III

BLANKETT FÖR MEDICINSK BEDÖMNING AV SKADAN 6 MÅNADER EFTER TRAFIKOLYCKAN **Uppföljningsdatum** ______

Idnr ☐☐☐☐☐ Personnr ☐☐☐☐☐☐☐☐☐☐

Namn ______ Trafikant ______

Olycksdatum ______ Ankomstdatum ______

Omhändertagande efter undersökning på akutmottagningen

☐ Inlagd på sjukhus Behandlad på ______ kliniken

☐ Poliklinisk behandling ______ kliniken

Vård

Poliklinisk behandling

Antal återbesök ___ st. Tidpunkter ______ Behandl.avslutad ☐ Ja ☐ Nej

Inlagd

Typ: **Behandlingsordningen anges med siffror på aktuell/a/ vårdavdelning/ar.**

Längd: **Antal påbörjade vårddygn registreras tillsammans med resp vårdavd.**

Typ IV-avd	Vårdavd		**Längd** (påbörjat dygn) Avd	
☐ KIVA	☐ NK	☐ Ögon	☐	☐☐☐
☐ TIVA	☐ Kirurgi	☐ Öron		
☐ Annan	☐ Ortopedi	☐ Njur	☐	☐☐☐
	☐ Thorax	☐ Barnmedicin		
	☐ Urologi	☐ Barnkirurgi	☐	☐☐☐
	☐ Infektion	☐ Barnrehab		
	☐ Medicin	☐ Rehab	☐	☐☐☐
	☐ Neurologi	☐ Långvård		

Remitterad till ______. Sjukhuset kontaktat för medicinsk uppföljning ☐ Ja ☐ Nej

Diagnos(er). De tre allvarligaste skadorna inom de sex anatomiska områdena (yttre, huvud/nacke, ansikte, bröst, buk och bäcken/extremiteter)

1. ______ ICD_1 ☐☐☐☐

2. ______ ICD_2 ☐☐☐☐

3. ______ ICD_3 ☐☐☐☐

Skadegradering (baseras på diagnos, vid multipelskador noteras de tre allvarligaste)

☐ AIS_1 ☐ AIS_2 ☐ AIS_3 ☐☐ ISS

Patientens medicinska tillstånd (6 mån efter behandling)

☐ Helt återställd ☐ **Kvarstående besvär. Ange vad** ______

☐ Invaliditet. Ange fastlagd grad i % ☐☐☐ ______

☐ Avliden till följd av skadan. Tidpunkt ______

☐ Avliden av annan orsak. Tidpunkt ______

Skadeorsak ☐☐☐☐ E-kod **endast insamling av uppgifter i journaler**

Form IV

Idnr ☐☐☐☐☐
ifylles ej.

Personnr:
Namn:
Adress:

Frågor om Din hälsa
före olyckan

Innan Du bläddrar vidare...

För oss är det viktigt att veta när Du svarar på enkäten.
Vi ber Dig därför vänligen att **fylla i dagens datum.**

Datum när Du besvarar enkäten ________

OBS! Det finns text på både fram- och baksidor.

Sätt kryss om formuläret ☐
har fyllts i av anhörig

Var vänlig och kryssa för den ruta under varje rubrik som bäst beskriver hur Du kände Dig **före olyckan**. Observera att endast **en ruta under varje rubrik** skall kryssas för.

Funktionsnedsättning Endast **ett alternativ** skall väljas!

☐ **Ingen**
Kunde arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet och hade ett normalt fungerande socialt liv.

☐ **Lätt**
Kunde arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet. Sjukdomen begränsade dock möjligheten att utföra vissa hobbies och fritidsaktiviteter.

☐ **Måttlig**
Kunde arbeta/gå i skola, men hade problem att klara vissa arbetsuppgifter eller hade problem att upprätthålla ett normalt socialt liv. Klarade alla hushållsgöromål utom de allra tyngsta.

☐ **Svårighet att arbeta**
Kunde arbeta/gå i skola, men klarade endast ett fåtal arbetsuppgifter. Kunde inte upprätthålla ett normalt socialt liv. Klarade bara av lättare hushållsgöromål.

☐ **Oförmögen att arbeta**
För sjuk för att arbeta eller fullfölja utbildning. Kunde endast utföra ett fåtal lättare hushållsgöromål i hemmet och behövde viss hjälp vid förflyttning.

☐ **Oförmögen att förflytta mig utan hjälp av person eller utan rullstol**

☐ **Sängliggande**

☐ **Medvetslös**

Smärta Endast **ett alternativ** skall väljas!

☐ **Ingen**

☐ **Lätt**
Hade lätta smärtor som försvann med hjälp av alvedon/magnecyl.

☐ **Måttlig**
Hade måttliga smärtor som inte försvann med hjälp av alvedon/magnecyl.

☐ **Kraftig**
Hade svåra smärtor mot vilka morfin var föreskrivet.

Forts nästa sida!

Obehag Endast **ett altenativ** skall väljas!

☐ **Inget**
Nästan alltid mycket glad och avslappnad. Hade mycket stöd av och kontakt med vänner.

☐ **Lätt**
Glad och avslappnad största delen av tiden, men orolig och deprimerad ibland. Hade en del stöd av och kontakt med vänner.

☐ **Måttligt**
Orolig och deprimerad största delen av tiden, men glad och avslappnad ibland. Hade lite stöd av och kontakt med vänner.

☐ **Kraftigt**
Nästan alltid mycket orolig och deprimerad. Inget stöd av eller kontakt med vänner.

☐ **Extremt deprimerad**
Övervägde om livet var värt att leva.

Var vänlig och fyll i uppgifterna A och B.
Kryssa i **minst en ruta i varje grupp (1 - 6) i uppgift A**. Välj det/de påståenden som bäst beskriver hur Du känner Dig i dag. I **uppgift B** skall Du **dra en linje** från rutan till skalan.

UPPGIFT A

Grupp 1

☐ Jag går utan svårigheter.

☐ Jag kan inte gå utan hjälpmedel (käpp, krycka eller rullator).

☐ Jag är sängliggande.

Grupp 2

☐ Jag behöver ingen hjälp med min dagliga hygien, mat eller påklädning.

☐ Jag kan inte klä på mig själv.

☐ Jag kan inte äta utan hjälp.

Grupp 3

☐ Jag klarar av min huvudsakliga sysselsättning (t ex arbete, studier, hushållssysslor).

☐ Jag klarar inte av min huvudsakliga sysselsättning.

Grupp 4

☐ Jag klarar av familje- och fritidsaktiviteter.

☐ Jag klarar inte av familje- och fritidsaktiviteter.

Grupp 5

☐ Jag har varken smärtor eller obehag.

☐ Jag har måttliga smärtor eller obehag.

☐ Jag har svåra smärtor eller obehag.

Grupp 6

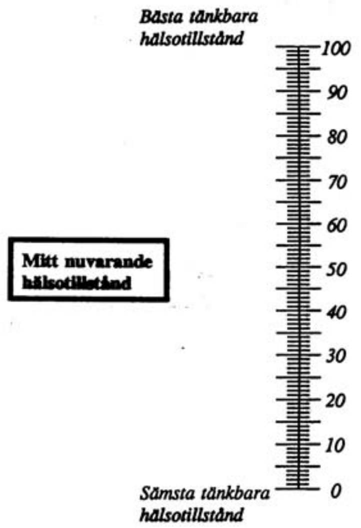
☐ Jag är inte orolig eller nedstämd.

☐ Jag är orolig eller nedstämd.

UPPGIFT B

Till hjälp för att avgöra hur bra eller dåligt ett hälstillstånd är finns nedanstående skala. Ditt bästa tänkbara hälsotillstånd motsvarar 100 på skalan och Ditt sämsta tänkbara hälsotillstånd av 0.

Vi vill att Du skall markera hur bra eller dåligt Ditt hälsotillstånd är i dag, så som Du själv bedömmer det. Gör detta genom att dra **en linje** från rutan till den punkt på skalan som makerar hur Ditt hälsotillstånd är i dag.



Forts nästa sida!

Form V

Idnr ☐☐☐☐☐
ifylles ej.

Personnr:
Namn:
Adress:

Frågor om Din hälsa
ett dygn efter olyckan

Innan Du bläddrar vidare…

För oss är det viktigt att veta när Du svarar på enkäten.
Vi ber Dig därför vänligen att **fylla i dagens datum.**

Datum när Du besvarar enkäten ________

OBS! Det finns text på både fram- och baksidor.

Sätt kryss om formuläret ☐
har fyllts i av anhörig

Var vänlig och kryssa för den ruta under varje rubrik som bäst beskriver hur Du kände Dig **ett dygn efter olyckan**. Observera att endast **en ruta under varje rubrik** skall kryssas för.

Funktionsnedsättning

Endast **ett alternativ** skall väljas!

☐ **Ingen**
Kunde arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet och hade ett normalt fungerande socialt liv.

☐ **Lätt**
Kunde arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet. Sjukdomen begränsade dock möjligheten att utföra vissa hobbies och fritidsaktiviteter.

☐ **Måttlig**
Kunde arbeta/gå i skola, men hade problem att klara vissa arbetsuppgifter eller hade problem att upprätthålla ett normalt socialt liv. Klarade alla hushållsgöromål utom de allra tyngsta.

☐ **Svårighet att arbeta**
Kunde arbeta/gå i skola, men klarade endast ett fåtal arbetsuppgifter. Kunde inte upprätthålla ett normalt socialt liv. Klarade bara av lättare hushållsgöromål.

☐ **Oförmögen att arbeta**
För sjuk för att arbeta eller fullfölja utbildning. Kunde endast utföra ett fåtal lättare hushållsgöromål i hemmet och behövde viss hjälp vid förflyttning.

☐ **Oförmögen att förflytta mig utan hjälp av person eller utan rullstol**

☐ **Sängliggande**

☐ **Medvetslös**

Smärta

Endast **ett alternativ** skall väljas!

☐ **Ingen**

☐ **Lätt**
Hade lätta smärtor som försvann med hjälp av alvedon/magnecyl.

☐ **Måttlig**
Hade måttliga smärtor som inte försvann med hjälp av alvedon/magnecyl.

☐ **Kraftig**
Hade svåra smärtor mot vilka morfin var föreskrivet.

Forts nästa sida!

Obehag Endast **ett altenativ** skall väljas!

☐ **Inget**
Nästan alltid mycket glad och avslappnad. Hade mycket stöd av och kontakt med vänner.

☐ **Lätt**
Glad och avslappnad största delen av tiden, men orolig och deprimerad ibland. Hade en del stöd av och kontakt med vänner.

☐ **Måttligt**
Orolig och deprimerad största delen av tiden, men glad och avslappnad ibland. Hade lite stöd av och kontakt med vänner.

☐ **Kraftigt**
Nästan alltid mycket orolig och deprimerad. Inget stöd av eller kontakt med vänner.

☐ **Extremt deprimerad**
Övervägde om livet var värt att leva.

Forts nästa sida!

Var vänlig och fyll i uppgifterna A och B.
Kryssa i **minst en ruta i varje grupp (1 - 6) i uppgift A**. Välj det/de påståenden som bäst beskriver hur Du kände Dig **ett dygn** efter olyckan. I **uppgift B** skall Du **dra en linje** från rutan till skalan.

UPPGIFT A

Grupp 1

☐ Jag gick utan svårigheter.

☐ Jag kunde inte gå utan hjälpmedel (käpp, krycka eller rullator).

☐ Jag var sängliggande.

Grupp 2

☐ Jag behövde ingen hjälp med min dagliga hygien, mat eller påklädning.

☐ Jag kunde inte klä på mig själv.

☐ Jag kunde inte äta utan hjälp.

Grupp 3

☐ Jag klarade av min huvudsakliga syssel-sättning (t ex arbete, studier, hushålls-sysslor).

☐ Jag klarade inte av min huvudsakliga sysselsättning.

Grupp 4

☐ Jag klarade av familje- och fritids-aktiviteter.

☐ Jag klarade inte av familje- och fri-tidsaktiviteter.

Grupp 5

☐ Jag hade varken smärtor eller obehag.

☐ Jag hade måttliga smärtor eller obehag.

☐ Jag hade svåra smärtor eller obehag.

Grupp 6

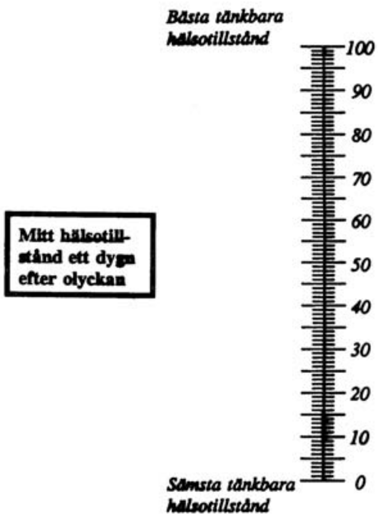
☐ Jag var inte orolig eller nedstämd.

☐ Jag var orolig eller nedstämd.

UPPGIFT B

Till hjälp för att avgöra hur bra eller dåligt ett hälstillstånd är finns nedanstående skala. Ditt bästa tänkbara hälsotillstånd motsvarar 100 på skalan och Ditt sämsta tänkbara hälsotillstånd av 0.

Vi vill att Du skall markera hur bra eller dåligt Ditt hälsotillstånd var ett dygn efter olyckan, så som Du själv bedömmer det. Gör detta genom att dra **en linje** från rutan till den punkt på skalan som makerar hur Ditt hälsotillstånd var ett dygn efter olyckan.



Forts nästa sida!

Var vänlig och besvara följande frågor även om Du tycker att Du svarat på liknande frågor tidigare i formuläret. Dina svar skall beskriva **Din situation ett dygn efter olyckan.**

Om Du var sängliggande någon gång under dagen på grund av skadan, besvara frågorna 1a) och 1b):

1a) Varför låg Du till sängs under dagen?
(Du får kryssa för flera alternativ.)

- ☐ Läkaren hade ordinerat det.
- ☐ Jag orkade inte vara uppe.
- ☐ Jag kunde inte förflytta mig utan hjälp.
- ☐ Något annat. Ange vad ____________________

1b) Hur många timmar låg Du till sängs under dagen? __________ timmar

2 Påverkade trafikolyckan Din hälsa på något sätt som inte framgår av Dina tidigare svar?

- ☐ Nej
- ☐ Ja. Ange hur____________________

____

____

3 Påverkade något annat än trafikolyckan Din hälsa?

- ☐ Nej
- ☐ Ja. Ange hur____________________

____

____

Tack för Din medverkan!

Form VI

Idnr ☐☐☐☐☐
ifylles ej.

Personnr:
Namn:
Adress:

Frågor om Din hälsa
en månad efter olyckan

Innan Du bläddrar vidare...

För oss är det viktigt att veta när Du svarar på enkäten.
Vi ber Dig därför vänligen att **fylla i dagens datum**.

Datum när Du besvarar enkäten _________

OBS! Det finns text på både fram- och baksidor.

Sätt kryss om formuläret ☐
har fyllts i av anhörig

Var vänlig och kryssa för den ruta under varje rubrik som bäst beskriver hur Du känner Dig idag. Observera att endast **en ruta under varje rubrik** skall kryssas för.

Funktionsnedsättning

Endast **ett alternativ** skall väljas!

☐ **Ingen**
Kan arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet och har ett normalt fungerande socialt liv.

☐ **Lätt**
Kan arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet. Sjukdomen begränsar dock möjligheten att utföra vissa hobbies och fritidsaktiviteter.

☐ **Måttlig**
Kan arbeta/gå i skola, men har problem att klara vissa arbetsuppgifter eller har problem att upprätthålla ett normalt socialt liv. Klarar alla hushållsgöromål utom de allra tyngsta.

☐ **Svårighet att arbeta**
Kan arbeta/gå i skola, men klarar endast ett fåtal arbetsuppgifter. Kan inte upprätthålla ett normalt socialt liv. Klarar bara av lättare hushållsgöromål.

☐ **Oförmögen att arbeta**
För sjuk för att arbeta eller fullfölja utbildning. Kan endast utföra ett fåtal lättare hushållsgöromål i hemmet och behöver viss hjälp vid förflyttning.

☐ **Oförmögen att förflytta mig utan hjälp av person eller utan rullstol**

☐ **Sängliggande**

☐ **Medvetslös**

Smärta

Endast **ett alternativ** skall väljas!

☐ **Ingen**

☐ **Lätt**
Har lätta smärtor som försvinner med hjälp av alvedon/magnecyl.

☐ **Måttlig**
Har måttliga smärtor som inte försvinner med hjälp av alvedon/magnecyl.

☐ **Kraftig**
Har svåra smärtor mot vilka morfin är föreskrivet.

Forts nästa sida!

Var vänlig och fyll i uppgifterna A och B.
Kryssa i **minst en ruta i varje grupp (1 - 6) i uppgift A**. Välj det/de påståenden som bäst beskriver hur Du känner Dig i dag. I **uppgift B** skall Du **dra en linje** från rutan till skalan.

UPPGIFT A

Grupp 1

☐ Jag går utan svårigheter.

☐ Jag kan inte gå utan hjälpmedel (käpp, krycka eller rullator).

☐ Jag är sängliggande.

Grupp 2

☐ Jag behöver ingen hjälp med min dagliga hygien, mat eller påklädning.

☐ Jag kan inte klä på mig själv.

☐ Jag kan inte äta utan hjälp.

Grupp 3

☐ Jag klarar av min huvudsakliga syssel-sättning (t ex arbete, studier, hus-hållssysslor).

☐ Jag klarar inte av min huvudsakliga sysselsättning.

Grupp 4

☐ Jag klarar av familje- och fritids-aktiviteter.

☐ Jag klarar inte av familje- och fri-tidsaktiviteter.

Grupp 5

☐ Jag har varken smärtor eller obehag.

☐ Jag har måttliga smärtor eller obehag.

☐ Jag har svåra smärtor eller obehag.

Grupp 6

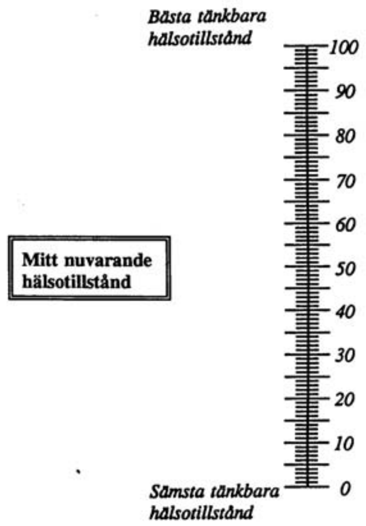
☐ Jag är inte orolig eller nedstämd.

☐ Jag är orolig eller nedstämd.

UPPGIFT B

Till hjälp för att avgöra hur bra eller dåligt ett hälstillstånd är finns nedanstående skala. Ditt bästa tänkbara hälsotillstånd motsvarar 100 på skalan och Ditt sämsta tänkbara hälsotillstånd av 0.

Vi vill att Du skall markera hur bra eller dåligt Ditt hälsotillstånd är i dag, så som Du själv bedömmer det. Gör detta genom att dra **en linje** från rutan till den punkt på skalan som makerar hur Ditt hälsotillstånd är i dag.



Forts nästa sida!

Obehag Endast **ett altenativ** skall väljas!

☐ **Inget**
Nästan alltid mycket glad och avslappnad. Har mycket stöd av och kontakt med vänner.

☐ **Lätt**
Glad och avslappnad största delen av tiden, men orolig och deprimerad ibland. Har en del stöd av och kontakt med vänner.

☐ **Måttligt**
Orolig och deprimerad största delen av tiden, men glad och avslappnad ibland. Lite stöd av och kontakt med vänner.

☐ **Kraftigt**
Nästan alltid mycket orolig och deprimerad. Inget stöd av eller kontakt med vänner.

☐ **Extremt deprimerad**
Överväger om livet är värt att leva.

Var vänlig och besvara följande frågor <u>även</u> om Du tycker att Du svarat på liknande frågor tidigare i formuläret.

Om Du är sängliggande någon gång under dagen på grund av skadan, besvara frågorna 1a) och 1b):

1a) Varför ligger Du till sängs under dagen?
(Du får ~~kryssa för flera~~ alternativ.)

☐ Läkaren har ordinerat det.
☐ Jag orkar inte vara uppe.
☐ Jag kan inte förflytta mig utan hjälp.
☐ Något annat. Ange vad ________________________________

1b) Hur många timmar ligger Du till sängs under dagen? ________timmar

2 Har trafikolyckan påverkat Din hälsa på något sätt som inte framgår av Dina tidigare svar?

☐ Nej
☐ Ja. Ange hur________________________________

____

____

3 Har något annat än trafikolyckan påverkat Din hälsa?

☐ Nej
☐ Ja. Ange hur________________________________

____

____

Forts nästa sida!

Vi ber Dig vänligen att också besvara nedanstående frågor.

1. Hur många läkarbesök har Du gjort på grund av skadan den första månaden efter olyckan? Räkna inte Ditt första akutbesök!

   ....st

2. Vilken är Din huvudsakliga sysselsättning?

   ☐ Förvärsarbetar
   ☐ Pensionär
   ☐ Studerande
   ☐ Annat, ange vad ....

3. Om Du förvärvsarbetar ber vi Dig att ange hur mycket Din ordinarie arbetstid före skadan uppgick till i procent.
   (Exempel: Har Du en heltidstjänst är Din ordinarie arbetstid 100%.)

   ....%

4. Hur många dagar har Du varit sjukskriven på grund av skadan den första månaden efter olyckan?

   ....st

Tack för Din medverkan!

Form VII

Idnr ☐☐☐☐☐
ifylles ej.

Personnr:
Namn:
Adress:

Frågor om Din hälsa
sex månder efter olyckan

Innan Du bläddrar vidare...

För oss är det viktigt att veta när Du svarar på enkäten.
Vi ber Dig därför vänligen att **fylla i dagens datum.**

Datum när Du besvarar enkäten ________

OBS! Det finns text på både fram- och baksidor.

Sätt kryss om formuläret ☐
har fyllts i av anhörig

Var vänlig och kryssa för den ruta under varje rubrik som bäst beskriver hur Du känner Dig idag. Observera att endast **en ruta under varje rubrik** skall kryssas för.

Funktionsnedsättning

Endast **ett alternativ** skall väljas!

☐ **Ingen**
Kan arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet och har ett normalt fungerande socialt liv.

☐ **Lätt**
Kan arbeta/gå i skola som vanligt, utföra/sköta alla sysslor i hemmet. Sjukdomen begränsar dock möjligheten att utföra vissa hobbies och fritidsaktiviteter.

☐ **Måttlig**
Kan arbeta/gå i skola, men har problem att klara vissa arbetsuppgifter eller har problem att upprätthålla ett normalt socialt liv. Klarar alla hushållsgöromål utom de allra tyngsta.

☐ **Svårighet att arbeta**
Kan arbeta/gå i skola, men klarar endast ett fåtal arbetsuppgifter. Kan inte upprätthålla ett normalt socialt liv. Klarar bara av lättare hushållsgöromål.

☐ **Oförmögen att arbeta**
För sjuk för att arbeta eller fullfölja utbildning. Kan endast utföra ett fåtal lättare hushållsgöromål i hemmet och behöver viss hjälp vid förflyttning.

☐ **Oförmögen att förflytta mig utan hjälp av person eller utan rullstol**

☐ **Sängliggande**

☐ **Medvetslös**

Smärta

Endast **ett alternativ** skall väljas!

☐ **Ingen**

☐ **Lätt**
Har lätta smärtor som försvinner med hjälp av alvedon/magnecyl.

☐ **Måttlig**
Har måttliga smärtor som inte försvinner med hjälp av alvedon/magnecyl.

☐ **Kraftig**
Har svåra smärtor mot vilka morfin är föreskrivet.

Forts nästa sida!

Obehag

Endast **ett alternativ** skall väljas!

☐ **Inget**
Nästan alltid mycket glad och avslappnad. Har mycket stöd av och kontakt med vänner.

☐ **Lätt**
Glad och avslappnad största delen av tiden, men orolig och deprimerad ibland. Har en del stöd av och kontakt med vänner.

☐ **Måttligt**
Orolig och deprimerad största delen av tiden, men glad och avslappnad ibland. Lite stöd av och kontakt med vänner.

☐ **Kraftigt**
Nästan alltid mycket orolig och deprimerad. Inget stöd av eller kontakt med vänner.

☐ **Extremt deprimerad**
Överväger om livet är värt att leva.

Forts nästa sida!

Var vänlig och fyll i uppgifterna A och B.
Kryssa i **minst en ruta i varje grupp (1 - 6) i uppgift A**. Välj det/de påståenden som bäst beskriver hur Du känner Dig i dag. I **uppgift B** skall Du **dra en linje** från rutan till skalan.

UPPGIFT A

Grupp 1

☐ Jag går utan svårigheter.

☐ Jag kan inte gå utan hjälpmedel (käpp, krycka eller rullator).

☐ Jag är sängliggande.

Grupp 2

☐ Jag behöver ingen hjälp med min dagliga hygien, mat eller påklädning.

☐ Jag kan inte klä på mig själv.

☐ Jag kan inte äta utan hjälp.

Grupp 3

☐ Jag klarar av min huvudsakliga sysselsättning (t ex arbete, studier, hushållssysslor).

☐ Jag klarar inte av min huvudsakliga sysselsättning.

Grupp 4

☐ Jag klarar av familje- och fritidsaktiviteter.

☐ Jag klarar inte av familje- och fritidsaktiviteter.

Grupp 5

☐ Jag har varken smärtor eller obehag.

☐ Jag har måttliga smärtor eller obehag.

☐ Jag har svåra smärtor eller obehag.

Grupp 6

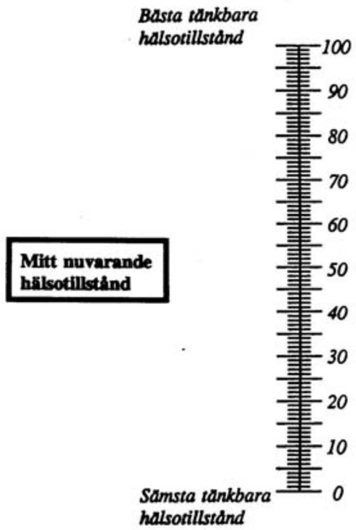
☐ Jag är inte orolig eller nedstämd.

☐ Jag är orolig eller nedstämd.

UPPGIFT B

Till hjälp för att avgöra hur bra eller dåligt ett hälstillstånd är finns nedanstående skala. Ditt bästa tänkbara hälsotillstånd motsvarar 100 på skalan och Ditt sämsta tänkbara hälsotillstånd av 0.

Vi vill att Du skall markera hur bra eller dåligt Ditt hälsotillstånd är i dag, så som Du själv bedömmer det. Gör detta genom att dra **en linje** från rutan till den punkt på skalan som makerar hur Ditt hälsotillstånd är i dag.



Forts nästa sida!

Var vänlig och besvara följande frågor <u>även</u> om Du tycker att Du svarat på liknande frågor tidigare i formuläret.

Om Du är sängliggande någon gång under dagen på grund av skadan, besvara frågorna 1a) och 1b):

1a) Varför ligger Du till sängs under dagen?
(Du får kryssa för flera alternativ.)

- ☐ Läkaren har ordinerat det.
- ☐ Jag orkar inte vara uppe.
- ☐ Jag kan inte förflytta mig utan hjälp.
- ☐ Något annat. Ange vad ________________________________

1b) Hur många timmar ligger Du till sängs under dagen? ________ timmar

2 Har trafikolyckan påverkat Din hälsa på något sätt som inte framgår av Dina tidigare svar?

- ☐ Nej
- ☐ Ja. Ange hur________________________________

____

____

3 Har något annat än trafikolyckan påverkat Din hälsa?

- ☐ Nej
- ☐ Ja. Ange hur________________________________

____

____

Forts nästa sida!

Vi ber Dig vänligen att besvara nedanstående frågor.

---

1. Har Du på grund av **Din skada i trafiken** vårdats på

a) rehabiliteringsklinik på sjukhus eller motsvarande	☐ ja	☐ nej
Om ja, hur länge vårdades Du där?	............st dagar	
b) vårdhem/sjukhem eller motsvarande	☐ ja	☐ nej
Om ja, hur länge vårdades Du där?	............st dagar	

2. Har Du på grund av **Din skada i trafiken** besökt läkare, sjuksköterska eller sjukgymnast någon gång under **de senaste fem månaderna**?

a) läkare	☐ ja	☐ nej
Om ja, ange antalet besök	.... st besök	
b) sjuksköterska/sjukgymnast	☐ ja	☐ nej
Om ja, ange antalet besök	.... st besök	

Frågorna 3 och 4 skall besvaras om Du förvärvsarbetar.

3. Har Din arbetstid minskat **på grund av skadan i trafiken**?	☐ ja	☐ nej
Om ja, vilken är Din arbetstid idag?	.................%	
4. Har Du under de senaste fem månaderna varit sjukskriven **på grund av skadan i trafiken**?	☐ ja	☐ nej

Om ja, ange vilken eller vilka perioder Du varit sjukskriven under de senaste fem månaderna.

fr o m ....../......19...... t o m ....../......19......

fr o m ....../......19...... t o m ....../......19......

fr o m ....../......19...... t o m ....../......19......

Tack för Din medverkan!

Accuracy of indicator estimates – approach and estimators

Working paper

Karin Brundell-Freij, Department of Traffic Engineering, Lund University

The method applied in the following is based on the basic understanding that *"The number of accidents can not be predicted, no more than a roll of a dice."* (Hauer & Gårder, 1986). For that reason, Hauer and Gårder argue that the true measure of safety for a system is the ***expected*** number of accidents during a given time period, E(λ). In this perspective, the number of accidents actually occurring, λ, is merely an estimate of that target value.

Based on the same approach, in this work we have regarded any indicator value computed, as an *estimate* of a corresponding expected value. Those unknown expected values each represent the target, "true", value for a specific dimension of safety consequences. The observed data is thus regarded as outcome of stochastic processes, based on the expected, "true" values.

The indicators which are presented in this work fall into three main categories, relating to

- Numbers (of injured)
- Total consequences (aggregated over a set of injured individuals)
- Average consequences for each individual (severity)

respectively.

All indicators may either be given as a comprehensive description, relevant to the whole group registered, or (more often) as a value relevant for a specific subgroup, *i*, only. Such subgroups may relate to specific road user categories, types of traffic environment, etcetera.

There are both absolute and "relative" versions of indicators. The "relative" representations focus comparison between subgroups. The nature of comparison does however differ somewhat between the three types of indicators, according to the table below.

Absolute indicator	**"Relative" equivalent**
Numbers, N_i	Proportion, $p_i^N = \frac{N_i}{N_{tot}}$
Total consequences, $x_i^{TOT} = \sum_{j \in i} x_j$	Proportion, $p_i^X = \frac{x_i^{TOT}}{x_{tot}^{TOT}}$
Severity, $\overline{x_i} = \frac{\sum_{j \in i} x_j}{N_i}$	Normalised severity, $\overline{x_i}^{rel} = \frac{\overline{x_i}}{\overline{\overline{x_{TOT}}}}$

In the table, N is numbers, and x consequences. The subscript *i* represents values relevant for the subgroup *i*, while the **sub**script *TOT* represents values relevant to the whole group of injured. In contrast, the **super**script *TOT*, refers to a sum, an aggregation over all individuals in a given (sub) group. The subscript *j*, finally, refers to individuals.

For all indicators, accuracy has been estimated, based on the overall approach that the values are to be regarded as outcome of a stochastic process, and that they **estimate** the true expected values of that process. The estimation methods have been chosen as a balance between relevance of the stochastic model assumed, on one hand, and the tractability of the computations required for the estimations of accuracy, on the other.

In the following, the chosen approach is presented for each of the six types of indicators separately. The approach is here represented by the equation applied for estimating the variance of the estimate, $V*$. In the main text of the thesis, however, the square root of $V*$, (standard error, s.e.) is used to represent accuracy in figures and tables.

Numbers, absolute

Here we base the estimation of accuracy on the very common Poisson model for accident numbers (Hauer, 1997). Thus, $V^*(N_i) = N_i$.

"Relative" numbers, proportion

Here, a rather simplified model is applied. We assume that N_i is the outcome of a binomial experiment, where each of the N_{TOT} individuals (with this number being regarded as fixed) are assigned to subgroup *i* with a given probability. This probability is then the target, true, value $E(p_i^N)$. Under this model, the relevant variance could be estimated as

$$V^*(p_i^N) = \frac{p_i^N(1 - p_i^N)}{N_{TOT}}$$

which is the estimator we have used.

It is clear that the stochastic model here is far from ideal. A much more appropriate model would regard all N_i as the outcome of separate Poisson processes. For that model, however, the estimation of $V^*(p_i^N)$ becomes considerably more complex.

Total consequences, absolute

The estimation in this case is based on two entities that are estimated separately

- the relevant number of injured, N_i, and
- the average severity for those, $\overline{x_i} = \frac{\sum_{j \in i} x_j}{N_i}$

For the estimation of total consequences, those are multiplied together. The two estimates may be regarded as stochastically independent.

Due to non-response, the N applied for the enumeration to total consequences - number of registered injured -, and the N upon which the computation of average severity is based – number of respondents - will not always match. To allow for that difference, two different variables, $N_{i,enum}$ (for enumeration) and N_i (basis for average) is used in the following.

For the estimation of variance, we apply Gauss' approximation formula for the variance of a function of a vector of independent stochastic variables, $\widetilde{Z}$:

$$V(f(\widetilde{Z})) = \sum V(Z_i)(\frac{\partial f}{\partial Z_i})^2 .$$

For the case when $f(Z_1, Z_2) = Z_1 Z_2$ we get

$$V(f(\widetilde{Z})) = (Z_2)^2 V(Z_1) + (Z_1)^2 V(Z_2)$$

In our case the two elements are $N_{i,enum}$ and $\overline{x_i}$, respectively.

For $N_{i,enum}$ we use $V^*(N_{i,enum}) = N_{i,enum}$ (Poisson model).

For $\overline{x_i}$ we have the usual equation

$$V^*(\overline{x_i}) = \frac{V^*(x_j, j \in i)}{N_i} .$$

Thus, we may estimate

$$V^*(x_i^{TOT}) = N_{i,enum}{}^2 \frac{V^*(x_j, j \in i)}{N_i} + \overline{x_i}^2 N_{i,enum}$$

"Relative" total consequences, proportion

For this type of indicator, we base our estimation on four separate entities. We have N_i, and $\overline{x_i}$ as before, but also the corresponding values for the individuals **not** relevant to *i*, N_{non-i}, and $\overline{x_{non-i}}$, respectively.

$$p_i^X = \frac{x_i^{TOT}}{x_{tot}^{TOT}} = \frac{N_{i,enum}\overline{x_i}}{N_{i,enum}\overline{x_i} + N_{non-i,enum}\overline{x_{non-i}}}$$

As before, the four entities of the estimation may be regarded as independent of each other. Again, we apply Gauss' approximation, which gives:

$$V^*(\frac{Z_1Z_2}{Z_1Z_2+Z_3Z_4}) = V(Z_1)\left(\frac{Z_2}{Z_1Z_2+Z_3Z_4} - \frac{Z_1(Z_2)^2}{(Z_1Z_2+Z_3Z_4)^2}\right)^2 +$$

$$+V(Z_2)\left(\frac{Z_1}{Z_1Z_2+Z_3Z_4} - \frac{(Z_1)^2Z_2}{(Z_1Z_2+Z_3Z_4)^2}\right)^2 +$$

$$+V(Z_3)\left(-\frac{Z_1Z_2Z_4}{(Z_1Z_2+Z_3Z_4)^2}\right)^2 + V(Z_4)\left(-\frac{Z_1Z_2Z_3}{(Z_1Z_2+Z_3Z_4)^2}\right)^2$$

As before, we use Poisson approximation for numbers

$$V^*(N_i) = N_i \quad ; \quad V^*(N_{non-i}) = N_{non-i}$$

and apply

$$V^*(\overline{x_i}) = \frac{V^*(x_j, j \in i)}{N_i}.$$

For $V^*(\overline{x_{non-i}})$, however, we do not unfortunately have any comprehensive estimate from the standard output from the analyses. This is because all initial analyses are made per subgroup.

To avoid extensive extra computer work, we therefore assume that $V(\overline{x_{non-i}})$ may be estimated by weighing together the variances of all other subgroups, *k*, (that is all except *i)*, according to their relative size:

$$V^*(\overline{x_{non-i}}) \approx \sum_{k \in non-i} \frac{N_k}{N_{TOT}^* - N_i} V(\overline{x_k}).$$

This approximation is valid when the uncertainty of the estimation of average severity dominates over the uncertainty in the relative size of subgroups. A possible case when this would be less applicable is when there are certain small subgroups (the size of which thus is uncertain from data), which have consequences that are extreme compared to consequences in other subgroups.

In most cases, however, it is assumed that weighing the variances from subgroups together, is a relevant approximation.

Under the assumptions made, we thus may express:

$$V*\left(\frac{N_i\overline{x_i}}{N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}}}\right)=N_i\left(\frac{\overline{x_i}}{N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}}}-\frac{N_i(\overline{x_i})^2}{(N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}})^2}\right)^2+$$

$$+\frac{V(x_j,j\in i)}{N_i}\left(\frac{N_i}{N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}}}-\frac{(N_i)^2\overline{x_i}}{(N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}})^2}\right)^2+$$

$$+N_{non-i}\left(-\frac{N_i\overline{x_i}\,\overline{x_{non-i}}}{(N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}})^2}\right)^2+$$

$$+\sum_{k\in non-i}\frac{N_k}{N^*_{TOT}-N_i}V(\overline{x_k})\left(-\frac{N_i\overline{x_i}N_{non-i}}{(N_i\overline{x_i}+N_{non-i}\overline{x_{non-i}})^2}\right)^2$$

Severity, absolute

As has been seen above, this is estimated as an ordinary mean over cases, and the corresponding estimate of the variance is standard output according to

$$V*(\overline{x_i})=\frac{V*(x_j,j\in i)}{N_i}$$

"Relative" severity, normalised

The normalised version of the severity indicator is introduced only to improve comparability between different indicators (which may be very different in scale), when presented in the same figure.

For that reason, the estimate of accuracy here neglects the uncertainty of the denominator, $\overline{x_{TOT}}$. Thus, our approach simply regards the division by the overall average as a rescaling of the estimated values $\overline{x_i}$, by a fixed scale factor. Consequently, the relevant variance is estimated as

$$V^*(\overline{x_i}) = \frac{V^*(x_j, j \in i)}{N_i \overline{(x_{TOT})}^2}.$$

References

Hauer E : Observational before-after studies in road safety : estimating the effect of highway and traffic engineering measures on road safety. Pergamon, Oxford, 1997

Hauer E, Gårder P, 1986: Research into the Validity of the Traffic Conflict Technique. Accident Analysis and Prevention. Vol 18, No 6, 1986.

Appendix D

Table D4.1 Municipalities in the admittance areas of the five hospitals, 1991

Hospitals	**Municipalities** (Dec 31, 1991**,** SCB 1992**)**		
	Name	**Inhabitants**	**Area (km^2)**
Karlshamn	**Karlshamn**	31 407	491.2
(62,767 inh., 1,069 km^2)	Olofström	15 029	391.7
	Sölvesborg	16 331	186.2
Karlskrona	**Karlskrona**	59 279	1 043.2
(88,401 inh., 1,872 km^2)	Ronneby	29 122	829.0
Lidköping	Essunga	6 028	236.0
(80 579 inh., 2, 034 km^2)	Grästorp	6 152	264.5
	Götene	13 543	405.6
	Lidköping	36 097	688.9
	Skara	18 759	439.4
Lund	Burlöv	14 498	18.8
(217,539 inh. 1,903 km^2)	Eslöv	28 195	421.3
	Hörby	13 748	422.5
	Höör	13 186	293.5
	Kävlinge	23 599	153.2
	Lomma	17 099	55.2
	Lund	89 598	430.8
	Staffanstorp	17 616	107.8
Umeå	Bjurholm	2 924	1 316.9
(126,931 inh. 9,347 km^2)	Nordmaling	8 184	1 233.6
	Robertsfors	7 868	1 298.0
	Umeå	92 653	2 316.5
	Vindeln	6 691	2 648.3
	Vännäs	8 611	533.7

The five hospitals: 576,217 inh. 16,226 km^2
The total of Sweden: 8 644,119 inh., 410,934 km^2

Table D4.2 Police reported traffic injured in Sweden during one year, 1991, distributed over injury severity and selected traffic-engineering factors (SCB, 1992)

Factors	**Injured** N=21,802	
	No.	%
Injury Severity		
Dead	745	3.4
Severely injured	4,832	22.2
Slightly injured	16,225	74.4
Road environment		
Rural	10,004	45.9
Urban	11,798	54.1
Road users		
Pedestrians	1,707	7.8
Cyclists	2,821	12.9
Mopedists	834	3.8
Motor-cyclists	971	4.5
Motorists	15,357	70.4
Others	112	.5
Types of accident		
Single	5,272	24.2
Collision	14,716	67.5
Others	1,814	8.3

Appendix E

Table E5.1 Police and hospital data from five hospital admittance areas, 1991/92 distributed over sub-groups within the sources

Hospital	P		S		eS		gPS		eP		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	
Karlshamn	172	50.0	293	85.2	172	50.0	120	34.9	52	15.1	344
Karlskrona	213	38.4	482	86.5	342	61.6	133	24.0	80	14.4	555
Lidköping	282	41.8	560	83.0	393	58.2	147	21.8	135	20.0	675
Lund	725	63.7	697	61.2	423	37.2	264	23.2	451	39.6	1,138
Umeå	330	32.8	883	87.9	675	67.2	199	19.8	131	13.0	1,005
Total	1,722	46.3	2,915*	78.4	2,005	53.9	863	23.2	849	22.8	3,717

* Incl 56 dead, of whom 49 are not treated at hospital

Table E5.2 Cumulative average and sum of health loss among injured within the first week after the accident distributed over received hospital care, data from five hospitals, 1991/92 (lost days with full health)

Health loss	Care			Total
	Dead	In-patient	Out-patient	
Mean (s e)	6.9 (.03)	1.5 (.04)	.9 (.02)	1.2 (.03)
Sum (s e)	**408 (46)**	**1,067 (46)**	**1,914 (51)**	**3,389 (97)**
% of Sum (s e)	**12.0 (?)**	**31.5 (?)**	**56.5 (?)**	**100.0**
N (w1)	59	458	1,344	1,861
N (total=t)	**59**	**726**	**2,129**	**2,914**
% of Nt	**2.0**	**24.9**	**73.1**	**100.0**

Enumerated numbers are written in **bold letters**

Abbreviations: (s e) = standard error, N=population answering the health inquiry, Nt=the total population, w1=within one week

Table E5.3 Costs [x10^6 SEK] of medical care and sick leave for registered injured road users at five hospitals in 1991/92 in different time perspectives

Indicator	Time perspectives									
	- m1		- m6		- y1		-y2		-y3,5	
	No.	%	No.	%	No.	%	No.	%	No.	%
Hospital stay	29.89	55.8	100.46	69.4	110.20	67.8	125.99	66.2	138.9	62.7
Visits to a doctor	7.05	13.1	9.00	6.2	9.67	5.9	10.33	5.5	10.89	4.9
Visits to a physiotherapist/nurse	-		2.05	1.4	3.05	1.9	3.87	2.0	4.77	2.2
Sick leave	16.64	31.1	33.29	23.0	39.67	24.4	50.08	26.3	67.12	30.3
Total and % of subtotal	53.58	100.0	144.80	100.0	162.59	100.0	190.27	100.0	221.7	100.0
% of total cost		24.2		65.3		73.3		85.8		

Table E6.1 Injured in different road environments, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Road environment	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
Rural	950 (31)	55.2 (.01)	1,023 (32)	35.1 (.9)
Urban	772 (28)	44.8 (.01)	1,773 (42)	60.8 (.9)
Unknown	-	-	119 (11)	4.1 (.3)
Total injured	1,722 (42)	100.0	2,915 (54)	100.0

Abbreviations: (s e) =standard error

Table E6.2 Injury severities, police and received care for traffic injured, hospital distributed over injured in different road environments, data from the five hospital admittance areas, 1991/92

Road environment	**Police,** N=1,722			**Hospital**, N=2,914		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Rural	5.1 (.7)	24.5 (1.4)	70.4 (1.5)	4.4 (.6)	29.2 (1.4)	66.4 (1.5)
Urban	1.0 (.4)	25.1 (1.6)	73.8 (1.6)	.4 (.2)	22.8 (1.0)	76.8 (1.0)
Unknown	-	-	-	0 (0)	24.6 (4.0)	75.4 (4.0)
Total	3.3 (.4)	24.8 (1.0)	72.0 (1.1)	1.8 (.3)	25.2 (.8)	73.1 (.8)

Abbreviation: D=dead, Se I=severely injured, Sl I=slightly injured, In-p= In-patient cared, Out-p=Out-patient cared,
(s e)=standard error

Table E6.3 Average and sum of injury severity score (ISS) distributed over injured in different road environments, data from five hospitals, 1991/92

ISS	**Road environment**			
	Rural	**Urban**	**Unknown**	**Total**
Mean (s e	4.7 (.3)	2.9 (.1)	2.9 (.3)	3.5 (.1)
Sum (s e)	4,753 (295)	5,100 (202)	343 (49)	10,197 (362)
% of Sum (s e)	46.6 (1.9)	50.0 (1.9)	3.4 (.5)	100.0
N	1,020	1,771	118	2,909
% of N	35.1	60.9	4.1	100.0

Abbreviations: (s e)=standard error, N=measured numbers

Table E6.4 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured in different road environments, data from five hospitals, 1991/92

Lengths of hospital stay	**Road environment**			
	Rural	**Urban**	**Unknown**	**Total**
m1				
Mean (s e)	1.8 (.2)	1.3 (.1)	1.5 (.4)	1.5 (.1)
Sum (s e)	1,789 (174)	2,305 (191)	181 (55)	4,274 (266)
% of Sum (s e)	41.8 (3.7)	53.9 (3.7)	4.2 (1.3)	100.0
m6				
Mean (s e)	6.6 (1.0)	3.9 (.5)	6.4 (2.6)	5.0 (.5)
Sum (s e)	**6,766 (1,085)**	**6,915 (951)**	**760 (317)**	**14,440 (1,461)**
% of Sum (s e)	**46.9 (6.6)**	**47.9 (6.1)**	**5.3 (2.2)**	**100.0**
y1				
Mean (s e)	7.6 (1.2)	4.6 (.6)	6.9 (2.7)	5.7 (.6)
Sum (s e)	**7,747 (1,262)**	**8,067 (1,115)**	**814 (320)**	**16,628 (1,700)**
% of Sum (s e)	**46.6 (6.3)**	**48.5 (6.0)**	**4.9 (2.0)**	**100.0**
y2				
Mean (s e)	9.2 (1.5)	5.5 (.8)	7.9 (2.8)	6.9 (.7)
Sum (s e)	**9,443 (1,568)**	**9,769 (1,491)**	**926 (333)**	**20,139 (2,182)**
% of Sum (s e)	**46.9 (6.3)**	**48.5 (6.1)**	**4.6 (1.8)**	**100.0**
y3,5				
Mean (s e)	10.5 (1.7)	6.4 (1.1)	7.9 (2.8)	7.9 (.9)
Sum (s e)	**10,741 (1,773)**	**11,365 (2,009)**	**926 (333)**	**23,032 (2,707)**
% of Sum (s e)	**46.6 (6.5)**	**49.3 (6.4)**	**4.0 (1.6)**	**100.0**
N (m1)	1,022	1,773	118	2,913
N (m6)	439	810	46	1,295
N (y1)	411	744	40	1,195
N (y2)	405	720	39	1,164
N (y3,5)	381	698	35	1,114
N (total=t)	1,022	1,773	118	2,913
% of Nt	35.1	60.9	4.1	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, N=measured numbers, (s e) = standard error

Table E6.5 Cumulative average and total sum of visits to a doctor one month and longer after the accident distributed over injured in different road environments, data from five hospitals, 1991/92

Visits to a doctor [1]	**Road environment**			
	Rural	**Urban**	**Unknown**	**Total**
m1				
Mean (s e)	1.7 (.1)	2.0 (.1)	2.0 (.2)	1.9 (.04)
Sum (s e)	**1,719 (78)**	**3,475 (122)**	**233 (28)**	**5,427 (147)**
% of Sum (s e)	**31.7 (1.3)**	**64.0 (1.4)**	**4.3 (.5)**	**100.0**
m6				
Mean (s e)	2.3 (.1)	2.7 (.1)	2.9 (.5)	2.6 (.1)
Sum (s e)	**2,394 (120)**	**4,752 (212)**	**346 (67)**	**7,492 (250)**
% of Sum (s e)	**32.0 (1.9)**	**63.4 (2.3)**	**4.6 (.9)**	**100.0**
y1				
Mean (s e)	2.7 (.1)	2.9 (.1)	3.2 (.5)	2.8 (.1)
Sum (s e)	**2,711 (141)**	**5,106 (221)**	**383 (69)**	**8,200 (270)**
% of Sum (s e)	**33.1 (1.9)**	**62.3 (2.3)**	**4.7 (.9)**	**100.0**
y2				
Mean (s e)	3.0 (.2)	3.2 (.1)	3.9 (.6)	3.2 (.1)
Sum (s e)	**3,110 (166)**	**5,638 (267)**	**459 (80)**	**9,207 (322)**
% of Sum (s e)	**33.8 (2.0)**	**61.2 (2.4)**	**5.0 (.9)**	**100.0**
y3,5				
Mean (s e)	3.3 (.2)	3.5 (.2)	3.9 (.6)	3.4 (.1)
Sum (s e)	**3,366 (177)**	**6,223 (319)**	**459 (80)**	**10,048 (371)**
% of Sum (s e)	**33.5 (2.0)**	**61.9 (2.3)**	**4.6 (.9)**	**100.0**
N (m1)	533	937	48	1,518
N (m6)	475	791	42	1,308
N (y1)	456	746	39	1,241
N (y2)	447	733	39	1,219
N (y3,5)	429	713	35	1,177
N (total=t)	1,023	1,773	119	2,915
% of Nt	35.1	60.8	4.1	100.0

1) The first visit to E. R. is included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, N=measured numbers, (s e) = standard error

Table E6.6 Cumulative average and total sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured in different road environments, data from five hospitals, 1991/92

Visits to a physiotherapist/nurse	Road environment			
	Rural	**Urban**	**Unknown**	**Total**
m6				
Mean (s e)	2.4 (.6)	2.6 (.3)	6.3 (3.0)	2.7 (.3)
Sum (s e)	**2,435 (588)**	**4,574 (543)**	**750 (368)**	**7,759 (857)**
% of Sum (s e)	**31.4 (8.1)**	**59.0 (10.2)**	**9.7 (4.5)**	**100.0**
y1				
Mean (s e)	4.1 (.7)	3.5 (.4)	8.4 (3.3)	3.9 (.4)
Sum (s e)	**4,172 (761)**	**6,268 (659)**	**995 (399)**	**11,435 (1,069)**
% of Sum (s e)	**36.5 (6.9)**	**54.8 (7.5)**	**8.7 (3.4)**	**100.0**
y2				
Mean (s e)	5.5 (.8)	4.2 (.4)	12.0 (4.2)	5.0 (.4)
Sum (s e)	**5,583 (859)**	**7,520 (722)**	**1,424 (512)**	**14,526 (1,210)**
% of Sum (s e)	**38.4 (6.8)**	**51.8 (6.9)**	**9.8 (3.4)**	**100.0**
y3,5				
Mean (s e)	6.7 (.9)	5.4 (.6)	12.0 (4.2)	6.1 (.5)
Sum (s e)	**6,892 (962)**	**9,523 (1,001)**	**1,424 (512)**	**17,839 (1,460)**
% of Sum (s e)	**38.6 (6.0)**	**53.4 (6.2)**	**8.0 (2.8)**	**100.0**
N (m6)	447	727	40	1,214
N (y1)	444	721	39	1,204
N (y2)	438	721	38	1,197
N (y3,5)	426	708	39	1,168
N (total=t)	1,023	1,773	119	2,915
% of Nt	35.1	60.8	4.1	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, N=measured numbers, (s e) = standard error

Table E6.7 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured in different road environments, data from five hospitals, 1991/92

Lengths of sick leave [1]	**Road environment**			
	Rural	**Urban**	**Unknown**	**Total**
m1				
Mean (s e)	3.9 (.3)	3.4 (.2)	4.6 (1.0)	3.6 (.2)
Sum (s e)	**4,040 (322)**	**6,007 (382)**	**548 (133)**	**10,595 (517)**
% of Sum (s e)	**38. 1 (3.0)**	**56.7 (3.2)**	**5.2 (1.2)**	**100.0**
m6				
Mean (s e)	7.8 (.8)	6.9 (.6)	8.0 (2.3)	7.2 (.5)
Sum (s e)	**7,989 (851)**	**12,177 (1,041)**	**947 (281)**	**21,112 (1,370)**
% of Sum (s e)	**37.8 (3.8)**	**57.7 (4.0)**	**4.5 (1.4)**	**100.0**
y1				
Mean (s e)	9.2 (.9)	8.2 (.7)	10.8 (2.9)	8.6 (.5)
Sum (s e)	**9,407 (966)**	**14,498 (1,227)**	**1,282 (358)**	**25,187 (1,596)**
% of Sum (s e)	**37.3 (3.8)**	**57.6 (4.1)**	**5.1 (1.5)**	**100.0**
y2				
Mean (s e)	11.1 (1.2)	10.4 (1.0)	16.6 (4.8)	10.9 (.7)
Sum (s e)	**11,400 (1,206)**	**18,523 (1,749)**	**1,971 (578)**	**31,894 (2,180)**
% of Sum (s e)	**35.7 (4.1)**	**58.1 (4.7)**	**6.2 (1.9)**	**100.0**
y3,5				
Mean (s e)	16.0 (2.1)	13.7 (1.4)	16.6 (4.8)	14.6 (1.2)
Sum (s e)	**16,352 (2,139)**	**24,214 (2,545)**	**1,971 (578)**	**42,537 (3,395)**
% of Sum (s e)	**38.4 (4.5)**	**56.9 (4.7)**	**4.6 (1.4)**	**100.0**
N (m1)	566	976	52	1,594
N (m6)	476	801	43	1,320
N (y1)	456	737	40	1,233
N (y2)	442	711	39	1.192
N (y3,5)	432	720	36	1,188
N (total=t)	1,023	1,773	119	2,915
% of Nt	35.1	60.8	4.1	100.0

1) The length of sick leave is based on 251 working days per year.

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, N=measured numbers, (s e) = standard error

Table E6.8 Cumulative average length and sum of health loss among injured one month and longer after the accident distributed over injured in different road environments, data from five hospitals, 1991/92

Length s of health loss	**Road environment**			
	Rural	**Urban**	**Unknown**	**Total**
m1				
Mean (s e)	4.7 (.1)	3.3 (.1)	3.4 (.4)	3.8 (.1)
Sum (s e)	**4,799 (209)**	**5,884 (174)**	**406 (50)**	**11,090 (276)**
% of Sum (s e)	**43.3 (1.4)**	**53.1 (1.4)**	**3.7 (.5)**	**100.0**
m6				
Mean (s e)	19.4 (.6)	11.1 (.4)	9.9 (1.7)	14.0 (.3)
Sum (s e)	**19,889 (1,240)**	**19,606 (943)**	**1,181 (214)**	**40,677 (1,573)**
% of Sum (s e)	**48.9 (1.8)**	**48.2 (1.7)**	**2.9 (.6)**	**100.0**
y1				
Mean (s e)	33.7 (.8)	16.9 (.7)	14.3 (2.8)	22.7 (.5)
Sum (s e)	**34,501 (1,897)**	**29,920 (1,416)**	**1,705 (347)**	**66,126 (2,393)**
% of Sum (s e)	**52.2 (1.8)**	**45.2 (1.6)**	**2.6 (.6)**	**100.0**
y2				
Mean (s e)	60.8 (1.5)	27.0 (1.2)	21.7 (5.4)	38.7 (.9)
Sum (s e)	**62,197 (3,427)**	**47,888 (2,554)**	**2,585 (654)**	**112,671 (4,324)**
% of Sum (s e)	**55.2 (2.0)**	**42.5 (1.7)**	**2.3 (.6)**	**100.0**
y3,5				
Mean (s e)	97.1 (2.3)	39.1 (1.9)	22.8 (5.5)	58.8 (1.4)
Sum (s e)	**99,374 (5,343)**	**69,375 (3,955)**	**2,713 (664)**	**171,462 (6,681)**
% of Sum (s e)	**58.0 (1.8)**	**40.5 (1.7)**	**1.6 (.4)**	**100.0**
N (m1)	604	1,049	55	1,708
N (m6)	502	846	47	1,395
N (y1)	471	780	41	1,292
N (y2)	453	752	40	1,245
N (y3,5)	441	734	37	1,212
N (total=t)	1,023	1,773	119	2,915
% of Nt	35.1	6+.8	4.1	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, N=measured numbers, (s e) = standard error

Table E6.9 Injured road users, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Road users	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
Pedestrian	80 (9)	4.6 (2.3)	320 (18)	11.0 (1.8)
Cyclist	249 (16)	14.5 (2.2)	1,123 (34)	38.5 (1.5)
Mopedist	93 (10)	5.4 (2.3)	183 (14)	6.3 (1.8)
Motorcyclist	83 (9)	4.8 (2.4)	130 (11)	4.5 (1.8)
Motorist	1,202 (35)	69.8 (1.3)	1,106 (33)	38.0 (1.5)
Others	15 (4)	.9 (2.4)	33 (6)	1.1 (1.8)
Unknown	-	-	19 (4)	.7 (1.9)
Total injured	1,722 (42)	100.0	2,915 (54)	100.0

Abbreviations: (s e) =standard error

Table E6.10 Injury severities, police and received care for traffic injured, hospital distributed over road users, data from the five hospital admittance areas, 1991/92

Road users	**Police,** N=1,722			**Hospital**, N=2,914		
	Injury severity			Injury severity		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Pedestrian	5.0 (2.4)	37.5 (5.4)	57.5 (5.5)	3.8 (1.1)	27.5 (2.5)	71.9 (2.5)
Cyclist	2.4 (1.0)	34.1 (3.0)	63.5 (3.0)	.4 (.2)	21.9 (1.2)	77.6 (1.2)
Mopedist	0 (0)	29.0 (4.7)	71.0 (4.7)	0 (0)	36.1 (3.6)	63.9 (3.6)
Motorcyclist	1.2 (1.2)	42.2 (5.4)	56.6 (5.4)	.8 (.8)	36.9 (4.2)	62.3 (4.3)
Motorist	3.7 (.5)	20.5 (1.1)	75.7 (1.2)	4.0 (.6)	25.0 (1.3)	71 1 (1.4)
Others	0 (0)	20.0 (10.3)	80.0 (10.3)	0 (0)	21.2 (7.1)	78.8 (7.1)
Unknown	-	-	-	0 (0)	10.5 (7.0)	89.5 (7.0)
Total	3.3 (.4)	24.8 (1.0)	72.0 (1.1)	1.8 (.3)	25.2 (.8)	73.1 (.8)

Abbreviation: D = dead, Se I = severely injured, Sl I = slightly injured, In-p= in-patient cared, Out-p= out-patient cared, (s e) = standard error

Table E6.11 Average and sum of injury severity score (ISS) distributed over injured road users, data from five hospitals, 1991/92

ISS	**Road users**							**Total**
	P	**C**	**Mp**	**MC**	**M**	**O**	**U**	
Mean (s e)	3.7 (.3)	2.9 (.1)	3.6 (.3)	4.2 (.5)	4.1 (.2)	2.3 (.3)	1.8 (.4)	3.5 (.1)
std dev	4.6	3.5	4.2	6.1	7.7	2.0	1.5	5.7
Sum (s e)	1,176 (105)	3,210 (151)	666 (76)	547 (85)	4,486 (288)	75 (17)	35 (10)	10,195 (362)
% of Sum (s e)	11.5 (1.1)	31.5 (1.9)	6.5 (.8)	5.4 (.8)	44.0 (2.5)	.7 (.2)	.3 (.1)	100.0
Nt (t=total)	320	1,123	183	130	1,106	33	20	2,915
% of Nt	11.0	38.5	6.3	4.5	37.9	1.1	.7	100.0

Abbreviations: P= pedestrians, C=cyclists, Mp=mopedists, MC=motor-cyclists, M=motorists, O=others, U=unknown, (s e) = standard error, N=measured numbers

Table E6.12 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured road users, data from five hospitals, 1991/92

Lengths of hospital stay	**Road users**							
	P	**C**	**Mp**	**MC**	**M**	**O**	**U**	**Total**
m1								
Mean (s e)	2.2 (.3)	1.0 (.1)	2.4 (.4)	1.8 (.4)	1.6 (.2)	.5 (.2)	.2 (.1)	1.5 (.1)
Sum (s e)	698 (112)	1,145 (131)	439 (87)	233 (51)	1,735 (174)	17 (8)	3 (2)	4,270 (266)
% of Sum (s e)	16.3 (2.9)	26.8 (3.7)	10.3 (2.2)	5.5 (1.3)	40.6 (4.8)	.4 (.2)	.1 (.1)	100.0
m6								
Mean (s e)	9.5 (1.9)	2.9 (.6)	5.9 (1.5)	2.6 (.5)	5.9 (1.0)	2.9 (1.9)	.2 (.1)	4.9 (.5)
Sum (s e)	**3,040 (630)**	**3,290 (648)**	**1,085 (283)**	**339 (70)**	**6,497 (1,135)**	**96 (65)**	**3 (2)**	**14,351 (1,461)**
% of Sum (s e)	**21.2 (4.9)**	**22.9 (5.1)**	**7.6 (2.4)**	**2.4 (.7)**	**45.3 (7.6)**	**.7 (.5)**	**0 (0)**	**100.0**
y1								
Mean (s e)	10.0 (2.0)	3.8 (.8)	6.0 (1.5)	2.6 (.5)	6.9 (1.2)	2.9 (1.9)	.2 (.1)	5.7 (.6)
Sum (s e)	**3,184 (646)**	**4,245 (864)**	**1,093 (283)**	**343 (71)**	**7,602 (1,317)**	**96 (65)**	**3 (2)**	16,566 (1,700)
% of Sum (s e)	**19.2 (4.5)**	**25.6 (5.5)**	**6.6 (2.1)**	**2.1 (.6)**	**45.9 (7.3)**	**.6 (.4)**	**0 (0)**	100.0
y2								
Mean (s e)	11.0 (2.2)	5.0 (1.1)	6.1 (1.5)	2.8 (.5)	8.6 (1.5)	2.9 (1.9)	.2 (.1)	6.9 (.7)
Sum (s e)	**3,523 (716)**	**5,570 (1,281)**	**1,122 (284)**	**358 (71)**	**9,483 (1,643)**	**96 (65)**	**3 (2)**	**20,154 (2,182)**
% of Sum (s e)	**17.5 (4.2)**	**27.6 (6.1)**	**5.6 (1.7)**	**1.8 (.5)**	**47.1 (7.4)**	**.5 (.3)**	**0 (0)**	**100.0**
y3,5								
Mean (s e)	11.0 (2.2)	6.2 (1.6)	6.1 (1.5)	2.8 (.5)	10.0 (1.7)	2.9 (1.9)	.2 (.1)	7.9 (.9)
Sum (s e)	**3,523 (716)**	**6,906 (1,853)**	**1,122 (284)**	**360 (71)**	**11,097 (1,858)**	**96 (65)**	**3 (2)**	**23,108 (2,708)**
% of Sum (s e)	**15.2 (3.8)**	**29.9 (6.9)**	**4.9 (1.5)**	**1.6 (.5)**	**48.0 (7.7)**	**.4 (.3)**	**0 (0)**	**100.0**
N (m1)	320	1,123	183	130	1,105	33	19	2,913
N (m6)	151	498	94	66	464	13	9	1,295
N (y1)	134	465	84	62	430	13	7	1,195
N (y2)	126	455	85	61	417	13	7	1,164
N (y3,5)	119	443	80	57	397	11	7	1,114
Nt (t=total)	320	1,123	183	130	1,105	33	19	2,913
% of Nt	11.0	38.5	6.3	4.5	37.9	1.1	.7	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: P= pedestrians, C=cyclists, Mp=mopedists, MC=motor-cyclists, M=motorists, O=others, U=unknown, m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N=measured numbers

Table E6.13 Cumulative average and total sum of visits to a doctor one month and longer after the accident distributed over injured road users, data from five hospitals, 1991/92

Visits to a doctor [1]	Road users							Total
	P	C	Mp	MC	M	O	U	
m1								
Mean (s e)	2.0 (.1)	1.9 (.1)	2.0 (.1)	2.4 (.2)	1.7 (.1)	1.6 (.2)	1.7 (.2)	1.9 (.04)
Sum (s e)	**634 (45)**	**2,122 (86)**	**359 (36)**	**307 (34)**	**1,924 (98)**	**51 (11)**	**32 (8)**	**5,429 (145)**
% of Sum (s e)	**11.7 (.9)**	**39.0 (1.7)**	**6.6 (.7)**	**5.7 (.6)**	**35.4 (1.7)**	**.9 (.2)**	**.6 (.2)**	**100.0**
m6								
Mean (s e)	2.7 (.1)	2.5 (.1)	2.9 (.1)	3.2 (.2)	2.5 (.1)	2.7 (.4)	2.0 (.3)	2.6 (.1)
Sum (s e)	**851 (55)**	**2,774 (99)**	**527 (42)**	**420 (38)**	**2,776 (130)**	**89 (17)**	**39 (9)**	**7,475 (250)**
% of Sum (s e)	**11.4 (1.1)**	**37.1 (2.4)**	**7.1 (1.0)**	**5.6 (.7)**	**37.1 (2.3)**	**1.2 (.3)**	**.5 (.2)**	**100.0**
y1								
Mean (s e)	2.9 (.2)	2.6 (.1)	3.1 (.2)	3.5 (.2)	2.9 (.1)	3.0 (.5)	2.0 (.3)	2.8 (.1)
Sum (s e)	**934 (63)**	**2,897 (108)**	**573 (46)**	**459 (41)**	**3,185 (154)**	**100 (20)**	**39 (9)**	**8,187 (270)**
% of Sum (s e)	**11.4 (1.1)**	**35.4 (2.3)**	**7.0 (1.0)**	**5.6 (.7)**	**38.9 (2.4)**	**1.2 (.3)**	**.5 (.2)**	**100.0**
y2								
Mean (s e)	3.5 (.4)	2.7 (.1)	3.4 (.2)	4.1 (.3)	3.4 (.2)	3.0 (.5)	2.0 (.3)	3.1 (.1)
Sum (s e)	**1,123 (145)**	**3,043 (120)**	**615 (51)**	**528 (54)**	**3,727 (182)**	**100 (20)**	**39 (9)**	**9,175 (323)**
% of Sum (s e)	**12.2 (1.7)**	**33.2 (2.5)**	**6.7 (1.0)**	**5.8 (.8)**	**40.6 (2.8)**	**1.1 (.3)**	**.4 (.1)**	**100.0**
y3,5								
Mean (s e)	3.6 (.4)	2.8 (.1)	3.4 (.2)	5.1 (.9)	3.8 (.2)	3.0 (.5)	2.0 (.3)	3.4 (.1)
Sum (s e)	**1,165 (147)**	**3,189 (136)**	**629 (52)**	**668 (123)**	**4,214 (219)**	**100 (20)**	**39 (9)**	**10,004 (372)**
% of Sum (s e)	**11.6 (1.7)**	**31.9 (2.7)**	**6.3 (1.0)**	**6.7 (1.4)**	**42.1 (3.2)**	**1.0 (.3)**	**.4 (.1)**	**100.0**
N (m1)	168	569	90	69	592	20	10	1,518
N (m6)	146	487	87	67	498	14	9	1,308
N (y1)	136	465	84	64	473	12	7	1,241
N (y2)	132	461	84	62	461	12	7	1,219
N (y3,5)	127	451	77	59	445	11	7	1,177
Nt (t=total)	320	1,123	183	130	1,106	33	20	2,915
% of Nt	11.0	38.5	6.3	4.5	37.9	1.1	.7	100.0

2) The first visit to E. R. is included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: P= pedestrians, C=cyclists, Mp=mopedists, MC=Motor-cyclists, M=motorists, O=others, U=unknown, m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N (1m)=measured numbers at the given time

Table E6.14 Cumulative average and total sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured road users, data from five hospitals, 1991/92

Visits to a physiotherapist or a nurse	**Road users**							**Total**
	P	**C**	**Mp**	**MC**	**M**	**O**	**U**	
m6								
Mean (s e)	2.6 (.7)	2.0 (.4)	2.2 (1.2)	3.6 (1.4)	3.2 (.6)	4.8 (3.4)	1.0 (.9)	2.6 (.3)
Sum (s e)	**845 (216)**	**2,212 (399)**	**401 (223)**	**469 (183)**	**3,506 (661)**	**157 (114)**	**19 (17)**	**7,609 (857)**
% of Sum (s e)	**11.1 (3.8)**	**29.1 (7.1)**	**5.3 (3.1)**	**6.2 (2.7)**	**46.1 (10.0)**	**2.1 (1.6)**	**.2 (.2)**	**100.0**
y1								
Mean (s e)	3.6 (.7)	2.5 (.4)	3.7 (1.5)	4.1 (1.4)	5.4 (.8)	5.2 (3.4)	1.0 (.9)	3.9 (.4)
Sum (s e)	**1,140 (239)**	**2,763 (470)**	**672 (275)**	**538 (187)**	**5,975 (861)**	**171 (115)**	**19 (17)**	**11,277 (1,069)**
% of Sum (s e)	**10.1 (2.8)**	**24.5 (5.1)**	**6.0 (2.6)**	**4.8 (1.9)**	**53.0 (8.4)**	**1.5 (1.1)**	**.2 (.2)**	**100.0**
y2								
Mean (s e)	4.6 (.9)	2.7 (.4)	3.8 (1.5)	5.2 (1.5)	7.5 (.9)	5.9 (3.5)	1.0 (.9)	4.9 (.4)
Sum (s e)	**1,460 (281)**	**2,991 (480)**	**696 (276)**	**670 (198)**	**8,297 (1,013)**	**196 (118)**	**19 (17)**	**14,329 (1,209)**
% of Sum (s e)	**10.2 (2.5)**	**20.9 (4.0)**	**4.9 (2.0)**	**4.7 (1.6)**	**57.9 (7.4)**	**1.4 (.9)**	**.1 (.1)**	**100.0**
y3,5								
Mean (s e)	4.8 (.9)	2.9 (.4)	3.8 (1.5)	6.4 (1.7)	10.1 (1.2)	5.9 (3.5)	1.0 (.9)	6.1 (.5)
Sum (s e)	**1,530 (285)**	**3,249 (493)**	**696 (276)**	**829 (231)**	**11,151 (1,292)**	**196 (118)**	**19 (17)**	**17,670 (1,460)**
% of Sum (s e)	**8.7 (2.0)**	**18.4 (3.3)**	**3.9 (1.6)**	**4.7 (1.5)**	**63.1 (6.8)**	**1.1 (.7)**	**.1 (.1)**	**100.0**
N (m6)	131	451	80	66	465	12	9	1,214
N (y1)	133	449	82	64	457	12	7	1,204
N(y2)	128	454	83	61	451	13	7	1,197
N(y35)	124	447	78	58	443	11	7	1,168
Nt (t=total)	320	1,123	183	130	1,106	33	20	2,915
% of Nt	11.0	38.5	6.3	4.5	37.9	1.1	.7	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: P= pedestrians, C=cyclists, Mp=mopedists, MC=motor-cyclists, M=motorists, O=others, U=unknown, m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N (1m)=measured numbers at the given time

Table E6.15 Cumulative average length and sum of sick leave [in working day] one month and longer after the accident distributed over injured road users, data from five hospitals, 1991/92

Length of sick leave [1]	**Road users**							**Total**
	P	**C**	**Mp**	**MC**	**M**	**O**	**U**	
m1								
Mean (s e)	3.1 (.5)	3.0 (.2)	2.0 (.6)	8.0 (1.0)	4.2 (.3)	2.7 (1.2)	3.4 (2.4)	3.6 (.2)
Sum (s e)	**976 (156)**	**3,388 (292)**	**360 (106)**	**1,044 (164)**	**4,612 (332)**	**89 (44)**	**64 (48)**	**10,533 (516)**
% of Sum (s e)	**9.3 (1.7)**	**32.2 (3.5)**	**3.4 (1.0)**	**9.9 (1.8)**	**43.8 (4.4)**	**.8 (.4)**	**.6 (.5)**	**100.0**
m6								
Mean (s e)	4.4 (.7)	6.4 (.7)	3.1 (1.3)	15.0 (2.8)	8.7 (.8)	8.3 (3.3)	3.4 (2.4)	7.2 (.5)
Sum (s e)	**1,392 (225)**	**7,195 (846)**	**574 (240)**	**1,946 (384)**	**9,622 (945)**	**274 (114)**	**64 (48)**	**21,068 (1,369)**
% of Sum (s e)	**6.6 (1.4)**	**34.2 (4.5)**	**2.7 (1.2)**	**9.2 (2.1)**	**45.7 (5.3)**	**1.3 (.6)**	**.3 (.2)**	**100.0**
y1								
Mean (s e)	4.8 (.8)	7.4 (.8)	3.4 (1.3)	15.9 (2.9)	11.1 (1.0)	8.3 (3.3)	3.4 (2.4)	8.6 (.5)
Sum (s e)	**1,548 (264)**	**8,298 (953)**	**621 (242)**	**2,062 (395)**	**12,238 (1,160)**	**274 (114)**	**64 (48)**	**25,106 (1,596)**
% of Sum (s e)	**6.2 (1.3)**	**33.1 (4.1)**	**2.5 (1.0)**	**8.2 (1.8)**	**48.7 (5.1)**	**1.1 (.5)**	**.3 (.2)**	**100.0**
y2								
Mean (s e)	5.9 (1.2)	8.3 (.9)	3.4 (1.3)	20.7 (4.3)	15.2 (1.6)	8.3 (3.3)	3.4 (2.4)	10.9 (.7)
Sum (s e)	**1,876 (393)**	**9,369 (1,077)**	**621 (242)**	**2,697 (572)**	**16,791 (1,743)**	**274 (114)**	**64 (48)**	**31,694 (2,180)**
% of Sum (s e)	**5.9 (1.4)**	**29.6 (4.0)**	**2.0 (.8)**	**8.5 (2.0)**	**53.0 (5.6)**	**.9 (.4)**	**.2 (.2)**	**100.0**
y3,5								
Mean (s e)	5.9 (1.2)	9.0 (1.2)	6.5 (3.4)	23.5 (5.1)	23.4 (2.7)	8.3 (3.3)	3.4 (2.4)	14.6 (1.2)
Sum (s e)	**1,876 (393)**	**10,122 (1,308)**	**1,188 (618)**	**3,053 (674)**	**25,905 (2,961)**	**274 (114)**	**64 (48)**	**42,483 (3,394)**
% of Sum (s e)	**4.4 (1.1)**	**23.8 (3.7)**	**2.8 (1.5)**	**7.2 (1.8)**	**61.0 (6.1)**	**.6 (.3)**	**.2 (.1)**	**100.0**
N (m1)	174	599	98	71	622	21	9	1,594
N (m6)	148	496	90	67	496	14	9	1,320
N (y1)	133	468	84	61	469	11	7	1,233
N(y2)	127	458	82	60	447	11	7	1,192
N(y35)	129	455	79	60	447	11	7	1,188
Nt (t=total)	320	1,123	183	130	1,106	33	20	2,915
% of Nt	11.0	38.5	6.3	4.5	37.9	1.1	.7	100.0

1) The length of sick leave is based on 251 working days per year.

Enumerated numbers are written in **bold letters**

Abbreviations: P= pedestrians, C=cyclists, Mp=mopedists, MC=motor-cyclists, M=motorists, O=others, U=unknown, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N (1m)=measured numbers at the given time

Table E6.16 Cumulative average health loss and sum of health one month and longer after the accident distributed over injured road users, data from five hospitals, 1991/92

Health loss	**Road users**							**Total**
	P	**C**	**Mp**	**MC**	**M**	**O**	**U**	
m1								
Mean (s e)	4.3 (.2)	2.9 (.1)	2.8 (.2)	4.1 (.2)	4.7 (.1)	3.5 (.5)	1.9 (.4)	3.8 (.1)
Sum (s e)	**1,383 (88)**	**3,224 (125)**	**511 (47)**	**531 (50)**	**5.253 (216)**	**114 (22)**	**36 (9)**	**11,053 (276)**
% of Sum (s e)	**12.5 (.9)**	**29.2 (1.3)**	**4.6 (.5)**	**4.8 (.5)**	**47.5 (1.7)**	**1.0 (.2)**	**.3 (.1)**	**100.0**
m6								
Mean (s e)	15.9 (.9)	8.7 (.5)	7.5 (.9)	13.0 (1.2)	20.1 (.7)	9.8 (2.3)	4.7 (1.6)	13.9 (.3)
Sum (s e)	**5,097 (460)**	**9,769 (657)**	**1,376 (181)**	**1,692 (236)**	**22,261 (1,317)**	**323 (85)**	**89 (37)**	**40,607 (1,572)**
% of Sum (s e)	**12.6 (1.1)**	**24.1 (1.5)**	**3.3 (.5)**	**4.2 (.5)**	**54.8 (2.3)**	**.8 (.2)**	**.2 (.1)**	**100.0**
y1								
Mean (s e)	24.4 (1.4)	12.7 (.7)	10.9 (1.3)	19.3 (1.8)	35.3 (1.0)	14.0 (3.3)	4.7 (1.6)	22,7 (.5)
Sum (s e)	**7,794 (677)**	**14,290 (990)**	**1,993 (257)**	**2,514 (355)**	**38,996 (2,020)**	**463 (118)**	**89 (37)**	**66,139 (2,391)**
% of Sum (s e)	**11.8 (1.0)**	**21.6 (1.4)**	**3.0 (.4)**	**3.8 (.5)**	**59.0 (2.2)**	**.7 (.2)**	**.1 (.1)**	**100.0**
y2								
Mean (s e)	37.5 (2.2)	19.9 (1.3)	17.6 (2.7)	31.2 (3.4)	63.8 (1.8)	19.2 (4.3)	4.7 (1.6)	38.7 (.9)
Sum (s e)	**11,998 (1,152)**	**22,319 (1,802)**	**3,220 (501)**	**4,058 (638)**	**70,549 (3,667)**	**634 (152)**	**89 (37)**	**112,867 (4,320)**
% of Sum (s e)	**10.6 (.9)**	**19.8 (1.4)**	**2.9 (.5)**	**3.6 (.5)**	**62.5 (2.3)**	**.6 (.2)**	**.1 (0)**	**100.0**
y3,5								
Mean (s e)	52.9 (3.1)	28.6 (2.0)	23.2 (3.7)	46.0 (5.4)	101.2 (2.8)	23.0 (5.7)	4.7 (1.6)	59.1 (1.4)
Sum (s e)	**16,941 (1,717)**	**32,154 (2,838)**	**4,252 (686)**	**5,983 (997)**	**111,964 (5,695)**	**757 (197)**	**89 (37)**	**172,139 (6,693)**
% of Sum (s e)	**9.8 (.9)**	**18.7 (1.4)**	**2.5 (.4)**	**3.5 (.5)**	**65.0 (2.3)**	**.4 (.1)**	**.1 (0)**	**100.0**
N (m1)	193	640	105	77	662	20	11	1,708
N (m6)	162	518	93	69	530	14	9	1,395
N (y1)	140	487	88	63	494	13	7	1,292
N(y2)	130	478	80	61	476	13	7	1,245
N(y35)	129	467	80	57	461	11	7	1,212
Nt (t=total)	320	1,123	183	130	1,106	33	20	2,915
% of Nt	11.0	38.5	6.3	4.5	37.9	1.1	.7	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: P= pedestrians, C=cyclists, Mp=mopedists, MC=motor-cyclists, M=motorists, O=others, U=unknown, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N (1m)=measured numbers at the given time

Table E6.17 Injured in different traffic accidents, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Types of accident	Police [P] data		Hospital [H] data	
	No.	%	No.	%
Single	583 (24)	33.9 (2.0)	1,683 (41)	57.7 (1.2)
Collision	1,138 (34)	66.1 (1.4)	1,151(34)	39.5 (1.4)
Unknown	1 (1)	.0 (3.2)	81 (9)	2.8 (1.8)
Total injured	1,722 (42)	100.0	2,915 (54)	100.0

Abbreviations: (s e) =standard error

Table E.18 Injury severities, police and received care for traffic injured, hospital distributed over injured in different traffic accidents, data from the five hospital admittance areas, 1991/92

Types of accident	**Police,** N=1,722			**Hospital**, N=2,914		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Single	2.6 (.7)	29.2 (1.9)	68.3 (1.9)	.9(.2)	24.4 (1.5)	74.7 (1.1)
Collision	3.6 (.6)	22.6 (1.2)	73.8 (1.3)	3.2 (.5)	26.3 (1.3)	70.5 (1.3)
Unknown	0 (0)	0 (0)	.1 (3.2	0 (0)	25.0 (4.8)	75.0 (4.8)
Total	3.3 (.4)	24.8 (1.0)	72.0 (1.1)	1.8 (.3)	25.2 (.8)	73.1 (.8)

Abbreviation: D = dead, Se I = severely injured, Sl I = slightly injured, In-p= in-patient cared, Out-p= out-patient cared, (s e) = standard error

Table E6.19 Average and sum of injury severity score (ISS) distributed over injured in different traffic accidents, data from five hospitals, 1991/92

ISS	Types of accident			
	S	C	Unknown	Total
Mean (s e)	3.1 (.1)	4.0 (.2)	2.6 (.2)	3.5 (.1)
Sum (s e)	4,855 (209)	5,137 (293)	205 (30)	10,197 (362)
% of Sum (s e)	47.6 (1.8)	50.4 (1.8)	2.0 (.3)	100.0
Nt (t=total)	1,551	1,278	80	2,909
% of Nt	53.3	33.9	2.8	100.0

Abbreviations: S=single, C=collision, (s e) = standard error, N=measured numbers

Table E6.20 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured in different traffic accidents, data from five hospitals, 1991/92

Lengths of hospital stay	**Types of accident**			
	S	**C**	**Unknown**	**Total**
m1				
Mean (s e)	1.2 (.1)	1.8 (.2)	.8 (.3)	1.5 (.1)
Sum (s e)	1,913 (167)	2,300 (203)	61 (22)	4,274 (266)
% of Sum (s e)	44.8 (3.2)	53.8 (3.3)	1.4 (.5)	100.0
m6				
Mean (s e)	3.6 (.6)	6.6 (.9)	.8 (.3)	4.9 (.5)
Sum (s e)	**5,614 (902)**	**8,486 (1,116)**	**61 (22)**	**14,160 (1,461)**
% of Sum (s e)	**39.6 (5.1)**	**59.9 (5.1)**	**.4 (.2)**	**100.0**
y1				
Mean (s e)	3.7 (.6)	8.2 (1.1)	.8 (.3)	5.6 (.6)
Sum (s e)	**5,738 (905)**	**10,454 (1,392)**	**61 (22)**	**16,253 (1,700)**
% of Sum (s e)	**35.3 (4.8)**	**64.3 (4.8)**	**.4 (.1)**	**100.0**
y2				
Mean (s e)	4.2 (.7)	10.2 (1.4)	.8 (.3)	6.8 (.7)
Sum (s e)	**6,593 (1,066)**	**13,010 (1,840)**	**61 (22)**	**19,664 (2,182)**
% of Sum (s e)	**33.5 (4.9)**	**66.2 (4.9)**	**.3 (.1)**	**100.0**
y3,5				
Mean (s e)	4.8 (.8)	11.8 (1.8)	.8 (.3)	7.7 (.9)
Sum (s e)	**7,386 (1,287)**	**15,068 (2,310)**	**61 (22)**	**22,515 (2,707)**
% of Sum (s e)	**32.8 (5.2)**	**66.9 (5.2)**	**.3 (.1)**	**100.0**
N (m1)	1,555	1,278	80	2,913
N (m6)	668	596	31	1,295
N (y1)	623	546	26	1,195
N (y2)	607	531	26	1,164
N (y3,5)	585	503	26	1,114
Nt (t=total)	1,555	1,278	80	2,913
% of Nt	53.4	43.9	2.7	100.0

Abbreviations: S=single accident, C=collision, U=unknown, m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N=measured numbers

Table E6.21 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured in different traffic accidents, data from five hospitals, 1991/92

Visits to a doctor [1]	**Types of accident**			
	S	**C**	**Unknown**	**Total**
m1				
Mean (s e)	1.9 (.06)	1.8 (.05)	1.8 (.2)	1.9 (.04)
Sum (s e)	**2,970 (118)**	**2,326 (89)**	**144 (23)**	**5,438 (147)**
% of Sum (s e)	**54.6 (1.5)**	**42.8 (1.5)**	**2.6 (.4)**	**100.0**
m6				
Mean (s e)	2.6 (.1)	2.6 (.1)	1.9 (.2)	2.6 (.1)
Sum (s e)	**4,027 (220)**	**3,284 (128)**	**154 (24)**	**7,466 (250)**
% of Sum (s e)	**53.9 (1.8)**	**44.0 (1.8)**	**2.1 (.3)**	**100.0**
y1				
Mean (s e)	2.8 (.1)	2.9 (.1)	1.9 (.2)	2.8 (.1)
Sum (s e)	**4,370 (236)**	**3,655 (139)**	**154 (24)**	**8,178 (270)**
% of Sum (s e)	**53.4 (1.8)**	**44.7 (1.8)**	**1.9 (.3)**	**100.0**
y2				
Mean (s e)	3.1 (.2)	3.3 (.1)	1.9 (.2)	3.1 (.1)
Sum (s e)	**4,727 (251)**	**4,269 (203)**	**154 (24)**	**9,149 (322)**
% of Sum (s e)	**51.7 (2.0)**	**46.7 (1.9)**	**1.7 (.3)**	**100.0**
y3,5				
Mean (s e)	3.2 (.2)	3.9 (.2)	1.9 (.2)	3.4 (.1)
Sum (s e)	**4,883 (254)**	**4,908 (263)**	**154 (24)**	**9,944 (371)**
% of Sum (s e)	**49.1 (2.0)**	**49.4 (2.0)**	**1.6 (.3)**	**100.0**
N (m1)	759	727	32	1,518
N (m6)	663	616	29	1,308
N (y1)	635	580	26	1,241
N (y2)	627	566	26	1,219
N (y3,5)	598	553	26	1,177
Nt (t=total)	1,555	1,278	80	2,913
% of Nt	57.7	39.5	2.7	100.0

3) The first visit to E. R. is included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: S=single accident, C=collision, U=unknown, m1= within one month; m6=within six months, y1=within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N=measured numbers at given time

Table E6.22 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured in different traffic accidents, data from five hospitals, 1991/92

Visits to a physiotherapist/nurse	**Types of accident**			
	S	**C**	**Unknown**	**Total**
m6				
Mean (s e)	2.6 (.5)	2.8 (.4)	.4 (.3)	2.6 (.3)
Sum (s e)	**3,996 (744)**	**3,578 (468)**	**31 (24)**	**7,606 (857)**
% of Sum (s e)	**52.5 (5.8)**	**47.0 (5.8)**	**.4 (.3)**	**100.0**
y1				
Mean (s e)	3.8 (.6)	4.2 (.5)	.4 (.3)	3.9 (.4)
Sum (s e)	**5,862 (918)**	**5,355 (586)**	**31 (24)**	**11,248 (1,069)**
% of Sum (s e)	**52.1 (4.9)**	**47.6 (4.9)**	**.3 (.2)**	**100.0**
y2				
Mean (s e)	4.5 (.6)	5.6 (.6)	.4 (.3)	4.9 (.4)
Sum (s e)	**7,044 (998)**	**7,144 (728)**	**31 (24)**	**14,219 (1,210)**
% of Sum (s e)	**49.5 (4.4)**	**50.2 (4.4)**	**.2 (.2)**	**100.0**
y3,5				
Mean (s e)	4.9 (.6)	7.7 (.8)	.4 (.3)	6.0 (.5)
Sum (s e)	**7,573 (997)**	**9,828 (1,053)**	**31 (24)**	**17,432 (1,464)**
% of Sum (s e)	**43.4 (4.3)**	**56.4 (4.3)**	**.2 (.1)**	**100.0**
N (m6)	618	568	28	1,214
N (y1)	617	561	26	1,204
N(y2)	615	556	26	1,197
N(y35)	599	543	26	1,168
Nt (t=total)	1,555	1,278	80	2,913
% of Nt	53.4	43.9	2.7	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: S=single accident, C=collision, U=unknown, m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N=measured numbers at given time

Table E6.23 Cumulative average length and sum of sick leave [in working days] one month and longer after the accident distributed over injured in different traffic accidents, data from five hospitals, 1991/92

Length of sick leave [1)]	**Types of accident**			
	S	**C**	**Unknown**	**Total**
m1				
Mean (s e)	3.5 (.2)	3.8 (.2)	3.2 (1.1)	3.6 (.2)
Sum (s e)	**5.427 (383)**	**4,844 (334)**	**255 (89)**	**10,526 (516)**
% of Sum (s e)	**51.6 (3.0)**	**46.0 (2.9)**	**2.4 (.8)**	**100.0**
m6				
Mean (s e)	6.8 (.6)	7.9 (.7)	3.9 (1.3)	7.2 (.5)
Sum (s e)	**10,512 (983)**	**10,109 (933)**	**313 (107)**	**20,934 (1,371)**
% of Sum (s e)	**50.2 (3.5)**	**48.3 (3.5)**	**1.5 (.5)**	**100.0**
y1				
Mean (s e)	7.7 (.7)	9.9 (.9)	3.9 (1.3)	8.5 (.5)
Sum (s e)	**11,942 (1,090)**	**12,627 (1,133)**	**313 (107)**	**24,882 (1,597)**
% of Sum (s e)	**48.0 (3.4)**	**50.7 (3.4)**	**1.3 (.4)**	**100.0**
y2				
Mean (s e)	8.8 (.8)	13.5 (1.3)	3.9 (1.3)	10.7 (.7)
Sum (s e)	**13,746 (1,320)**	**17,215 (1,668)**	**313 (107)**	**31,274 (2,181)**
% of Sum (s e)	**44.0 (3.5)**	**55.0 (3.6)**	**1.0 (.4)**	**100.0**
y3,5				
Mean (s e)	10.1 (1.1)	20.0 (2.2)	3..9 (1.3)	14.3 (1.2)
Sum (s e)	**15,690 (1,696)**	**25,586 (2,788)**	**313 (107)**	**41,588 (3,389)**
% of Sum (s e)	**37.7 (3.7)**	**61.5 (3.8)**	**.8 (.3)**	**100.0**
N (m1)	796	763	35	1,594
N (m6)	675	616	29	1,320
N (y1)	632	575	26	1,233
N(y2)	611	555	26	1,192
N(y35)	606	556	26	1,188
Nt (t=total)	1,555	1,278	80	2,913
% of Nt	53.4	43.9	2.7	100.0

1) The length of sick leave is based on 251 working days per year

Enumerated numbers are written in **bold letters**

Abbreviations: S=single accident, C=collision, U=unknown, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N=measured numbers at given time

Table E6.24 Cumulative average health loss and sum of health one day and longer after the accident distributed over injured in different traffic accidents, data from five hospitals, 1991/92

Health loss	Types of accident			
	S	**C**	**Unknown**	**Total**
m1				
Mean (s e)	3.3 (.1)	4.4 (.1)	2.1 (.2)	3.8 (.1)
Sum (s e)	**5,198 (172)**	**5,672 (213)**	**164 (22)**	**11,034 (276)**
% of Sum (s e)	**47.1 (1.3)**	**51.4 (1.4)**	**1.5 (.2)**	**100.0**
m6				
Mean (s e)	11.0 (.4)	18.0 (.6)	4.5 (.8)	13.9 (.3)
Sum (s e)	**17,150 (915)**	**22,948 (1,268)**	**361 (66)**	**40,459 (1,572)**
% of Sum (s e)	**42.4 (1.5)**	**56.7 (1.6)**	**.9 (.2)**	**100.0**
y1				
Mean (s e)	16.8 (.7)	30.6 (.8)	4.5 (.8)	22.6 (.5)
Sum (s e)	**26,172 (1,392)**	**39,156 (1,929)**	**361 (66)**	**65,690 (2,391)**
% of Sum (s e)	**39.8 (1.5)**	**59.6 (1.5)**	**.6 (.1)**	**100.0**
y2				
Mean (s e)	27.1 (1.2)	54.3 (1.5)	4.5 (.8)	38.4 (.9)
Sum (s e)	**42,065 (2,511)**	**69,444 (3,489)**	**361 (66)**	**111,871 (4,319)**
% of Sum (s e)	**37.6 (1.5)**	**62.1 (1.5)**	**.3 (.1)**	**100.0**
y3,5				
Mean (s e)	39.1 (1.9)	85.4 (2.3)	4.5 (.8)	58.5 (1.4)
Sum (s e)	**60,867 (3,881)**	**109,167 (5,416**	**361 (66)**	**170,395 (6,692)**
% of Sum (s e)	**35.7 (1.5)**	**64.1 (1.5)**	**.2 (.1)**	**100.0**
N (m1)	868	800	40	1,708
N (m6)	717	646	32	1,395
N (y1)	659	606	27	1,292
N(y2)	638	581	26	1,245
N(y35)	617	569	26	1,212
Nt (t=total)	1,555	1,278	80	2,913
% of Nt	53.4	43.9	2.7	100.0

4) The first visit to E. R. is included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: S=single accident, C=collision, U=unknown, m1= within one month; m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, (s e) = standard error, N=measured numbers at given time

Table E6.25 Injured in different types of road design, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Road design	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
Link	933 (31)	54.2 (1.6)	1,224 (35)	42.0 (1.4)
Junction	681 (26)	39.5 (1.9)	829 (29)	28.4 (1.6)
Separated area	103 (10)	6.0 (2.3)	413 (20)	14.2 (1.7)
Others	1 (1)	.1 (3.1)	123 (11)	4.2 (1.8)
Unknown	4 (2)	.2 (2.2)	325 (18)	11.2 (1.8)
Total injured	1,722 (42)	100.0	2,915 (54)	100.0

Abbreviations: (s e) =standard error

Table E6.26 Injury severities, police [P] and received care for traffic injured, hospital [H] distributed over injured in different road designs, data from the five hospital admittance areas, 1991/92

Road design	**Police,** N=1,722			**Hospital**, N=2,914		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Link	4.3 (.7)	25.7 (1.4)	70.0 (1.5)	3.0 (.5)	28.4 (1.3)	68.5 (1.3)
Intersection	2.3 (.6)	22.6 (1.6)	75.0 (1.7)	1.8 (.5)	25.9 (1.5)	72.3 (1.6)
Separated area	0 (0)	29.1 (4.5)	70.9 (4.5)	0 (0)	17.2 (1.9)	82.8 (1.9)
Others	0 (0)	100.0 (0)	0 (0)	0 (0)	22.8 (3.8)	77.2 (3.8)
Unknown	0 (0)	50.0 (25.0)	50.0 (25.0)	0 (0)	21.8 (2.3)	78.2 (2.3)
Total	3.3 (.4)	24.8 (1.0)	72.0 (1.1)	1.8 (.3)	25.2 (.8)	73.1 (.8)

Abbreviation: D=dead, Se I=severely injured, Sl I=slightly injured, In-p= in-patient cared, Out-p=out-patient cared, (s e) =standard error

Table E6.27 Average and sum of injury severity score (ISS) distributed over injured in different road designs, data from five hospitals, 1991/92

ISS	**Road design**					
	Link	**Junction**	**Separated area**	**Others**	**Unknown**	**Total**
Mean (s e)	4.0 (.2)	3.6 (.2)	2.6 (.1)	2.5 (.2)	2.7 (.2)	3.5 (.1)
std dev	6.8	6.2	2.3	2.3	2.8	5.7
Sum (s e)	4,922 (276)	3,019 (208)	1,080 (71)	313 (38)	861 (69)	10,195 (362)
% of Sum (s e)	48.3 (2.1)	29.6 (1.8)	10.6 (.8)	3.1 (.4)	8.4 (.8)	100.0
Nt (t=total)	1,221	829	411	123	325	2,909
% of Nt	42.0	28.5	14.1	4.2	11.2	100.0

Abbreviations: (s e)=standard error, N= measured numbers

Table E6.28 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured in different road designs, data from five hospitals, 1991/92

Length of hospital stay	**Road design**					
	Links	**Junctions**	**Separated areas**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	1.5 (.1)	1.9 (.2)	.8 (.2)	1.2 (.3)	1.3 (.2)	1.5 (.1)
Sum (s e)	1,847 (171)	1,534 (168)	339 (65)	145 (39)	410 (81)	4,274 (266)
% of Sum (s e)	43.2 (4.2)	35.9 (3.9)	7.9 (1.6)	3.4 (1.0)	9.6 (2.0)	100.0
m6						
Mean (s e)	5.3 (.9)	6.5 (1.0)	2.0 (.8)	3.7 (1.5)	2.8 (.9)	4.8 (.5)
Sum (s e)	**6,494 (1,086)**	**5,364 (810)**	**843 (315)**	**451 (182)**	**923 (306)**	**14,075 (1,461)**
% of Sum (s e)	**46.1 (6.8)**	**38.1 (6.3)**	**6.0 (2.3)**	**3.2 (1.4)**	**6.6 (2.3)**	**100.0**
y1						
Mean (s e)	6.2 (1.0)	**7.7 (1.1)**	2.0 (.8)	3.7 (1.5)	2.8 (.9)	5.5 (.6)
Sum (s e)	**7,546 (1,269)**	**6,383 (965)**	**843 (315)**	**451 (182)**	**923 (306)**	**16,146 (1,700)**
% of Sum (s e)	**46.7 (6.7)**	**39.5 (6.3)**	**5.2 (2.1)**	**2.8 (1.2)**	**5.7 (2.0)**	**100.0**
y2						
Mean (s e)	7.7 (1.3)	9.5 (1.6)	2.2 (.5)	3.7 (1.5)	2.8 (.9)	6.7 (.7)
Sum (s e)	**9,356 (1,584)**	**7,867 (1,320)**	**917 (324)**	**451 (182)**	**923 (306)**	**19,514 (2,182)**
% of Sum (s e)	**47.9 (6.9)**	**40.3 (6.5)**	**4.7 (1.8)**	**2.3 (1.0)**	**4.7 (1.7)**	**100.0**
y3,5						
Mean (s e)	8.8 (1.5)	11.2 (2.2)	2.2 (.5)	3.7 (1.5)	2.8 (.9)	7.7 (.9)
Sum (s e)	**10,738 (1,791)**	**9,268 (1,811)**	**917 (324)**	**451 (182)**	**923 (306)**	**22,297 (2,707)**
% of Sum (s e)	**48.2 (7.4)**	**41.6 (6.9)**	**4.1 (1.6)**	**2.0 (.9)**	**4.1 (1.5)**	**100.0**
N (m1)	1,223	829	413	123	325	2,913
N (m6)	522	423	183	57	110	1,295
N (y1)	483	386	171	52	103	1,195
N (y1)	478	369	164	50	103	1,164
N (y3,5)	452	354	160	50	98	1,114
Nt (t=total)	1,223	829	413	123	325	2,913
% of Nt	42.0	28.5	14.2	4.2	11.2	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month, m6=within six months, y1=within a year, y2= within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.29 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured in different road designs, data from five hospitals, 1991/92

Visits to a doctor [1]	Road design					
	Link	Junction	Separated area	Others	Unknown	Total
m1						
Mean (s e)	1.8 (.1)	1.8 (.1)	2.0 (.1)	1.8 (.1)	1.9 (.1)	1.9 (.04)
Sum (s e)	**2,252 (106)**	**1,525 (69)**	**809 (54)**	**223 (25)**	**624 (52)**	**5,434 (148)**
% of Sum (s e)	**41.4 (1.7)**	**28.1 (1.4)**	**14.9 (1.0)**	**4.1 (.5)**	**11.5 (1.0)**	**100.0**
m6						
Mean (s e)	2.6 (.1)	2.6 (.1)	2.4 (.1)	2.2 (.2)	2.5 (.3)	2.6 (.1)
Sum (s e)	**3,219 (193)**	**2,155 (109)**	**1,008 (67)**	**272 (29)**	**803 (89)**	**7,457 (250)**
% of Sum (s e)	**43.2 (2.2)**	**28.9 (1.8)**	**13.5 (1.1)**	**3.6 (.5)**	**10.8 (1.2)**	**100.0**
y1						
Mean (s e)	2.8 (.2)	3.0 (.1)	2.5 (.1)	2.2 (.2)	2.9 (.4)	2.8 (.1)
Sum (s e)	**3,476 (200)**	**2,446 (122)**	**1,043 (69)**	**274 (29)**	**926 (121)**	**8,165 (270)**
% of Sum (s e)	**42.6 (2.4)**	**30.0 (2.0)**	**12.8 (1.1)**	**3.4 (.4)**	**11.3 (1.5)**	**100.0**
y2						
Mean (s e)	3.2 (.2)	3.5 (.2)	2.6 (.1)	2.3 (.2)	3.0 (.4)	3.1 (.1)
Sum (s e)	**3,929 (219)**	2,**877 (181)**	**1,070 (69)**	**281 (30)**	**965 (122)**	**9,123 (323)**
% of Sum (s e)	**43.1 (2.4)**	**31.5 (2.1)**	**11.7 (1.0)**	**3.1 (.4)**	**10.6 (1.4)**	**100.0**
y3,5						
Mean (s e)	3.5 (.2)	3.8 (.2)	2.6 (.1)	2.4 (.2)	3.6 (.6)	3.4 (.1)
Sum (s e)	**4,296 (246)**	**3,142 (193)**	**1,093 (71)**	**294 (31)**	**1,164 (206)**	**9,989 (372)**
% of Sum (s e)	**43.0 (2.9)**	**31.5 (2.5)**	**10.9 (1.1)**	**2.9 (.4)**	**11.6 (2.0)**	**100.0**
N (m1)	635	500	205	59	119	1,518
N (m6)	550	422	175	57	104	1,308
N (y1)	518	401	169	51	102	1,241
N (y1)	511	389	167	51	101	1,219
N (y3,5)	490	377	163	49	98	1,177
Nt (t=total)	1,224	829	413	123	325	2,914
% of Nt	42.0	28.5	14.2	4.2	11.2	100.0

1) The first visit to E. R. is included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month, m6=within six months, y1=within a year, y2= within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.30 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed on injured in different road designs, data from five hospitals, 1991/92

Visits to a physiotherapist /nurse	**Road design**					
	Link	**Junction**	**Separated area**	**Others**	**Unknown**	**Total**
m6						
Mean (s e)	2.5 (.5)	2.8 (.4)	2.4 (.6)	1.5 (.7)	3.9 (1.5)	2.7 (.3)
Sum (s e)	**2,999 (642)**	**2,280 (341)**	**1,008 (265)**	**188 (89)**	**1,277 (483)**	**7,752 (857)**
% of Sum (s e)	**38.7 (8.4)**	**29.4 (6.9)**	**13.0 (4.2)**	**2.4 (1.3)**	**16.5 (5.9)**	**100.0**
y1						
Mean (s e)	3.5 (.6)	4.3 (.5)	3.3 (.8)	2.5 (1.2)	5.9 (2.2)	3.9 (.4)
Sum (s e)	**4,280 (712)**	**3,590 (446)**	**1,362 (340)**	**309 (146)**	**1,916 (720)**	**11,457 (1,069)**
% of Sum (s e)	**37.4(7.5)**	**31.3 (6.7)**	**11.9 (3.7)**	**2.7 (1.4)**	**16.7 (5.8)**	**100.0**
y2						
Mean (s e)	4.5 (.6)	5.8 (.7)	3.9 (.9)	4.1 (2.0)	6.2 (2.2)	4.9 (.4)
Sum (s e)	**5,473 (783)**	**4,785 (570)**	**1,624 (370)**	**506 (246)**	**2,006 (722)**	**14,393 (1,209)**
% of Sum (s e)	**38.0 (6.7)**	**33.2 (6.3)**	**11.3 (3.1)**	**3.5 (1.8)**	**13.9 (4.8)**	**100.0**
y3,5						
Mean (s e)	5.8 (.8)	7.2 (.8)	4.1 (.9)	6.1 (2.8)	6.8 (2.3)	6.1 (.5)
Sum (s e)	**7,076 (1,034)**	**5,962 (674)**	**1,678 (372)**	**752 (349)**	**2,197 (741)**	**17,665 (1,460)**
% of Sum (s e)	**40.1 (6.6)**	**33.8 (6.0)**	**9.5 (2.6)**	**4.3 (2.1)**	**12.4 (4.1)**	**100.0**
N (m6)	504	395	163	51	101	1,214
N (y1)	502	388	165	51	98	1,204
N(y2)	499	383	164	50	101	1,197
N(y35)	486	373	162	50	97	1,168
Nt (t=total)	1,224	829	413	123	325	2,914
% of Nt	42.0	28.5	14.2	4.2	11.2	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month, m6=within six months, y1=within a year, y2= within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.31 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured in different road designs, data from five hospitals, 1991/92

Length of sick leave [1)]	**Road design**					
	Link	**Junction**	**Separated area**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	3.9 (.3)	3.6 (.3)	2.8 (.4)	4.3 (.9)	3.3 (.6)	3.6 (.2)
Sum (s e)	**4,807 (351)**	**2,989 (259)**	**1,138 (160)**	**525 (119)**	**1,084 (201)**	**10,543 (516)**
% of Sum (s e)	**45.6 (3.8)**	**28.4 (2.9)**	**10.8 (1.7)**	**5.0 (1.2)**	**10.3 (1.9)**	**100.0**
m6						
Mean (s e)	8.3 (.8)	7.3 (.8)	4.4 (.8)	7.1 (1.8)	6.3 (1.5)	7.2 (.5)
Sum (s e)	**10,180 (995)**	**6,090 (705)**	**1,799 (318)**	**871 (230)**	**2,043 (491)**	**20,982 (1,369)**
% of Sum (s e)	**48.5 (4.9)**	**29.0 (3.8)**	**8.6 (1.7)**	**4.2 (1.2)**	**9.7 (2.4)**	**100.0**
y1						
Mean (s e)	10.0 (.9)	9.0 (1.0)	4.8 (.8)	7.9 (1.9)	7.0 (1.6)	8.5 (.5)
Sum (s e)	**12,228 (1,147)**	**7,449 (855)**	**1,996 (349)**	**974 (242)**	**2,266 (526)**	**24,912 (1,596)**
% of Sum (s e)	**49.1 (4.7)**	**29.9 (3.8)**	**8.0 (1.6)**	**3.9 (1.1)**	**9.1 (2.2)**	**100.0**
y2						
Mean (s e)	12.1 (1.2)	12.5 (1.6)	5.4 (1.0)	8.7 (2.0)	8.6 (2.0)	10.7 (.7)
Sum (s e)	**14,853 (1,428)**	**10,353 (1,340)**	**2,247 (430)**	**1,073 (262)**	**2,780 (651)**	**31,307 (2,180)**
% of Sum (s e)	**47.4 (4.8)**	**33.1 (4.2)**	**7.1 (1.6)**	**3.4 (.9)**	**8.9 (2.2)**	**100.0**
y3,5						
Mean (s e)	16.5 (1.9)	17.1 (2.3)	5.4 (1.0)	13.1 (4.8)	11.4 (3.4)	14.3 (1.2)
Sum (s e)	**20,141 (2,350)**	**14,208 (1,955)**	**2,247 (430)**	**1,607 (597)**	**3,696 (1,126)**	**41,900 (3,394)**
% of Sum (s e)	**48.1 (5.9)**	**33.9 (5.1)**	**5.4 (1.3)**	**3.8 (1.5)**	**8.8 (2.8)**	**100.0**
N (m1)	668	514	221	63	128	1,594
N (m6)	550	427	182	54	107	1,320
N (y1)	522	394	166	50	101	1,233
N(y2)	504	378	162	48	100	1,192
N(y35)	493	381	164	50	100	1,188
Nt (t=total)	1,224	829	413	123	325	2,914
% of Nt	42.0	28.5	14.2	4.2	11.2	100.0

1) The length of sick leave is based on 251 working days per year
Enumerated numbers are written in **bold letters**
Abbreviations: m1=within one month, m6=within six months, y1=within a year, y2= within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.32 Cumulative average health loss and sum of health loss among injured one month and longer after the accident distributed over injured in different road designs, data from five hospitals, 1991/92

Health loss	**Road design**					
	Link	**Junction**	**Separated area**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	4.0 (.1)	4.3 (.2)	2.9 (.1)	2.9 (.2)	3.0 (.2)	3.8 (.1)
Sum (s e)	**4,938 (199)**	**3,539 (160)**	**1,205 (65)**	**362 (38)**	**983 (70)**	**11,027 (276)**
% of Sum (s e)	**44.8 (1.6)**	**32.1 (1.5)**	**10.9 (.7)**	**3.3 (.4)**	**8.9 (.7)**	**100.0**
m6						
Mean (s e)	15.3 (.5)	16.7 (.8)	8.7 (.6)	9.6 (1.2)	8.9 (1.0)	13.8 (.3)
Sum (s e)	**18,773 (1,133)**	**13,878 (958)**	**3,596 (292)**	**1,185 (165)**	**2,889 (332)**	**40,321 (1,572)**
% of Sum (s e)	**46.6 (2.0)**	**34.4 (1.8)**	**8.9 (.8)**	**2.9 (.5)**	**7.2 (.9)**	**100.0**
y1						
Mean (s e)	25.7 (.7)	28.1 (1.2)	12.3 (.9)	12.6 (1.5)	12.3 (1.4)	22.5 (.5)
Sum (s e)	**31,483 (1,719)**	**23,320 (1,475)**	**5,084 (411)**	**1,546 (204)**	**3,996 (483)**	**65,430 (2,391)**
% of Sum (s e)	**48.1 (1.9)**	**35.6 (1.7)**	**7.8 (.7)**	**2.4 (.4)**	**6.1 (.8)**	**100.0**
y2						
Mean (s e)	45.2 (1.3)	49.5 (2.2)	17.7 (1.6)	17.8 (2.5)	16.4 (1.9)	38.2 (.9)
Sum (s e)	**55,368 (3,116)**	**41,000 (2,706)**	**7,316 (670)**	**2,192 (328)**	**5,345 (648)**	**111,221 (4,320)**
% of Sum (s e)	**49.8 (1.9)**	**36.9 (1.8)**	**6.6 (.7)**	**2.0 (.3)**	**4.8 (.6)**	**100.0**
y3,5						
Mean (s e)	70.2 (1.9)	77.0 (3.4)	23.9 (2.2)	23.8 (3.9)	20.9 (2.6)	58.1 (1.4)
Sum (s e)	**85,942 (4,818)**	**63,801 (4,240)**	**9,856 (950)**	**2,923 (500)**	**6,788 (1872)**	**169,309 (7,768)**
% of Sum (s e)	**50.8 (1.9)**	**37.7 (1.8)**	**5.8 (.6)**	**1.7 (.3)**	**4.0 (.6)**	**100.0**
N (m1)	706	544	243	68	147	1,708
N (m6)	575	450	193	58	119	1,395
N (y1)	537	418	179	51	107	1,292
N(y2)	520	401	170	50	104	1,245
N(y35)	503	390	169	49	101	1,212
Nt (t=total)	1,224	829	413	123	325	2,914
% of Nt	42.0	28.5	14.2	4.2	11.2	100.0

Enumerated numbers are written in **bold letters**
Abbreviations: m1=within one month, m6=within six months, y1=within a year, y2= within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.33 Injured in different types of road-surface condition, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Road-surface conditions	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
Dry	1,018 (32)	59.1 (1.5)	1,415 (38)	48.6 (1.3)
Wet	472 (22)	27.4 (2.0)	504 (22)	17.3 (1.7)
Ice/snow	213 (15)	12.4 (2.3)	538 (23)	18.5 (1.7)
Others	0 (0)	0 (0)	14 (4)	.5 (1.9)
Unknown	19 (4)	1.1 (2.4)	443 (21)	15.2 (1.7)
Total injured	1,722 (42)	100.0	2,915 (54)	100.0

Abbreviations: (s e) =standard error

Table E6.34 Injury severities, police [P] and received care for traffic injured, hospital [H] distributed over injured on different road-surface conditions, data from the five hospital admittance areas, 1991/92

Road-surface conditions	**Police,** N=1,722			**Hospita**l, N=2,914		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Dry	3.7 (.6)	25.5 (1.4)	70.7 (1.4)	2.5 (.4)	25.2 (1.1)	72.3 (1.2)
Wet	3.0 (.8)	23.3 (2.0)	73.7 (2.0)	2.4 (.7)	27.6 (2.0)	70.0 (2.0)
Ice/snow	1.9 (.9)	25.4 (3.0)	72.8 (3.0)	.7 (.4)	26.8 (1.9)	72.5 (1.9)
Others	0 (0)	0 (0)	0 (0)	0 (0)	42.9 (13.2)	57.1 (13.2)
Unknown	0 (0)	15.8 (8.4)	84.2 (8.4)	0 (0)	19.9 (1.9)	80.1 (1.9)
Total	3.3 (.4)	24.8 (1.0)	72.0 (1.1)	1.8 (.3)	25.2 (.8)	73.1 (.8)

Abbreviation: D=dead, Se I=severely injured, Sl I=slightly injured, In-p=in-patient cared, Out-p=out-patient cared,
(s e) =standard error

Table E6.35 Average and sum of injury severity score (ISS) distributed over injured on different road-surface conditions, data from five hospitals, 1991/92

ISS	**Road-surface conditions**					
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	**Total**
Mean (s e)	3.8 (.2)	4.0 (.3)	2.9 (.2)	3.4 (.8)	2.7 (.2)	3.5 (.1)
std dev	6.3	7.0	4.2	2.9	3.1	5.7
Sum (s e)	5,402 (276)	2,003 (181)	1,533 (117)	48 (17)	1,209 (87)	10,195 (362)
% of Sum (s e)	53.0 (2.3)	19.6 (1.7)	15.0 (1.3)	.5 (.2)	11.9 (1.0)	100.0
Nt (t=total)	1,411	504	537	14	443	2,909
% of Nt	48.5	17.3	18.5	.5	15.2	100.0

Abbreviations: (s e)=standard error, N= measured numbers

Table E6.36 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured on different road-surface conditions, data from five hospitals, 1991/92

Length of hospital stay	Road-surface conditions					
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	1.5 (.1)	2.0 (.3)	1.2 (.2)	3.4 (2.1)	1.1 (.2)	1.5 (.1)
Sum (s e)	2,107 (185)	1,008 (141)	619 (89)	48 (33)	487 (83)	4,269 (266)
% of Sum (s e)	49.4 (5.5)	23.6 (3.9)	14.5 (2.6)	1.1 (.8)	11.4 (2.3)	100.0
m6						
Mean (s e)	4.7 (.7)	7.4 (1.6)	3.6 (.9)	12.3 (6.3)	3.5 (1.0)	4.8 (.5)
Sum (s e)	**6,688 (948)**	**3,704 (793)**	**1,948 (512)**	**172 (94)**	**1,568 (464)**	**14,081 (1,461)**
% of Sum (s e)	**47.5 (7.7)**	**26.3 (6.0)**	**13.8 (4.1)**	**1.2 (.7)**	**11.1 (3.6)**	**100.0**
y1						
Mean (s e)	5.2 (.7)	10.0 (2.0)	3.7 (.9)	12.3 (6.3)	3.6 (1.0)	5.5 (.6)
Sum (s e)	**7,353 (1,048)**	**5,030 (1,035)**	**1,969 (513)**	**172 (94)**	**1,582 (464)**	**16,106 (1,700)**
% of Sum (s e)	**45.7 (7.5)**	**31.2 (6.4)**	**12.2 (3.6)**	**1.1 (.6)**	**9.8 (3.2)**	**100.0**
y2						
Mean (s e)	6.0 (.9)	13.9 (2.9)	3.9 (1.0)	12.3 (6.3)	3.6 (1.0)	6.7 (.7)
Sum (s e)	**8,541 (1,276)**	**6,985 (1,465)**	**2,082 (519)**	**172 (94)**	**1,608 (465)**	**19,389 (2,182)**
% of Sum (s e)	**44.0 (7.7)**	**36.0 (6.8)**	**10.7 (3.2)**	**.9 (.5)**	**8.3 (2.9)**	**100.0**
y3,5						
Mean (s e)	6.4 (.9)	18.0 (4.0)	4.2 (1.0)	12.3 (6.3)	3.6 (1.0)	7.6 (.9)
Sum (s e)	**8,993 (1,325)**	**9,077 (2,050)**	**2,249 (534)**	**172 (94)**	**1,608 (465)**	**22,099 (2,707)**
% of Sum (s e)	**40.7 (7.9)**	**41.1 (7.4)**	**10.2 (3.3)**	**.8 (.5)**	**7.3 (2.6)**	**100.0**
N (m1)	1,414	504	538	14	443	2,913
N (m6)	668	246	230	9	142	1,295
N (y1)	613	226	218	8	130	1,195
N (y2)	601	218	210	8	127	1,164
N (y35)	571	209	202	8	124	1,114
Nt (t=total)	1,414	504	538	14	443	2,913
% of Nt	48.5	17.3	18.5	.5	15.2	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month, m6= within six months, y1=within a year, y2 =within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N= measured numbers at given time

Table E6.37 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured on different road-surface conditions, data from five hospitals, 1991/92

Visits to a doctor [1)]	**Road-surface conditions**					
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	1.9 (.05)	1.9 (.1)	1.7 (.05)	1.6 (.2)	2.0 (.1)	1.9 (.04)
Sum (s e)	**2,644 (98)**	**978 (79)**	**909 (49)**	**22 (7)**	**890 (60)**	**5,444 (148)**
% of Sum (s e)	**48.6 (1.7)**	**18.0 (1.3)**	**16.7 (1.0)**	**.4 (.1)**	**16.4 (1.1)**	**100.0**
m6						
Mean (s e)	2.6 (.1)	2.9 (.2)	2.2 (.1)	2.6 (.7)	2.5 (.1)	2.6 (.1)
Sum (s e)	**3,634 (186)**	**1,462 (115)**	**1,194 (68)**	**36 (12)**	**1,112 (78)**	**7,438 (250)**
% of Sum (s e)	**48.9 (2.2)**	**19.7 (1.6)**	**16.1 (1.2)**	**.5 (.2)**	**14.9 (1.2)**	**100.0**
y1						
Mean (s e)	2.8 (.1)	3.3 (.2)	2.4 (.1)	2.6 (.7)	2.6 (.2)	2.8 (.1)
Sum (s e)	**3,973 (201)**	**1,673 (124)**	**1,264 (71)**	**36 (12)**	**1,170 (82)**	**8,117 (270)**
% of Sum (s e)	**48.9 (2.2)**	**20.6 (1.6)**	**15.6 (1.2)**	**.4 (.2)**	**14.4 (1.2)**	**100.0**
y2						
Mean (s e)	3.1 (.1)	4.0 (.3)	2.6 (.1)	2.7 (.7)	2.8 (.2)	3.1 (.1)
Sum (s e)	**4,369 (222)**	**2,026 (181)**	**1,404 (85)**	**38 (13)**	**1,249 (91)**	**9,087 (323)**
% of Sum (s e)	**48.1 (2.5)**	**22.3 (2.0)**	**15.5 (1.3)**	**.4 (.2)**	**13.7 (1.2)**	**100.0**
y3,5						
Mean (s e)	3.4 (.2)	4.4 (.4)	2.9 (.2)	2.7 (.7)	2.9 (.2)	3.4 (.1)
Sum (s e)	**4,765 (258)**	**2,223 (193)**	**1,582 (121)**	**38 (13)**	**1,302 (94)**	**9,910 (371)**
% of Sum (s e)	**48.1 (2.6)**	**22.4 (2.0)**	**16.0 (1.5)**	**.4 (.1)**	**13.1 (1.2)**	**100.0**
N (m1)	761	288	299	9	161	1,518
N (m6)	684	250	225	7	142	1,308
N (y1)	648	237	219	7	130	1,241
N (y2)	637	230	214	8	130	1,219
N (y35)	613	221	209	7	127	1,177
Nt (t=total)	1,414	504	538	14	443	2,913
% of Nt	48.5	17.3	18.5	.5	15.2	100.0

2) The first visit to E. R. is included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month, m6= within six months, y1=within a year, y2 =within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N= measured numbers at given time

Table E6.38 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured on different road-surface conditions, data from five hospitals, 1991/92

Visits to a physiotherapist /nurse	Road-surface conditions					
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	**Total**
m6						
Mean (s e)	2.5 (.4)	3.1 (.6)	2.6 (.6)	11.9 (11.2)	1.8 (.6)	2.6 (.3)
Sum (s e)	**3,594 (630)**	**1,542 (325)**	**1,383 (312)**	**166 (163)**	**797 (255)**	**7,483 (857)**
% of Sum (s e)	**48.0 (12.6)**	**20.6 (7.4)**	**18.5 (6.8)**	**2.2 (2.2)**	**10.7 (4.6)**	**100.0**
y1						
Mean (s e)	3.8 (.6)	4.9 (.8)	3.5 (.7)	13.8 (11.3)	2.5 (.7)	3.8 (.4)
Sum (s e)	**5,436 (790)**	**2,461 (415)**	**1,865 (385)**	**193 (165)**	**1,088 (317)**	**11,043 (1,069)**
% of Sum (s e)	**49.2(9.6)**	**22.3 (6.0)**	**16.9 (4.9)**	**1.7 (1.5)**	**9.9 (3.5)**	**100.0**
y2						
Mean (s e)	4.5 (.6)	6.8 (1.0)	4.4 (.7)	13.8 (11.3)	4.1 (1.2)	4.9 (.4)
Sum (s e)	**6.383 (841)**	**3,422 (518)**	**2,353 (411)**	**193 (165)**	**1,815 (536)**	**14,165 (1,209)**
% of Sum (s e)	**45.1 (7.8)**	**24.2 (5.6)**	**16.6 (4.2)**	**1.4 (1.2)**	**12.8 (4.2)**	**100.0**
y3,5						
Mean (s e)	5.2 (.6)	9.3 (1.3)	5.9 (1.3)	13.8 (11.3)	4.6 (1.3)	6.0 (.5)
Sum (s e)	**7,374 (907)**	**4,667 (671)**	**3,176 (717)**	**193 (165)**	**2,050 (566)**	**17,458 (1,460)**
% of Sum (s e)	**42.2 (6.9)**	**26.7 (5.6)**	**18.2 (4.7)**	**1.1 (1.0)**	**11.7 (3.6)**	**100.0**
N (m6)	628	233	217	8	128	1,214
N (y1)	630	227	214	8	125	1,204
N (y2)	623	226	212	8	128	1,197
N (y35)	611	216	207	7	127	1,168
Nt (t=total)	1,414	504	538	14	443	2,914
% of Nt	48.5	17.3	18.5	.5	15.2	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m6= within six months, y1=within a year, y2 =within two years, y3,5=within 3 years and 5 months,
(s e)=standard error, N= measured numbers at given time

Table E6.39 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured on different road-surface conditions, data from five hospitals, 1991/92

Length of sick leave [1]	**Road-surface conditions**					
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	3.5 (.2)	3.4 (.4)	4.5 (.4)	.6 (.4)	2.9 (.5)	3.6 (.2)
Sum (s e)	**4,995 (350)**	**1,729 (195)**	**2,440 (244)**	**9 (6)**	**1,298 (217)**	**10,471 (516)**
% of Sum (s e)	**47.7 (3.4)**	**16.5 (2.0)**	**23.3 (2.5)**	**.1 (.1)**	**12.4 (2.0)**	**100.0**
m6						
Mean (s e)	7.3 (.7)	7.3 (1.1)	8.5 (1.1)	.6 (.4)	5.2 (1.1)	7.2 (.5)
Sum (s e)	**10,287 (955)**	**3,694 (561)**	**4,555 (612)**	**9 (6)**	**2,299 (472)**	**20,844 (1,369)**
% of Sum (s e)	**49.4 (4.6)**	**17.7 (2.9)**	**21.9 (3.2)**	**0 (0)**	**11.0 (2.3)**	**100.0**
y1						
Mean (s e)	8.7 (.8)	9.1 (1.3)	9.7 (1.2)	.6 (.4)	5.9 (1.3)	8.5 (.5)
Sum (s e)	**12,313 (1,124)**	**4,599 (662)**	**5,226 (668)**	**9 (6)**	**2,627 (575)**	**24,733 (1,596)**
% of Sum (s e)	**49.7 (4.5)**	**18.6 (2.9)**	**21.1 (3.0)**	**0 (0)**	**10.6 (2.4)**	**100.0**
y2						
Mean (s e)	10.8 (1.1)	11.9 (1.8)	12.5 (1.7)	.6 (.4)	7.4 (1.9)	10.7 (.7)
Sum (s e)	**15,271 (1,514)**	**6,021 (912)**	**6,724 (914)**	**9 (6)**	**3,259 (855)**	**31,283 (2,180)**
% of Sum (s e)	**48.8 (4.9)**	**19.2 (3.2)**	**21.5 (3.3)**	**0 (0)**	**10.4 (2.7)**	**100.0**
y3,5						
Mean (s e)	14.3 (1.6)	16.0 (2.6)	17.9 (3.2)	.6 (.4)	9.2 (2.7)	14.4 (1.2)
Sum (s e)	**20,167 (2,300)**	**8,047 (1,322)**	**9,613 (1,707)**	**9 (6)**	**4,070 (1,179)**	**41,905 (3,394)**
% of Sum (s e)	**48.1 (5.7)**	**19.2 (3.6)**	**22.9 (4.2)**	**0 (0)**	**9.7 (2.9)**	**100.0**
N (m1)	804	298	313	10	169	1,594
N (m6)	676	254	235	9	146	1,320
N (y1)	642	236	217	8	130	1,233
N (y2)	624	223	211	8	126	1,192
N (y35)	618	227	208	8	127	1,188
Nt (t=total)	1,414	504	538	14	443	2,914
% of Nt	48.5	17.3	18.5	.5	15.2	100.0

1) The length of sick leave is based on 251 working days per year

Enumerated numbers are written in **bold letters**

Abbreviations: m1= within one month, m6= within six months, y1=within a year, y2 =within two years, y3,5=within 3 years and 5 months, (s e)=standard error, N= measured numbers at given time

Table E6.40 Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over injured on different road-surface conditions, data from five hospitals, 1991/92

Health loss	**Road-surface conditions**					
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	**Total**
m1						
Mean (s e)	3.8 (.1)	4.5 (.1)	3.4 (.1)	2.7 (.6)	3.4 (.2)	3.8 (.1)
Sum (s e)	**5,431 (201)**	**2,251 (131)**	**1,855 (97)**	**38 (11)**	**1,520 (103)**	**11,094 (276)**
% of Sum (s e)	**49.0 (1.5)**	**20.3 (1.1)**	**16.7 (.9)**	**.3 (.1)**	**13.7 (1.0)**	**100.0**
m6						
Mean (s e)	14.6 (.5)	17.3 (.8)	11.6 (.7)	8.7 (2.1)	11.4 (1.0)	14.0 (.3)
Sum (s e)	**20,617 (1,204)**	**8,720 (735)**	**6,216 (496)**	**122 (38)**	**5,059 (502)**	**40,735 (1,572)**
% of Sum (s e)	**50.6 (2.0)**	**21.4 (1.4)**	**15.3 (1.1)**	**.3 (.1)**	**12.4 (1.2)**	**100.0**
y1						
Mean (s e)	24.4 (.8)	29.3(1.2)	17.7 (1.0)	10.2 (2.5)	16.1 (1.4)	22.7 (.5)
Sum (s e)	**34,517 (1,852)**	**14,762 (1,113)**	**9,497 (739)**	**143 (38)**	**7,127 (705)**	**66,046 (2,391)**
% of Sum (s e)	**52.3 (1.9)**	**22.4 (1.4)**	**14.4 (1.0)**	**.2 (.1)**	**10.8 (1.1)**	**100.0**
y2						
Mean (s e)	42.8 (1.4)	50.9 (2.0)	28.2 (1.7)	13.5 (3.7)	24.4 (2.6)	38.7 (.9)
Sum (s e)	**60,578 (3,379)**	**25,635 (1,991)**	**15,178 (1,290)**	**189 (58)**	**10,795 (1,267)**	**112,374 (4,320)**
% of Sum (s e)	**53.9 (2.0)**	**22.8 (1.4)**	**13.5 (1.0)**	**.2 (.1)**	**9.6 (1.1)**	**100.0**
y3,5						
Mean (s e)	65.8 (2.1)	79.9 (3.2)	41.7 (2.6)	18.5 (5.7)	33.8 (4.1)	58.7 (1.4)
Sum (s e)	**93,145 (5,229)**	**40,292 (3,116)**	**22,452 (1,983)**	**259 (86)**	**14,975 (1,969)**	**171,123 (6,693)**
% of Sum (s e)	**54.4 (2.0)**	**23.5 (1.5)**	**13.1 (1.0)**	**.2 (.1)**	**8.8 (1.1)**	**100.0**
N (m1)	864	315	340	10	19	1,708
N (m6)	725	251	251	9	149	1,395
N (y1)	678	244	226	8	136	1,292
N (y2)	651	235	220	8	131	1,245
N (y35)	629	231	215	8	129	1,212
Nt (t=total)	1,414	504	538	14	443	2,914
% of Nt	48.5	17.3	18.5	.5	15.2	100.0

Estimated numbers are written in **bold letters**

Abbreviations: 1m = within one month; 6m = within six months, 1y = within a year, 2y = within two years, 3,5y = within 3 years and 5 months, (s e) = standard error, N = measured numbers at given time

Table E6.41 Injured at different type of light conditions, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Light conditions	Police [P] data		Hospital [H] data	
	No.	%	No.	%
Daylight	1,143 (34)	66.4 (1.4)	1,583 (40)	54.3 (1.3)
Dawn/dusk	125 (11)	7.3 (2.3)	325 (18)	11.2 (1.8)
Darkness	454 (21)	26.4 (2.1)	668 (26)	22.9 (1.6)
Unknown	0 (0)	0 (0)	338 (18)	11.6 (1.7)
Total injured	1,722 (42)	100.0	2,914 (54)	100.0

Abbreviations: (s e) =standard error

Table E6.42 Injury severities, police [P] and received care for traffic injured, hospital [H] distributed over injured at different light conditions, data from the five hospital admittance areas, 1991/92

Light conditions	**Police,** N=1,722			**Hospita**l, N=2,914		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Daylight	3.0 (.5)	23.3 (1.3)	73.8 (1.3)	2.0 (.4)	24.6 (1.1)	73.5 (1.1)
Dawn/dusk	2.4 (1.4)	22.4 (3.7)	75.2 (3.9)	.9 (.5)	27.7 (2.5)	71.4 (2.5)
Darkness	4.2 (.9)	29.3 (2.1)	66.5 (2.2)	2.5 (.6)	27.4 (1.7)	70.1 (1.8)
Unknown	0 (0)	0 (0)	0 (0)	.3 (.3)	21.0 (2.2)	78.7 (2.2)
Total	3.3 (.4)	24.8 (1.0)	72.0 (1.1)	1.8 (.3)	25.2 (.8)	73.1 (.8)

Abbreviation: D=dead, Se I=severely injured, Sl I=slightly injured, In-p=in-patient cared, Out-p=out-patient cared,
(s e) =standard error

Table E6.43 Average and sum of injury severity score (ISS) distributed over injured at different light conditions, data from five hospitals, 1991/92

ISS	Light conditions				
	Daylight	**Dawn/dusk**	**Darkness**	**Unknown**	**Total**
Mean (s e)	3.6 (.2)	3.4 (.3)	3.7 (.2)	2.8 (.2)	3.5 (.1)
Sum (s e)	5,653 (276)	1,108 (118)	2,498 (187)	933 (82)	10,192 (362)
% of Sum (s e)	55.5 (2.3)	10.9 (1.1)	24.5 (1.6)	9.2 (.8)	100.0
Nt (t=total)	1,579	324	668	338	2,909
% of Nt	54.3	11.1	23.0	11.6	100.0

Abbreviations: (s e)=standard error, N=measured numbers

Table E6.44 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured at different light conditions, data from five hospitals, 1991/92

Length of hospital stay	**Light conditions**				
	Daylight	**Dawn/dusk**	**Darkness**	**Unknown**	**Total**
m1					
Mean (s e)	1.4 (.1)	1.6 (.3)	1.7 (.2)	1.2 (.2)	1.5 (.1)
Sum (s e)	2,248 (191)	530 (97)	1,101 (139)	399 (70)	4,277 (266)
% of Sum (s e)	52.6 (4.2)	12.4 (2.3)	25.7 (3.3)	9.3 (1.8)	100.0
m6					
Mean (s e)	4.8 (.6)	5.5 (1.6)	5.5 (1.2)	3.5 (1.2)	4.9 (.5)
Sum (s e)	**7,662 (1,029)**	**1,794 (523)**	**3,669 (798)**	**1,166 (395)**	**14,290 (1,461)**
% of Sum (s e)	**53.6 (7.3)**	**12.6 (3.8)**	**25.7 (5.6)**	**8.2 (2.9)**	**100.0**
y1					
Mean (s e)	5.8 (.8)	5.7 (1.6)	6.4 (1.3)	3.5 (1.2)	5.6 (.6)
Sum (s e)	**9,118 (1,255)**	**1,843 (525)**	**4,242 (896)**	**1,176 (395)**	**16,379 (1,700)**
% of Sum (s e)	**55.7 (7.1)**	**11.3 (3.4)**	**25.9 (5.4)**	**7.2 (2.6)**	**100.0**
y2					
Mean (s e)	7.5 (1.1)	6.1 (1.6)	7.0 (1.4)	3.6 (1.2)	6.7 (.7)
Sum (s e)	**11,809 (1,732)**	**1,970 (540)**	**4,669 (960)**	**1,200 (396)**	**19,648 (2,182)**
% of Sum (s e)	**60.1 (6.8)**	**10.0 (3.0)**	**23.8 (5.0)**	**6.1 (2.2)**	**100.0**
y3,5					
Mean (s e)	9.0 (1.4)	6.3 (1.7)	7.2 (1.4)	3.6 (1.2)	7.7 (.9)
Sum (s e)	**14,310 (2,270)**	**2,048 (546)**	**4,769 (963)**	**1,200 (396)**	**22,327 (2,707)**
% of Sum (s e)	**64.1 (6.0)**	**9.2 (2.7)**	**21.4 (4.6)**	**5.4 (1.9)**	**100.0**
N (m1)	1,583	325	667	338	2,913
N (m6)	770	143	266	116	1,295
N (y1)	712	130	246	107	1,195
N (y2)	703	129	233	99	1,164
N (y35)	660	124	230	100	1,114
Nt (t=total)	1,583	325	667	338	2,913
% of Nt	54.3	11.2	22.9	11.6	100.0

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one months, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.45 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured at different light conditions, data from five hospitals, 1991/92

Visits to a doctor [1]	**Light conditions**				
	Daylight	**Dawn/dusk**	**Dark**	**Unknown**	**Total**
m1					
Mean (s e)	1.8 (.04)	2.0 (.1)	1.9 (.1)	2.0 (.1)	1.9 (.04)
Sum (s e)	**2,865 (96)**	**640 (48)**	**1,276 (89)**	**673 (52)**	**5,454 (148)**
% of Sum (s e)	**52.5 (1.8)**	**11.7 (.9)**	**23.4 (1.4)**	**12.3 (1.0)**	**100.0**
m6					
Mean (s e)	2.4 (.1)	2.9 (.2)	2.8 (.3)	2.6 (.2)	2.6 (.1)
Sum (s e)	**3,815 (135)**	**949 (88)**	**1,897 (185)**	**862 (69)**	**7,523 (250)**
% of Sum (s e)	**50.7 (2.4)**	**12.6 (1.3)**	**25.2 (2.2)**	**11.5 (1.1)**	**100.0**
y1					
Mean (s e)	2.7 (.1)	3.4 (.3)	3.0 (.3)	2.7 (.2)	2.8 (.1)
Sum (s e)	**4,195 (148)**	**1,099 (114)**	**2,017 (188)**	**919 (74)**	**8,230 (270)**
% of Sum (s e)	**51.0 (2.5)**	**13.3 (1.5)**	**24.5 (2.1)**	**11.2 (1.1)**	**100.0**
y2					
Mean (s e)	3.0 (.1)	3.8 (.4)	3.5 (.4)	2.9 (.2)	3.2 (.1)
Sum (s e)	**4,670 (170)**	**1,229 (128)**	**2,351 (243)**	**977 (81)**	**9,227 (323)**
% of Sum (s e)	**50.6 (2.7)**	**13.3 (1.5)**	**25.5 (2.4)**	**10.6 (1.1)**	**100.0**
y35					
Mean (s e)	3.2 (.1)	3.8 (.4)	4.1 (.4)	2.9 (.2)	3.5 (.1)
Sum (s e)	**5,066 (195)**	**1,251 (129)**	**2,752 (292)**	**993 (82)**	**10,062 (372)**
% of Sum (s e)	**50.3 (2.8)**	**12.4 (1.5)**	**27.4 (2.5)**	**9.9 (1.1)**	**100.0**
N (m1)	886	164	328	140	1,518
N (m6)	771	142	280	115	1,308
N (y1)	739	133	261	108	1,241
N (y2)	729	132	254	104	1,219
N (y35)	696	129	250	102	1,177
Nt (t=total)	1,583	325	667	338	2,913
% of Nt	54.3	11.2	22.9	11.6	100.0

3) The first visit to E. R. is included in the records presented

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one months, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.46 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured at different light conditions, data from five hospitals, 1991/92

Visits to a physiotherapist /nurse	**Light conditions**				
	Daylight	**Dawn/dusk**	**Darkness**	**Unknown**	**Total**
m6					
Mean (s e)	2.4 (.3)	3.8 (1.6)	2.7 (.6)	2.7 (.8)	2.6 (.3)
Sum (s e)	**3,768 (484)**	**1,225 (534)**	**1,810 (427)**	**903 (275)**	**7,706 (857)**
% of Sum (s e)	**48.9 (9.1)**	**15.9 (6.6)**	**23.5 (6.7)**	**11.7 (4.3)**	**100.0**
y1					
Mean (s e)	3.7 (.4)	5.9 (2.1)	3.4 (.7)	4.1 (1.2)	3.9 (.4)
Sum (s e)	**5,800 (613)**	**1,927 (675)**	**2,259 (455)**	**1,393 (414)**	**11,378 (1,069)**
% of Sum (s e)	**51.0 (8.1)**	**16.9 (5.5)**	**19.8 (5.0)**	**12.2 (4.0)**	**100.0**
y2					
Mean (s e)	4.7 (.5)	6.5 (2.1)	4.4 (.8)	6.2 (1.7)	5.0 (.4)
Sum (s e)	**7,388 (722)**	**2,108 (681)**	**2,935 (511)**	**2,082 (586)**	**14,512 (1,209)**
% of Sum (s e)	**50.9 (7.2)**	**14.5 (4.6)**	**20.2 (4.5)**	**14.3 (4.2)**	**100.0**
y35					
Mean (s e)	5.7 (.5)	6.6 (2.1)	6.7 (1.3)	6.7 (1.8)	6.1 (.5)
Sum (s e)	**8,987 (857)**	**2,160 (682)**	**4,491 (854)**	**2,248 (609)**	**17,885 (1,460)**
% of Sum (s e)	**50.2 (6.6)**	**12.1 (3.8)**	**25.1 (5.1)**	**12.6 (3.6)**	**100.0**
N (m6)	721	132	250	111	1,214
N (y1)	714	133	255	102	1,204
N (y2)	712	131	252	102	1,197
N (y35)	688	128	249	103	1,168
Nt (t=total)	1,583	325	668	338	2,914
% of Nt	54.3	11.2	22.9	11.6	100.0

Estimated numbers are written in **bold letters**

Abbreviations: m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months,
(s e)=standard error, N=measured numbers at given time

Table E6.47 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured at different light conditions, data from five hospitals, 1991/92

Length of sick leave [1]	**Light conditions**				
	Daylight	**Dawn/dusk**	**Darkness**	**Unknown**	**Total**
m1					
Mean (s e)	3.4 (.2)	4.4 (.5)	3.9 (.4)	3.3 (.5)	3.6 (.2)
Sum (s e)	**5,408 (362)**	**1,426 (182)**	**2,623 (259)**	**1,122 (192)**	**10,579 (516)**
% of Sum (s e)	**51.1 (3.4)**	**13.5 (1.8)**	**24.8 (2.6)**	**10.6 (1.8)**	**100.0**
m6					
Mean (s e)	7.2 (.6)	9.8 (1.7)	7.0 (.9)	5.3 (1.0)	7.2 (.5)
Sum (s e)	**11,344 (1,013)**	**3,191 (378)**	**4,661 (587)**	**1,775 (359)**	**20,970 (1,369)**
% of Sum (s e)	**54.1 (4.7)**	**15.2 (2.8)**	**22.2 (3.2)**	**8.5 (1.9)**	**100.0**
y1					
Mean (s e)	8.6 (.7)	12.3 (2.1)	7.8 (.9)	6.4 (1.4)	8.6 (.5)
Sum (s e)	**13,593 (1,163)**	**4,012 (708)**	**5,197 (654)**	**2,176 (481)**	**24,978 (1,596)**
% of Sum (s e)	**54.4 (4.8)**	**16.1 (2.9)**	**20.8 (3.1)**	**8.7 (2.0)**	**100.0**
y2					
Mean (s e)	11.2 (1.0)	14.4 (2.7)	9.2 (1.2)	8.2 (2.3)	10.8 (.7)
Sum (s e)	**17,804 (1,630)**	**4,664 (875)**	**6,166 (800)**	**2,778 (771)**	**31,412 (2,180)**
% of Sum (s e)	**56.7 (5.2)**	**14.8 (2.9)**	**19.6 (3.1)**	**8.8 (2.5)**	**100.0**
y35					
Mean (s e)	15.1 (1.5)	18.3 (3.9)	13.0 (2.5)	10.5 (3.2)	14.4 (1.2)
Sum (s e)	**23,899 (2,425)**	**5,948 (1,262)**	**8,677 (1,658)**	**3,539 (1,084)**	**42,063 (3,394)**
% of Sum (s e)	**56.8 (6.1)**	**14.1 (3.2)**	**20.6 (4.1)**	**8.4 (2.7)**	**100.0**
N (m1)	928	179	344	143	1,594
N (m6)	780	141	278	121	1,320
N (y1)	736	130	261	106	1,233
N (y2)	718	126	247	101	1,192
N (y35)	707	130	248	103	1,188
Nt (t=total)	1,583	325	667	338	2,913
% of Nt	54.3	11.2	22.9	11.6	100.0

1) The length of sick leave is based on 251 working days per year

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one months, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E6.48 Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over injured at different light conditions, data from five hospitals, 1991/92

Health loss	**Light conditions**				
	Daylight	**Dawn/dusk**	**Darkness**	**Unknown**	**Total**
m1					
Mean (s e)	3.8 (.1)	3.4 (.2)	4.1 (.1)	3.5 (1.5)	3.8 (.1)
Sum (s e)	**6,041 (203)**	**1,110 (80)**	**2,759 (148)**	**1,182 (84)**	**11,092 (276)**
% of Sum (s e)	**54.5(5.2)**	**10.0 (1.5)**	**24.9 (3.2)**	**10.7 (4.2)**	**100.0**
m6					
Mean (s e)	14.5 (.4)	10.5 (.8)	15.5 (.8)	11.9 (2.1)	14.0 (.3)
Sum (s e)	**22,881 (1,170)**	**3,401 (394)**	**10,348 (883)**	**4,029 (427)**	**40,659 (1,572)**
% of Sum (s e)	**56.3 (2.6)**	**8.4 (.9)**	**25.5 (1.9)**	**9.9 (1.7)**	**100.0**
y1					
Mean (s e)	23.9 (.7)	16.0 (1.3)	25.4 (1.3)	17.4 (2.4)	22.6 (.5)
Sum (s e)	**37,889 (1,783)**	**5,207 (603)**	**17,000 (1,341)**	**5,867 (635)**	**65,962 (2,391)**
% of Sum (s e)	**57.4 (2.2)**	**7.9 (.8)**	**25.8 (1.6)**	**8.9 (1.2)**	**100.0**
y2					
Mean (s e)	41.5 (1.2)	25.3 (2.1)	43.6 (2.3)	11.3 (3.7)	38.5 (.9)
Sum (s e)	**65,714 (3,230)**	**8,221 (1,024)**	**29,119 (2,420)**	**9,157 (1,218)**	**112,212 (4,320)**
% of Sum (s e)	**58.6 (2.1)**	**7.3 (.8)**	**26.0 (1.6)**	**8.2 (1.1)**	**100.0**
y35					
Mean (s e)	63.2 (1.8)	36.7 (3.0)	68.9 (3.6)	38.4 (5.2)	58.7 (1.4)
Sum (s e)	**100,072 (4,982)**	**11,935 (1,547)**	**46,047 (3,798)**	**12,981 (1,928)**	**171,036 (6,693)**
% of Sum (s e)	**58.5 (2.1)**	**7.0 (.7)**	**26.9 (1.7)**	**7.6 (1.1)**	**100.0**
N (m1)	991	191	376	150	1,708
N (m6)	828	149	296	122	1,395
N (y1)	770	139	274	109	1,292
N (y2)	743	137	262	103	1,245
N (y35)	720	130	259	103	1,212
Nt (t=total)	1,583	325	668	338	2,914
% of Nt	54.3	11.2	22.9	11.6	100.0

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one months, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N=measured numbers at given time

Table E7.1 Injured in urban areas, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Road users	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
P+C+Mp	346 (19)	44.8 (2.7)	1,304 (36)	73.5 (1.2)
M	374 (19)	48.4 (2.6)	382 (20)	21.5 (2.1)
MC	46 (7)	6.0 (3.5)	67 (8)	3.8 (2.3)
Others	6 (2)	0.8 (3.6)	15 (4)	0.8 (2.3)
Unknown	0 (0)	0 (0)	5 (2)	0.3 (2.5)
Total injured	772 (28)	100.0	1,773 (42)	100.0

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, (s e) =standard error

Table E7.2 Injury severities, police and received care for traffic injured, hospital distributed over selected road users in urban areas, data from the five hospital admittance areas, 1991/92

Road users	**Police,** N=722			**Hospital**, N=1,733		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
P+C+Mp	1.2 (.6)	34.7 (2.6)	64.2 (2.6)	.2 (.1)	23.4 (1.2)	76.5 (1.2)
M	1.1 (.6)	14.7 (1.8)	84.2 (1.9)	1.3 (.6)	18.6 (2.0)	80.1 (2.0)
MC		41.3 (7.3)	58.7 (7.3)		34.3 (5.8)	65.7 (5.8)
Others			100.0 (.0)		33.3 (12.2)	66.7 (12.2)
Unknown					20.0 (17.9)	80.0 (17.9)
Total	1.0 (.4)	25.1 (1.6)	73.8 (1.6)	.4 (.2)	22.8 (1.0)	76.8 (1.0)

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, D=dead, Se I=severely injured, Sl I= slightly injured, In-p=in-patient cared, Out-p=out-patient cared, (s e)=standard error

Table E7.3 Average and sum of injury severity score (ISS) distributed over selected road users in urban areas, data from five hospitals, 1991/92

ISS	**Road users**					**Total**
	P+C+Mp	**M**	**MC**	**Others**	**Unknown**	
Mean (s e)	2.9 (.1)	2.5 (.2)	4.3 (.9)	2.6 (.6)	1.0 (0)	2.9 (.1)
std dev	3.3	4.7	7.1	2.4	0	3.8
Sum (s e)	3,812 (158)	950 (104)	288 (68)	39 (14)	5 (2.2)	5,094 (202)
% of Sum (s e)	74.8 (3.1)	18.7 (2.0)	5.7 (1.3)	.8 (.3)	.1 (0)	100.0
Nt (t=total)	1,302	382	67	15	5	1,771
% of Nt	73.5	21.6	3.8	.8	.3	100.0

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, (s e) = standard error, N = measured numbers

Table E7.4 Cumulative average and sum of hospital stay [days] one month and longer after the accident distributed over selected road users in urban areas, data from five hospitals, 1991/92

Lengths of hospital stay (H S)	**Road users (R U)**					**Total**
	P+C+Mp	**M**	**MC**	**Others**	**Unknown**	
m1						
Mean (s e)	1.3 (.1)	1.2 (.2)	2.0 (.5)	.9 (.5)	.2 (.2)	1.3 (.1)
Sum (s e)	1,708 (165)	443 (90)	132 (38)	14 (8)	1 (1)	2,298 (191)
% of Sum (s e)	74.3 (4.9)	19.3 (3.8)	5.7 (1.7)	.6 (.4)	0 (0)	100.0
m6						
Mean (s e)	4.2 (.7)	3.1 (1.1)	2.7 (.8)	1.4 (.6)	.2 (.2)	3.9 (.5)
Sum (s e)	**5,516 (860)**	**1,192 (411)**	**184 (55)**	**20 (9)**	**1 (1)**	**6,913 (951)**
% of Sum (s e)	**79.8 (6.1)**	**17.2 (5.5)**	**2.7 (1.0)**	**.3 (.2)**	**0 (0)**	**100.0**
y1						
Mean (s e)	5.0 (.8)	3.3 (1.1)	2.8 (.8)	1.4 (.6)	.2 (.2)	4.5 (.6)
Sum (s e)	**6,559 (1,033)**	**1,276 (414)**	**188 (56)**	**20 (9)**	**1 (1)**	**8,044 (1,115)**
% of Sum (s e)	**81.5 (5.5)**	**15.9 (4.9)**	**2.3 (.8)**	**.3 (.1)**	**0 (0)**	**100.0**
y2						
Mean (s e)	6.2 (1.1)	3.6 (1.1)	2.9 (.8)	1.4 (.6)	.2 (.2)	5.5 (.8)
Sum (s e)	**8,124 (1,418)**	**1,387 (422)**	**192 (56)**	**20 (9)**	**1 (1)**	**9,724 (1,491)**
% of Sum (s e)	**83.5 (4.9)**	**14.3 (4.3)**	**2.0 (.7)**	**.2 (.1)**	**0 (0)**	**100.0**
y3,5						
Mean (s e)	7.2 (1.5)	4.4 (1.2)	2.9 (.8)	1.4 (.6)	.2 (.2)	6.4 (1.1)
Sum (s e)	**9,441 (1,936)**	**1,662 (444)**	**194 (56)**	**20 (9)**	**1 (1)**	**11,318 (2,009)**
% of Sum (s e)	**83.4 (4.8)**	**14.7 (4.3)**	**1.7 (.6)**	**.2 (.1)**	**0 (0)**	**100.0**
N (m1)	1,304	382	67	15	5	1773
N (m6)	601	165	35	7	2	810
N (y1)	554	148	34	6	2	744
N (y2)	538	140	34	6	2	720
N (y3.5)	523	134	33	6	2	698
Nt (t=total)	1,304	382	67	15	5	1,773
% of N	73.5	21.5	3.8	.8	.3	100.0

Estimated numbers are written in **bold letters**

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.5 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over selected road users in urban areas, data from five hospitals, 1991/92

Visits to a doctor [1] **(V D)**	**Road users (R U)**					**Total**
	P+C+Mp	**M**	**MC**	**Others**	**Unknown**	
m1						
Mean (s e)	1.9 (.05)	2.0 (.2)	2.4 (.2)	1.6 (.3)	1.5 (.5)	2.0 (.05)
Sum (s e)	**2,491 (92)**	**779 (75)**	**162 (25)**	**24 (7)**	**8 (4)**	**3.464 (122)**
% of Sum (s e)	**71.9 (2.2)**	**22.5 (1.9)**	**4.7 (.7)**	**.7 (.2)**	**.2 (.1)**	**100.0**
m6						
Mean (s e)	2.6 (.1)	3.0 (.2)	3.3 (.4)	2,3 (.6)	1.5 (.5)	2.7 (.1)
Sum (s e)	**3,338 (187)**	**1,135 (95)**	**218 (33)**	**35 (12)**	**8 (4)**	**4,733 (212)**
% of Sum (s e)	**70.5 (2.5)**	**24.0 (2.1)**	**4.6 (.8)**	**.7 (.3)**	**.2 (.1)**	**100.0**
y1						
Mean (s e)	2.8 (.1)	3.3 (.2)	3.6 (.4)	3.0 (.9)	1.5 (.5)	2.9 (.1)
Sum (s e)	**3,547 (194)**	**1,253 (100)**	**239 (34)**	**45 (16)**	**8 (4)**	**5,091 (221)**
% of Sum (s e)	**69.7 (2.5)**	**24.6 (2.1)**	**4.7 (.8)**	**.9 (.4)**	**.1 (.1)**	**100.0**
y2						
Mean (s e)	3.0 (.2)	3.8 (.3)	3.8 (.4)	3.0 (.9)	1.5 (.5)	3.2 (.1)
Sum (s e)	**3,873 (239)**	**1,448 (112)**	**253 (35)**	**45 (16)**	**8 (4)**	**5,625 (267)**
% of Sum (s e)	**68.8 (2.6)**	**25.7 (2.2)**	**4.5 (.8)**	**.8 (.3)**	**.1 (.1)**	**100.0**
y3,5						
Mean (s e)	3.1 (.2)	4.6 (.4)	5.4 (1.5)	3.0 (.9)	1.5 (.5)	3.5 (.2)
Sum (s e)	**4,042 (248)**	**1,738 (157)**	**363 (105)**	**45 (16)**	**8 (4)**	**6,196 (319)**
% of Sum (s e)	**65.2 (3.9)**	**28.1 (3.2)**	**5.9 (1.8)**	**.7 (.3)**	**.1 (.1)**	**100.0**
N (m1)	680	209	36	10	2	937
N (m6)	578	167	37	7	2	791
N (y1)	552	151	35	6	2	746
N(y2)	545	146	34	6	2	733
N(y3.5)	529	142	34	6	2	713
Nt (t=total)	1,304	382	67	15	5	1,773
% of Nt	73.5	21.5	3.8	.8	.3	100.0

1) The first visit to E. R. is included in the records presented

Estimated numbers are written in **bold letters**

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.6 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over selected road users in urban areas, data from five hospitals, 1991/92

Visits to a physiotherapist/nurse (V PN)	Road users (R U)					Total
	P+C+Mp	M	MC	Others	Unknown	
m6						
Mean (s e)	2.2 (.3)	3.9 (.8)	3.6 (1.9)	2.3 (2.0)	0 (0)	2.6 (.3)
Sum (s e)	**2,804 (422)**	**1,475 (311)**	**243 (129)**	**35 (31)**	**0 (0)**	**4,556 (545)**
% of Sum (s e)	**61.5 (7.7)**	**32.4 (7.2)**	**5.3 (2.9)**	**.8 (.7)**	**0 (0)**	**100.0**
y1						
Mean (s e)	2.9 (.4)	5.7 (1.0)	4.5 (1.9)	2.3 (2.0)	0 (0)	3.5 (.4)
Sum (s e)	**3,744 (516)**	**2,195 (389)**	**300 (134)**	**35 (31)**	**0 (0)**	**6,274 (660)**
% of Sum (s e)	**59.7 (6.5)**	**35.0 (6.3)**	**4.8 (2.2)**	**.6 (.5)**	**0 (0)**	**100.0**
y2						
Mean (s e)	3.1 (.4)	8.2 (1.3)	5.1 (1.9)	2.3 (2.0)	0 (0)	4.3 (.4)
Sum (s e)	**4,083 (525)**	**3,125 (489)**	**342 (136)**	**35 (31)**	**0 (0)**	**7,585 (723)**
% of Sum (s e)	**53.8 (5.8)**	**41.2 (6.1)**	**4.5 (1.9)**	**.5 (.4)**	**0 (0)**	**100.0**
y3,5						
Mean (s e)	3.4 (.4)	12.5 (2.2)	6.7 (2.5)	2.3 (2.0)	0 (0)	5.5 (.6)
Sum (s e)	**4,409 (540)**	**4,783 (868)**	**448 (170)**	**35 (31)**	**0 (0)**	**9,674 (1,003)**
% of Sum (s e)	**45.6 (6.0)**	**49.4 (6.9)**	**4.6 (2.0)**	**.4 (.3)**	**0 (0)**	**100.0**
N (m6)	530	155	34	6	2	727
N (y1)	534	145	35	5	2	721
N(y2)	535	143	35	6	2	721
N(y35)	525	142	33	6	2	708
Nt (t=total)	1,304	382	67	15	5	1,773
% of Nt	73.5	21.5	3.8	.8	.3	100.0

Estimated numbers are written in **bold letters**

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.7 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over selected road users in urban areas, data from five hospitals, 1991/92

Length of sick leave [1] (S L)	**Road users (R U)**					**Total**
	P+C+Mp	**M**	**MC**	**Others**	**Unknown**	
m1						
Mean (s e)	2.9 (.2)	4.4 (.5)	6.1 (1.3)	4.2 (2.5)	0 (0)	3.4 (.2)
Sum (s e)	**3,809 (308)**	**1,698 (196)**	**406 (102)**	**63 (40)**	**0 (0)**	**5,976 (383)**
% of Sum (s e)	**63.7 (4.5)**	**28.4 (3.8)**	**6.8 (1.7)**	**1.1 (.7)**	**0 (0)**	**100.0**
m6						
Mean (s e)	5.7 (.6)	10.2 (1.5)	10.7 (3.2)	12.2 (5.8)	0 (0)	6.9 (.6)
Sum (s e)	**7,395 (829)**	**3,883 (582)**	**720 (223)**	**184 (94)**	**0 (0)**	**12,182 (1,038)**
% of Sum (s e)	**60.7 (5.7)**	**31.9 (5.3)**	**5.9 (2.0)**	**1.5 (.8)**	**0 (0)**	**100.0**
y1						
Mean (s e)	6.4 (.7)	13.8 (2.0)	11.1 (3.2)	12.2 (5.8)	0 (0)	8.2 (.7)
Sum (s e)	**8,391 (928)**	**5,283 (790)**	**745 (224)**	**184 (94)**	**0 (0)**	**14,603 (1,225)**
% of Sum (s e)	**57.5 (5.4)**	**36.2 (5.4)**	**5.1 (1.7)**	**1.3 (.7)**	**0 (0)**	**100.0**
y2						
Mean (s e)	7.1 (.8)	21.5 (3.7)	18.3 (6.5)	12.2 (5.8)	0 (0)	10.6 (1.0)
Sum (s e)	**9,209 (1,027)**	**8,209 (1,430)**	**1,225 (442)**	**184 (94)**	**0 (0)**	**18,827 (1,748)**
% of Sum (s e)	**48.9 (6.0)**	**43.6 (7.1)**	**6.5 (2.6)**	**1.0 (.6)**	**0 (0)**	**100.0**
y3,5						
Mean (s e)	8.1 (1.1)	32.8 (5.7)	23.1 (8.1)	12.2 (5.8)	0 (0)	14.0 (1.4)
Sum (s e)	**10,539 (1,397)**	**12,511 (2,186)**	**1,548 (549)**	**184 (94)**	**0 (0)**	**24,781 (2,540)**
% of Sum (s e)	**42.5 (6.0)**	**50.5 (7.6)**	**6.2 (2.5)**	**.7 (.4)**	**0 (0)**	**100.0**
N (m1)	709	218	37	10	2	976
N (m6)	592	165	35	7	2	801
N (y1)	552	145	33	5	2	737
N(y2)	535	136	33	5	2	711
N(y3.5)	536	142	34	6	2	720
Nt (t=total)	1,304	382	67	15	5	1,773
% of Nt	73.5	21.5	3.8	.8	.3	100.0

1) The length of sick leave is based on 251 working days per year

Estimated numbers are written in **bold letters**

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.8 *Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over selected road users in urban areas, data from five hospitals, 1991/92*

Length of health loss (H L)	**Road users (R U)**					**Total**
	P+C+Mp	**M**	**MC**	**Others**	**Unknown**	
m1						
Mean (s e)	3.1 (.1)	4.0 (.2)	3.6 (.3)	3.2 (.7)	1.3 (.4)	3.3 (.1)
Sum (s e)	**4,046 (136)**	**1,539 (103)**	**241 (31)**	**48 (14)**	**6 (2.8)**	**5,881 (174)**
% of Sum (s e)	**68.8 (1.9)**	**26.2 (1.7)**	**4.1 (.6)**	**.8 (.3)**	**.1 (.1)**	**100.0**
m6						
Mean (s e)	9.8 (.4)	15.8 (1.3)	10.5 (1.6)	8.1 (3.0)	1.3 (.4)	11.1 (.4)
Sum (s e)	**12,764 (692)**	**6,044 (634)**	**701 (122)**	**121 (50)**	**6 (2.8)**	**19,636 (943)**
% of Sum (s e)	**65.0 (2.7)**	**30.8 (2.6)**	**3.6 (.7)**	**.6 (.3)**	**0 (0)**	**100.0**
y1						
Mean (s e)	14.3 (.7)	26.8 (2.0)	14.6 (2.4)	10.0 (3.3)	1.3 (.4)	16.9 (.7)
Sum (s e)	**18,689 (1,027)**	**10,221 (973)**	**981 (176)**	**150 (54)**	**6 (2.8)**	**30,048 (1,416)**
% of Sum (s e)	**62.2 (2.7)**	**34.0 (2.6)**	**3.3 (.7)**	**.5 (.2)**	**0 (0)**	**100.0**
y2						
Mean (s e)	22.0 (1.2)	46.6 (3.8)	21.9 (4.2)	13.8 (5.0)	1.3 (.4)	27.2 (1.2)
Sum (s e)	**28,733 (1,852)**	**17,809 (1,773)**	**1,469 (296)**	**208 (80)**	**6 (2.8)**	**48,225 (2,554)**
% of Sum (s e)	**59.6 (2.9)**	**36.9 (2.9)**	**3.0 (.7)**	**.4 (.2)**	**0 (0)**	**100.0**
y3,5						
Mean (s e)	30.8 (1.9)	71.9 (6.0)	31.5 (6.3)	20.7 (8.5)	1.3 (.4)	39.5 (1.9)
Sum (s e)	**40,141 (2,855)**	**27,470 (2,786)**	**2,112 (439)**	**311 (133)**	**6 (2.8)**	**70,040 (3,955)**
% of Sum (s e)	**57.3 (3.1)**	**39.2 (3.1)**	**3.0 (.7)**	**.4 (.2)**	**0 (0)**	**100.0**
N (m1)	766	229	41	10	3	1,049
N (m6)	622	178	37	7	2	846
N (y1)	577	160	35	6	2	780
N(y2)	557	153	34	6	2	752
N(y3.5)	546	147	33	6	2	734
Nt (t=total)	1,304	382	67	15	5	1,773
% of Nt	73.5	21.5	3.8	.8	.3	100.0

Estimated numbers are written in **bold letters**

Abbreviations: P=pedestrian, C=cyclist, Mp=mopedist, M=motorist, MC=motorcyclist, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.9 Performed t-tests of the influence of the selected road users in urban areas; means

Time perspectives	Indicators					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	U3>M: p=0.1					
m1		U3~M	U3~M		U3<M: p=0.01	U3<M: p=0.001
m6		U3~M	U3<M: p=0.2	U3<M: p=0.05	U3<M: p=0.01	U3<M: p=0.001
y1		U3~M	U3<M: p=0.05	U3<M: p=0.01	U3<M: p=0.001	U3<M: p=0.001
y2		U3>M: p=0.1	U3<M: p=0.02	U3<M: p=0.001	U3<M: p=0.001	U3<M: p=0.001
y3.5		U3>M: p=0.2	U3<M: p=0.001	U3<M: p=0.001	U3<M: p=0.001	U3<M: p=0.001

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, U3=pedestrians + cyclists + mopedists, M=motorists, ~ =no statistically significant difference

Table E7.10 Performed t-tests of the influence of the selected road users in urban areas; totals

Time perspectives	Indicators					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	U3>M: p=0.001					
m1		U3>M: p=0.001	U3>M: p=0.001		U3>M: p=0.001	U3>M: p=0.001
m6		U3>M: p=0.001	U3>M: p=0.001	U3>M: p=0.02	U3>M: p=0.001	U3>M: p=0.001
y1		U3>M: p=0.001	U3>M: p=0.001	U3>M: p=0.02	U3>M: p=0.02	U3>M: p=0.001
y2		U3>M: p=0.001	U3>M: p=0.001	U3>M: p=0.2	U3~M	U3>M: p=0.001
y3.5		U3>M: p=0.001	U3>M: p=0.001	U3~M	U3~M	U3>M: p=0.01

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist or a nurse,
S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, U3=pedestrians + cyclists + mopedists, M=motorists, ~ =no statistically significant difference

Table E7.11 Injured motorists on links in rural areas, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Speed limits	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
50	12 (4)	2.2 (4.3)	4 (2)	.8 (4.4)
70	163 (13)	30.1 (3.6)	90 (10)	17.9 (4.0)
90	294 (17)	54.3 (2.9)	184 (14)	36.6 (3.6)
110	69 (8)	12.8 (4.0)	54 (7)	10.7 (4.2)
Unknown	3 (0)	.6 (0)	171 (13)	34.0 (3.6)
Total injured	541(23)	100.0	503 (22)	100.0

Abbreviations: (s e)=standard error

Table E7.12 Injury severities, police, and received care, hospital, distributed over injured motorists on links at selected speed limits in rural areas, data from the five hospital admittance areas, 1991/92

Speed limits	**Police,** N=541			**Hospital**, N=503		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
50		16.7 (10.8)	83.3 (10.8)		75.0 (21.7)	25.0 (21.7)
70	3.7 (1.5)	23.3 (3.3)	73.0 (3.5)	4.4 (2.2)	37.8 (5.1)	57.8 (5.2)
90	5.4 (1.3)	29.6 (3.0)	65.0 (2.8)	8.7 (2.1)	39.1 (3.6)	52.2 (3.7)
110	14.5 (4.2)	27.5 (5.4)	58.0 (5.9)	18.5 (5.3)	37.0 (6.6)	44.4 (6.8)
Unknown			100.0 (.0)		12.9 (2.6)	87.1 (2.6)
Total	5.9 (1.0)	27.0 (1.9)	67.1 (2.0)	6.0 (1.1)	30.0 (2.0)	64.0 (2.1)

Abbreviations: D=dead, Se I=severely injured, Sl I= slightly injured, In-p=in-patient cared, Out-p=out-patient cared,
(s e)=standard error

Table E7.13 Average and sum of injury severity score (ISS) distributed over injured motorists on links at selected speed limits in rural areas, data from five hospitals, 1991/92

ISS	**Speed limits**					**Total**
	50	**70**	**90**	**110**	**Unknown**	
Mean (s e)	2.8 (1.0)	5.7 (.9)	6.6 (.8)	9.8 (1.8)	2.0 (.3)	5.2 (.4)
std dev	2.1	8.4	10.6	13.3	3.8	9.1
Sum (s e)	11 (7)	516 (96)	1,222 (171)	529 (121)	335 (56)	2,613 (236)
% of Sum (s e)	.4 (.3)	19.7 (4.1)	46.8 (6.4)	20.3 (4.4)	12.8 (2.6)	100.0
Nt (t=total)	4	90	184	54	171	503
% of Nt	.8	17.9	36.6	.10.7	34.0	100.0

Abbreviations: (s e) = standard error, Nt = total numbers

Table E7.14 Cumulative average and sum of hospital stay [days] one month and longer after the accident distributed over injured motorists on links at selected speed limits in rural areas, data from five hospitals, 1991/92

Length of hospital stay (H S)	**Speed limits**					**Total**
	50	**70**	**90**	**110**	**Unknown**	
m1						
Mean (s e)	0.8 (.6)	3.1 (.7)	2.3 (.4)	2.2 (.8)	.5 (.2)	1.8 (.2)
Sum (s e)	3 (2.4)	282 (69)	429 (85)	117 (47)	89 (43)	920 (126)
% of Sum (s e)	.3 (.3)	30.6 (8.1)	46.6 (10.1)	12.7 (5.3)	9.7 (4.7)	100.0
m6						
Mean (s e)	0.8 (.6)	10.8 (5.4)	13.7 (4.3)	14.8 (12.7)	2.6 (1.6)	9.4 (2.1)
Sum (s e)	**3 (2.4)**	**974 (491)**	**2,519 (806)**	**801 (692)**	**439 (269)**	**4,737 (1,078)**
% of Sum (s e)	**.1 (.1)**	**20.6 (12.9)**	**53.2 (23.2)**	**16.9 (13.6)**	**9.3 (6.8)**	**100.0**
y1						
Mean (s e)	0.8 (.6)	11.5 (6.4)	16.5 (5.1)	31.5 (20.9)	2.6 (1.6)	12.4 (2.6)
Sum (s e)	**3 (2.4)**	**1,036 (585)**	**3,043 (955)**	**1,700 (1,141)**	**439 (269)**	**6,222 (1,305)**
% of Sum (s e)	**0 (0)**	**16.7 (12.2)**	**48.9 (24.8)**	**27.3 (16.1)**	**7.1 (5.5)**	**100.0**
y2						
Mean (s e)	0.8 (.6)	13.4 (6.7)	24.3 (7.4)	41.2 (23.1)	2.6 (1.6)	16.7 (3.3)
Sum (s e)	**3 (2.4)**	**1,202 (608)**	**4,466 (1,368)**	**2,224 (1,257)**	**439 (269)**	**8,334 (1,678)**
% of Sum (s e)	**0 (0)**	**14.4 (9.4)**	**53.6 (22.4)**	**26.7 (13.9)**	**5.3 (3.9)**	**100.0**
y3,5						
Mean (s e)	0.8 (.6)	14.5 (6.8)	31.7 (8.8)	41.2 (23.1)	2.6 (1.6)	19.5 (3.8)
Sum (s e)	**3 (2.4)**	**1,302 (616)**	**5,835 (1,650)**	**2,224 (1,257)**	**439 (269)**	**9,803 (1,916)**
% of Sum (s e)	**0 (0)**	**13.3 (8.0)**	**59.5 (21.0)**	**22.7 (12.2)**	**4.4 (3.2)**	**100.0**
N (m1)	3	90	184	54	171	502
N (m6)	1	29	74	12	74	190
N (y1)	1	26	66	11	73	177
N (y2)	1	27	66	10	71	175
N (y3.5)	1	27	61	9	69	167
Nt (t=total)	4	90	184	54	171	503
% of N	.8	17.9	36.6	10.7	34.0	100.0

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.15 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured motorists on links at selected speed limits in rural areas, data from five hospitals, 1991/92

Visits to a doctor [1] (V D)	**Speed limits**					**Total**
	50	**70**	**90**	**110**	**Unknown**	
m1						
Mean (s e)	1.0 (0)	1.9 (.2)	1.5 (.2)	1.2 (.2)	1.5 (.1)	1.6 (.1)
Sum (s e)	**4 (2)**	**167 (23)**	**283 (36)**	**65 (15)**	**262 (25)**	**781 (52)**
% of Sum (s e)	**.5 (.3)**	**21.3 (3.0)**	**36.3 (3.8)**	**8.4 (1.9)**	**33.5 (3.4)**	**100.0**
m6						
Mean (s e)	1.0 (0)	3.0 (.6)	2.4 (.2)	1.5 (.3)	1.9 (.2)	2.2 (.2)
Sum (s e)	**4 (2)**	**273 (60)**	**438 (52)**	**79 (17)**	**325 (36)**	**1,118 (86)**
% of Sum (s e)	**.4 (.2)**	**24.4 (4.8)**	**39.2 (5.3)**	**7.0 (1.8)**	**29.1 (4.3)**	**100.0**
y1						
Mean (s e)	1.0 (0)	3.7 (.7)	2.8 (.3)	1.6 (.3)	2.0 (.2)	2.5 (.2)
Sum (s e)	**4 (2)**	**334 (70)**	**512 (59)**	**84 (18)**	**344 (40)**	**1,277 (221)**
% of Sum (s e)	**.3 (.2)**	**26.1 (4.9)**	**40.0 (5.5)**	**6.6 (1.7)**	**26.9 (4.2)**	**100.0**
y2						
Mean (s e)	1.0 (0)	4.9 (1.0)	3.2 (.3)	1.6 (.3)	2.2 (.3)	3.0 (.2)
Sum (s e)	**4 (2)**	**445 (97)**	**585 (65)**	**84 (18)**	**381 (49)**	**1,499 (121)**
% of Sum (s e)	**.3 (.1)**	**29.7 (5.6)**	**39.0 (6.0)**	**5.6 (1.5)**	**25.4 (4.5)**	**100.0**
y3,5						
Mean (s e)	1.0 (0)	5.4 (1.1)	3.5 (.4)	1.8 (.4)	2.3 (.5)	3.2 (.2)
Sum (s e)	**4 (2)**	**482 (99)**	**650 (76)**	**98 (23)**	**392 (81)**	**1,626 (319)**
% of Sum (s e)	**.2 (.1)**	**29.7 (5.8)**	**40.0 (6.3)**	**6.0 (1.8)**	**24.1 (5.1)**	**100.0**
N (m1)	1	41	98	29	88	257
N (m6)	1	33	83	20	75	212
N (y1)	1	31	84	20	73	209
N(y2)	1	31	80	19	72	203
N(y3.5)	1	31	75	19	69	195
Nt (t=total)	4	90	184	54	171	503
% of Nt	.8	17.9	36.6	10.7	34.0	100.0

2) The first visit to E. R. i1s included in the records presented

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.16 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured motorists on links at selected speed limits in rural areas, data from five hospitals, 1991/92

Visits to a physiotherapist/nurse (V PN)	Speed limits					Total
	50	70	90	110	Unknown	
m6						
Mean (s e)	0 (0)	7.7 (6.7)	3.9 (1.6)	.9 (.6)	.6 (.3)	3.1 (1.2)
Sum (s e)	0 (0)	**693 (605)**	**721 (302)**	**48 (33)**	**109 (50)**	**1,572 (609)**
% of Sum (s e)	**0 (0)**	**44..1 (25.1)**	**45.9 (34.7)**	**3.1 (3.4)**	**7.0 (6.2)**	**100.0**
y1						
Mean (s e)	0 (0)	10.6 (6.9)	6.5 (2.0)	1.2 (.6)	1.3 (.6)	4.8 (1.3)
Sum (s e)	0 (0)	**954 (622)**	**1,199 (365)**	**62 (36)**	**220 (101)**	**2,435 (667)**
% of Sum (s e)	**0 (0)**	**39.2 (18.1)**	**49.2 (25.0)**	**2.6 (2.1)**	**9.0 (6.1)**	**100.0**
y2						
Mean (s e)	0 (0)	11.1 (6.9)	7.9 (2.1)	1.4 (.7)	1.9 (.7)	5.7 (1.4)
Sum (s e)	0 (0)	**998 (624)**	**1,458 (388)**	**76 (39)**	**331 (128)**	**2,863 (688)**
% of Sum (s e)	**0 (0)**	**34.9 (16.2)**	**50.9 (22.1)**	**2.7 (2.0)**	**11.6 (6.6)**	**100.0**
y3,5						
Mean (s e)	0 (0)	11.3 (6.9)	9.7 (2.4)	2.1 (.9)	2.3 (.8)	6.6 (1.4)
Sum (s e)	0 (0)	**1,016 (624)**	**1,786 (440)**	**112 (48)**	**387 (140)**	**3,300 (773)**
% of Sum (s e)	**0 (0)**	**30.8 (14.7)**	**54.1 (20.5)**	**3.4 (2.2)**	**11.7 (6.1)**	**100.0**
N (m6)	1	30	76	19	70	196
N (y1)	1	31	80	19	71	202
N(y2)	1	29	78	19	71	198
N(y35)	1	30	74	20	69	194
Nt (t=total)	4	90	184	54	171	503
% of Nt	.8	17.9	36.6	10.7	34,0	100,0

Estimated numbers are written in **bold letters**

Abbreviations: m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error,
N (m1)=measured numbers at given time

Table E7.17 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured motorists on links at selected speed limits in rural areas, data from five hospitals, 1991/92

Length of sick leave [1)] ((S L)	**Speed limits**					**Total**
	50	**70**	**90**	**110**	**Unknown**	
m1						
Mean (s e)	1.0 (1.0)	4.8(1.0)	4.7 (.8)	4.5 (1.4)	3.4 (.6)	4.3 (.4)
Sum (s e)	**4 (4)**	**436 (99)**	**873 (159)**	**241 (85)**	**588 (114)**	**2,142 (236)**
% of Sum (s e)	**.2 (.2)**	**20.4 (5.0)**	**40.7 (7.2)**	**11.3 (4.0)**	**27.5 (5.8)**	**100.0**
m6						
Mean (s e)	1.0 (1.0)	12.8 (4.3)	11.2 (2.6)	5.2 (1.5)	5.0 (1.3)	8.6 (1.3)
Sum (s e)	**4 (4)**	**1,156 (401)**	**2,052 (486)**	**280 (90)**	**855 (220)**	**4,347 (681)**
% of Sum (s e)	**.1 (.1)**	**26.6 (8.6)**	**47.2 (10.8)**	**6.4 (2.7)**	**19.7 (6.2)**	**100.0**
y1						
Mean (s e)	1.0 (1.0)	19.3 (5.7)	12.9 (2.9)	7.3 (2.6)	6.4 (1.9)	11.1 (1.6)
Sum (s e)	**4 (4)**	**1,740 (528)**	**2,377 (537)**	**392 (144)**	**1,088 (322)**	**5,602 (823)**
% of Sum (s e)	**.1 (.1)**	**31.1 (8.8)**	**42.4 (10.3)**	**7.0 (3.1)**	**19.4 (6.5)**	**100.0**
y2						
Mean (s e)	1.0 (1.0)	27.0 (8.7)	17.0 (3.9)	9.3 (3.3)	6.5 (1.9)	14.3 (2.2)
Sum (s e)	**4 (4)**	**2,429 (795)**	**3,131 (732)**	**502 (182)**	**1,105 (322)**	**7,171 (1,095)**
% of Sum (s e)	**.1 (.1)**	**33.9 (9.8)**	**43.7 (11.5)**	**7.0 (3.3)**	**15.4 (5.6)**	**100.0**
y3,5						
Mean (s e)	1.0 (1.0)	37.1 (12.3)	28.2 (7.9)	9.3 (3.3)	6.6 (1.9)	20.1 (3.7)
Sum (s e)	**4 (4)**	**3,335 (1.122)**	**5,186 (1,459)**	**502 (182)**	**1,105 (322)**	**10,132 (1,877)**
% of Sum (s e)	**0 (0)**	**32.9 (10.7)**	**51.2 (13.2)**	**5.0 (2.5)**	**10.9 (4.3)**	**100.0**
N (m1)	2	43	104	30	92	271
N (m6)	1	34	85	21	72	213
N (y1)	1	32	85	20	73	211
N(y2)	1	29	79	20	72	201
N(y3.5)	1	31	78	19	69	198
Nt (t=total)	4	90	184	54	171	503
% of Nt	.8	17.9	36.6	10.7	34,0	100,0

1) The length of sick leave is based on 251 working days per year

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.18 Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over injured motorists on links at selected speed limits in rural areas, data from five hospitals, 1991/92

Lengths of health loss (H L)	**Speed limits**					**Total**
	50	**70**	**90**	**110**	**Unknown**	
m1						
Mean (s e)	3.1 (2.2)	5.5 (.5)	6.1 (.3)	9.4 (.6)	2.6 (.2)	5.1 (.2)
Sum (s e)	**12 (10)**	**496 (70)**	**1,128 (113)**	**507 (83)**	**439 (41)**	**2,583 (162)**
% of Sum (s e)	**.5 (.4)**	**19.2 (2.5)**	**43.7 (3.5)**	**19.6 (2.8)**	**17.0 (2.0)**	**100.0**
m6						
Mean (s e)	3.1 (2.2)	20.9 (2.5)	29.4 (1.6)	46.8 (4.1)	7.0 (1.2)	21.9 (.9)
Sum (s e)	**12 (10)**	**1,881 (386)**	**5,412 (701)**	**2,525 (524)**	**1,198 (209)**	**11,028 (975)**
% of Sum (s e)	**.1 (.1)**	**17.1 (2.7)**	**49.1 (4.2)**	**22.9 (3.4)**	**10.9 (2.0)**	**100.0**
y1						
Mean (s e)	3.1 (2.2)	35.6 (3.6)	54.1 (2.5)	86.7 (6.0)	9.2 (1.4)	38.6 (1.3)
Sum (s e)	**12 (10)**	**3,201 (582)**	**9,960 (1,082)**	**4,680 (806)**	**1,580 (251)**	**19,433 (1,483)**
% of Sum (s e)	**.1 (.1)**	**16.5 (2.4)**	**51.3 (3.8)**	**24.1 (3.2)**	**8.1 (1.4)**	**100.0**
y2						
Mean (s e)	3.1 (2.2)	65.0 (6.7)	102.3 (4.7)	165.0 (10.6)	13.0 (2.1)	71.2 (2.4)
Sum (s e)	**12 (10)**	**5,854 (1,058)**	**18,821 (1,981)**	**8,908 (1,463))**	**2,228 (372)**	**35,822 (1,483)**
% of Sum (s e)	**0 (0)**	**16.3 (2.3)**	**52.5 (3.8)**	**24.9 (3.3)**	**6.2 (1.2)**	**100.0**
y3,5						
Mean (s e)	3.1 (2.2)	106.6 (10.3)	167.9 (7.7)	275.5 (15.1)	15.7 (2.7)	115.5 (3.6)
Sum (s e)	**12 (10)**	**9.595 (1,647)**	**30,898 (3,123)**	**14,877 (2,272)**	**2,692 (469)**	**58,074 (4,203)**
% of Sum (s e)	**0 (0)**	**16.5 (2.3)**	**53.2 (3.6)**	**25.6 (3.2)**	**4.6 (.9)**	**100.0**
N (m1)	2	46	113	31	99	291
N (m6)	1	34	94	22	76	227
N (y1)	1	32	88	21	73	215
N(y2)	1	30	86	20	72	209
N(y3.5)	1	31	81	21	69	203
Nt (t=total)	4	90	184	54	171	503
% of Nt	.8	17.9	36.6	10.7	34,0	100,0

Estimated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3.5=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E71.9 Performed t-tests of the influence of the selected speed limits in rural areas among motorists; means

Time perspectives	Indicators					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	70~90 70<110: p=0.05 90<110: p=0.2					
m1		70~90 70~110 90~110	70>90: p=0.2 70>110: p=0.02 90~110		70~90 70~110 90~110	70~90 70<110: p=0.001 90<110: p=0.001
m6		70~90 70~110 90~110	70~90 70>110: p=0.05 90>110: p=0.02	70~90 70~110 90>110: p=0.1	70~90 70>110: p=0.1 90>110: p=0.05	70<90: p=0.01 70<110: p=0.001 90<110: p=0.001
y1		70~90 70~110 90~110	70~90 70>110: p=0.01 90>110: p=0.01	70~90 70>110: p=0.2 90>110: p=0.02	70~90 70>110: p=0.1 90>110: p=0.2	70<90: p=0.001 70<110: p=0.001 90<110: p=0.001
y2		70~90 70~110 90~110	70>90: p=0.2 70>110: p=0.01 90>110: p=0.001	70~90 70>110: p=0.2 90>110: p=0.01	70~90 70>110: p=0.1 90>110: p=0.2	70<90: p=0.001 70<110: p=0.001 90<110: p=0.001
y3.5		70<90: p=0.2 70~110 90~110	70>90: p=0.2 70>110: p=0.01 90>110: p=0.01	70~90 70>110: p=0.2 90>110: p=0.01	70~90 70>110: p=0.05 90>110: p=0.05	70<90: p=0.001 70<110: p=0.001 90<110: p=0.001

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, VP N=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, ~ =no statistically significant difference

Table E7.20 Performed t-tests of the influence of selected speed limits in rural areas among motorists; totals

Time perspectives	Indicators					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	70<90: p=0.001 70~110 90>110: p=0.001					
m1		70<90: p=0.2 70>110: p=0.05 90>110: p=0.01	70<90: p=0.01 70>110: p=0.001 90>110: p=0.001		70<90: p=0.05 70>110: p=0.01 90>110: p=0.001	70<90: p=0.001 70~110 90>110: p=0.001
m6		70<90: p=0.2 70~110 90>110: p=0.2	70<90: p=0.05 70>110: p=0.01 90>110: p=0.001	70~90 70~110 90>110: p=0.05	70<90: p=0.2 70>110: p=0.05 90>110: p=0.001	70<90: p=0.001 70~110 90>110: p=0.001
y1		70<90: p=0.1 70~110 90~110	70<90: p=0.1 70>110: p=0.001 90>110: p=0.001	70~90 70>110: p=0.2 90>110: p=0.01	70~90 70>110: p=0.02 90>110: p=0.001	70<90: p=0.001 70<110: p=0.2 90>110: p=0.001
y2		70<90: p=0.05 70~110 90~110	70~90 70>110: p=0.001 90>110: p=0.001	70~90 70>110: p=0.2 90>110: p=0.001	70~90 70>110: p=0.02 90>110: p=0.001	70<90: p=0.001 70<110: p=0.1 90>110: p=0.001
y3.5		70<90: p=0.02 70<110: p=0.2 90>110: p=0.05	70<90: p=0.2 70>110: p=0.001 90>110: p=0.001	70~90 70>110: p=0.2 90>110: p=0.001	70~90 70>110: p=0.02 90>110: p=0.01	70<90: p=0.001 70<110: p=0.1 90>110: p=0.001

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, ~ =no statistically significant difference

Table E7.21 Injured cyclists in urban areas, police data [P] and hospital data [H] from five hospital admittance areas, 1991/92

Type of accidents	**Police [P] data**		**Hospital [H] data**	
	No.	**%**	**No.**	**%**
Single	37 (6)	17.3 (6.2)	576 (24)	63.4 (2.0)
Co unpr	29 (5)	13.6 (6.4)	126 (11)	13.9 (3.1)
Co mv	146 (12)	68.2 (3.9)	157 (13)	17.3 (3.0)
Co others	2 (1)	1.4 (.9)	15 (4)	1.7 (3.3)
Unknown	0 (0)	0 (0)	35 (6)	3.9 (3.3)
Total injured	214 (15)	100.0	909 (30)	100.0

Abbreviations: Co unpr= collisions with unprotected road users, Co mv = collisions with motor vehicles, Co others = collision with others, (s e)=standard error

Table E7.22 Injury severities, police, and received care, hospital, distributed over injured cyclists in different accidents in urban areas, data from the five hospital admittance areas, 1991/92

Type of accidents	**Police,** N=214			**Hospita**l, N=909		
	Injury severity			Injury severity/care		
	D (s e)	Se I (s e)	Sl I (s e)	D (s e)	In-p (s e)	Out-p (s e)
Single	2.7 (2.7)	32.4 (7.7)	64.9 (7.9)	.2 (.2)	19.3 (1.6)	80.6 (1.7)
Co unpr		24.1 (7.9)	75.9 (7.9)		20.6 (3.6)	79.4 (3.6)
Co mv	.7 (.7)	39.7 (4.1)	59.6 (4.1)	.6 (.6)	28.7 (3.6)	70.7 (3.6)
Co others			100.0 (0)		20.0 (10.3)	80.0 (10.3)
Unknown			100.0 (0)		20.0 (6.8)	80.0 (6.8)
Total	.9 (.7)	36.0 (3.3)	63.1 (3.3)	.2 (.2)	21.1 (1.4)	78.7 (1.4)

Abbreviations: Co unpr= collisions with unprotected road users, Co mv = collisions with motor vehicles, Co others = collision with others, D=dead, Se I= severely injured, Sl I= slightly injured, In-p=In-patient cared, Out-p=Out-patient cared, (s e)=standard error

Table E7.23 Average and sum of injury severity score (ISS) distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

ISS	**Type of accidents (T A)**					**Total**
	Single	**Co unpr**	**Co mv**	**Co others**	**Unknown**	
Mean (s e)	2.6 (.1)	2.3 (.2)	3.7 (.4)	3.0 (.6)	2.3 (.3)	2.8 (.1)
std dev	2.5	2.0	5.4	2.3	1.9	3.1
Sum (s e)	1,509 (86)	290 (34)	586 (82)	45 (15)	80 (18)	2,510 (126)
% of Sum (s e)	60.1 (3.4)	11.5 (1.5)	23.3 (2.8)	1.8 (.6)	3.2 (.7)	100.0
Nt (t=total)	576	126	157	15	35	909
% of Nt	63.4	13.9	17.3	1.7	3.9	100.0

Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, (s e) = standard error, Nt = total numbers

Table B7.24 Cumulative average and sum of hospital stay [days] one month and longer after the accident distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

Length of hospital stay (H S)	**Type of accidents (T A)**					**Total**
	Single	**Co unpr**	**Co mv**	**Co others**	**Unknown**	
m1						
Mean (s e)	0.8 (.1)	.5 (.1)	2.2 (.5)	1.6 (1.0)	.4 (.2)	1.0 (.1)
Sum (s e)	432 (74)	58 (15)	382 (88)	24 (16)	14 (6)	909 (117)
% of Sum (s e)	47.5 (8.6)	6.4 (2.2)	41.9 (8.6)	2.6 (1.8)	1.5 (.8)	100.0
m6						
Mean (s e)	1.4 (.3)	.9 (.2)	9.2 (3.0)	1.6 (1.0)	.4 (.2)	2.7 (.7)
Sum (s e)	**823 (152)**	**111 (29)**	**1,437 (472)**	**24 (16)**	**14 (6)**	**2,409 (599)**
% of Sum (s e)	**34.2 (10.6)**	**4.6 (2.3)**	**59.6 (9.6)**	**1.0 (.8)**	**.6 (.4)**	**100.0**
y1						
Mean (s e)	1.4 (.3)	.9 (.2)	14.1 (4.2)	1.6 (1.0)	.4 (.2)	3.5 (.9)
Sum (s e)	**823 (152)**	**111 (29)**	**2,215 (674)**	**24 (16)**	**14 (6)**	**3,188 (823)**
% of Sum (s e)	**25.8 (8.7)**	**3.5 (1.9)**	**69.5 (8.1)**	**.8 (.6)**	**.4 (.3)**	**100.0**
y2						
Mean (s e)	1,6 (.3)	.9 (.2)	20.4 (6.6)	1.6 (1.0)	.4 (.2)	4.7 (1.4)
Sum (s e)	**899 (170)**	**111 (29)**	**3,209 (1,045)**	**24 (16)**	**14 (6)**	**4,257 (1,248)**
% of Sum (s e)	**21.1 (8.2)**	**2.6 (1.6)**	**75.4 (7.4)**	**.6 (.5)**	**.3 (.2)**	**100.0**
y35						
Mean (s e)	1.6 (.3)	.9 (.2)	27.8 (9.9)	1.6 (1.0)	.4 (.2)	5.9 (2.0)
Sum (s e)	**899 (170)**	**111 (29)**	**4,360 (1,558)**	**24 (16)**	**14 (6)**	**5,407 (1,821)**
% of Sum (s e)	**16.6 (7.5)**	**2.1 (1.4)**	**80.6 (6.7)**	**.4 (.4)**	**.3 (.2)**	**100.0**
N (m1)	576	126	157	15	35	909
N (m6)	250	53	87	7	12	409
N (y1)	235	51	77	7	10	380
N (y2)	229	50	75	7	10	371
N (y35)	225	48	72	7	10	362
Nt (t=total)	576	126	157	15	35	909
% of N	63.4	13.9	17.3	1.7	3.9	100.0

Estimated numbers are written in **bold letters**

Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.25 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

Visits to a doctor [1] (V D)	**Type of accidents (T A)**					**Total**
	Single	**Co unpr**	**Co mv**	**Co others**	**Unknown**	
m1						
Mean (s e)	1.8 (.1)	1.0 (.2)	1.9 (.1)	2.2 (.6)	2.0 (.4)	1.9 (.1)
Sum (s e)	**1,054 (58)**	**257 (32)**	**298 (31)**	**33 (13)**	**70 (18)**	**1,712 (78)**
% of Sum (s e)	**61.6 (3.3)**	**15.0 (1.9)**	**17.4 (2.0)**	**1.9 (.7)**	**4.1 (1.0)**	**100.0**
m6						
Mean (s e)	2.4 (.3)	2.5 (.2)	2.8 (.2)	2.2 (.6)	2.0 (.4)	2.4 (.2)
Sum (s e)	**1,365 (160)**	**320 (39)**	**432 (45)**	**33 (13)**	**70 (18)**	**2,220 (169)**
% of Sum (s e)	**61.5 (4.1)**	**14.4 (2.2)**	**19.5 (2.7)**	**1.5 (.6)**	**3.2 (.9)**	**100.0**
y1						
Mean (s e)	2.5 (.3)	2.6 (.2)	3.0 (.3)	2.2 (.6)	2.0 (.4)	2.6 (.2)
Sum (s e)	**1,417 (164)**	**326 (39)**	**473 (49)**	**33 (13)**	**70 (18)**	**2,319 (174)**
% of Sum (s e)	**61.1 (4.0)**	**14.1 (2.1)**	**20.4 (2.8)**	**1.4 (.6)**	**3.0 (.8)**	**100.0**
y2						
Mean (s e)	2.6 (.3)	2.6 (.2)	3.2 (.3)	2.2 (.6)	2.0 (.4)	2.7 (.2)
Sum (s e)	**1,509 (170)**	**329 (39)**	**501 (52)**	**33 (13)**	**70 (18)**	**2,442 (181)**
% of Sum (s e)	**61.8 (4.0)**	**13.5 (2.0)**	**20.5 (2.8)**	**1.4 (.5)**	**2.9 (.8)**	**100.0**
y35						
Mean (s e)	2.7 (.3)	3.1 (.5)	3.4 (.3)	2.6 (.7)	2.0 (.4)	2.8 (.2)
Sum (s e)	**1,532 (170)**	**387 (64)**	**529 (59)**	**39 (14)**	**70 (18)**	**2,558 (191)**
% of Sum (s e)	**59.9 (4.5)**	**15.1 (2.8)**	**20.7 (3.0)**	**1.5 (.6)**	**2.7 (.8)**	**100.0**
N (m1)	286	71	99	10	11	477
N (m6)	240	52	82	7	12	393
N (y1)	235	49	76	7	10	377
N(y2)	235	49	73	7	10	374
N(y35)	225	50	73	7	10	365
Nt (t=total)	576	126	157	15	35	909
% of Nt	63.4	13.9	17.3	1.7	3.9	100.0

3) The first visit to E. R. i1s included in the records presented
Estimated numbers are written in **bold letters**
Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.26 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

Visits to a physiotherapist/nurse (V PN)	**Type of accidents (T A)**					**Total**
	Single	**Co unpr**	**Co mv**	**Co others**	**Unknown**	
m6						
Mean (s e)	1.8 (.4)	1.9 (1.1)	4.1 (1.4)	.3 (.3)	0 (0)	2.1 (.4)
Sum (s e)	**1,059 (258)**	**236 (138)**	**650 (225)**	**4 (4)**	**0 (0)**	**1,950 (386)**
% of Sum (s e)	**54.4 (12.5)**	**12.1 (7.2)**	**33.3 (10.8)**	**.2 (.2)**	**0 (0)**	**100.0**
y1						
Mean (s e)	2.5 (.6)	1.9 (1.1)	4.9 (1.5)	3 (.3)	0 (0)	2.7 (.5)
Sum (s e)	**1,420 (346)**	**243 (138)**	**775 (241)**	**4 (4)**	**0 (0)**	**2,443 (458)**
% of Sum (s e)	**58.1 (11.5)**	**10.0 (5.8)**	**31.7 ()**	**.2 (.2)**	**0 (0)**	**100.0**
y2						
Mean (s e)	2.6 (.6)	1.9 (1.1)	5.2 (1.5)	3 (.3)	0 (0)	2.8 (.5)
Sum (s e)	**1,515 (351)**	**243 (138)**	**822 (242)**	**4 (4)**	**0 (0)**	**2,585 (462)**
% of Sum (s e)	**58.6 (11.0)**	**9.4 (5.4)**	**31.8 ()**	**.2 (.2)**	**(0)**	**100.0**
y35						
Mean (s e)	2.9 (.6)	2.5 (1.2)	5.6 (1.6)	3 (.3)	0 (0)	3.1 (.5)
Sum (s e)	**1,642 (359)**	**309 (153)**	**883 (250)**	**4 (4)**	**0 (0)**	**2,838 (477)**
% of Sum (s e)	**57.9 (10.4)**	**10.9 (5.5)**	**31.1 ()**	**.2 (.2)**	**0 (0)**	**100.0**
N (m6)	225	48	74	7	12	366
N (y1)	224	49	74	6	10	363
N(y2)	229	47	74	7	10	367
N(y35)	226	48	71	7	10	362
Nt (t=total)	576	126	157	15	35	909
% of Nt	63.4	13.9	17.3	1.7	3.9	100,0

Estimated numbers are written in **bold letters**

Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.27 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

Length of sick leave [1)] (S L)	**Type of accidents (T A)**					**Total**
	Single	**Co unpr**	**Co mv**	**Co others**	**Unknown**	
m1						
Mean (s e)	2.7 (.3)	2.5 (.6)	4.2 (.7)	2.7 (1.3)	2.4 (1.7)	2.9 (.3)
Sum (s e)	**1,558 (205)**	**312 (78)**	**655 (117)**	**40 (23)**	**84 (62)**	**2,649 (256)**
% of Sum (s e)	**58.8 (7.2)**	**11.8 (3.3)**	**24.7 (5.2)**	**1.5 (.9)**	**3.2 (2.3)**	**100.0**
m6						
Mean (s e)	5.3 (.9)	4.3 (1.4)	11.7 (2.8)	2.7 (1.3)	4.1 (2.5)	6.2 (.8)
Sum (s e)	**3,079 (555)**	**544 (175)**	**1,843 (456)**	**40 (23)**	**145 (88)**	**5,651 (780)**
% of Sum (s e)	**54.5 (8.7)**	**9.6 (3.6)**	**32.6 (7.5)**	**.7 (.4)**	**2.6 (1.7)**	**100.0**
y1						
Mean (s e)	6.0 (1.0)	4.3 (1.4)	15.1 (3.4)	2.7 (1.3)	4.1 (2.5)	7.2 (1.0)
Sum (s e)	**3,429 (593)**	**544 (175)**	**2,366 (552)**	**40 (23)**	**145 (88)**	**6,524 (885)**
% of Sum (s e)	**52.6 (8.5)**	**8.3 (3.1)**	**36.3 (7.5)**	**.6 (.4)**	**2.2 (1.4)**	**100.0**
y2						
Mean (s e)	6.6 (1.1)	4.3 (1.4)	17.7 (4.0)	2.7 (1.3)	4.1 (2.5)	8.0 (1.1)
Sum (s e)	**3,777 (650)**	**544 (175)**	**2,783 (634)**	**40 (23)**	**145 (88)**	**7,288 (990)**
% of Sum (s e)	**51.8 (8.4)**	**7.5 (2.8)**	**38.2 (7.5)**	**.6 (.3)**	**2.0 (1.3)**	**100.0**
y35						
Mean (s e)	6.6 (1.1)	4.3 (1.4)	21.7 (5.6)	2.7 (1.3)	4.1 (2.5)	8.7 (1.4)
Sum (s e)	**3,777 (650)**	**544 (175)**	**3,406 (891)**	**40 (23)**	**145 (88)**	**7,912 (1,238)**
% of Sum (s e)	**47.7 (9.3)**	**6.9 (2.8)**	**43.1 (8.5)**	**.5 (.3)**	**1.8 (1.2)**	**100.0**
N (m1)	300	73	101	11	12	497
N (m6)	247	56	82	7	12	404
N (y1)	236	51	77	7	10	381
N(y2)	230	50	74	7	10	371
N(y35)	227	50	76	7	10	370
Nt (t=total)	576	126	157	15	35	909
% of Nt	63.4	13.9	17.3	1.7	3.9	100,0

1) The length of sick leave is based on 251 working days per year

Estimated numbers are written in **bold letters**

Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.28 Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

Lengths of health loss (H L)	**Type of accidents (T A)**					**Total**
	Single	**Co unpr**	**Co mv**	**Co others**	**Unknown**	
m1						
Mean (s e)	2.6 (.1)	2.9 (.2)	3.6 (.2)	2.4 (.7)	1.9 (.3)	2.8 (.1)
Sum (s e)	**1,517 (83)**	**365 (36)**	**567 (51)**	**36 (12)**	**67 (14)**	**2,551 (106)**
% of Sum (s e)	**59.5 (2.8)**	**14.3 (1.7)**	**22.2 (2.1)**	**1.4 (.5)**	**2.6 (.7)**	**100.0**
m6						
Mean (s e)	7.3 (.5)	8.1 (1.1)	12.8 (1.8)	9.8 (5.5)	4.5 (1.4)	8.3 (.5)
Sum (s e)	**4,228 (361)**	**1,021 (157)**	**2,008 (344)**	**147 (87)**	**159 (52)**	**7,564 (550)**
% of Sum (s e)	**55.9 (5.3)**	**13.5 (2.6)**	**26.5 (4.3)**	**1.9 (1.2)**	**2.1 (.8)**	**100.0**
y1						
Mean (s e)	10.3 (.8)	10.6 (1.4)	20.4 (3.1)	17.1 (7.5)	4.5 (1.4)	12.0 (.8)
Sum (s e)	**5,915 (522)**	**1,331 (193)**	**3,202 (558)**	**257 (120)**	**159 (52)**	**10,865 (836)**
% of Sum (s e)	**54.4 (5.4)**	**12.3 (2.4)**	**29.5 (4.7)**	**2.4 (1.2)**	**1.5 (.6)**	**100.0**
y2						
Mean (s e)	15.5 (1.5)	14.4 (2.2)	34.4 (6.1)	29.5 (11.3)	4.5 (1.4)	18.4 (1.5)
Sum (s e)	**8,947 (956)**	**1,808 (287)**	**5,408 (1,062)**	**443 (181))**	**159 (52)**	**16,765 (1,540)**
% of Sum (s e)	**53.4 (6.1)**	**10.8 (2.4)**	**32.3 (5.4)**	**2.6 (1.3)**	**.9 (.4)**	**100.0**
y35						
Mean (s e)	21.2 (2.4)	19.0 (3.2)	52.4 (9.7)	48.5 (17.3)	4.5 (1.4)	26.1 (2.4)
Sum (s e)	**12,230 (1,522)**	**2,388 (413)**	**8,234 (1,687)**	**727 (277)**	**159 (52)**	**23,739 (2,440)**
% of Sum (s e)	**51.5 (6.6)**	**10.1 (2.5)**	**34.7 (6.0)**	**3.1 (1.4)**	**.7 (.3)**	**100.0**
N (m1)	324	77	107	11	15	534
N (m6)	263	59	82	7	12	423
N (y1)	248	54	78	7	10	397
N(y2)	246	52	75	7	10	390
N(y35)	236	53	74	7	10	380
Nt (t=total)	576	126	157	15	35	909
% of Nt	63.4	13.9	17.3	1.7	3.9	100,0

Estimated numbers are written in **bold letters**

Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.28 Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over injured cyclists in different accidents in urban areas, data from five hospitals, 1991/92

Lengths of health loss (H L)	Type of accidents (T A)					Total
	Single	Co unpr	Co mv	Co others	Unknown	
m1						
Mean (s e)	2.6 (.1)	2.9 (.2)	3.6 (.2)	2.4 (.7)	1.9 (.3)	2.8 (.1)
Sum (s e)	**1,517 (83)**	**365 (36)**	**567 (51)**	**36 (12)**	**67 (14)**	**2,551 (106)**
% of Sum (s e)	**59.5 ()**	**14.3 ()**	**22.2 ()**	**1.4 ()**	**2.6 ()**	**100.0**
m6						
Mean (s e)	7.3 (.5)	8.1 (1.1)	12.8 (1.8)	9.8 (5.5)	4.5 (1.4)	8.3 (.5)
Sum (s e)	**4,228 (361)**	**1,021 (157)**	**2,008 (344)**	**147 (87)**	**159 (52)**	**7,564 (550)**
% of Sum (s e)	**55.9 ()**	**13.5 ()**	**26.5 ()**	**1.9 ()**	**2.1 ()**	**100.0**
y1						
Mean (s e)	10.3 (.8)	10.6 (1.4)	20.4 (3.1)	17.1 (7.5)	4.5 (1.4)	12.0 (.8)
Sum (s e)	**5,915 (522)**	**1,331 (193)**	**3,202 (558)**	**257 (120)**	**159 (52)**	**10,865 (836)**
% of Sum (s e)	**54.4 ()**	**12.3 ()**	**29.5 ()**	**2.4 ()**	**1.5 ()**	**100.0**
y2						
Mean (s e)	15.5 (1.5)	14.4 (2.2)	34.4 (6.1)	29.5 (11.3)	4.5 (1.4)	18.4 (1.5)
Sum (s e)	**8,947 (956)**	**1,808 (287)**	**5,408 (1,062)**	**443 (181))**	**159 (52)**	**16,765 (1,540)**
% of Sum (s e)	**53.4 (0)**	**10.8 ()**	**32.3 ()**	**2.6 ()**	**.9 ()**	**100.0**
y35						
Mean (s e)	21.2 (2.4)	19.0 (3.2)	52.4 (9.7)	48.5 (17.3)	4.5 (1.4)	26.1 (2.4)
Sum (s e)	**12,230 (1,522)**	**2,388 (413)**	**8,234 (1,687)**	**727 (277)**	**159 (52)**	**23,739 (2,440)**
% of Sum (s e)	**51.5 (0)**	**10.1 ()**	**34.7 ()**	**3.1 ()**	**.7 (0)**	**100.0**
N (m1)	324	77	107	11	15	534
N (m6)	263	59	82	7	12	423
N (y1)	248	54	78	7	10	397
N(y2)	246	52	75	7	10	390
N(y35)	236	53	74	7	10	380
Nt (t=total)	576	126	157	15	35	909
% of Nt	63.4	13.9	17.3	1.7	3.9	100,0

Estimated numbers are written in **bold letters**

Abbreviations: Co unpr=collisions with unprotected road users, Co mv =collisions with motor vehicles, Co others=collision with others, m1=within one month; m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months, (s e)=standard error, N (m1)=measured numbers at given time

Table E7.29 Performed t-tests of the influence of three types of accidents on injured cyclists in urban areas; means

Time perspectives	**Indicators**					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	S>CU: p=0.2 S<CM: p=0.02 CU<CM: p=0.01					
m1		S>CU: p=0.1 S<CM: p=0.01 CU<CM: p=0.001	S~CU S~CM CU~CM		S~CU S<CM: p=0.05 CU<CM: p=0.1	S~CU S<CM: p=0.001 CU<CM: p=0.02
m6		S>CU: p=0.2 S<CM: p=0.01 CU<CM: p=0.01	S~CU S~CM CU~CM	S~CU S<CM: p=0.2 CU<CM: p=0.2	S~CU S<CM: p=0.05 CU<CM: p=0.02	S~CU S<CM: p=0.01 CU<CM: p=0.05
y1		S>CU: p=0.2 S<CM: p=0.01 CU<CM: p=0.01	S~CU S<CM: p=0.2 CU~CM	S~CU S<CM: p=0.2 CU<CM: p=0.2	S~CU S<CM: p=0.02 CU<CM: p=0.01	S~CU S<CM: p=0.01 CU<CM: p=0.01
y2		S>CU: p=0.1 S<CM: p=0.01 CU<CM: p=0.01	S~CU S<CM: p=0.2 CU<CM: p=0.2	S~CU S<CM: p=0.2 CU<CM: p=0.1	S>CU: p=0.2 S<CM: p=0.001 CU<CM: p=0.001	S~CU S<CM: p=0.01 CU<CM: p=0.01
y3.5		S>CU: p=0.1 S<CM: p=0.01 CU<CM: p=0.01	S~CU S<CM: p=0.2 CU~CM	S~CU S<CM: p=0.1 CU<CM: p=0.2	S~CU S<CM: p=0.01 CU<CM: p=0.01	S~CU S<CM: p=0.01 CU<CM: p=0.01

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, S=single accidents, CU= collisions with unprotected road users, CM=collisions with motor vehicles, ~ =no statistically significant difference

Table E7.30 Performed t-tests of the influence of three types of accidents on injured cyclists in urban areas; totals

Time perspectives	**Indicators**					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	S>CU: p=0.001 S>CM: p=0.001 CU<CM:p=0..001					
m1		S>CU: p=0.001 S~CM CU<CM: p=0.001	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.2		S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.02	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.01
m6		S>CU: p=0.001 S~CM CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.1	S>CU: p=0.01 S~CM CU<CM: p=0.2	S>CU: p=0.001 S>CM: p=0.1 CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.01
y1		S>CU: p=0.001 S<CM: p=0.05 CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.02	S>CU: p=0.01 S>CM: p=0.2 CU<CM: p=0.1	S>CU: p=0.001 S>CM: p=0.2 CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.01
y2		S>CU: p=0.001 S<CM: p=0.05 CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.2 CU<CM: p=0.05	S>CU: p=0.001 S~CM CU<CM: p=0.001	S>CU: p=0.001 S>CM: p=0.02 CU<CM: p=0.01
y3.5		S>CU: p=0.001 S<CM: p=0.05 CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.001 CU<CM: p=0.2	S>CU: p=0.001 S>CM: p=0.1 CU<CM: p=0.001	S>CU: p=0.001 S~CM CU<CM: p=0.01	S>CU: p=0.001 S>CM: p=0.1 CU<CM: p=0.001

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, S=single accidents, CU= collisions with unprotected road users, CM=collisions with motor vehicles, ~ =no statistically significant difference

Table E7.31 Injured pedestrians in single accidents in urban areas, hospital data [H] from five hospital admittance areas, 1991/92

Road-surface conditions	**Hospital [H] data**	
	No.	**%**
Dry	36 (6)	17.9 (6.4)
Wet	17 (4)	8.5 (6.8)
Ice/snow	73 (9)	36.3 (5.6)
Others	3 (2)	1.5 (7.0)
Unknown	72 (9)	35.8 (5.7)
Total injured	201 (14)	100.0

Abbreviations: (s e)=standard error

Table E7.32 Received care distributed over injured pedestrians in single accidents in different types of road-surface conditions in urban areas, data from the five hospitals, 1991/92

Road-surface conditions	**Hospital**, N=201		
	Injury care		
	D (s e)	In-p (s e)	Out-p (s e)
Dry		11.1 (5.2)	88.9 (5.2)
Wet		11.8 (7.8)	88.2 (7.8)
Ice/snow		31.5 (5.4)	68.5 (5.4)
Others		0 (0)	100.0 (0)
Unknown		12.5 (3.9)	87.5 (3.9)
Total	0 (0)	18.9 (2.8)	81.1 (2.8)

Abbreviations: D=dead, In-p=in-patient cared, Out-p=out-patient cared, (s e)=standard error

Table E7.33 Average and sum of injury severity score (ISS) distributed over injured pedestrians in single accidents in different types of road-surface conditions in urban areas, data from five hospitals, 1991/92

ISS	**Road-surface conditions (R C)**					**Total**
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	
Mean (s e)	2.3 (.3)	2.5 (.5)	3.3 (.2)	1.0 (.0)	2.9 (.2)	2.9 (.1)
std dev	2.0	2.2	2.1	0	1.9	2.0
Sum (s e)	82 (18)	43 (14)	235 (33)	3 (2)	208 (29)	571 (49)
% of Sum (s e)	14.4 (3.1)	7.5 (2.4)	41.2 (4.9)	.5 (.3)	36.4 (4.6)	100.0
Nt (t=total)	35	17	72	3	72	199
% of Nt	17.6	8.5	36.2	1.5	36.2	100.0

Abbreviations: (s e) = standard error, Nt = total numbers

Table E7.34 Cumulative average and sum of hospital stay one month and longer after the accident distributed over injured pedestrians in single accidents in different types of road-surface conditions in urban areas, data from five hospitals, 1991/92

Lengths of hospital stay (H S)	Road-surface conditions (R C)					Total
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	
m1						
Mean (s e)	1.0 (.7)	1.4 (1.0)	1.5 (.4)	0 (0)	1.1 (.4)	1.2 (.3)
Sum (s e)	36 (27)	23 (19)	111 (30)	0 (0)	76 (30)	246 (53)
% of Sum (s e)	14.6 (10.6)	9.3 (7.6)	45.1 (16.1)	0 (0)	31.0 (13.1)	100.0
m6						
Mean (s e)	1.0 (.7)	1.4 (1.0)	2.6 (.6)	0 (0)	2.7 (.9)	2.2 (.4)
Sum (s e)	**36 (27)**	**23 (19)**	**188 (49)**	**0 (0)**	**192 (69)**	**440 (89)**
% of Sum (s e)	**8.2 (6.2)**	**5.2 (4.4)**	**42.7 (13.0)**	**0 (0)**	**43.7 (13.1)**	**100.0**
y1						
Mean (s e)	1.0 (.7)	1.4 (1.0)	2.6 (.6)	0 (0)	2.7 (.9)	2.2 (.4)
Sum (s e)	**36 (27)**	**23 (19)**	**188 (49)**	**0 (0)**	**192 (69)**	**440 (89)**
% of Sum (s e)	**8.2 (6.2)**	**5.2 (4.4)**	**42.7 (13.0)**	**0 (0)**	**43.6 (13.1)**	**100.0**
y2						
Mean (s e)	1,0 (.7)	1.4 (1.0)	2.6 (.6)	0 (0)	2.7 (.9)	2.2 (.4)
Sum (s e)	**36 (27)**	**23 (19)**	**188 (49)**	**0 (0)**	**192 (69)**	**440 (89)**
% of Sum (s e)	**8.2 (6.2)**	**5.2 (4.4)**	**42.7 (13.0)**	**0 (0)**	**43.6 (13.1)**	**100.0**
y35						
Mean (s e)	1.0 (.7)	1.4 (1.0)	2.6 (.6)	0 (0)	2.7 (.9)	2.2 (.4)
Sum (s e)	**36 (27)**	**23 (19)**	**188 (49)**	**0 (0)**	**192 (69)**	**440 (89)**
% of Sum (s e)	**8.2 (6.2)**	**5.2 (4.4)**	**42.7 (13.0)**	**0 (0)**	**43.6 (13.1)**	**100.0**
N (m1)	36	17	73	3	72	201
N (m6)	18	9	33	1	33	94
N (y1)	16	7	33	1	28	85
N (y2)	15	7	32	1	26	81
N (y35)	15	7	31	1	25	79
Nt (t=total)	36	17	73	3	72	201
% of N	17.9	8.5	36.3	1.5	35.8	100.0

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3,5 within 3 years and 5 months, N (m1)=measured numbers at given time

Table E7.35 Cumulative average and sum of visits to a doctor one month and longer after the accident distributed over injured pedestrians in single accidents in different types of road-surface conditions in urban areas, data from five hospitals, 1991/92

Visits to a doctor [1] (V D)	**Road-surface conditions (R C)**					**Total**
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	
m1						
Mean (s e)	2.1 (.3)	2.1 (.3)	2.0 (.2)	1.0 (0)	1.9 (.2)	2.0 (.1)
Sum (s e)	**75 (17)**	**36 (10)**	**147 (20)**	**3 (2)**	**140 (21)**	**401 (35)**
% of Sum (s e)	**18.6 (3.9)**	**8.9 (2.6)**	**36.8 (4.8)**	**.7 (.4)**	**34.9 (4.8)**	**100.0**
m6						
Mean (s e)	2.4 (.4)	2.4 (.4)	2.8 (.3)	1.0 (0)	2.6 (.3)	2.6 (.2)
Sum (s e)	**87 (19)**	**41 (11)**	**207 (28)**	**3 (2)**	**184 (28)**	**522 (45)**
% of Sum (s e)	**16.7 (3.8)**	**7.9 (2.4)**	**39.6 (5.4)**	**.6 (.3)**	**35.2 (5.2)**	**100.0**
y1						
Mean (s e)	2.6 (.4)	2.6 (.4)	2.9 (.3)	1.0 (0)	2.8 (.3)	2.7 (.2)
Sum (s e)	**92 (19)**	**44 (12)**	**211 (29)**	**3 (2)**	**199 (30)**	**549 (47)**
% of Sum (s e)	**16.8 (3.8)**	**7.9 (2.4)**	**38.5 (5.4)**	**.5 (.3)**	**36.3 (5.4)**	**100.0**
y2						
Mean (s e)	2.6 (.4)	2.6 (.4)	2.9 (.3)	1.0 (0)	3.0 (.4)	2.8 (.2)
Sum (s e)	**92 (19)**	**44 (12)**	**211 (29)**	**3 (2)**	**215 (33)**	**565 (48)**
% of Sum (s e)	**16.3 (3.7)**	**7.7 (2.4)**	**37.4 (5.4)**	**.5 (.3)**	**38.1 (5.5)**	**100.0**
y35						
Mean (s e)	2.6 (.4)	2.6 (.4)	3.0 (.3)	1.0 (0)	3.1 (.4)	2.9 (.2)
Sum (s e)	**92 (19)**	**44 (12)**	**215 (29)**	**3 (2)**	**220 (33)**	**574 (48)**
% of Sum (s e)	**16.0 (3.7)**	**7.6 (2.3)**	**37.5 (5.4)**	**.5 (.3)**	**38.3 (5.5)**	**100.0**
N (m1)	14	11	41	1	36	103
N (m6)	17	9	32	1	31	90
N (y1)	16	7	33	1	28	85
N (y2)	15	7	32	1	27	82
N (y35)	15	7	31	1	26	80
Nt (t=total)	36	17	73	3	72	201
% of Nt	17.9	8.5	36.3	1.5	35.8	100.0

4) The first visit to E. R. i1s included in the records presented

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3,5 within 3 years and 5 months, N (m1)=measured numbers at given time

Table E7.36 Cumulative average and sum of visits to a physiotherapist/nurse six months and longer after the accident distributed over injured pedestrians in single accidents in different road-surface conditions in urban areas, data from five hospitals, 1991/92

Visits to a physiotherapist/nurse (V PN)	**Road-surface conditions (R C)**					**Total**
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	
m6						
Mean (s e)	.4 (.2)	2.9 (2.5)	2.1 (.8)	0 (0)	3.2 (1.2)	2.2 (.5)
Sum (s e)	**13 (7)**	**49 (44)**	**153 (58)**	**0 (0)**	**231 (92)**	**446 (113)**
% of Sum (s e)	**2.8 (2.0)**	**11.0 (9.7)**	**34.4 (15.4)**	**0 (0)**	**51.8 (19.0)**	**100.0**
y1						
Mean (s e)	.4 (.2)	4.3 (2.9)	2.5 (.8)	0 (0)	4.5 (1.6)	3.0 (.6)
Sum (s e)	**13 (7)**	**73 (50)**	**183 (62)**	**0 (0)**	**327 (116)**	**596 (135)**
% of Sum (s e)	**2.1 (1.5)**	**12.3 (8.7)**	**30.7 (12.8)**	**0 (0)**	**54.9 (17.1)**	**100.0**
y2						
Mean (s e)	.4 (.2)	4.3 (2.9)	2.9 (.9)	0 (0)	5.5 (1.7)	3.5 (.7)
Sum (s e)	**13 (7)**	**73 (50)**	**215 (67)**	**0 (0)**	**399 (127)**	**700 (145)**
% of Sum (s e)	**1.8 (1.2)**	**10.5 (7.4)**	**30.7 (11.7)**	**0 (0)**	**57.0 (15.4)**	**100.0**
y3,5						
Mean (s e)	.4 (.2)	4.3 (2.9)	3.0 (.9)	0 (0)	6.2 (1.8)	3.8 (.7)
Sum (s e)	**13 (7)**	**73 (50)**	**224 (67)**	**0 (0)**	**446 (135)**	**756 (151)**
% of Sum (s e)	**1.7 (1.1)**	**9.7 (6.9)**	**29.7 (11.0)**	**0 (0)**	**59.0 (14.6)**	**100.0**
N (m6)	17	8	31	1	28	85
N (y1)	16	7	32	1	27	83
N (y2)	15	7	32	1	27	82
N (y35)	15	7	31	1	26	80
Nt (t=total)	36	17	73	3	72	201
% of Nt	17.9	8.5	36.3	1.5	35.8	100,0

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3,5 within 3 years and 5 months, N (m1)=measured numbers at given time

Table E7.37 Cumulative average length and sum of sick leave [in working days] among injured one month and longer after the accident distributed over injured pedestrians in single accidents in different road-surface conditions in urban areas, data from five hospitals, 1991/92

Length of sick leave [1] (S L)	**Road-surface conditions (R C)**					**Total**
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	
m1						
Mean (s e)	3.2 (1.7)	1.7 (.9)	5.4 (1.2)	2.7 (0)	2.6 (.8)	3.7 (.6)
Sum (s e)	**115 (66)**	**29 (16)**	**398 (99)**	**8 (5)**	**185 (61)**	**735 (134)**
% of Sum (s e)	**15.7 (8.4)**	**3.9 (2.5)**	**54.1 (12.6)**	**1.1 (.7)**	**25.1 (8.7)**	**100.0**
m6						
Mean (s e)	3.2 (1.7)	1.7 (.9)	8.1 (1.9)	2.7 (0)	3.6 (1.2)	5.0 (.9)
Sum (s e)	**115 (66)**	**29 (16)**	**593 (147)**	**8 (5)**	**258 (88)**	**1,003 (184)**
% of Sum (s e)	**11.5 (6.5)**	**2.9 (1.8)**	**59.1 (11.9)**	**.8 (.5)**	**25.7 (8.9)**	**100.0**
y1						
Mean (s e)	3.2 (1.7)	1.7 (.9)	8.1 (1.9)	2.7 (0)	3.6 (1.2)	5.0 (.9)
Sum (s e)	**115 (66)**	**29 (16)**	**593 (147)**	**8 (5)**	**258 (88)**	**1,003 (184)**
% of Sum (s e)	**11.5 (6.5)**	**2.9 (1.8)**	**59.1 (11.9)**	**.8 (.5)**	**25.7 (8.9)**	**100.0**
y2						
Mean (s e)	3.2 (1.7)	1.7 (.9)	8.1 (1.9)	2.7 (0)	3.6 (1.2)	5.0 (.9)
Sum (s e)	**115 (66)**	**29 (16)**	**593 (147)**	**8 (5)**	**258 (88)**	**1,003 (184)**
% of Sum (s e)	**11.5 (6.5)**	**2.9 (1.8)**	**59.1 (11.9)**	**.8 (.5)**	**25.7 (8.9)**	**100.0**
y35						
Mean (s e)	3.2 (1.7)	1.7 (.9)	8.1 (1.9)	2.7 (0)	3.6 (1.2)	5.0 (.9)
Sum (s e)	**115 (66)**	**29 (16)**	**593 (147)**	**8 (5)**	**258 (88)**	**1,003 (184)**
% of Sum (s e)	**11.5 (6.5)**	**2.9 (1.8)**	**59.1 (11.9)**	**.8 (.5)**	**25.7 (8.9)**	**100.0**
N (m1)	16	11	41	1	37	106
N (m6)	16	9	34	1	33	93
N (y1)	15	7	31	1	26	80
N (y2)	15	6	32	1	24	78
N (y35)	15	7	32	1	26	81
Nt (t=total)	36	17	73	3	72	201
% of Nt	17.9	8.5	36.3	1.5	35.8	100,0

1) The length of sick leave is based on 251 working days per year

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3,5 within 3 years and 5 months, N (m1)=measured numbers at given time

Table E7.38 Cumulative average health loss and sum of health among injured one month and longer after the accident distributed over injured pedestrians in single accidents in different road-surface conditions in urban areas, data from five hospitals, 1991/92

Lengths of health loss (H L)	**Road-surface conditions (R C)**					**Total**
	Dry	**Wet**	**Ice/snow**	**Others**	**Unknown**	
m1						
Mean (s e)	2.7 (.3)	4.1 (.4)	3.8 (.3)	1.6 (.8)	4.0 (.3)	3.7 (.2)
Sum (s e)	**97 (17)**	**69 (15)**	**276 (31)**	**5 (3)**	**289 (34)**	**736 (51)**
% of Sum (s e)	**13.1 (2.7)**	**9.4 (2.4)**	**37.5 (4.4)**	**.7 (.5)**	**39.3 (4.5)**	**100.0**
m6						
Mean (s e)	8.9 (2.2)	14.6 (3.7)	12.3 (1.3)	1.6 (.8)	14.8 (1.7)	12.6 (.9)
Sum (s e)	**322 (88)**	**248 (77)**	**897 (123)**	**5 (3)**	**1,066 (154)**	**2,538 (227)**
% of Sum (s e)	**12.7 (3.7)**	**9.8 (3.4)**	**35.3 (5.7)**	**.2 (.2)**	**42.0 (6.3)**	**100.0**
y1						
Mean (s e)	13.5 (3.4)	22.1 (5.9)	16.4 (2.0)	1.6 (.8)	20.4 (2.5)	17.6 (1.4)
Sum (s e)	**487 (133)**	**375 (114)**	**1,200 (167)**	**5 (3)**	**1,466 (211)**	**3,533 (836)**
% of Sum (s e)	**13.8 (4.2)**	**10.6 (3.8)**	**34.0 (6.0)**	**.1 (.1)**	**41.5 (6.7)**	**100.0**
y2						
Mean (s e)	17.3 (5.1)	32.7 (9.6)	21.4 (3.1)	1.6 (.8)	31.0 (5.5)	24.8 (2.5)
Sum (s e)	**621 (190)**	**557 (178)**	**1,566 (245)**	**5 (3)**	**2,229 (419)**	**4,978 (530)**
% of Sum (s e)	**12.5 (4.4)**	**11.2 (4.3)**	**31.5 (6.6)**	**.1 (.1)**	**44.8 (8.1)**	**100.0**
y35						
Mean (s e)	21.0 (6.2)	49.2 (13.7)	26.9 (4.5)	1.6 (.8)	40.4 (7.5)	32.2 (3.4)
Sum (s e)	**755 (234)**	**837 (253)**	**1,960 (345)**	**5 (3)**	**2,909 (560)**	**6,466 (715)**
% of Sum (s e)	**11.8 (4.2)**	**12.9 (4.8)**	**30.3 (6.8)**	**.1 (.1)**	**45.0 (8.5)**	**100.0**
N (m1)	22	11	47	2	40	122
N (m6)	19	8	40	1	34	102
N (y1)	16	7	33	1	29	86
N (y2)	15	7	31	1	26	80
N (y35)	15	7	32	1	26	81
Nt (t=total)	36	17	73	3	72	201
% of Nt	17.9	8.5	39.4	1.5	35.8	100,0

Enumerated numbers are written in **bold letters**

Abbreviations: m1=within one month; m6=within six months, y1=within a year, y2=within two years, y3,5 within 3 years and 5 months, N (m1)=measured numbers at given time

Table E7.39 Performed t-tests of the influence of selected road-surface conditions on pedestrians injured in single accidents in urban areas; means

Time perspectives	**Indicators**					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	D~W D<I: p=0.05 W~I					
m1		D~W D~I W~I	D~W D~I W~I		D~W D~I W<I: p=0.02	D<W: p=0.01 D<I: p=0.01 W~I
m6		D~W D<I: p=0.2 W~I	D~W D~I W~I	D~W D<I: p=0.05 W~I	D~W D<I: p=0.1 W<I: p=0.01	D<W: p=0.2 D<I: p=0.2 W~I
y1		D~W D<I: p=0.2 W~I	D~W D~I W~I	D<W: p=0.2 D<I: p=0.05 W~I	D~W D<I: p=0.1 W<I: p=0.01	D~W D~I W~I
y2		D~W D<I: p=0.2 W~I	D~W D~I W~I	D<W: p=0.2 D<I: p=0.01 W~I	D~W D<I: p=0.1 W<I: p=0.01	D<W: p=0.2 D~I W~I
y3.5		D~W D<I: p=0.2 W~I	D~W D~I W~I	D<W: p=0.2 D<I: p=0.01 W~I	D~W D<I: p=0.1 W<I: p=0.01	D<W: p=0.1 D~I W>I: p=0.2

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, V PN=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, D=dry, W=wet, Ice/snow=I, ~ =no statistically significant difference

Table E7.40 Performed t-tests of the influence of selected road-surface conditions on pedestrians injured in single accidents in urban areas; totals

Time perspectives	**Indicators**					
	ISS	**H S**	**V D**	**V PN**	**S L**	**H L**
Immediate	D>W: p=0.1 D<I: p=0.001 W<I: p=0.001					
m1		D~W D<I: p=0.1 W<I: p=0.02	D>W: p=0.05 D<I: p=0.01 W<I: p=0.001		D~W D<I: p=0.02 W<I: p=0.001	D~W D<I: p=0.001 W<I: p=0.001
m6		D~W D<I: p=0.01 W<I: p=0.01	D>W: p=0.05 D<I: p=0.001 W<I: p=0.001	D~W D<I: p=0.02 W<I: p=0.2	D~W D<I: p=0.01 W<I: p=0.001	D~W D<I: p=0.001 W<I: p=0.001
y1		D~W D<I: p=0.01 W<I: p=0.01	D>W: p=0.05 D<I: p=0.001 W<I: p=0.001	D~W D<I: p=0.01 W<I: p=0.2	D~W D<I: p=0.01 W<I: p=0.001	D~W D<I: p=0.001 W<I: p=0.001
y2		D~W D<I: p=0.01 W<I: p=0.01	D>W: p=0.05 D<I: p=0.001 W<I: p=0.001	D~W D<I: p=0.01 W<I: p=0.1	D~W D<I: p=0.01 W<I: p=0.001	D~W D<I: p=0.001 W<I: p=0.001
y3.5		D~W D<I: p=0.01 W<I: p=0.01	D>W: p=0.05 D<I: p=0.001 W<I: p=0.001	D~W D<I: p=0.01 W<I: p=0.1	D~W D<I: p=0.01 W<I: p=0.001	D~W D<I: p=0.01 W<I: p=0.01

Abbreviations: ISS= Injury severity score, H S=hospital stay, V D= visits to a doctor, VPN=visits to a physiotherapist or a nurse, S L=sick leave, H L=health loss, m1= within one month, m6= within six months, y1= within a year, y2=within two years, y3,5=within 3 years and 5 months, D=dry, W=wet, Ice/snow=I, ~ =no statistically significant difference

Appendix F

Table F8.1 Severity measured by standardized means among injured in rural and urban areas defined over selected indicators at different time

Indicators	Road environment		Target indicators	
	R	U	All H C y35 1)	H L y35 2)
All H C y35	1.24	0.86	√	--
H L y35	1.65	0.67	++	√
D [P]	1.55	0.32	+	0
Se I [P]	0.99	1.01	-	--
D [H]	2.42	0.25	++	++
In-p [H]	1.15	0.91	0	--
ISS	1.33	0.82	0	-
H S m1	1.19	0.88	0	--
H S m6	1.33	0.79	0	-
H S y1	1.33	0.80	0	-
H S y2	1.34	0.80	0	-
H S y35	1.33	0.81	0	-
V D m1	0.90	1.05	-	--
V D m6	0.91	1.04	-	--
V D y1	0.94	1.02	-	--
V D y2	0.96	1.01	-	--
V D y35	0.95	1.02	-	--
V PN m6	0.89	0.97	-	--
V PN y1	1.04	0.90	-	--
V PN y2	1.10	0.85	-	--
V PN y35	1.10	0.88	-	--
S L m1	1.09	0.93	-	--
S L m6	1.08	0.95	-	--
S L y1	1.06	0.95	-	--
S L y2	1.02	0.96	-	--
S L y35	1.10	0.94	-	--
H L m1	1.23	0.87	0	--
H L m6	1.39	0.79	+	-
H L y1	1.49	0.74	+	-
H L y2	1.57	0.70	+	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	+	++
1) R=1.24	- 0.86	0.87 – 1.11	1.12 – 1.36	1.37 – 1.61	1.62 -
2) R=1.65	- 1.27	1.28 – 1.52	1.53 – 1.77	1.78 – 2.02	2.03 -

Table F8.2 Severity measured by standardized means among injured motorists, cyclists and pedestrians defined by selected indicators at different time

Indicators	**Road-users**			**Target indicators**	
	M	**C**	**P**	**All H C y35 1)**	**H L y35 2)**
All H C y35	1.36	0.70	1.15	√	-
H L y35	1.71	0.48	0.90	+	√
D [P]	1.12	0.73	1.52	-	--
Se I [P]	0.83	1.38	1.51	--	--
D [H]	2.15	0.25	0.65	++	++
In-p [H]	0.99	0.88	1.08	-	--
ISS	1.16	0.82	1.06	-	--
H S m1	1.07	0.69	1.48	-	--
H S m6	1.19	0.60	1.93	-	--
H S y1	1,21	0.67	1.75	-	--
H S y2	1.24	0.72	1.59	0	--
H S y35	1.26	0.78	1.39	0	--
V D m1	0.94	1.02	1.06	--	--
V D m6	0.98	0.96	1.04	--	--
V D y1	1.02	0.92	1.04	-	--
V D y2	1.07	0.86	1.11	-	--
V D y35	1.11	0.83	1.06	-	--
V PN m6	1.21	0.75	1.01	-	--
V PN y1	1.40	0.64	0.92	0	-
V PN y2	1.52	0.54	0.93	+	-
V PN y35	1.66	0.48	0.79	+	0
S L m1	1.16	0.84	0.84	-	--
S L m6	1.20	0.89	0.60	-	--
S L y1	1.28	0.86	0.56	0	-
S L y2	1.40	0.77	0.54	0	-
S L y35	1.61	0.62	0.40	+	0
H L m1	1.25	0.76	1.14	0	--
H L m6	1.44	0.62	1.14	0	-
H L y1	1.55	0.56	1.07	+	0
H L y2	1.65	0.51	0.97	+	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) M=1.36	- 0.98	0.99 – 1.23	1.24 – 1.48	1.49 – 1.73	1.74 -
2) M=1.71	- 1.33	1.34 – 1.58	1.59 – 1.83	1.84 – 2.08	2.09 -

Table F8.3 Severity measured by standardized means among injured in single accidents and collisions defined by selected indicators at different time

Indicators	Traffic accidents		Target indicators	
	S	Co	All H C y35 1)	H L y35 2)
All H C y35	0.69	1.43	√	0
H L y35	0.67	1.46	0	√
D [P]	0.79	1.06	-	--
Se I [P]	1.25	0.90	--	--
D [H]	0.45	1.74	+	+
In-p [H]	0.98	1.03	--	--
ISS	0.89	1.15	-	-
H S m1	0.84	1.22	-	-
H S m6	0.74	1.37	0	0
H S y1	0.66	1.47	0	0
H S y2	0.63	1.51	0	0
H S y35	0.61	1.53	0	0
V D m1	1.02	0.97	--	--
V D m6	1.01	1.00	--	--
V D y1	1.00	1.02	--	--
V D y2	0.97	1.06	-	--
V D y 35	0.92	1.13	-	-
V PN m6	0.98	1.07	-	--
V PN y1	0.98	1.09	-	-
V PN y2	0.93	1.15	-	-
V PN y35	0.81	1.29	-	-
S L m1	0.97	1.05	--	--
S L m6	0.94	1.10	-	-
S L y1	0.90	1.16	-	-
S L y2	0.82	1.25	-	-
S L y35	0.71	1.40	0	0
H L m1	0.88	1.17	-	-
H L m6	0.79	1.29	-	-
H L y1	0.75	1.36	0	0
H L y2	0.70	1.42	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) C=1.43	- 1.05	1.06 – 1.30	1.31 – 1.55	1.56 – 1.80	1.81 -
2) C=1.46	- 1.08	1.09 – 1.33	1.34 – 1.58	1.59 – 1.83	1.84 -

Table F8.4 Severity measured by standardized means among injured on links, at junctions and on separated areas defined by selected indicators at different time

Indicators	Road designs			Target indicators	
	L	J	S	All H C y35 1)	H L y35 2)
All H C y35	1.13	1.33	0.38	√	0
H L y35	1.21	1.32	0.41	0	√
D [P]	1.30	0.70	0	--	--
Se I [P]	1.04	0.91	1.17	--	--
D [H]	1.55	1.25	0	0	0
In-p [H]	1.14	1.01	0.69	-	-
ISS	1.15	1.04	0.75	-	-
H S m1	1.03	1.26	0.56	0	0
H S m6	1.10	1.34	0.42	0	0
H S y1	1.11	1.39	0.37	0	0
H S y2	1.14	1.42	0.33	0	0
H S y35	1.15	1.46	0.29	+	+
V D m1	0.99	0.99	1.05	-	-
V D m6	1.03	1.02	0.95	-	-
V D y1	1.01	1.05	0.90	-	-
V D y2	1.03	1.11	0.83	-	-
V D y35	1.02	1.10	0.77	-	-
V PN m6	0.92	1.03	0.92	-	-
V PN y1	0.89	1.10	0.84	-	-
V PN y2	0.90	1.17	0.80	-	-
V PN y35	0.95	1.19	0.67	-	-
S L m1	1.09	1.00	0.76	-	-
S L m6	1.15	1.02	0.60	-	-
S L y1	1.17	1.05	0.56	-	-
S L y2	1.13	1.16	0.51	-	-
S L y35	1.14	1.19	0.38	-	-
H L m1	1.07	1.13	0.77	-	-
H L m6	1.11	1.21	0.63	0	0
H L y1	1.15	1.25	0.55	0	0
H L y2	1.19	1.30	0.46	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) J=1.33	- 0.95	0.96 – 1.20	1.21 – 1.45	1.46 – 1.70	1.71 -
2) J=1.32	- 0.94	0.95 – 1.19	1.20 – 1.44	1.45 – 1.69	1.70 -

Table F8.5 *Severity measured by standardized means among injured in dry, wet and icy/snowy road conditions defined by selected indicators at different time*

Indicators	Road conditions			Target indicators	
	D	W	I	All H C y35 1)	H L y35 2)
All H C y35	0.92	1.77	0.82	√	++
H L y35	1.12	1.36	0.71	--	√
D [P]	1.12	0.91	0.58	--	--
Se I [P]	1.03	0.94	1.02	--	--
D [H]	1.40	1.50	0.35	-	+
In-p [H]	1.00	1.08	1.08	--	-
ISS	1.09	1.13	0.81	--	-
H S m1	1.01	1.36	0.78	--	0
H S m6	0.98	1.52	0.75	-	+
H S y1	0.94	1.80	0.66	0	++
H S y2	0.91	2.08	0.58	+	++
H S y35	0.84	2.37	0.55	++	++
V D m1	1.00	1.04	0.90	--	-
V D m6	1.01	1.14	0.87	--	-
V D y1	1.01	1.19	0.84	--	-
V D y2	0.99	1.29	0.84	--	0
V D y35	0.98	1.29	0.86	--	0
V PN m6	0.99	1.19	1.00	--	-
V PN y1	1.01	1.29	0.92	--	0
V PN y2	0.93	1.40	0.90	-	0
V PN y35	0.87	1.55	0.98	-	+
S L m1	0.98	0.96	1.26	--	--
S L m6	1.02	1.03	1.18	--	-
S L y1	1.02	1.07	1.14	--	-
S L y2	1.00	1.11	1.16	--	-
S L y35	0.99	1.11	1.24	--	-
H L m1	1.01	1.17	0.91	--	-
H L m6	1.04	1.24	0.83	--	0
H L y1	1.08	1.29	0.78	--	0
H L y2	1.11	1.32	1.00	--	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) W=1.77	- 1.39	1.40 – 1.64	1.65 – 1.89	1.90 – 2.14	2.15 -
2) W=1.36	- 0.98	0.99 – 1.23	1.24 – 1.48	1.49 – 1.73	1.74 -

Table F8.6 Severity measured by standardized means among injured in daylight, dawn/dusk and darkness conditions defined by selected indicators at different time

Indicators	**Light conditions**			**Target indicators**	
	Dl	**DD**	**Dn**	**All H C y35 1)**	**H L y35 2)**
All H C y35	1.09	1.03	0.97	√	-
H L y35	1.08	0.63	1.17	0	√
D [P]	0.91	0.73	1.27	-	0
Se I [P]	0.94	0.90	1.18	-	0
D [H]	1.10	0.45	1.40	0	+
In-p [H]	0.98	1.11	1.09	0	0
ISS	1.02	0.98	1.07	0	0
H S m1	0.97	1.11	1.12	0	0
H S m6	0.99	1.12	1.12	0	0
H S y1	1.02	1.01	1.13	0	0
H S y2	1.11	0.90	1.04	0	-
H S y35	1.18	0.82	0.93	0	-
V D m1	0.97	1.05	1.02	0	-
V D m6	0.93	1.13	1.10	-	0
V D y1	0.94	1.20	1.07	-	0
V D y2	0.93	1.19	1.11	-	0
V D y35	0.93	1.12	1.19	-	0
V PN m6	0.90	1.43	1.03	-	-
V PN y1	0.94	1.52	0.87	-	-
V PN y2	0.96	1.30	0.88	-	-
V PN y35	0.93	1.08	1.09	-	0
S L m1	0.94	1.21	1.08	-	0
S L m6	1.00	1.36	0.97	0	-
S L y1	1.00	1.44	0.91	0	-
S L y2	1.04	1.33	0.86	0	-
S L y35	1.05	1.27	0.90	0	-
H L m1	1.00	0.90	1.08	0	0
H L m6	1.04	0.75	1.11	0	0
H L y1	1.06	0.71	1.12	0	0
H L y2	1.08	0.66	1.13	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) Dl=1.09	- 0.71	0.72 – 0.96	0.97 – 1.21	1.22 – 1.46	1.47 -
2) Dn=1.17	- 0.79	0.80 – 1.04	1.05 – 1.29	1.30 – 1.54	1.55 -

Table E8.7 Severity measured by standardized means among unprotected respectively protected injured in urban areas defined by selected indicators at different time; N_{UnprPr}=1,686

Indicators	Road-users		Target indicators	
	Unpr N=1,304	Pr N=382	All H C y35 1)	H L y35 2)
All H C y35	**0.92**	**1.33**	√	--
H L y35	**0.78**	**1.82**	++	√
D [P]	1.20	1.10	-	--
Se I [P]	1.38	0.59	--	--
D [H]	0.60	2.60	++	++
In-p [H]	1.02	0.82	--	--
ISS	1.02	0.86	--	--
H S m1	1.01	0.89	--	--
H S m6	1.08	0.80	--	--
H S y1	1.11	0.74	--	--
H S y2	1.14	0.66	--	--
H S y35	1.13	0.68	--	--
V D m1	0.98	1.05	-	--
V D m6	0.96	1.11	-	--
V D y1	0.95	1.14	-	--
V D y2	0.94	1.20	-	--
V D y35	0.89	1.30	0	--
V PN m6	0.84	1.50	+	-
V PN y1	0.81	1.62	+	-
V PN y2	0.73	1.91	++	0
V PN y35	0.62	2.29	++	++
S L m1	0.87	1.32	0	--
S L m6	0.83	1.48	+	-
S L y1	0.78	1.68	+	-
S L y2	0.66	2.02	++	+
S L y35	0.58	2.34	++	++
H L m1	0.93	1.21	0	--
H L m6	0.88	1.43	0	--
H L y1	0.85	1.58	+	-
H L y2	0.81	1.71	++	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	-	0	+	++
1) Pr=1.33	- 0.95	0.96 – 1.20	1.21 – 1.45	1.46 – 1.70	1.71 -
2) Pr=1.82	- 1.44	1.45 – 1.69	1.70 – 1.94	1.95 – 2.19	2.20 -

Table F8.8 Severity measured by standardized means among motorists injured in three speed limit zones on links in rural areas defined by selected indicators at different time; N_{Mspeed}=328

Indicators	**Speed limits [km/h]**			**Target indicators**	
	70 n=90	**90 n=184**	**110 n=54**	**All H Cy35 1)**	**H L y3,5 2)**
All H C y35	1.08	1.53	1.61	√	--
H L y35	0.92	1.45	2.39	++	√
D [P]	0.63	0.92	2.46	++	0
Se I [P]	0.86	1.10	1.02	--	--
D [H]	0.71	1.48	2.98	++	++
In-p [H]	1.27	1.30	1.24	-	--
ISS	1.11	1.28	1.89	+	--
H S m1	1.72	1.28	1.19	--	--
H S m6	1.15	1.45	1.58	0	--
H S y1	0.93	1.34	2.54	++	+
H S y2	0.81	1.46	2.49	++	0
H S y35	0.74	1.63	2.11	++	-
V D m1	1.19	0.99	0.78	--	--
V D m6	1.36	1.07	0.66	--	--
V D y1	1.46	1.09	0.61	--	--
V D y2	1.66	1.07	0.52	--	--
V D y35	1.66	1.09	0.56	--	--
V PN m6	2.47	1.26	0.29	--	--
V PN y1	2.19	1.35	0.24	--	--
V PN y2	1.95	1.39	0.25	--	--
V PN y35	1.72	1.48	0.32	--	--
S L m1	1.14	1.11	1.05	--	--
S L m6	1.49	1.29	0.60	--	--
S L y1	1.74	1.16	0.65	--	--
S L y2	1.89	1.19	0.65	--	--
S L y35	1.84	1.40	0.46	--	--
H L m1	1.07	1.19	1.83	+	--
H L m6	0.95	1.34	2.13	++	-
H L y1	0.92	1.40	2.32	++	0
H L y2	0.91	1.44	2.32	++	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) 110 km/h=1.61	-1.23	1.24-1.48	1.49-1.73	1.74-1.98	1.99-
2) 110 km/h=2.39	-2.01	2.02-2.26	2.27-2.51	2.52-2.76	2.77-

Table F8.9 Severity measured by standardized means among cyclists injured in single accidents and collisions with unprotected or protected road-users in urban areas for selected indicators at different time; N_{CU}=859

Indicators	Traffic accidents			Target indicators	
	S N=576	Co Unpr N=126	Co Pr N=157	All H C y35 1)	H L y35 2)
All H C y35	0.49	0.34	3.64	√	++
H L y35	0.81	0.73	2.01	--	√
D [P]	3.00	0	0.78	--	--
Se I [P]	0.90	0.67	1.10	--	--
D [H]	1.00	0	3.00	--	++
In-p [H]	0.91	0.98	1.36	--	--
ISS	0.95	0.83	1.35	--	--
H S m1	0.75	0.46	2.43	--	++
H S m6	0.54	0.33	3.45	-	++
H S y1	0.41	0.25	4.02	++	++
H S y2	0.33	0.19	4.37	++	++
H S y35	0.26	0.15	4.67	++	++
V D m1	0.96	1.07	1.00	--	--
V D m6	0.97	1.04	1.13	--	--
V D y1	0.96	1.02	1.18	--	--
V D y2	0.97	0.97	1.19	--	--
V D y35	0.95	1.09	1.20	--	--
V PN m6	0.86	0.87	1.93	--	0
V PN y1	0.92	0.72	1.84	--	-
V PN y2	0.93	0.68	1.84	--	-
V PN y35	0.91	0.79	1.80	--	-
S L m1	0.93	0.85	1.43	--	--
S L m6	0.86	0.69	1.89	--	0
S L y1	0.83	0.60	2.10	--	0
S L y2	0.82	0.54	2.21	--	+
S L y35	0.75	0.50	2.49	--	++
H L m1	0.94	1.03	1.28	--	--
H L m6	0.88	0.97	1.54	--	--
H L y1	0.86	0.88	1.71	--	-
H L y2	0.84	0.78	1.87	--	-

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) Co =3.64	-3.26	3.27-3.51	3.52-3.76	3.77-4.01	4.02-
2) Mv=2.01	-1.63	1.64-1.88	1.89-2.13	2.14-2.38	2.39-

Table F8.10 *Severity measured by standardized means among pedestrians injured in single accidents on dry, wet and icy/snowy road surface conditions in urban areas defined by selected indicators at different time; N_{PSU}=126*

Indicators	Road conditions			Target indicators	
	D n=36	W n=17	I n=73	All H C y35 1)	H L y35 2)
All H C y35	0.55	0.59	1.27	√	--
H L y35	0.65	1.53	0.83	--	√
D [H]	0	0	0	--	--
In-p [H]	0.59	0.62	1.67	++	--
ISS	0.82	0.88	1.14	-	--
H S m1	0.81	1.10	1.24	0	--
H S m6	0.46	0.62	1.18	0	--
H S y1	0.46	0.62	1.18	0	--
H S y2	0.46	0.62	1.18	0	--
H S y35	0.46	0.62	1.18	0	--
V D m1	1.04	1.05	1.02	-	--
V D m6	0.93	0.93	1.09	-	--
V D y1	0.93	0.94	1.06	-	--
V D y2	0.93	0.94	1.06	-	--
V D y35	0.89	0.90	1.03	-	--
V PN m6	0.16	1.30	0.95	-	-
V PN y1	0.12	1.46	0.85	--	0
V PN y2	0.10	1.24	0.84	--	-
V PN y35	0.09	1.15	0.82	--	--
S L m1	0.88	0.47	1.49	+	--
S L m6	0.64	0.34	1.63	+	--
S L y1	0.64	0.34	1.63	+	--
S L y2	0.64	0.34	1.63	+	--
S L y35	0.64	0.34	1.63	+	--
H L m1	0.73	1.11	1.03	-	--
H L m6	0.71	1.16	0.97	-	--
H L y1	0.77	1.25	0.94	-	-
H L y2	0.70	1.32	0.87	--	-

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 0.25 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) I=1.27	-0.89	0.90-1.14	1.15-1.39	1.40-1.64	1.65-
2) W=1.53	-1.15	1.16-1.40	1.41-1.65	1.66-1.90	1.91-

Table F8.11 Problems for injured in rural and urban areas defined by selected indicators in different time perspective, [% of totals]

Indicators	Road environments		Target indicators	
	R	U	All H C y35 1)	H L y35 2)
All H C y35	**45**	**55**	√	-
H L y35	**59**	**41**	-	√
D [P]	86	14	--	++
Se I [P]	55	45	-	0
All I [P]	55	45	-	0
D [H]	85	15	--	++
In-p [H]	42	58	0	--
All I [H]	37	63	+	--
ISS	48	52	0	-
H S m1	44	56	0	--
H S m6	49	51	0	-
H S y1	49	51	0	-
H S y2	48	52	0	-
H S y35	49	51	0	-
V D m1	33	67	+	--
V D m6	33	67	+	--
V D y1	35	65	+	--
V D y2	36	64	+	--
V D y 35	35	65	+	--
V PN m6	35	65	+	--
V PN y1	40	60	0	--
V PN y2	43	57	0	-
V PN y35	42	58	0	--
S L m1	40	60	0	--
S L m6	40	60	0	--
S L y1	39	61	+	--
S L y2	38	62	+	--
S L y35	40	60	0	--
H L m1	45	55	0	-
H L m6	50	50	-	-
H L y1	54	46	-	-
H L y2	56	44	-	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) U=55	- 40	41 - 50	51 - 60	61 - 70	71 -
2) R=59	- 44	45 - 54	55 - 64	65 - 74	75 -

Table F8.12 Problems for injured motorists, cyclists and pedestrians defined by selected indicators in different time perspective, [% of totals]

Indicators	**Road-users**			**Target indicators**	
	M	**C**	**P**	**All H C y35 1)**	**H L y35 2)**
All H C y35	**56**	**30**	**14**	√	-
H L y35	**69**	**20**	**11**	+	√
D [P]	82	11	7	++	+
Se I [P]	68	24	8	+	0
All I [P]	79	16	5	++	+
D [H]	83	10	7	++	+
In-p [H]	45	41	14	-	--
All I [H]	43	44	13	-	--
ISS	51	36	13	-	--
H S m1	48	32	20	-	--
H S m6	51	25	24	-	--
H S y1	51	28	21	-	--
H S y2	51	30	19	-	--
H S y35	52	32	16	0	--
V D m1	41	45	14	--	--
V D m6	44	43	13	-	--
V D y1	46	41	13	-	--
V D y2	47	39	14	-	--
V D y35	49	37	14	-	--
V PN m6	53	34	13	0	--
V PN y1	60	28	12	0	-
V PN y2	65	24	11	+	0
V PN y35	70	20	10	+	0
S L m1	51	38	11	-	--
S L m6	53	39	8	0	--
S L y1	55	38	7	0	-
S L y2	60	33	7	0	-
S L y35	68	27	5	+	0
H L m1	53	33	14	0	--
H L m6	60	26	14	0	-
H L y1	64	23	13	+	-
H L y2	67	21	11	+	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) M=56	- 41	42 - 51	52 - 61	62 - 71	72 -
2) M=69	- 54	55 - 64	65 - 74	75 - 84	85 -

Table F8.13 Problems for injured in single accidents and collisions defined by selected indicators in different time perspective, [% of totals]

Indicators	Traffic accidents		Target indicators	
	S	Co	All H C y35 1)	H L y35 2)
All H C y35	**37**	**63**	√	0
H L y35	**36**	**64**	0	√
D [P]	23	77	+	+
Se I [P]	37	63	0	0
All I [P]	29	71	+	+
D [H]	24	76	+	+
In-p [H]	52	45	--	--
All I [H]	53	44	--	--
ISS	48	50	-	-
H S m1	45	54	-	-
H S m6	40	60	0	0
H S y1	35	64	0	0
H S y2	34	66	0	0
H S y35	33	67	0	0
V D m1	55	43	--	--
V D m6	54	44	--	--
V D y1	53	45	--	--
V D y2	52	47	--	--
V D y35	49	49	-	--
V PN m6	53	47	--	--
V PN y1	52	48	--	--
V PN y2	50	50	-	-
V PN y35	43	56	-	-
S L m1	52	46	--	--
S L m6	50	48	--	--
S L y1	48	51	-	-
S L y2	44	55	-	-
S L y35	38	62	0	0
H L m1	47	51	-	-
H L m6	42	57	-	-
H L y1	40	60	0	0
H L y2	38	62	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for a qualitative classification

	- -	**-**	**0**	**+**	**++**
1) Co=63	- 48	49- 58	59 - 68	69 - 78	79-
2) Co=64	- 49	50 -59	60 - 69	70 - 79	80 -

Table F8.14 Problems for injured on links, at junctions and on separated areas defined by selected indicators in different time perspective, [% of totals]

Indicators	Road designs			Target indicators	
	L	J	S	All H C y35 1)	H L y35 2)
All H C y3,5	**52**	**42**	**6**	√	0
H L y35	**54**	**40**	**6**	0	√
D [P]	71	29	0	++	++
Se I [P]	57	36	7	+	0
All I [P]	54	40	6	0	0
D [H]	64	36	0	+	+
In-p [H]	55	33	11	0	0
All I [H]	50	33	17	0	0
ISS	55	33	12	0	0
H S m1	50	41	9	0	0
H S m6	51	42	7	0	0
H S y1	51	43	6	0	0
H S y2	52	44	5	0	0
H S y 35	52	44	4	0	0
V D m1	49	33	18	0	-
V D m6	50	34	16	0	0
V D y1	50	35	15	0	0
V D y2	50	36	14	0	0
V D y35	50	37	13	0	0
V PN m6	48	36	16	0	-
V PN y1	46	39	15	-	-
V PN y2	46	40	14	-	-
V PN y35	48	41	11	0	-
S L m1	54	33	13	0	0
S L m6	56	34	10	0	0
S L y1	57	34	9	0	0
S L y2	54	38	8	0	0
S L y35	55	39	6	0	0
H L m1	51	37	12	0	0
H L m6	52	38	10	0	0
H L y1	53	39	8	0	0
H L y2	53	40	7	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) L=52	- 37	38- 47	48 - 57	58 - 67	68-
2) L=64	- 39	40 -49	50 - 59	60 - 69	70 -

Table F8.15 Problems for injured in dry, wet and icy/snowy road surface conditions defined by selected indicators in different time perspective, [% of totals]

Indicators	Road conditions			Target indicators	
	D	W	I	All H C y35 1)	H L y35 2)
All H C y35	**49**	**34**	**17**	√	-
H L y35	**60**	**26**	**14**	+	√
D [P]	68	25	7	++	+
Se I [P]	61	26	13	+	0
All I [P]	60	28	12	+	0
D [H]	67	26	7	++	+
In-p [H]	56	21	23	+	0
All I [H]	58	20	22	+	0
ISS	61	22	17	+	0
H S m1	56	27	17	+	0
H S m6	54	30	16	0	-
H S y1	51	35	14	0	-
H S y2	48	40	12	0	-
H S y35	44	45	11	-	--
V D m1	58	22	20	+	0
V D m6	58	23	20	+	0
V D y1	58	24	18	+	0
V D y2	56	26	18	+	0
V D y35	56	26	18	+	0
V PN m6	55	24	21	+	-
V PN y1	56	25	19	+	0
V PN y2	53	28	19	0	-
V PN y35	48	31	21	0	-
S L m1	54	19	27	0	-
S L m6	56	20	25	+	0
S L y1	56	21	23	+	0
S L y2	55	21	24	+	-
S L y35	53	21	26	0	-
H L m1	57	24	19	+	0
H L m6	58	25	17	+	0
H L y1	59	25	16	+	0
H L y2	60	25	15	+	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) D=49	- 34	35- 44	45 - 54	55 - 64	65-
2) D=64	- 45	46 -55	56 - 65	66 - 75	76 -

Table F8.16 Problems for injured in daylight, dawn/dusk and darkness conditions defined by selected indicators in different time perspective, [% of totals]

Indicators	**Light conditions**			**Target indicators**	
	Dl	**DD**	**Dn**	**All H C y35 1)**	**H L y35 2)**
All H C y35	**64**	**12**	**24**	√	0
H L y35	**63**	**8**	**29**	0	√
D [P]	61	5	34	0	0
Se I [P]	62	7	31	0	0
All I [P]	66	7	26	0	0
D [H]	62	5	33	0	0
In-p [H]	59	14	27	-	0
All I [H]	61	13	26	0	0
ISS	61	12	27	0	0
H S m1	58	14	28	-	-
H S m6	58	14	28	-	-
H S y1	60	12	28	0	0
H S y2	64	11	25	0	0
H S y35	67	10	23	+	0
V D m1	60	13	27	0	0
V D m6	57	14	29	-	-
V D y1	57	15	28	-	-
V D y2	56	15	29	-	-
V D y35	56	14	30	-	-
V PN m6	55	18	27	-	-
V PN y1	58	19	23	-	-
V PN y2	59	17	24	-	0
V PN y35	57	14	29	-	-
S L m1	57	15	28	-	-
S L m6	59	17	24	-	0
S L y1	60	17	23	0	0
S L y2	62	16	22	0	0
S L y35	62	15	23	0	0
H L m1	61	11	28	0	0
H L m6	63	9	28	0	0
H L y1	63	9	28	0	0
H L y2	64	8	28	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) Dl=64	- 49	50- 59	60 - 69	70 - 79	80-
2) Dl=63	- 48	49 -58	59 - 68	69 - 78	79 -

Table F8.17 Problems for unprotected respectively protected injured in urban areas defined by selected indicators in different time perspective, [% of totals]; N_{UnprPr}=1,686

Indicators	Traffic accidents		Target indicators	
	Unpr n=1,304	Pr n=382	All H C y35 1)	H L y35 2)
All H C y35	**70**	**30**	√	+
H L y35	**59**	**41**	-	√
D [P]	50	50	--	-
Se I [P]	69	31	0	+
All I [P]	48	52	--	-
D [H]	44	56	--	--
In-p [H]	81	19	+	++
All I [H]	77	23	+	++
ISS	80	20	+	++
H S m1	79	21	+	++
H S m6	82	18	+	++
H S y1	84	16	+	++
H S y2	85	15	+	++
H S y35	85	15	+	++
V D m1	76	24	+	++
V D m6	75	25	0	++
V D y1	74	26	0	+
V D y2	73	27	0	+
V D y35	70	30	0	+
V PN m6	66	34	0	+
V PN y1	63	37	-	0
V PN y2	57	43	-	0
V PN y35	48	52	--	-
S L m1	69	31	0	+
S L m6	66	34	0	+
S L y1	61	39	-	0
S L y2	53	47	--	-
S L y35	46	54	--	-
H L m1	72	28	0	+
H L m6	68	32	0	+
H L y1	65	35	-	+
H L y2	62	38	-	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) Unpr=70	- 55	56- 65	66 - 75	76 - 85	86-
2) Unpr=59	- 44	45 -54	55- 64	65 - 74	75 -

Table F8.18 Problems for motorists injured at three speed limit zones on links in rural areas defined by selected indicators in different time perspective, [% of totals], N_{Mspeed}=328

Indicators	**Speed limits [km/h]**			**Target indicators**	
	70 n=90	**90 n=184**	**110 n=54**	**All H C 35 1)**	**H L y35 2)**
All H C y35	**21**	**60**	**19**	√	0
H L y35	**17**	**56**	**27**	0	√
D [P]	19	50	31	-	-
Se I [P]	27	60	13	0	0
All I [P]	31	56	13	0	0
D [H]	13	55	32	-	0
In-p [H]	27	57	16	0	0
All I [H]	27	56	17	0	0
ISS	23	53	24	-	0
H S m1	34	52	14	-	0
H S m6	23	59	19	0	0
H S y1	18	53	29	-	0
H S y2	15	57	28	0	0
H S y35	14	62	24	0	+
V D m1	32	55	13	-	0
V D m6	35	55	10	-	0
V D y1	36	55	9	-	0
V D y2	40	52	8	-	0
V D y35	39	53	8	-	0
V PN m6	48	49	3	-	-
V PN y1	43	54	3	-	0
V PN y2	39	58	3	0	0
V PN y35	35	61	4	0	0
S L m1	28	56	16	0	0
S L m6	33	59	8	0	0
S L y1	38	53	9	-	0
S L y2	40	52	8	-	0
S L y35	37	57	6	0	0
H L m1	23	53	24	-	0
H L m6	19	55	26	-	0
H L y1	18	56	26	0	0
H L y2	17	56	27	0	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) 90 km/h=60	- 45	46- 55	56 - 65	66 - 75	76-
2) 90 km/h=56	- 41	42 -51	52 - 61	62 - 71	72 -

Table F8.19 Problems for cyclists injured in single accidents and collisions with unprotected or protected road-users in urban areas for selected indicators at different time; N_{CU}=859

Indicators	Traffic accidents			Target indicators	
	S N=576	Co Unpr N=126	Co Pr N=157	All H C y35 1)	H L y35 2)
All H C y35	**31**	**5**	**64**	√	--
H L y35	**54**	**11**	**36**	--	√
D [P]	50	0	50	-	0
Se I [P]	16	9	75	+	--
All I [P]	17	14	69	0	--
D [H]	50	0	50	-	0
In-p [H]	61	14	25	--	+
All I [H]	67	15	18	--	+
ISS	63	12	25	--	+
H S m1	49	7	44	--	-
H S m6	35	5	60	0	--
H S y1	26	4	70	+	--
H S y2	21	3	76	+	--
H S y35	17	2	81	++	--
V D m1	65	16	19	--	+
V D m6	65	15	20	--	+
V D y1	64	15	21	--	+
V D y2	65	14	21	--	+
V D y35	62	16	22	--	+
V PN m6	55	12	33	--	0
V PN y1	58	10	32	--	0
V PN y2	59	9	32	--	0
V PN y35	58	11	31	--	0
S L m1	62	12	26	--	+
S L m6	56	10	34	--	0
S L y1	54	9	37	--	0
S L y2	53	8	39	--	0
S L y35	49	7	44	--	-
H L m1	62	15	23	--	+
H L m6	58	14	28	--	0
H L y1	55	13	32	--	0
H L y2	55	11	34	--	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scale are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) CoPr=64	- 49	50- 59	60 - 69	70 - 79	80-
2) S=54	- 39	40 -49	50 - 59	60 - 69	70 -

Table F8.20 Problems for pedestrians injured in single accidents in dry, wet and icy/snowy road surface conditions in urban areas for selected indicators at different time; N_{PSU}=126

Indicators	Traffic accidents			Target indicators	
	D n=36	W n=17	I n=73	All H C y35 2)	H L y35 3)
All H C y35	**16**	**8**	**76**	√	++
H L y35	**21**	**24**	**55**	--	√
D [H]	0	0	0	--	--
In-p [H]	14	7	79	0	++
All I [H]	29	13	58	--	0
ISS	23	12	65	-	+
H S m1	21	14	65	-	+
H S m6	15	9	76	0	++
H S y1	15	9	76	0	++
H S y2	15	9	76	0	++
H S y35	15	9	76	0	++
V D m1	29	14	57	--	0
V D m6	26	12	62	-	+
V D y1	26	13	61	--	+
V D y2	26	13	61	--	+
V D y35	26	13	61	--	+
V PN m6	6	23	71	-	++
V PN y1	5	27	68	-	+
V PN y2	4	24	72	0	++
V PN y35	4	24	72	0	++
S L m1	21	5	74	0	++
S L m6	16	4	80	0	++
S L y1	16	4	80	0	++
S L y2	16	4	80	0	++
S L y35	16	4	80	0	++
H L m1	22	16	62	-	+
H L m6	22	17	61	--	+
H L y1	24	18	58	--	0
H L y2	23	20	57	--	0

Abbreviations: R=rural areas, U=urban areas, All H C= cost for all medical care and sick leave, H L= health loss, D=dead, Se I=severely injured, In-p=inpatient cared, ISS=Injury Severity Score, [P]=police source, [H]=hospital source, H S=hospital stay, V D=visits to a doctor, V PN= visits to a physiotherapist/nurse, S L=sick leave, m1=within one month, m6=within six months, y1=within a year, y2=within two years, y35=within 3 years and 5 months

The scales are based on 10 units intervals for the qualitative classification

	- -	**-**	**0**	**+**	**++**
1) I=76	- 61	62- 71	72 - 81	82 - 91	92-
2) I=55	- 40	41 -50	51 - 60	61 - 70	71 -

Table F8.21 Average costs [x10^3 SEK] of combined medical care and sick leave and standardized average cost for injured related to different road and traffic factors at five hospitals in 1991/92 three years and five months after the accident

Traffic-engineering factors											
Road environment mv 76.1		**Road users mv 76.1**		**Type of accident mv 74.5**		**Road design mv 74.3**		**Road surface conditions mv 74.0**		**Light conditions mv 74.7**	
Mv	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**
R 94.1	1.24	P 87.6	1.15	Si 51.1	0.69	L 83.8	1.13	D 67.9	0.92	Dl 81.3	1.09
U 65.2	0.86	C 53.0	0.70	Co 106.9	1.43	J 99.1	1.33	W 130.6	1.77	D/D 77.0	1.03
		M 103.2	1.36			S 27.9	0.38	I 60.9	0.82	Dn 72.3	0.97

Abbreviations: Mv=mean, Stmv=standardized mean, R=rural areas, U=urban areas, P=pedestrians, C=cyclists, M=motorists, Si=single accidents, Co=collisions, L=links, J=junctions, S=separated areas, D=dry road surfaces, W=wet road surfaces, I=icy/snowy road surfaces, Dl=daylight, D/D=dawn or dusk, Dn=darkness

Table F8.22 Average costs [x10^3 SEK] of combined medical care and sick leave and standardized average cost for injured related to selected measures for traffic safety at five hospitals in 1991/92 three years and five months after the accident

Traffic safety measures							
[P+C+Mp]-M urban areas mv 65,6		**M, speed rural areas mv 147.4**		**C, accidents, urban areas mv 31.3**		**P, single accidents, urban areas mv 27.6**	
Mv	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**
Unpr 60.0	0.92	70	1.08	Si 21.3	0.49	D 15.2	0.55
Pr 87.0	1.33	90	1.53	Co_{unpr} 16.1	0.34	W 16.4	0.59
		110	1.61	Co_{mv} 85.9	3.64	I 27.6	1.27

Abbreviations: Mv=mean, Stmv=standardized mean, R=rural areas, U=urban areas, P=pedestrians, C=cyclists, Mp=mopedists, M=motorists, Si=single accidents, Co=collisions, S=separated areas, D=dry road surfaces, W=wet road surfaces, I=icy/snowy road surfaces

Table F8.23 Costs [x10^6 SEK] for combined medical care and sick leave and their distributions between different road and traffic factors at five hospitals in 1991/92 three years and five months after the accident

Traffic-engineering factors											
Road environment sum 211.8		**Road users sum 201.6**		**Type of accident sum 216.0**		**Road design sum 196.1**		**Road surface conditions sum 194.6**		**Light conditions sum 202.0**	
Ssum	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**
R 96.2	45	P 28.0	14	Si 79.4	37	L 102.5	52	D 96.0	49	Dl 128.7	64
U 115.6	55	C 59.5	30	Co 136.6	63	J 82.1	42	W 65.8	34	D/D 25.0	12
		M 114.1	56			S 11.5	6	I 32.8	17	Dn 48.3	24

Abbreviations: R=rural areas, U=urban areas, P=pedestrians, C=cyclists, M=motorists, Si=single accidents, Co=collisions, L=links, J=junctions, S=separated areas, D=dry road surfaces, W=wet road surfaces, Icy/snowy road surfaces, Dl=daylight, D/D=dawn or dusk, Dn=darkness

Table F8.24 Costs [x10⁶ SEK] of combined medical care and sick leave and their distributions between different measures for traffic safety at five hospitals in 1991/92 three years and five months after the accident

Traffic safety measures							
[P+C+Mp]-M urban areas sum 111,5		**M, speed rural areas sum**		**C, accidents, urban areas sum**		**P, single accidents, urban areas sum**	
Ssum	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**
Unpr 78,3	70	70	21	Si	31	D	16
Pr 33,2	30	90	60	Co unpr	5	W	8
		110	90	Co mv	64	I	76

Abbreviations: Mv=mean, Stmv=standardized mean, R=rural areas, U=urban areas, P=pedestrians, C=cyclists, Mp=mopedists, M=motorists, Si=single accidents, Co=collisions, S=separated areas, D=dry road surfaces, W=wet road surfaces, Icy/snowy road surfaces

Table F8.25 Average costs [x10³ SEK] of combined medical care and sick leave and standardized average cost for injured related to different road and traffic factors at five hospitals in 1991/92 six months after the accident

Traffic-engineering factors											
Road environment mv 49.9		**Road users mv 49.7**		**Type of accident mv 49.2**		**Road design mv 49.0**		**Road surface conditions mv 48.9**		**Light conditions mv 49.5**	
Mv	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**	**Mv**	**Stmv**
R 62.1	1.24	P 77.3	1.55	Si 39.7	0.81	L 54.1	1.10	D 48.3	0.99	Dl 48.8	0.99
U 42.0	0.84	C 34.2	0.69	Co 62.8	1.28	J 60.8	1.24	W 67.3	1.38	D/D 58.6	1.18
		M 58.8	1.18			S 24.8	0.51	I 42.2	0.86	Dn 53.6	1.08

Abbreviations: Mv=mean, Stmv=standardized mean, R=rural areas, U=urban areas, P=pedestrians, C=cyclists, M=motorists, Si=single accidents, Co=collisions, L=links, J=junctions, S=separated areas, D=dry road surfaces, W=wet road surfaces, Icy/snowy road surfaces, Dl=daylight, D/D=dawn or dusk, Dn=darkness

Table F8.26 Costs [x10⁶ SEK] for combined medical care and sick leave and their distributions between different road and traffic factors at five hospitals in 1991/92 six months after the accident

Traffic-engineering factors											
Road environment sum 138.1		**Road users sum 128.1**		**Type of accident sum 142.1**		**Road design sum 126.8**		**Road surface Conditions sum 125.0**		**Light conditions sum 132.0**	
Ssum	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**	**Ssum**	**%**
R 63.6	46	P 24.7	19	Si 61.8	44	L 66.2	52	D 68.4	55	Dl 77.2	59
U 74.5	54	C 38.4	30	Co 80.3	56	J 50.4	40	W 33.9	27	D/D 19.0	14
		M 65.0	51			S 10.2	8	I 22.7	18	Dn 35.8	27

Abbreviations: Ssum=sum of the sub group, R=rural areas, U=urban areas, P=pedestrians, C=cyclists, M=motorists, Si=single accidents, Co=collisions, L=links, J=junctions, S=separated areas, D=dry road surfaces, W=wet road surfaces, Icy/snowy road surfaces, Dl=daylight, D/D=dawn or dusk, Dn=darkness

Appendix G

Validity of different indicators as predictors for the distribution of total consequences.

Each figure is based on

i) the ***target values*** – the percentage of total consequences observed for the dominant category in an analysis. The X-axis refers to the six analyses in chapter 6, with a label indicating the dominant category in each analysis. Target values are connected by the solid line '0'.

ii) five ***intervals*** around the target, representing varying ***quality*** of predictions. '++' represents a large overprediction, and '- - ' a large underprediction of the percentage for the dominant category. Error bars indicate flexible location of the borders between discrete quality intervals (applied for sensitivity analysis).

iii) early ***predictions*** of the percentage in the dominant category, based on a short-term indicator. These predictions are marked by solid squares.

The six figures in this Appendix refer to three different indicators ('ISS', 'In-p', 'HS, m1'), each evaluated against two different targets (distribution of health care costs and distribution of total health loss, both in a 3.5 year perspective).

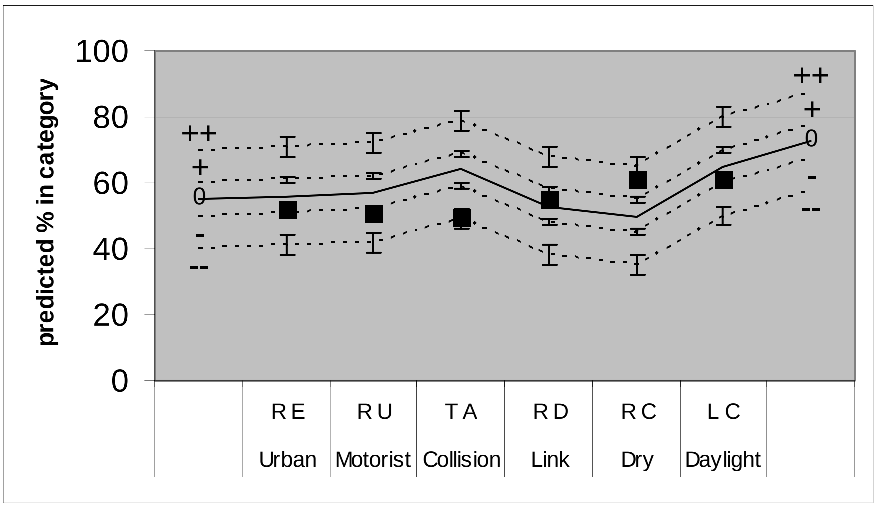


Figure G8.1 The validity of 'ISS' as a predictor of the distribution of total health care costs in a long-term perspective.

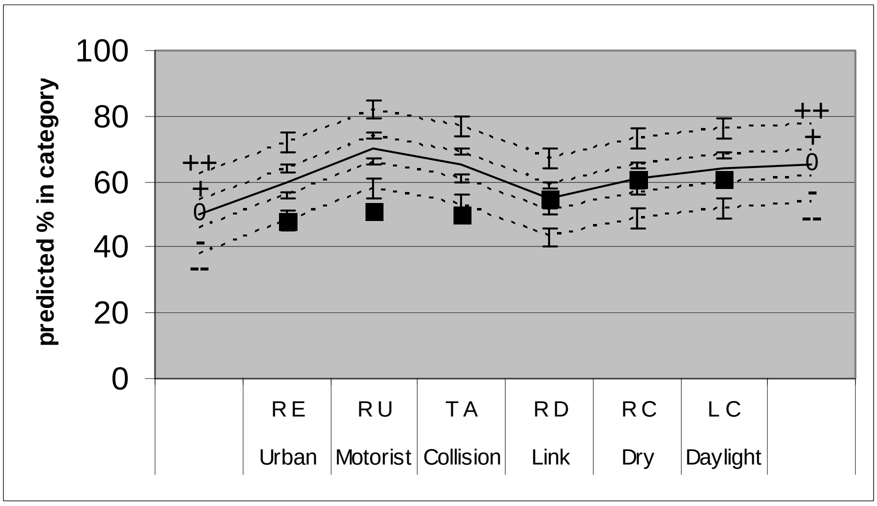


Figure G8.2 The validity of 'ISS' as a predictor of the distribution of total health loss in a long-term perspective.

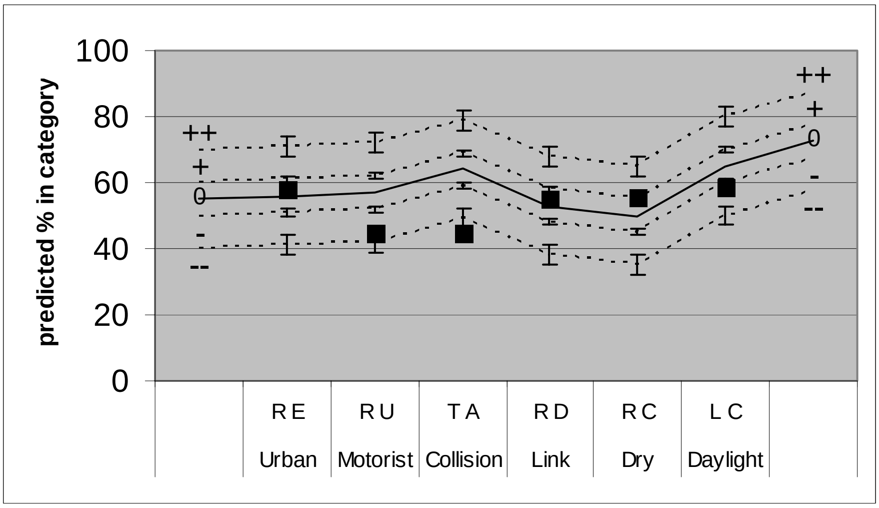


Figure G8.3 The validity of 'In-p' as a predictor of the distribution of total health care costs in a long-term perspective.

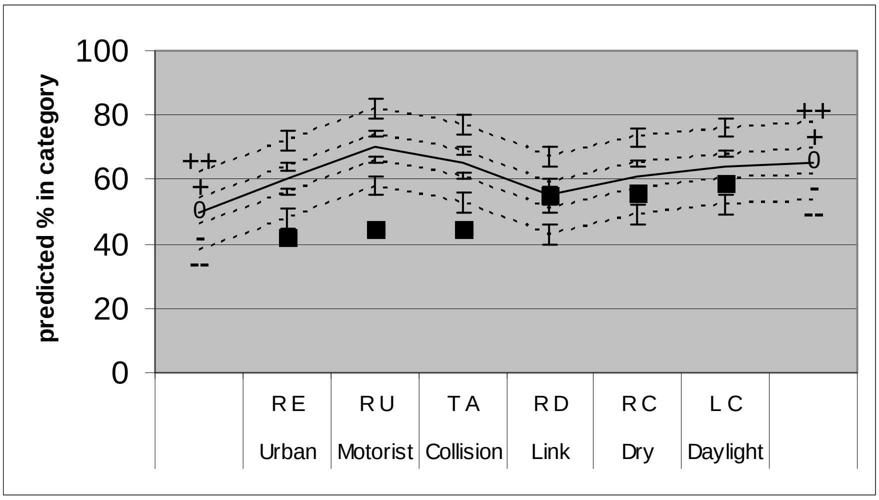


Figure G8.4 The validity of 'In-p' as a predictor of the distribution of total health loss in a long-term perspective

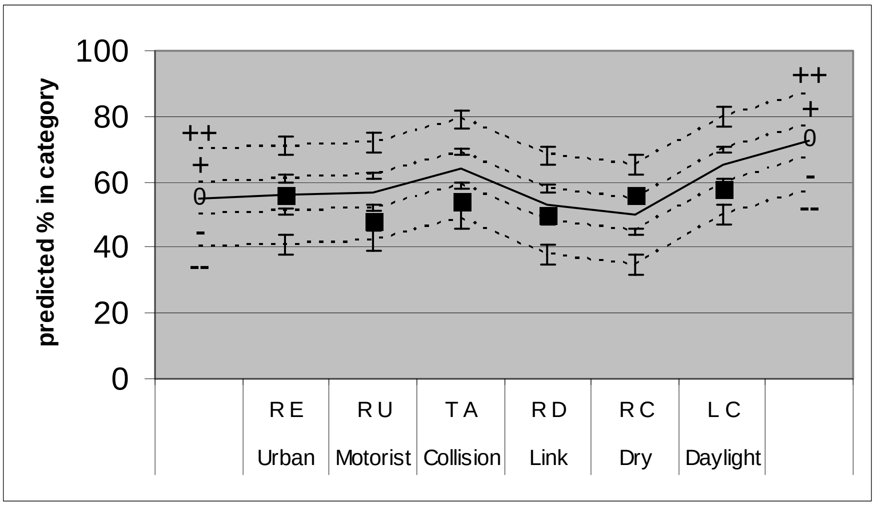


Figure G8.5 The validity of 'HS, m1' as a predictor of the distribution of total health care costs in a long-term perspective.

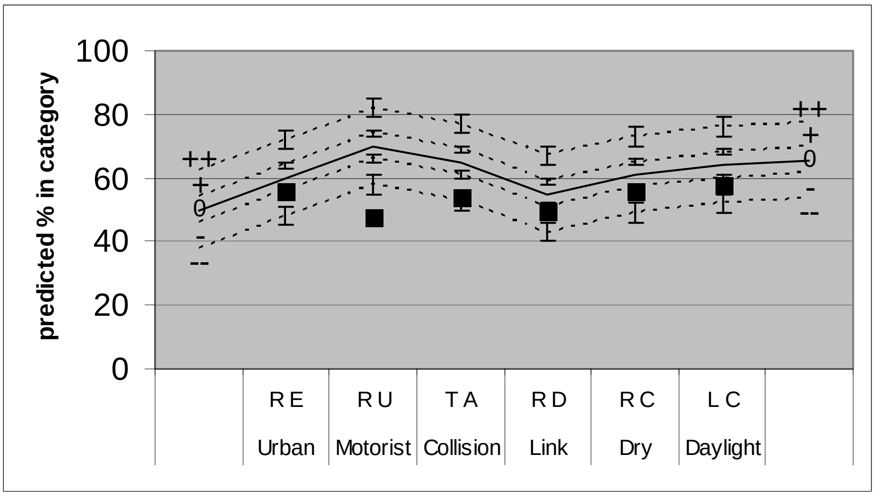


Figure G8.6 The validity of 'HS, m1' as a predictor of the distribution of total health loss in a long-term perspective.

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This project is financed by the Swedish Transportation Research Board [KFB] and the Swedish National Road Administration [Vägverket]
Richard Fisher (AmericaText) has examined the language in the thesis

Errata

Monica Berntman: *Consequences of Traffic Casualties in Relation to Traffic-Engineering Factors – An Analysis in Short-term and Long-term Perspectives.* Bulletin 214. 2003

Where	**Error**	**Correction**
Page VIII, line -11	mångfasettera	mångfasetterade
Page IX, line +3	upp gifter	uppgifter
Page 29, line -2	Ordinal	Interval
Page 36 , Footnot, line -18	[25]	[6]
Page 37, Table 4.3 Road-surface conditions, line +3	Is/snow	Icy/snowy
Page 39, Table 4.4 Karls-krona, Traffic injuries	Bold letters	No bold letters
Page 146 respectively page 147, line +3	Dry=green, wet=blue, ice/snow=red	Daylight=green, dawn-/dusk=blue, darkness=red
Page 153, Figure 7.3. Immediately after the accident. y-axis	Stan	Stand
Appendix E. Table E7.19	Table E71.9	Table E7.19