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# The Vision Zero and its Consequences<sup>1</sup>

by

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## 1 Present-Day Road Traffic Safety Problems

### 1.1 Health Problems Associated with the Road Transport System

According to the World Health Organization (WHO) constitution, health is defined as *a condition of complete physical, mental and social well-being and not simply the absence of disease or disability*. The large number of people who are killed or seriously injured every year as the result of accidents within the road transport system constitutes one of the major public health problems in Sweden.

During the past three years, an average of 600 people have been killed and between 60,000 and 80,000 injured per year in Sweden as a result of road traffic accidents. The number of these that have been hospitalized per year has been estimated at between 12,000 and 15,000. Approximately 200,000 persons have reported that they suffer from chronic conditions that were acquired in road traffic. About 4-5% of those born in Sweden every year die or are disabled as a result of traffic accidents.

Both the risk of dying and the number killed as a result of traffic accidents is considerably greater within the road transport system than in other kinds of transport. One explanation is naturally that there are comparatively more people using the road transport system. However, there are other underlying factors involved. Other types of transport have been developed on the premise that no accidents that lead to serious human injury are to occur within the system; the focus has been on the inherent safety features rather than on the ability of the individual to conduct himself in a safe manner. Furthermore, safety has been promoted by the fact that this has applied basically to commercial traffic where there are professional operators with technical systems at their disposal to enhance the safety level and prevent the potentially serious repercussions of human error.

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<sup>1</sup> Selected extract from Memorandum prepared by the Ministry of Transportation and Communications, Ds 1997:13

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Means of Transport	Killed per billion kilometres travelled
Moped	81.7
Motorcycle	77.3
Private Aviation	70
Pedestrians	44.6
Bicycles	20.8
Private cars, drivers	5.8
Private cars, passengers	3.6
Bus, rural roads	0.1
Train (Swedish State Railways)	0.07
Commercial Airlines	0

**Table 1.1.** Transport safety in Sweden in the 1990's. Source SNRA (1990-92) Railways Inspectorate (1991-94) and Civil Aviation Inspectorate (1990-94).

The environmental impact of the road transport system also greatly affects public health through the allergies, genetical defects, cancer, noise pollution etc caused by road traffic.

It has been estimated that several hundred people are afflicted by cancer every year in Sweden as a result of vehicle emissions. In other words, the health problems associated with the road transport system are highly influenced by the environmental and traffic safety situation.

## **1.2 Present-Day Road Traffic Safety Goals**

The national policy on road traffic safety was first adopted in the Swedish Parliament in 1982 and has since been ratified in 1988 and 1993. The goals are as follows:

- the total number of persons killed and injured in traffic shall be reduced continuously
- the risk of being killed or injured in traffic shall be reduced continuously for all categories of road-users
- the risk of being killed or injured in traffic shall be reduced to a greater extent for pedestrians and cyclists (unprotected road-users) than for motorists (protected road-users). Special attention shall be paid to the safety of children.

## **1.3 Present-Day Work on Road Traffic Safety**

Present-day work within the field of road traffic safety is based on the national road traffic safety programme for the period 1995-2000. Within this programme, particular emphasis is placed on ten areas, so-called reform areas, within which the focus is on solving various road traffic safety problems. These areas include: the valuation of road traffic safety, sobriety in traffic, fewer speed violations, a safer traffic environment and the use of cycle helmets.

A common theme in the reform areas is the description of characteristics within the road transport system that greatly influence road traffic safety. Concrete objectives have been set up for each reform area; e.g., a smaller proportion of intoxicated drivers at police controls, fewer speed violations and a larger proportion of cyclists wearing helmets. One of the advantages of these objectives is that they can be monitored at the national, regional and local levels. They also make the work within the field of road traffic safety more concrete and understandable for all involved; they thus serve as guidelines in the overall management of the work and facilitate winning popular support.

## **1.4            *The Development of Road Traffic Safety***

In order to describe the development of road traffic safety at an overall level, a study can be made of traffic fatality statistics. The number of persons killed in traffic between 1982 and 1989 rose from 758 to 904. This number started to decline markedly in April 1990 and continued throughout the year. There was a 15% reduction in traffic fatalities, the final number being 772 for 1990. On March 1, 1990 the price of petrol rose by SEK 1.15/litre which contributed to a reduction in the traffic volume by almost 5%.

During 1991 and 1992 the traffic volume rose again by a total of 2-3% and the number of traffic fatalities remained around 750 per year during this two-year period. On January 1, 1993 the price of petrol went up again and the traffic volume decreased by 3-4% during that year. From June 1993 there was a period in which the number of persons killed in traffic was drastically reduced. This period lasted up to the end of June 1994. The annual number of traffic deaths declined from 762 to 551 on an annual basis at that time.

The downward trend in the number of traffic fatalities calculated on an annual basis was broken in July 1994. Subsequent to this, there was a slightly upward trend and by the end of December 1995 the number of persons killed in traffic had increased by 3% from the end of June 1994. In 1995 the number was 572. The primary explanation to the increase is probably that the amount of car traffic had risen again. This stagnated in 1996. Preliminary accident statistics for 1996 indicate that the number of fatalities had fallen to 525 persons.

In conclusion, it can be determined that the number of deaths and serious injuries was reduced during the first half of the 1990's. The number of fatalities declined by 37% and the number seriously injured according to police report statistics fell by 32% between 1989 and 1995. The primary explanation for this reduction is that the great increase in traffic in the 1980's stagnated at the beginning of the next decade. The number of younger drivers at the wheel, i.e. those drivers who fall in the highest risk zone, declined notably, partially due to the increase in the price of petrol as well as to the fact that there were fewer applications for new driving licences. There is a great risk that the number of traffic fatalities and serious injuries will rise again as the economy improves.

## **1.5            *Costs of Traffic Accidents to Society***

The cost of road traffic accidents in Sweden has been analysed at the Institute of Traffic Technology at the Institute of Technology in Lund. The study showed that the cost to society for the traffic accidents that occurred in 1995 can be estimated at SEK 14.8 billion in 1995 money values. This represents about 1% of the GNP in 1995. The highest cost items are property damage costs and loss of production (as a result of sick leave, early retirement pensions, and premature death). These two items amount to SEK 5.7 and 5.6 billion respectively. Health care costs and administrative costs for insurance companies and the police have been estimated at SEK 2.1 billion and 1.4 billion respectively.

The highest cost is incurred by the vehicle owner who is obliged to pay for the repair of the damaged vehicles and compensation to injured persons through his car insurance and third-party liability insurance. Other significant costs are borne by the State via lost tax revenues due to loss of production and through social insurance payments for early retirement and temporary sick leave. The burden on county councils and primary local authorities can be estimated at SEK 1.6 and 1.3 billion respectively. This is comprised, in part, of the care and rehabilitation costs for traffic accident victims and partially by the loss of tax revenue due to the injured person's inability to work.

Studies have shown that the willingness of citizens to pay for a reduction in the statistical risk of a death amounts to almost SEK 12 million in 1995 money values. The corresponding willingness to pay to reduce the statistical risk of a serious injury amounts to SEK 1.9 million and to SEK 85,000 for a minor injury. If medical care costs, the net loss of production, administrative costs and personal property damage costs are added to the price the individual is willing to pay for a risk reduction (such costs are not included when individuals indicate their willingness to pay), a measure is obtained of how highly Swedish citizens value a risk reduction. The total value of reducing the risk of different accidents has thus been calculated at SEK 12.9 million for a death, SEK 2.4 million for an average serious injury and SEK 140,000 for an average mild injury. These figures can be used in socio-economic investment calculations in order to evaluate the benefit of different road traffic safety measures.

## **1.6 Valuation of Road Traffic Safety in Society**

In this context, valuation refers to the individual's basic views on or attitude towards road traffic safety. In other words, it is a question of acquiring an image of people's basic ideas on the concept of road traffic safety.

That people are killed and injured in the road transport system is something that very few accept. There is thus wide support for doing something about the situation. Poor road traffic safety seems to be a problem that people largely feel is due to the individual and his or her inability or lack of desire to behave correctly in traffic.

Consequently, the most important measures are perceived as those which aim at making individuals adapt to the applicable laws and regulations. There is thus no wide-spread general opinion that unsafe traffic situations and the dangers in traffic are a communal problem to be handled collectively with a sense of solidarity. Many people oppose general measures intended to improve road traffic safety. Reducing the speed limit is a prime example. The attitude to speed varies greatly between men and women, where women have a distinctly more positive attitude to lowering speed limits.

## **2 Vision Zero's Society with Safe Road Traffic**

### **2.1 Vision Zero**

#### **2.1.1 New Focus in the Work on Road Traffic Safety**

How road traffic safety is valued today is reflected through the different choice of measures taken to enhance it. When the problem is largely considered to depend on the incorrect behaviour of the individual road-user, it is quite logical that the measures chosen are those that aim at making him or her adapt to the road transport system instead of the other way around. Unlike in other areas (such as in other kinds of transport or in industry), safety on the roads is founded on the premise that people abide by certain rules, that they are generally quite sensible and that they always make the right decision.

In actual fact, it is largely due to the design of the road transport system that road-users risk exposure through traffic accidents to violent forces that are far beyond human endurance. This means that one single wrong decision or one single mistake can be fatal for several others.

According to current national policy, the number of road traffic fatalities and injuries shall continually decline. Drawn to its logical conclusion, this means that ultimately no one will be killed or injured on the roads. Vision Zero expresses this more clearly while shifting the focus to the most serious injuries:

Vision Zero means that eventually no one will be killed or seriously injured within the road transport system.
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Vision Zero does not presume that all accidents that result in personal property damage or in less serious injuries must be eliminated. These occurrences are not considered to be an essential element in the road traffic safety problem even if they can entail large costs for the State, county councils, municipalities and individuals. Rather, focus shall be placed on those incidents that lead to a person being killed or seriously injured. The WHO definition of health does indeed also include a sense of security aspect. However, by concentrating the effort exerted in the field of road traffic safety on solving the most serious health problems, the sense of security will

also increase. Vision Zero is not only an expression of current policy, it is also a promulgation of the ethical approach to the health problems associated with road traffic.

It can never be ethically acceptable that people are killed or seriously injured when moving within the road transport system.

Vision Zero ought to be a long-term goal for the design and functioning of the road transport system. At the present time, it is neither possible nor particularly meaningful to ascertain when this goal can be achieved or at what cost. What is important, however, is to realise that the Vision Zero approach will alter the aim of the work on road traffic safety; i.e., from endeavouring to reduce the number of accidents to the formulation of an explicit goal: to eliminate the risk of chronic health impairment caused by a traffic accident. This new approach will also alter the question from "what can we do?" to "what must we do?"

With this as the basis, wide-spread discussions are then needed to deal with how a Vision Zero approach should be allowed to influence the emphasis placed on different goals in the national policy on traffic and the environment as well as on how socio-economic calculations are viewed. At present, these calculations constitute an important basis when deciding on a balance between different goals. These issues will probably be treated in the Communication Committee's final report which is planned for completion by March 1, 1997.

### 2.1.2 Responsibility for Road Traffic Safety

Vision Zero presumes an new division of responsibility for road traffic safety within the road transport system. Up until the present time, basically the entire responsibility has been placed on the individual road-user. This approach is reflected, for example, in Section 5 of the Road Traffic Ordinance: *The road-user shall exercise the attention and caution dictated by the prevailing circumstances to avoid a traffic accident. He shall behave in a manner that in no way unnecessarily obstructs or disrupts traffic. The road-user shall otherwise also show respect for other road-users and those residing by the road or who are found in its immediate vicinity.*

There are no corresponding obligations placed on those designing different elements of the road transport system. This unilateral division of responsibility is non-constructive if the basic premise is to achieve Vision Zero. The responsibility for road traffic safety should be introduced along the following lines.

1. The designers of the system are always ultimately responsible for the design, operations and use of the road transport system and are thereby responsible for the level of safety within the entire system.
2. Road-users are responsible for following the rules for using the road transport system set by the system designers.
3. If road-users fail to obey these rules due to a lack of knowledge, acceptance or ability, or if injuries do occur, the system designers are required to take the necessary further steps to counteract people being killed and seriously injured.

### 2.1.3 Vision Zero Demands on the Future Road Transport System

Much of the work on road traffic safety and the environment within the road transport system is aimed at minimizing the negative impact of traffic on human health both today and in the future. The purpose of the work on road traffic safety is to prevent people from being killed or injured in traffic accidents while that of the work on the environment is that people and the surroundings should not suffer from vehicle emissions and the noise emanating from traffic. In the work on attaining a sustainable road transport system, consideration should also be paid to the fact that several thousand people are killed and seriously injured in road traffic every year.

Taking the Vision Zero approach means that paying attention to human life and health is an absolute requirement in the design and functioning of the road transport system. This implies that road traffic safety issues, in

similarity to environmental issues, must be clearly integrated in all the processes that affect road traffic safety in the road transport system and be based on the following:

The level of violence that the human body can tolerate without being killed or seriously injured shall be the basic parameter in the design of the road transport system.

It is upon this principle that the future society with safe road traffic can develop: through designing and constructing roads, vehicles and transport services so that the level of violence that can be tolerated by the human being is not exceeded; and through the effective contribution of different support systems such as rules and regulations, education, information, surveillance, rescue services, care and rehabilitation. With this as the basis, there will be a positive demand for new and effective solutions that can contribute to a road transport system where human needs, prerequisites and demands are in focus.

## 2.1.4 Vision Zero and Present-Day Work on Road Traffic Safety

Through designing a new road transport system on the basis of the principles mentioned in the foregoing we are heading towards the realisation of Vision Zero. In the meantime, there are serious faults in the system today which must be rectified in the near future. The methods for attaining a high level of road traffic safety in both the long- and short-run are partially dissimilar, but both perspectives are necessary.

In the current work on road traffic safety, analyses are made of those problems generated by road traffic in order to identify the short- and long-term measures needed. This can involve reviewing present regulations, initiating new technological and tangible measures within the area of vehicles and roads or influencing road-user behaviour and attitudes through education, information and surveillance.

Future work within the field of road traffic safety should lead to system designers and system users assuming their share of the responsibility for health and safety within the road transport system. The present-day road traffic safety situation can be improved through effective, focused public opinion campaigns, road-user information and traffic surveillance. This work can also serve to increase social readiness and acceptance for the long-term transition to the society with safe road traffic envisioned by Vision Zero. This could, for example, be expressed in a greater demand for new technology promoting road traffic safety.

Through the focus on environmental issues, there has been a greater understanding of the causes and effects of environmental problems on the part of decision-makers and citizens. There is, at present a widespread debate throughout all levels of society as to what must be foregone to be able to convert our resource intensive society into an ecologically sustainable society. A similar broad debate including grass-roots commitment is also required on the subject of road traffic safety so that the present-day focus can eventually result in a society with safe road traffic.

It is highly essential that the work on road traffic safety be co-ordinated, as far as possible, with the overall work on environmental issues and the work on other closely related areas of activity (such as the work environment, health and welfare promotion, crime prevention etc). This is partially due to the fact that this work is largely based on grass-root commitment and partially because of the common ambition to prevent health impairment and crime both today and tomorrow.

## 2.2 *Operational Strategy*

To create a society with safe road traffic, a strategy must be formulated for the long-term goal-oriented work in the field of road traffic safety, a so-called operational strategy.

The following statement is contained in the National Road Traffic Safety Programme for 1994-2000: *The basis and focus for the future work on road traffic safety is the human being, her needs and limitations, her desires and ability, her norms and experiences, her duties and obligations.*

This Programme was aimed primarily at reducing the number of killed and injured by the turn of the millennium. To a large extent, its measures were intended to influence people to follow rules and regulations of their own free will and accept the responsibility inherent in the role of road-user. However, the more long-term work on road traffic safety should be based to a greater extent on human *limitations*, on the human *need* that the design of the system allow for human error and on the human *desire* and *ability* to set demands on the design and functioning of the road transport system.

The formulation of Vision Zero's operational strategy can be based on the above. The strategy should specify the role of the different parties in the process and describe the interaction required to attain a society with safe road traffic. The strategy should be designed on the basis of the following target groups: citizens, high-level decision-makers, public authorities, the market and the mass media.

### 2.2.1 Citizens

The success of the work on road traffic safety depends on the individual citizen making demands on the design and functioning of the road transport system. In modern times, individual citizens are involved in influencing developments within many areas in society. This applies to questions that involve schools and recreation activities for children, environmental issues such as requirements on specific goods / products and re-cycling or requirements on new technology such as catalytic converters and airbags. Actions taken are seldom founded on applicable rules and regulations but come about owing to well-informed and interested citizens demanding changes which originate from an awareness that new systems and solutions do exist but are not being implemented.

Essentially, the strategy chosen is a question of our outlook on people. Is the individual an uninformed and disobedient person requiring coercion to be able to conform to a system? Or is he or she a competent and responsible citizen who constitutes an important resource in the structuring of a society with a safe traffic environment? If we believe the latter, what are the consequences on our work in the field of road traffic safety?

Obviously, no one would ever want any of one's closest family or friends to be killed or disabled in traffic. *Every single person has - or has had- his own personal "vision zero"*.

Problems can, however, arise when contemplating specific road traffic safety measures. It is not always obvious that the individual person sees the connection between a specific measure and its effect on road traffic safety in society as a whole. Lowering the speed limit is a prime example. This is often implemented to protect the most vulnerable road-users but entails all road-users making a sacrifice in the form of longer travelling times for the common good. Even if it can be presumed that every single individual places higher priority on life and good health than on saving time, the latter is more tangible and immediate. The potential for saving lives constitutes more of a theoretical concept. The higher the understanding of changes and the greater the sense of participation in the process the easier it is to accept change.

Naturally, the traditional strategy of enhancing road traffic safety through demanding that the individual road-user abide by traffic regulations and show consideration, good judgement and a sense of responsibility in traffic is also part of this new strategy. However, the importance of the traditional strategy will gradually diminish to give way to the new concept implying placing higher demands on the design and functioning of the system.

Citizens are provided support from the National Society for Road Safety (NTF) and other associations and voluntary pressure groups all of which are striving for better road traffic safety. Through methodically spreading consumer information and lobbying for consumer demands, these organizations can contribute to safer products and services being placed at the disposal of both public and private parties.

This means that the strategy for the role played by citizens in the work on road traffic safety should be

- to consolidate the legitimacy of their demands for better road traffic safety in residential areas and in the vicinity of schools and day-care centres, as well as their demands on the engineering design of roads and vehicles and on the action taken by the authorities in connection with serious traffic accidents
- to improve their insight and awareness of the major risks and dangers in traffic and the way in which these can be best counteracted
- to increase their own motivation in certain situations to exchange comfort and shorter travelling times for a safer and better environment
- to increase their own motivation to obey traffic rules and show consideration, good judgement and a sense of responsibility in traffic
- to support and encourage local volunteer groups working on better road traffic safety.

## 2.2.2 High-Level Decision-Makers

More active citizens will be placing new, even bothersome demands on those in power in society, political decision-makers and other *decision-makers within the public and private sector*. Higher demands will also be placed on the ability of those in power to be able to choose and motivate measures that in certain cases are more effective than those demanded. Part of the operational strategy within the work on road traffic safety should therefore be

- to prepare high-level decision-makers for the anticipated increase in the road traffic safety demands that will be presented
- to increase the insight and awareness of the major risks and dangers in traffic and the way in which these can be best counteracted
- to support and facilitate the interest of high-level decision-makers in road traffic safety and their interest in prioritizing effective measures.

## 2.2.3 Public Authorities

”Public authorities” designates all the national, municipal and county *civil servants* who in one way or another generate, procure, and make decisions on rules and regulations on road traffic and transports or who otherwise have an influence on the road transport system in the course of their work.

The procurement of road transports is a common phenomenon within the operations of large parts of the public sector. In this context, these authorities are in a position of being able to demand that both passenger and goods transports are done in a way that is both safe and environmentally sound. In addition to authorities being able to place basic demands that all aspects of transport services are carried out according to regulations, further demands can be made under the condition that they occur in open competition in a non-discriminatory manner.

Civil servants also generate much of their own road transport through in-house operations, official business trips and through travelling to and from work. An internal official policy can be decided for this kind of travel and transport requiring that it be undertaken in a way that promotes road traffic safety and protects the environment. This policy can include everything from the purchase of private vehicles to encouraging employees to use bicycle helmets, seat belts etc on work-related journeys.

The measures taken by the various authorities to promote road traffic safety within the framework of their ordinary operations should, as far as possible, be co-ordinated and be carried out in co-operation with all those concerned. This applies, for example, to the planning and implementation of traffic regulations, civil works, maintenance and operations, education, information and surveillance. In other words it is not only a question of

taking the right measure but that this is done at the right time and in the right way and that it is aimed at the right target group. It is only when all these criteria have been met that good acceptance and a complete effect can be attained.

A strategy as far as public authorities are concerned should include the points specified for high-level decision-makers and also consist of

- supporting and facilitating the co-operation between those working at a national, regional and local level and the co-ordination of their work
- stimulating the authorities to allow road traffic safety and environmental aspects to be guiding principles when procuring goods and services
- stimulating the authorities to adopt a transport and travel policy for internal operations with high demands being placed on road traffic safety and environmental considerations
- stimulating the authorities to encourage work-related trips that are environmentally sound and that promote road traffic safety.

## 2.2.4 The Market

In this context, "the market" refers to the conditions that substantially control the actions of manufacturers, *the business sector*. It is important to formulate a strategy that supports a market demand for products and services within the road transport sector that are environmentally friendly and promote road traffic safety.

That which is all-decisive in the actions of the business sector are the market assessments made by companies with respect to their goods and services. If companies believe that their customers will demand safety features, this will be reflected in the development of their products and services. If customers such as individual citizens, public authorities and the business sector demand transport services and products that promote high road traffic safety, these will be developed and become available on the market.

Similarly to the public sector, the private sector can be stimulated to set road traffic safety and environmental requirements on their procurement of transports as well as examine their own transports, business trips and work-related trips from this point of view. In addition to doing this from purely ethical motives, companies can hereby lower their own costs through fewer employee injuries and property damages as well as increase their revenues as a result of profits on marketing.

In summary, the strategy with respect to the conditions for the private sector deals with

- influencing the supply of safe transport services and products through creating market demands for them
- stimulating the business sector to develop new services and products that can meet future market demands with respect to promoting road traffic safety and the environment
- stimulating the business sector to allow road traffic safety and environmental aspects to be guiding principles when procuring goods and services
- stimulating the business sector to adopt a transport and travel policy for internal operations with high demands being placed on road traffic safety and environmental considerations
- stimulating the business sector to encourage work-related trips that are environmentally sound and that promote road traffic safety.

## 2.2.5 Mass Media

*The mass media* has the highly important task of portraying the work on road traffic safety in the same way as it examines and reports all other changes in society. In this respect, the mass media is an important transmitter of information between the individual citizen, high-level decision-makers, public authorities and the business sector.

In its capacity as critic of events in society, the mass media plays a crucial role in the events that lead to the creation of a society with safe road traffic, both when it is a matter of presenting and throwing light upon new facts as well as when it come to stimulating a general debate. This strategy should therefore be based on

- supporting the mass media in its work by supplying facts and objective information
- providing easily accessible information on the different measures in progress or that are being planned to increase road traffic safety.

## 2.3 Strategy of Action

Vision Zero describes the state wherein a society is characterized by safe road traffic. Nevertheless, it should be possible to define safe road traffic in itself, not only as the absence of serious injuries. It is therefore necessary to formulate the strategy of action to be taken to achieve safe road traffic based on a public health and road traffic safety perspective.

The strategy of action points out what the guiding principles should be when choosing measures. On the other hand, the tangible measures chosen to solve a specific problem can be different depending on the degree of their acceptance and the demand that exists for the various types of measures.

### 2.3.1 Safe Road Traffic

#### Basic Principles

That the speed of travel in itself is highly significant for both the course of events in an accident and in the resulting injuries is obvious. The design of both roads and vehicles as well as the protective devices used also have a great influence on accident and injury risks. To attain safe road traffic it is therefore necessary that the relationship between these factors be taken into consideration, with speed being the most important factor. In other words, the speed limits within the road transport system should be determined by the technical standard of vehicles and roads so as not to exceed the level of violence that the human body can tolerate. The safer the roads and vehicles, the higher the speed that can be accepted.

The road transport system shall, in principle, be available to everyone. The Vision Zero approach implies that the system design must allow for human error without this leading to serious injury. Thus, both urban and rural roads and streets must be designed according to the principle that the fundamental design parameter be the road traffic safety need of the most vulnerable groups of road-users.

#### Important Characteristics

One prerequisite for safe road traffic is the design and maintenance of roads and streets. Vehicle design is another important factor in the prevention of serious accidents and injuries. In combination with the technical systems installed, the vehicle design must serve to guard against severe injuries, assist drivers so that serious accidents can be avoided as far as possible and function so as to prevent the vehicle from being used by unsuitable drivers such as in the case of theft. Road informatics should be developed in a way that supports a safe, environmentally-friendly use of the different parts of the road transport system. The technical equipment in the vehicle should even ensure that drivers are not under the influence of any drugs and that everyone in the vehicle is using a seat belt and/or another protective device.

Safe road traffic also presumes that cyclists, motorcyclists and those driving mopeds wear helmets and that they are visible during hours of darkness. Moreover, it is highly essential that road-users are well-informed and understand the factors that greatly affect road traffic safety. In a safe road traffic situation this is manifested through the consideration shown by road-users to others in the road environment and their readiness to assume responsibility for the safety of others while making active demands on effective and user-friendly system solutions.

### 2.3.2 Accident Prevention Measures

Traditionally, many road traffic safety measures have been aimed at trying to prevent accidents from happening, largely through attempting to influence road-user values and behaviour to counteract dangerous conduct. Other measures have been aimed at vehicle design and functioning; e.g., brake system research and development.

The graph below presents the exposure to violence to which people are subjected in traffic accidents. This illustrates that the exposure is low in most accidents while very few accidents entail high exposure.

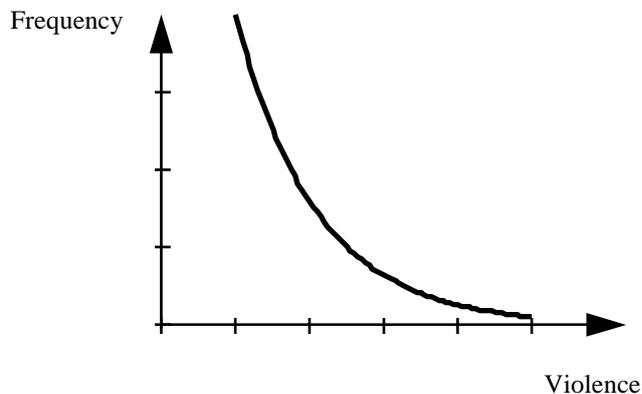


Figure 2.1 Exposure to Violence. Distribution between the number of accidents and the violence of the force.

### 2.3.3 Injury Prevention Measures

In many cases it is more effective to lessen the injuries resulting from a traffic accident than to try to prevent the accident itself. Single-car accidents serve as a good example. While there is a multitude of reasons why single-vehicle accidents occur, there are only a few, well-defined, reasons why an injury occurs in connection with a single accident. In this case it can be much more efficient to reduce the risk of injury than the accident risk.

The relation between the violence of the force and health impairment is known for several body parts and types of injury, as well as for different road-user categories and age groups. It is therefore possible to use graphs to present the relation between the violence of the force and the risk of a serious health impairment for protected road-users (motorists) and unprotected road-users (pedestrians and cyclists). The violence of the force in these graphs can be described in mechanical terms such as changes in the speed of a vehicle or of a part of the body in connection with an accident.

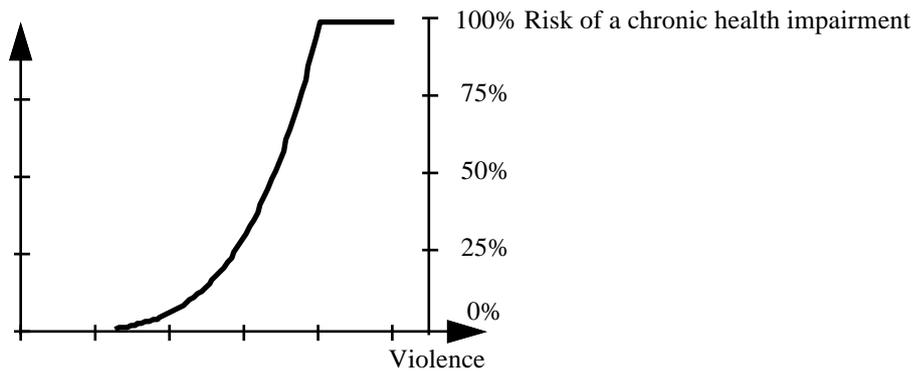


Figure 2.2 Tolerance to violence. Relation between violence and the risk of a serious health impairment.

### 2.3.4 Requirement of An Overall Approach

#### Both accident prevention and injury prevention measures are required

The road traffic safety problem (i.e., those cases where the force is violent enough to cause a serious health impairment, shown by the shaded area in Figure 2.3) is illustrated through combining the two foregoing graphs.

It is through reducing the exposure to violence while simultaneously increasing the tolerance to violence that Vision Zero can be realised; or, in other words: it is a matter of taking measures that either individually or in combination serve both to prevent accidents (so that the left-hand curve in Figure 2.3 is moved to the left), and to prevent injuries (so that the right-hand curve is moved to the right).

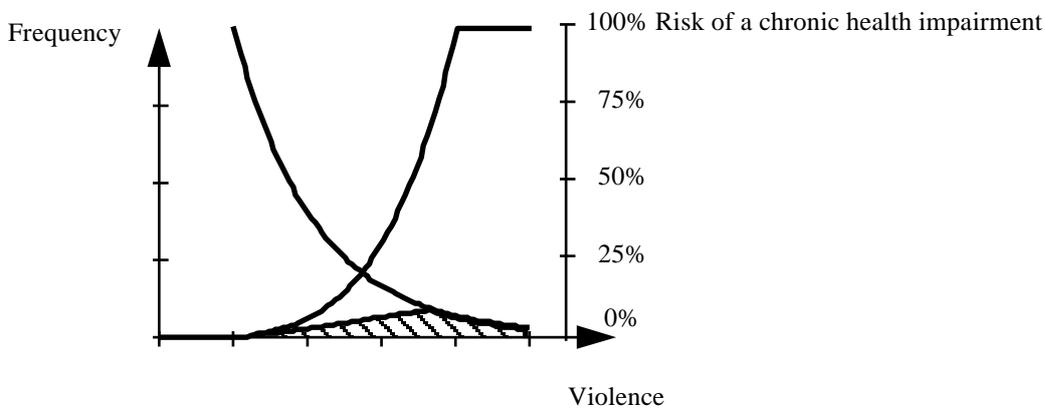


Figure 2.3 Relation between exposure to violence and tolerance to violence. The bottom curve describes the distribution of the number of persons seriously injured as a function of violence and risk.

In those cases where neither the measures for preventing accidents nor those for preventing injury are successful in the prevention of serious human injury, the strategy of action consists of an additional safety net. Through efficient rescue services, health care and rehabilitation, it is possible to countervail so that the injuries incurred do not entail death or chronic health impairment. In other words, it is a question of taking measures so that the bottom curve in the graph is pushed down to zero.

#### Moving the Main Focus

Up until the present time, road traffic safety measures have been largely aimed at the prevention of accidents, mostly due to the fact that the accident and the individual road-user have been the focus of the problem analysis. In essence, Vision Zero means that accidents per se can be accepted, but only if they do not cause serious health impairment. This means that the focus will be shifted from accident prevention measures to injury prevention

measures which are largely aimed at improving the design of the road transport system rather than the capacity of the individual road-user.

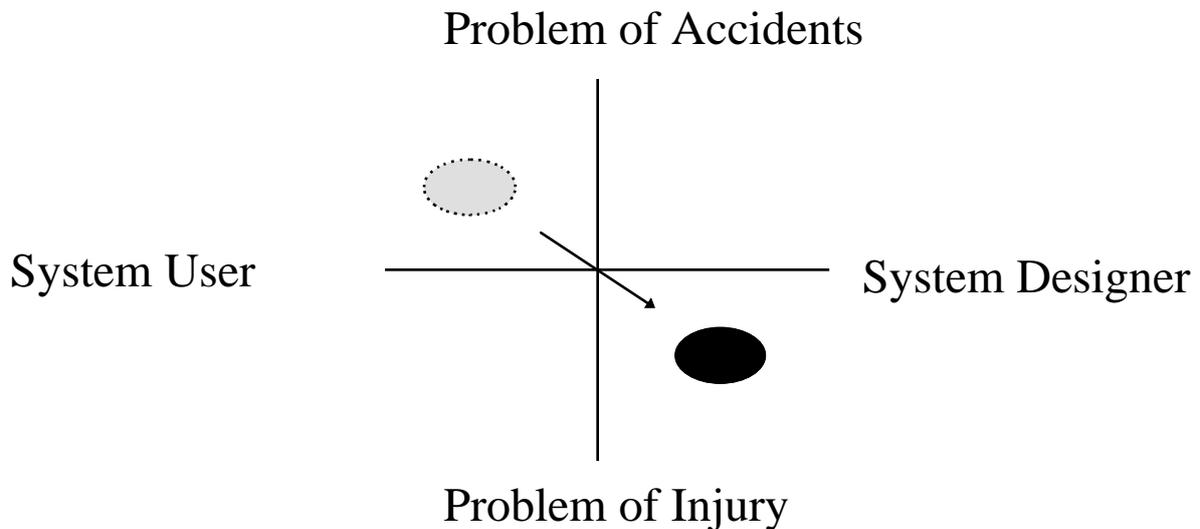


Figure 2.4 Moving the focus to injury prevention through system design

## **2.4 Future Work on Road Traffic Safety**

It is essential to carry through the action and operational strategies outlined in the foregoing if a safe road traffic society according to Vision Zero is to be realised. Based on a definition of what safe road traffic means in practice, effective efforts must be made within all levels of society, from the local to the international and in both the private and public sectors.

An altered valuation of road traffic safety is an important prerequisite for achieving a safe road traffic environment. The need for an altered valuation is also highly applicable to questions concerning the environmental impact of the road transport system. It would therefore be advantageous to co-ordinate the work on influencing decision-makers' and citizens' valuation of road traffic safety with the work on creating an environmentally-friendly road transport system.

It should be incumbent upon the Swedish National Road Administration, in co-operation with the National Police Board, the Swedish Association of Local Authorities and the National Society for Road Safety, to elaborate a result-based model for safe road traffic within the framework of the so-called reform areas. This model is to be defined by these agencies for the future work within the field of road traffic safety. The overall effect of the reform work should result in the realisation of Vision Zero in the long run.