SWOV
INSTITUTE FOR ROAD SAFETY RESEARCH

RESEARCH ACTIVITIES

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Contents:

Editorial

This issue of Research Activities offers information about a variety of topics and opens with a discussion on the numbers of road crash casualties in the Netherlands and the possibilities for setting a new, lower target for 2020.

Dutch road traffic fatalities in 2007 somewhat lower than in 2006

The number of road fatalities further decreased from 811 in 2006 to 791 in 2007. This was announced by the Dutch Minister of Transport at the two-yearly Dutch Road Safety Conference in April. This number is corrected for under-reporting.

After an impressive decrease of 19% in 2004 to 881 fatalities and a further decrease of 7% in 2005 to 817, the number of road fatalities continued to go down, be it at a less spectacular pace, in 2006 (811) and 2007 (791). The developments in recent years make it very likely that the current Dutch road safety target for 2010, not more than 750 road deaths, will be met.

Towards a more ambitious 2020 target

The positive developments renewed the discussion about setting a new and more ambitious target for 2020. The present target aims for a maximum of 580 fatalities. However, given recent positive developments, such a target is not very ambitious anymore and is no stimulus to make extra efforts to save more human lives. A more ambitious target seems reasonable now. The discussion was very well timed, since the Ministry of Transport is working on a new Dutch Road Safety Plan for the period 2008-2020. Already in 2007, Transport Minister Eurlings informally stated that a target of 500 road deaths in 2020 seemed 'pretty good' to him. The issue came up again at the Dutch Road Safety Conference in April this year when the Minister presented the latest road safety figures. At that occasion, SWOV offered to investigate the feasibility of such a target or an even more ambitious target and what could be done to get there. The results were recently published.

Continued on page 2

QUOTE

It's not the car that drives itself into a tree; mostly it's the driver.

Jörg Kubitzki
Traffic psychologist

Continuing from page 1

500 target feasible with unchanged road safety policy

SWOV calculated that with just doing what has been planned, the number of road deaths in 2020 can be expected to be around 500. For this so-called baseline prognosis it was assumed that traffic would increase according to the scenario of the largest growth and that the current road safety policy would continue, both qualitatively and quantitatively. The baseline prognosis does include the potentially positive safety effects of the introduction of road pricing, which is planned to come into effect in 2012.

Heading for a target of 440 fatalities or less?

To reach an even sharper target, SWOV formulated a set of promising measures and estimated their effects on top of the previously mentioned baseline prognosis. These measures are very strongly related to the themes in the Road Safety Plan and include some expected positive developments in the field of vehicle technology. With these measures, a target of 440 will be feasible. By additionally speeding up the implementation of a sustainably safe infrastructure, banning dangerous behaviour like drink-driving and speeding, and reducing relatively hazardous mobility, for instance of young novice drivers, a target of 350 fatalities in 2020 can be achieved. All of the included measures are known to be cost-effective and to save a proportional number of fatalities, especially when they are part of an integrated policy approach. Infrastructural measures, for instance, can often be carried out as part of (major) road rehabilitation projects or new infrastructural projects and as part of their budgets, or as part of projects for optimising accessibility.

Parliament in favour of a 500, some of a 440 target

At the general road safety meeting of the Dutch Parliament and the Minister of Transport in June, the road safety target 2020 was one of the issues. Referring to the results of the SWOV study, several members of Parliament asked the minister to reconsider his road safety ambitions. A majority was in favour of a 500 target. Some parties would prefer the Minister to consider the 440 target. In a letter to the Parliament mid July, the Minister wrote that he has the intention to lower the 2020 target to 500 fatalities and that he will discuss this with his partners, provincial, regional, and local governments. The new target will be introduced in the Road Safety Plan 2008-2020, which will be discussed in Parliament after the summer recess.

The SWOV study is reported in report number R-2008-5 'A maximum of 500 road deaths in 2020: why not? Measures and effect estimates aimed at achieving a more ambitious road safety target'. This report can be found on www.swov.nl under Publications. It is in Dutch, but contains an English summary.

15th Dutch National Road Safety Conference: over 500 participants

Road safety still enjoys a lot of interest in the Netherlands. Over 500 Dutch and a few Belgian road safety professionals attended the Dutch National Road Safety Conference which took place on 24 April in Rotterdam.

This two-yearly happening was organised for the 15th time by SWOV and the Royal Dutch Tourist Club ANWB, co-financed by the Dutch Ministry of Transport. Participants included policy makers, administrators, engineers, consultants, police officers and researchers.

Antisocial drivers

At the plenary morning session, Transport Minister Eurlings announced the number of road deaths for 2007 and called for a more severe policy to combat drink driving, speeding, and aggressive driving. In particular the extremely antisocial drivers, the 'riffraff' as he called them, need a stricter and more severe approach. A demerit point system for all drivers – the Netherlands currently have a demerit point system for novice drivers only - could be one of the options, according to Minister Eurlings.

Linking safety and environment

The Directors of both ANWB and SWOV also addressed the participants in the plenary morning session. Fred Wegman, Director of SWOV, emphasized a few essential issues for further improving the Dutch road safety level: an integrated approach, implementation of modern technologies in road traffic, active cooperation between all relevant parties, and, last but not least, using the Sustainable Safety vision as the guiding principle. As an example of the integrated approach, Wegman mentioned the links between road safety issues and environmental issues. In the coming period SWOV will work together with SenterNovem, an agency of the Dutch Ministry of Economic Affairs, promoting sustainable development and innovation, both within the Netherlands and abroad. Issues for which cooperation would have an added value include, according to Wegman, speed management, mobility management, and eco-driving. The cooperation between SWOV and SenterNovem will be effectuated within the next few months.

SWOV Managing Director Fred Wegman (l) and Transport Minister Camiel Eurlings (r)

Papers, posters and panels

Papers and posters about a wide variety of relevant issues offered the participants the latest information about the topics of their interest. There, or in the workshops they could share their experiences in face to face discussions. The Dutch non-profit road safety organizations presented themselves during the breaks. In two panel discussions, the main players in the field of road safety policy and decision making at national, provincial, and local level debated about the possibilities and limitations, chances and challenges for implementing road safety measures with sometimes competing interests and budgets.

Including safety in regional road network analyses

The Dutch government promotes a regional mobility policy and therefore asks the Dutch regions to carry out what are called regional road network analyses. These analyses are intended to optimize spatial developments and mobility for all transport modes in the period 2010-2020 and will form a basis for decisions on investments in roads and public transport. SWOV is developing a method to include road safety in these regional network analyses in a more structural way.

Improving mobility and accessibility

The regional network analyses focus on mobility and accessibility in each of the regions. They are a co-production of national government, provinces and municipal partnerships. Current bottlenecks and potential future bottlenecks are identified, based on spatial and mobility developments. Applying a multimodal approach, a set of measures is developed to improve accessibility and the effects are worked out quantitatively using traffic simulations. All the regional analyses together will give an overview of the national situation.

Assessing the safety effects

The network analyses do not have safety as their main goal, but it is obvious that measures for accessibility may also affect the safety level of a region. In the network analyses carried out so far, road safety was taken account of in a qualitative way, if at all. SWOV developed a method to integrate road safety into the analyses in a more structural and quantitative way, based on the Sustainable Safety principles. The method is straightforward. Each type of road has a particular risk level, which is determined by the number of fatalities or severe casualties per vehicle kilometre travelled on that particular road type. If a road is destined to get another function and, hence, will become another road type or category, the number of casualties will be affected. Similarly, if a road has to accommodate more vehicles in future, this will also affect the number of casualties. As the risk levels per road category are known to differ between regions, for example because of differences in traffic composition and road characteristics, it is advisable to use risk information on a regional level.

The method

The SWOV method consists of two parts. First, there is a network test to determine whether the current road categories in the regional network meet the functional requirements of Sustainable Safety. The test determines whether the design and use correspond with the function of the road and whether the fastest route is also the safest route. If this is not the case, the network analyses need to be based on the correct function and the related traffic characteristics, assuming that in the near future these roads will have the appropriate function and layout. The second part consists of making prognoses of the safety level. For each set of measures, the prognoses are made by multiplying the estimated traffic volumes by the risk levels of the corresponding road categories. This gives an indication of the safety effects of the mobility measures.

Two pilots

The methodology was piloted in two Dutch regions. Both regions had information about the risk levels of their own road network and used dynamic simulations for their network analyses. The pilots showed that it was indeed possible to demonstrate safety differences between various accessibility measures. The difference between the most and the least safe accessibility variant amounted to almost 10% in terms of the number of casualties.

Report R-2007-12 'Road safety in regional network analyses' can be found on www.swov.nl under Publications. The report is in Dutch and has a summary in English.

2nd SafetyNet Conference, Rome, 17 & 18 April 2008

How symbolic: on top of the ancient Roman Tabularium – where once the archives of ancient Rome were housed – the SafetyNet team showed how solid knowledge and data are essential for road safety policy making. We are standing on the shoulders of giants, but the horizon of zero road casualties is still out of sight.

Built during the 13th and 14th century, the Palazzo Senatorio ("Senatorial Palace") stands fiercely atop the Tabularium and for two days, welcomed an enthusiastic group of people who are committed to improving road safety by evidence-based policymaking. The event was the second and closing conference of the European SafetyNet project. Well over 200 attendants were served with a variety of recent developments on the collection, harmonisation, analysis, dissemination and use of road safety related data and knowledge.

The SafetyNet team showed that they had taken major steps during the past four project years.

The team succeeded in enhancing and expanding the CARE database, formulated a vision on the use of risk exposure data in Europe, and developed and applied a widely applicable set of safety performance indicators. Recommendations for independent and transparent accident investigation were also formulated. Finally, a harmonised European database of fatal crashes and an accident causation database were developed, each containing over 1,000 recent cases. To be able to analyse all emerging interrelated information, the SafetyNet team developed multi-level and time-series statistical methods, and applied them to the different types of data from the project. Finally, since one of the main goals of SafetyNet was to make preparations for a European Road Safety Observatory, the ERSO website (www.erso.eu) was developed. This website, which has approximately 6,000 visitors each month, offers the European road safety professional the up-to-date and wide-range data and knowledge that is necessary to perform evidence-based policymaking.

The 27 presentations at the 2nd SafetyNet conference are available at www.erso.eu, as are the main project results and deliverables.

Economic developments and road safety: mutual influence

Economic developments have an influence on road safety and, conversely, road safety has an influence on the economy. This is made clear in the SWOV exploration of economics and road safety that was recently published.

SWOV carried out this exploration in order to find out whether economic developments have an effect on road safety, whether road safety has an effect on economic developments, which developments they may be, and what explanations can be found for these relations between economic developments and road safety.

Effects of the economy on road safety

First of all, a brief study was made of international research in which, making use of models, the relation was investigated between macro-economic variables like unemployment and income, and road safety. Several studies show a relation between economic variables and road safety, but few explanations and foundations are given. Therefore, SWOV looked for economic influential factors that could offer an explanation for the relation between economy and road safety for the Dutch situation. The SWOV study distinguished between effects on risk and mobility, and effects on freight transport and people transport.

The economy can have an influence on road safety in two different ways: in the first place economic developments have an effect on mobility and consequently on road safety. There are several economic factors that stimulate mobility, like for instance growth of production and income, internationalization, (relative) decrease of transport costs, and computerization/e-commerce. Factors like an increase in new logistics concepts, outsourcing, and specialization reduce the volume of freight transport.
In the second place economic factors may affect the crash and/or casualty rate. The crash rate will for instance increase due to the growth in home deliveries due to e-commerce, young people who more readily buy a car in economically sound times, and the purchase of a second car due to growing incomes. These second cars are often smaller and possibly less safe.

Effects of road safety on the economy

There are different ways in which crahes affect the economy. In the first place road crashes are the cause of many costs: expenses for medical care, repairs or replacement of vehicles and roads, and dealing with the crashes by police, fire brigade, and insurance companies. Annually, in the Netherlands, these costs amount to more than 5 billion euro and are more than 1% of the Dutch gross national product. These expenses cause economic activity in the form of production, but with fewer crashes these finances could go to other useful destinations, and other products could be made or services offered.
Secondly, there are costs that are no official part of the gross national product. They are the result of congestion caused by crashes, and of intangible costs like sorrow, pain, and loss of joy of living. In these cases there is loss of production, which is responsible for a lower gross national product than that in a situation in which fewer or no crashes would take place. In the Netherlands, these costs amount to approximately 7 billion euro per year. This makes the total cost of road traffic crashes in the Netherlands amount to more than 12 billion euro at the price level of 2003. This amount is not compensated to any extent by the economic activity which is caused by crashes. Finally, costs are made in preventing crashes. The exact amount is unknown, but for the Netherlands a rough estimate arrives at a minimum of 1.5 billion euro in 2003.

Increased investments in prevention

In the first place we can expect that the continued growth of freight and people transport that is partly the result of economic developments will lead to an increase of 'the exposure to risk' and therefore to more road crashes. This means that efforts continue to be needed to reduce risks in order to reduce crashes and casualties. More investments in measures to reduce the crash rate are then necessary. The SWOV study has brought to light an important argument to increase investments in prevention: the substantial negative impact of road traffic crashes on the economy. Investments in road safety can reduce the societal costs of road crashes. Cost-benefit analyses have shown that the benefits of road safety measures, expressed in savings on costs as a result of crashes, often exceed the costs of the measure itself.

Continuation

The relation between road safety and the economy offers many leads for continued research. In the coming period SWOV will carry out research into the expenditure on prevention: how much money is spent on prevention, who is it spent by, and what is it spent on.

The SWOV exploration 'Economics and road safety' (R-2006-30) can be consulted on www.swov.nl under Research, Publications. The report is in Dutch, but has an English summary.

Advanced Cruise Control

Advanced Cruise Control (ACC) systems can have a favourable effect on road safety when used on motorways with non-congested traffic and can also have a positive effect on fuel consumption and road capacity. ACC can have negative safety effects if it is used in busy traffic and on other roads than main roads. The factsheet *Advanced Cruise Control (ACC)* describes the present state of affairs concerning the ACC system, its effects and the expected future developments.

It has been estimated that in about 30% of fatal crashes excessive speed is involved. Speed management, therefore, is a crucial factor in road safety. In-vehicle technology can support the driver in choosing an appropriate speed at all times and places, and in specific conditions. Advanced Cruise Control (ACC) is one of these in-vehicle technologies.

System

Advanced Cruise Control (ACC), also known as adaptive or intelligent cruise control, is an extension of conventional cruise control systems. It was brought onto the market as a comfort system, but ACC also affects driver behaviour, both in a positive as well as in a negative way.
ACC maintains the driver-set vehicle speed, but also uses a frontal radar/laser sensor to adjust the vehicle's speed to that of the vehicle ahead and consequently helps to maintain a pre-selected headway time to that vehicle. ACC can adjust the vehicle's speed and headway by controlling fuel flow or by slightly braking. This can have the positive effects of reducing the maximum speed, the reduction of speed differences, and a reduction of very short headway times. Negative ACC safety effects were also found, like for example increased lane position variability, delayed braking, and colliding with a stationary queue more frequently.

Effects

The operational characteristics of ACC can affect driving behaviour. For example, when using an ACC type that takes over more of the driving task and offers more support in critical situations, drivers seem to adapt their behaviour and increase their speed. Traffic conditions like traffic density and road type also affect the use and the effect of ACC.
Drivers find ACC reliable and easy to use and to drive with. ACC decreases the standard deviation of speed up to as much as 50% which results in more homogeneous driving speeds. ACC is expected to have a large road safety effect: assuming all vehicles are equipped with ACC, the number of traffic crashes on motorways could decrease by about 13% and those on provincial main roads by 3.4%. But only when used in non-congested traffic. Homogeneous driving speeds are also the main reason that ACC decreases fuel consumption and hence harmful emissions.

Developments

Technological developments are already bringing a new generation of ACC within reach. Combinations with other systems are very promising. Possibilities are a combination of ACC and Intelligent Speed Assistance (ISA) and a combination of ACC and Lane Departure Warning systems. Communication between vehicles and communication between vehicle and roadside could also have a positive effect on road safety.

More information about in-vehicle technology can be found in SWOV-report R-2006-25 'Speed support through the intelligent vehicle' and in the fact sheet Advanced Cruise Control (ACC)' Both publications are in English, and are available on www.swov.nl.

SWOV and MUARC: Memorandum of Understanding

SWOV Managing Director Fred Wegman (l) and MUARC Director Rod McClure (r)

SWOV and the Monash University Accident Research Center (MUARC) in Australia have agreed to exchange knowledge, employees and information, and to cooperate within projects. On 27 March 2008, SWOV managing director Fred Wegman and MUARC director Rod McClure have signed a Memorandum of Understanding to formalize this agreement.
The first activity in the framework of this Memorandum of Understanding is that one of SWOV's researchers, Nicole van Nes, will go to Australia from August 2008 until May 2009. She will work on projects which are of interest to both SWOV and MUARC. The research will involve speed behaviour, intersection design and the use of in-vehicle technology.

DALY and QALY: indicators of the consequences of (traffic) injury

In the area of health care DALY and QALY are widely used units of measure to express quality of life and the burden of disease. These units of measure are also a good supplementary indicator for the consequences of traffic injuries. This is one of the conclusions of a recently published SWOV study into the usefulness of DALYs and QALYs for road safety.

DALY is the abbreviation of Disability Adjusted Life Year; QALY stands for Quality Adjusted Life Year. Both are units of measure which combine the effects on mortality and quality of life and express the results in the same basic unit. This basic unit is time: life years.

DALYs: loss of (healthy) life years

A DALY of 0 stands for a life year in perfect health, a DALY of 1 stands for deceased. A value between 0 and 1 indicates a life year with illness or limitations. By multiplying a life year with this value a 'for disabilities adjusted life year', is calculated. The closer the value is to 1, the more serious the injury. DALYs were developed by the World Health Organization and the World Bank in 1996 to enable calculations of the so-called 'burden of disease'. The burden of disease is defined by the loss of health and the number of life years lost as a result of illness or injury. The Dutch National Institute for Public Health and the Environment (RIVM) uses this definition: "The number of DALYs consists of the number of healthy life years lost by a population due to illnesses". A positive effect on the number of life years and/or the quality of life is expressed in a loss of DALYs.

QALYs: healthy life years gained

In fact, a QALY is the reverse of a DALY. A QALY of 1 is a life year in full health, a QALY of 0 is deceased, an intermediate value is a life year with illness. If an intervention lengthens the life expectancy with one year in good health, it is expressed by one QALY. QALYs are about the total number QALYs gained in a population as the result of a measure.

Applications in the road safety area

Both DALYs and QALYs express the number of life years and the quality of life in one number. This makes it possible to, for example, compare medical treatments with different effects on life expectancy and quality of life, possibly balanced against the costs. It may also be possible to follow the effects of a disease like, for instance malaria or HIV, over the years. Road crashes are increasingly considered to be a public health problem and road safety measures as a prevention against death and injury. That is why QALYs and DALYs can also be used to compare the effects of different road safety measures and to compare the developments over the years. In addition, it is also possible to compare the consequences of different health threats, like for example air pollution and road traffic crashes. DALYs en QALYs have the advantage over existing measures that they combine the effects on (the prevention of) fatal injury and non-fatal injury in all its severities. This gives a more balanced picture than when only fatal injury and in-patients are taken into account, as is often the case at present.

A value for quality of life

An important and critical point for the usability of DALYs as well as QALYs is to determine a realistic value for the quality of life in the case of illness and injury. To this end several instruments are available which mostly consist of a questionnaire about health and its valuation. Studies comparing these instruments generally conclude that EuroQol is the most suitable for use on traffic injury. In EuroQol the casualty describes his state of health with the use of five questions that have three possible answers each. Each question is about a dimension which involves the quality of life: mobility, self-care, daily activities, pain/discomfort, and anxiety/depression. The valuation of the state of health, a value between 0 and 1, is then based on judgments of the general population on combinations of scores for the different dimensions.

Youths have less to lose and more to gain

An ethical issue is the fact that using DALYs and QALYs generally labels measures aimed at the young as being more cost-effective than measures aimed at the elderly. This is because the young have a higher life expectancy than older people and therefore have more QALYs to gain and more DALYs to lose. As such, measures

An example: DALYs as a result of road crashes and air pollution

The Dutch National Institute for Public Health and the Environment (RIVM) has calculated that in the year 2000 more people suffered an early death as a result of air pollution than (approx. 3,500) than of road traffic crashes (approx. 1,000). Some 4,000 people were admitted to hospital as a result of air pollution, which is fewer that the more than 6,000 road traffic crash in-patients. However, death and illness due to air pollution mainly involves people with poor health and/or the elderly. Road traffic casualties often are youths and people who at that moment were in excellent health. Comparison of the burden of disease (in DALYs) of air pollution with that of road traffic crashes therefore has an entirely different result than a comparison of the number of victims: the number of DALYs for road traffic crashes is more than 70 times higher than the number of DALYs for air pollution (ca. 70,000 to 1,000 DALYs). This can be explained by the much longer duration of traffic injury and a larger number of life years lost due to road traffic crashes.

Source: Knol, A.B. & Staatsen, B.A.M. (2005). *Trends in environmental burden of disease in the Netherlands 1980-2020*. RIVM, Bilthoven.

mainly leading to road safety improvements for the young, have more QALYs to be won and more DALYs to be lost than measures improving the road safety of the elderly. This can be overcome by consistently indicating how their use is divided over several relevant groups of people. The decision can then be made by not only looking at the total numbers of DALYs en QALYs, but by also taking their distribution over the groups into account.

A good additional indicator

The report concludes that QALYs and DALYs are good indicators to be included in road safety work. For practical application further research is necessary. This will initially focus on the calculation of the total number of DALYs in road traffic crashes in one or multiple years and how they are divided over several groups, for instance injury categories. In addition, the practicability of the available data needs to be investigated. Data is also required about the nature, severity and duration of the injury, data that is not systematically registered as yet. Furthermore, it is advisable to aim follow-up research at developing a method for calculating DALYs for those years for which no EuroQol data but other medical data about road crash casualties is available.

The report ' Usefulness of QALYs and DALYs for road safety' (R-2007-13) may be consulted on www.swov.nl under Research, Publications. The report is in Dutch, but has an English summary.

Roadworks in the Netherlands: about 20 fatal crashes per year

Every year, there are approximately 190 serious crashes at roadworks in the Netherlands, of which about 20 are fatal. In 2005, approximately 2% of all severe crashes happened at a roadworks location. Roadworks crashes are relatively often rear-end collisions and freight transport appears to be overrepresented in roadwork crashes.

Presently, SWOV is carrying out a study of road safety at roadworks and has recently published the findings until now in an update of the Fact sheet *Roadworks and road safety.* Further results are expected later this year.

Parties involved

Not the road workers, but the 'ordinary' road users usually are the casualties in the majority of roadworks crashes. Crashes in which road workers are involved, form only a small part of the roadworks crashes. Although the number of casualties among road workers is limited, the risk of a fatal accident is probably higher for road workers than for those working elsewhere in the construction industry. Half of the road workers report often or always feeling unsafe during roadworks. An analysis of Dutch crash data showed freight traffic to be involved in roadworks crashes relatively often. A lorry is involved in 6% of the other crash types; in roadworks crashes their percentage is 14%.

Location

Just over half of the roadworks crashes in the Netherlands occur on rural roads. Most crashes happen during activities on the carriageway, where the working area itself is the riskiest area. Roadworks that are carried out over a longer time span and roadworks that cover a longer stretch of road seem to have a lower risk. Roadworks crashes are relatively often rear-end collisions, especially on rural roads. Also on non-urban roads, there are a number of crashes between vehicles and roadworks vehicles or the cordoning-off. These crashes probably are partly due to speeds that are too high for the circumstances. In urban areas a number of crashes happens because slow traffic has entered a closed off road. Unclarity about the alternative route that needs to be followed and a not clearly marked working area seem to be important for this crash type.

Conditions

The risk of being involved in roadworks crashes generally is higher at night. Many of the crashes happen in the months June, September, October and November. This can be explained by these being the months in which roadworks are carried out most.
More than two-thirds of the severe roadworks crashes happen in dry weather and on a dry road surface. This largely coincides with the general picture of crashes in the Netherlands and therefore is not characteristic of roadworks crashes. The fact that roadworks are being carried out is not always the reason for roadworks crashes. A number of the crashes would most probably have

Continued on page 8

Colophon

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The SWOV website contains a wealth of information about a variety of road safety topics. The Knowledge Base and the SWOV fact sheets are all available in English. The library has extensive possibilities to search for international road safety literature and publications.

Continuing from page 7

occurred in any case, even if no roadworks had been in progress. This, for example, is the case of a crash happening because the stop sign was ignored. At the time of the crash roadworks were carried out on the main road, but these were unlikely to have been of influence on the intersecting vehicle's failure to stop.

Measures

The data analysis study was preceded by a survey of the international literature. The literature survey concluded that speed measures like enforcement and dynamic speed information can be helpful in lowering the speeds in the vicinity of roadworks. In addition, the Dutch Ministry of Transport has introduced new, more credible speed limits in the vicinity of roadworks on motorways which help drivers to comply with the limits there.

Shock absorbers and rumble strips reduce the risk and severity of the crashes.

The Netherlands has guidelines for uniform preparation, information and signing and marking of roadworks. It is important that these guidelines are not only followed for large-scale, but also for minor roadworks. The indication of the working area and the diversion of the traffic must be clear and unambiguous, so that the road users receive timely information about the roadworks and know what they are expected to do. There also needs to be sufficient space or guarding between the road workers and the traffic.

The updated fact sheet 'Roadworks and road safety', which makes use of Dutch data, is available on www.swov.nl . SWOV report R-2007-5 'Road safety at roadworks; A literature study', looks at the international information about this topic. The report is in Dutch, but has an English summary. The factsheet is in English.

Publications

Most SWOV reports are written in Dutch but they all include an English summary. Below is a selection of reports that have recently been published by SWOV. Reports that were published in or after the year 2000 can be found on our website (www.swov.nl) and may be downloaded free of charge.

Economics and road safety; An exploration of external influences

W. Wijnen. R-2006-30. 77 pp. € 12.50 (In Dutch)

This exploration focuses on the relation between economic developments and road safety. It is a twofold relation: economic developments can have an effect on the chancew occurance of road crashes and road crashes have economic consequences. This study has explored both relations using available literature and data. An inventory has been made of the opportunities and threats for road safety that result from economic developments and the implications for policy have been listed. See also page 4 of this issue of Research Activities.

The effects of mobility on road safety; An exploration of external influences

W. Wijnen & S. Houwing. R-2006-31. 64 pp. € 12.50 (In Dutch)

This exploration focuses on the relation between developments in mobility and road safety. Past, present and future developments in mobility have been investigated making use of available data and literature, and the significance of these developments for road safety has been described.

Usefulness of QALYs and DALYs for road safety

W. Wijnen. R-2007-13. 44 + 7 pp. € 11.25 (In Dutch)

QALY (Quality Adjusted Life Years) and DALY (Disability Adjusted Life Years) are units of measure that can be used to express the consequences of (traffic) injury. As yet, these measures are rarely used in road safety research and policy, but in other fields QALY and DALY are much more common. This study, which consists of a literature study and some interviews with policymakers and researchers, discusses the 'state of the art' of both concepts and investigates their usefulness and added value for road safety research and policy. See also page 6 of this issue of Research Activities.

Road safety in 2006; Analysis of crashes, mobility, behaviour and policy

P. Wesemann & W.A.M. Weijermars. R-2007-14. 102 + 15 pp. € 17.50 (In Dutch)

Since the mid-1970s the annual number of traffic fatalities has shown a decreasing trend in the Netherlands. In 2004 there was a sudden sharp decrease in the number of road deaths. The decrease continued in 2005. This report presents and discusses recent crash figures and tries to find an explanation for the developments that are found.

Speed support through the intelligent vehicle; Perspective, estimated effects and implementation aspects

P. Morsink, Ch. Goldenbeld, N. Dragutinovic, V. Marchau, L. Walta & K. Brookhuis. R-2006-25. 119 pp. € 17.50 (In English)

Speed management is a central theme in traffic management, aiming to optimize traffic in terms of safety, efficiency and the environment, by reducing speeding and speed differences in traffic. Intelligent vehicles can perform tasks that conventional measures cannot do at all, or do less efficiently. This report presents scientific evidence of the predicted effects of promising intelligent vehicle systems for speed support. Based on further insight, the report makes suggestions for further research and policymaking.

Developments in technology and environmental care in the field of traffic and transport, with implications for road safety; An exploration of external influences

C.C. Schoon. R-2008-4. 86 pp. € 15.- (In Dutch)

This study is aimed at establishing the most important developments in technology and environmental care that affect mobility and road safety. To this end, the exploration has been divided into the components infrastructure, vehicles, transport, ICT, traffic management, and environmental care. For each of these components the implications for road safety are discussed.

A maximum of 500 road deaths in 2020: why not? Measures and effect estimates aimed at achieving a more ambitious road safety target

L.T. Aarts, W.A.M. Weijermars, C.C. Schoon & P. Wesemann. R-2008-5. 30 + 18 pp. € 11.25 (In Dutch)

The present road safety target for the Netherlands is a maximum of 580 road deaths in 2020. SWOV has calculated that the number of road deaths in 2020 will be approximately 500, even with unchanged policy. In 2007, Minister of Transport Eurling himself said that a target of 500 road deaths in 2020 seemed 'pretty good' to him. At this occasion, SWOV offered to investigate the feasibility of such a target or an even more ambitious target and what could be done to get there. The results of this study are published in this report. See also page 1 of this issue of Research Activities.

Fact sheets:

- Advanced Cruise Control (ACC)
- Road works and road safety
- Accompanied driving

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