

# Prevention of Traffic Accidents in Childhood

Report on a WHO Study  
carried out in collaboration with  
the International Children's Centre  
and the University of Uppsala

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# WHO STUDY ON THE PREVENTION OF TRAFFIC ACCIDENTS IN CHILDHOOD

## INTRODUCTION

During the twentieth century there have been remarkable changes in the problems of child health. Spectacular progress has been made with regard to childhood morbidity and mortality, due largely at the beginning of the century to infectious diseases, malnutrition and congenital deformities. These advances have been linked to better living conditions, better nutrition, provision of drinking-water and sewage disposal facilities, and medical progress. Against this background accidents, particularly traffic accidents, now head the table as the commonest cause of death in childhood, and they have become the most serious "epidemic" in the western world and a major problem in all countries.

This state of affairs is generally recognized. In recent decades considerable research has been carried out, recommendations have been made and criticisms levelled at those "responsible": parents, doctors, teachers, architects and governments. Much effort and thought are needed if the situation, which is becoming increasingly intolerable, is to be improved. It would seem that steps taken up to now in the majority of countries have been too cautious, and ultimately have met with little success. The example set in some countries, for example Sweden and the United Kingdom, which have more progressive accident prevention policies, shows that solutions are possible, although difficult to achieve, and highlights areas in which further research must be carried out.

It is difficult to provide the decision makers with relevant information and to convince them that the problem of accidents involving children is a public health priority. We must ensure that public authorities, the mass media, town planners, architects, and particularly the public at large and the individual family, are so well informed that they will automatically assume the right attitudes to accident prevention.

The prevention of childhood accidents should, quite clearly, become one of the most important factors in general child care, and should be the fundamental concern of all those (individuals, groups and services) responsible for children. The aim must be to provide a life for children and young people, where a balance is maintained between safety and the necessary stimulation and development. To achieve this, a profound change in attitudes is required, as well as new legislation and further research.

The aim of this report<sup>a</sup> is to analyse the different aspects of traffic accident prevention in children, using the most up-to-date statistics. However, where necessary, reference has been made to the general problem of accidents in childhood and to non-traffic accidents.

The information contained in this report has been drawn largely from an international symposium on the prevention of accidents in childhood, held at the Department of Social Medicine, University Hospital, Uppsala (5-7 October 1977). The symposium was organized jointly by the WHO Regional Office for Europe, the Swedish National Board of Health and Welfare, the Folksam Insurance Company, and the Joint Committee for the Prevention of Childhood Accidents. Several WHO temporary advisers attended the symposium as well as a representative of the International Children's Centre. The problem of accidents in general was discussed. A separate report was published under the auspices of the Department of Social Medicine, University of Uppsala.

## 1. STATISTICAL DATA ON TRAFFIC ACCIDENTS IN CHILDHOOD

### 1.1 Methodological problems

It is comparatively simple to assess the number of serious accidents involving children, but it is much more difficult to calculate the number of minor accidents and to pinpoint the exact groups at risk.

#### 1.1.1 *Exposure to risk*

One of the most difficult problems confronted in assessing and comparing the frequency of traffic accidents involving children is that of the "denominator". It is one thing to calculate the number of accidents occurring, but relating this number to the population actually at risk is much more problematical. It is essential to define exposure to risk, if major errors are not to be made in comparing different regions, groups of the population and periods of time when assessing prevention programmes.<sup>b</sup>

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<sup>a</sup> The author would like to thank Dr C.A. Boucher (United Kingdom), Professor W. Böcher (Federal Republic of Germany), Professor V.E. Trubnikov (USSR) and Professors P.O. Petersson and R. Berfenstam of the University of Uppsala for their valuable assistance in compiling the report.

<sup>b</sup> **Beckett, E.M.** *Social policy and childhood accidents: problems of priorities and resource allocation* (paper presented at the meeting).

Some recent studies on determining exposure to risk have found that the danger to young children when crossing the road is generally underestimated, while others have shown that older children often behave far more sensibly in traffic than their parents do.

It is not simply the degree of risk within a population, but also the size of the population itself which may vary from one period to another, and there is consequently a great risk of misinterpreting statistics. For example, in Bratislava in the period 1964-1972 the number of accidents involving children of school age dropped by 6.6%, while at the same time the population concerned decreased by 19%, and the prevalence of accidents involving school-children rose in real terms.

A fall in the total number of accidents is, therefore, not always very significant and does not necessarily mean that progress has been made.

### 1.1.2 *Data collection*

There are serious gaps in our knowledge of accidents due to shortcomings and frequently lack of linkage between the information systems.

In every country there are numerous bodies concerned with traffic accidents: the police, the health services, social security departments, insurance companies, local organizations, various administrative bodies, etc., but there is inadequate cooperation between them.

The data available to each organization concerned, while incomplete in themselves, are complementary. The police may have very detailed knowledge of the circumstances leading up to accidents, but they only see the immediate consequences (especially as they have no real health responsibility), while health services, which are better placed to assess the long-term effects, have only very limited knowledge of the circumstances. Within the health services the information available may vary from department to department – emergency, surgery, rehabilitation. The knowledge of a general practitioner with regard to accidents is different from that of a hospital doctor.

Furthermore, each of the services concerned sees only a proportion of all the accidents occurring. In general, the police know only about serious accidents and others which have been reported to them. It has been shown that in Stockholm less than half the traffic accidents which take place are reported to the police. Similarly the health services are, in general, concerned only with accidents which cause serious physical injuries, whereas in the context of accident prevention it is equally important to know the circumstances leading up to minor accidents.

Finally, between the various sources of information available, the cooperation which would make it possible to build up a full and complete picture is missing.

Moreover, few countries represented at the meeting were able to give overall national accident statistics. Those which did, gave data provided by a national statistical office, or hospital statistics centralized at national level.

As far as other countries are concerned the only statistics available are local ones, from a region, an area, a local community, or from a hospital or all hospitals in a given area.

It is therefore important that public health authorities should have reliable statistics at their disposal, gathered at national level, or at the very least from main hospitals. The information system recently introduced in Denmark is of interest here: all hospitals must supply information to the National Board of Health on all patients admitted, with regard to the causes and results of accidents, in accordance with the International Classification of Diseases. Certain hospitals are also required to provide such information on outpatients. They are required to state the nature and seriousness of the injury and the cause and place of the accident.

While it is doubtless true that routine reports (be they from the police or the health services) will improve the quality and accuracy of statistics gathered, one must consider other possible sources of information, particularly special surveys such as:

- detailed surveys requiring the active participation of those concerned (questionnaires, etc.);
- specific inquiries into the circumstances and dynamics of accidents;
- cohort studies.

Such in-depth studies are essential. They should not be used to replace a more general system for gathering information, but to complement it, to make it more accurate, to contribute etiological arguments, to facilitate programme evaluation, etc.

In the majority of countries it is impossible to envisage an ideal information-collection system operating at national level — this would probably be too costly. Existing mechanisms should therefore be improved and complemented by more specific surveys chosen according to the needs and peculiarities of each region and each country, possible gaps in knowledge, and the demand for information from those individuals and organizations responsible for making decisions.

### 1.1.3 *Supply of information to decision-making bodies*

While this is not really a question of epidemiology in its normal sense we must consider, under the heading of information collection, the crucial question of conveying these facts to public authorities, i.e., all those bodies and administrations concerned with traffic accidents involving children, as well as to individuals with the power to make decisions.

There are often serious shortcomings in this sphere. The information available, incomplete as it may be, is not passed on to those people who

are in the best position to take effective preventive measures, and who often continue to give credence to superficial impressions and fallacious ideas. It is for this reason that many people, some of them working within the health services, still believe that accidents involving children, although they are numerous, are usually minor.

It is necessary to ask the following questions:

- What information do public health authorities need?
- What information is needed by the decision-making bodies at various levels (local, regional, governmental)?
- In what form can the available information be supplied? Is such information really useful?

There are several ways of classifying information, but that relating to accidents usually falls under three broad headings:

- people,
- facts,
- environment.

Services responsible for supplying information to officials must be able to answer the above questions for their country, their region and the authority involved.

## **1.2 Child mortality from road accidents**

### *1.2.1 Relative value of mortality statistics*

All countries have information on fatal accidents; however, a knowledge of the death rate alone is not a satisfactory basis for setting up accident prevention programmes or evaluating their effectiveness. Statistical estimates based on death rates alone are likely to be deceptive.

When child mortality from road accidents in a country drops, it must be established whether this drop is due to a reduction in the number and/or seriousness of accidents or, for example, to the greater effectiveness of emergency services or to an improvement in treatment techniques. It is no less important to establish whether this drop in mortality is associated with a corresponding increase in handicaps due to accidents.

A major problem in assessing road accident mortality is the definition of accidental death. In some countries when a child dies a few days after an accident, no declaration of accidental death is made. This is one source of considerable error in compiling statistics and comparing figures from different countries. However, the definition of "persons killed" as a result of accidents,

as recommended by the United Nations Economic Commission for Europe (ECE), is accepted in most countries. The definition is as follows: "any person who was killed outright or who died within 30 days as a result of the accident" (1).

### 1.2.2 Statistics on child mortality from road accidents in Europe

The average European accident mortality rates for boys, from all causes and from road accidents, are given in Table 1 (2).

Table 1. Accident mortality by age group. Europe, 1955-59 and 1968-71. (per 100 000 boys)

	1955-59			1968-71		
	1-4 years	5-9 years	10-14 years	1-4 years	5-9 years	10-14 years
All causes	40.5	26.2	21.0	34.6	28.3	21.6
Traffic	10.2	11.1	6.8	12.5	16.4	11.2

A detailed analysis of figures provided by WHO clearly shows that in all countries where statistics are available accidents are the main cause of death among children aged under 15, with traffic accidents heading the list. However, the main cause of accidental death<sup>a</sup> is suffocation in children under 1 year and, in some countries, drowning in children aged 1-4 years.

Thus, in Sweden, accidents are the cause of 40-50% of deaths between birth and 14 years, and half of these are traffic accidents. In Denmark, traffic accidents cause twice as many child deaths as all other causes added together. In Spain, with the exception of the first year of life, when they are responsible for only 10%, traffic accidents cause 30-40% of accidental deaths. In England and Wales, traffic accidents are responsible for one third of accidental deaths in the age group 0-4 years and more than two thirds in the 5-14 age group.

<sup>a</sup> In fact, in most countries the figures for death by suffocation in the first year are artificially inflated: infant cot deaths are often classified as accidental deaths.

Any attempt to generalize is prone to error, but one can say, generally speaking, that accidents cause between a quarter and half the deaths in Europe in the 1-14 age group; traffic accidents represent between one third and a half of this total and are the most common cause of accidental death.

Mortality rates alone cannot paint a true picture of the extent of the problem. Thus, with regard to reducing life expectancy, accidents are more significant than all other causes of death, since the victims are often young.

### 1.2.3 *Traffic accident mortality in the developing countries*

The industrialized countries face such a serious problem of traffic accidents involving children that they should offer the benefit of their experience to the developing countries which are today undergoing rapid economic, social and technological development, associated with an increase in road traffic accidents.

The developing countries must at all costs avoid making the same mistakes with regard to road building, increasing the number of cars on the road, and the mentality of road users, which have led in other countries to the major epidemic reflected in the figures quoted above. The prevention of accidents in childhood, particularly traffic accidents, should therefore be given a high priority in the developing countries by the authorities in various sectors. Consequently, our knowledge of accident epidemiology must be increased.

According to available statistics, accidents cause only 20% of child deaths and traffic accidents only 1-2%. In actual fact these percentages do not reveal the true extent of the problem because total mortality is very high as a result of infectious and nutritional diseases. When expressed in terms of the number of accidents per 100 000 children in the age group concerned, child accident mortality in the developing countries is seen to be as high as in the industrialized countries, and very often higher. Unfortunately, methodological problems and obstacles to efficient information gathering are considerable in the developing countries, and no data whatsoever are available concerning the least developed countries.

The establishment of a system for gathering data on accidents, especially traffic accidents, is essential even in countries with a limited public health infrastructure and few health workers. This will no doubt require not only the active participation of health staff, but also cooperation from other sectors – community leaders and development workers in villages, teachers, etc. A trial conducted recently by the International Children's Centre among readers of the journal *Children in the tropics* showed that it is possible to gather information, not only on mortality, but also on the causes, background and consequences of accidents involving children in the developing countries.

## 1.3 Morbidity

### 1.3.1 *Evaluation of morbidity from traffic accidents*

There is no doubt that mortality represents only the tip of the iceberg as far as children's accidents are concerned.

The assessment of accident morbidity – a step which must be taken before preventive measures are implemented – raises all the methodological problems outlined above; however, a thorough knowledge of morbidity would tell us much more than the death rate alone about hazards, vulnerable groups and the etiology of accidents.

The problem of defining accident morbidity is even more difficult than that of defining mortality. It is particularly difficult to draw the line between "accident" and "incident", and between "serious" and "non-serious" accidents. Generally only serious accidents are reported to the police or require medical treatment. As a result the authorities are not notified of the many accidents which cause little physical harm and do not, therefore, figure in statistics. They are no less important from an epidemiological point of view. The gaps in our knowledge with regard to such accidents deprive us of essential data for successful accident prevention schemes. This is one of the reasons why there must be an immediate improvement in the data collection systems.

It is of particular importance that research done at local level should lead to the recording of accidents which require the services of a family doctor, and that a better definition of accidents be established, in order to make it possible to compare data collected in different regions and countries. The ECE has proposed that "serious injuries" should be described as follows: "fractures, concussion, internal lesions, crushing, severe cuts and laceration, severe general shock requiring medical treatment and any other serious lesions entailing detention in hospital". A working group convened by the WHO Regional Office for Europe has asked that a more practical definition be studied which could be applied without qualified medical staff being involved: the term "seriously injured" would cover "any person who, 7 days after a road accident, and as a result of that accident, is still bedridden or suffers from total physical or mental incapacity, total incapacity being understood to mean a reduction of mobility such that the person is incapable of moving from one place to another without assistance" (1).

The ECE has proposed the following definition for "slight injuries": "secondary injuries such as sprains or bruises. Persons complaining of shock, but who have not sustained other injuries, should not be considered in the statistics as having been injured unless they show very clear symptoms of shock and have received medical treatment or appeared to require medical attention".

A more thorough knowledge of accident morbidity would also make it easier to interpret variations noted in a given country from one period to

another. When in the hospitals of a particular town it is noted that the number of children admitted to hospital following road accidents has remained static over a period of 20 years, but that the accidents are less serious, there is a tendency to assume that the frequency of accidents has not changed, but that the accidents which do occur are less serious than they have been in the past. There may in fact have been a drop in accident frequency, the drop being disguised by a greater tendency on the part of parents to seek hospital treatment for slight injuries.

### 1.3.2 *Road accident morbidity among children in Europe*

It is estimated in Sweden that 1 child in 10 visits the doctor as a result of an accident every year. Traffic accidents account for 10-20% of treatment, with considerable age variations: accidents in the home are most common in the first few years and they fall off steadily towards adolescence, while the number of accidents occurring outside the home, including road accidents, rises.

At a Gothenburg hospital, in one year (1975-76), it was found that of the 12374 children treated following accidents, 10% were the victims of traffic accidents. They were in general the most serious accidents: 20% of road accidents were considered serious as against 9% of accidents in the home.

Data from other countries paint a similar picture. In the United Kingdom it has been shown, following sectoral studies made in Cardiff and Sheffield, that 1 child in every 6 needs hospital treatment every year following an accident. In Finland there are 64 accidents per 1000 children aged under 15, i.e. 1 child in 15 has an accident every year and half of these accidents are traffic accidents. In Bratislava, each year, 1 child in 7 has to have surgical treatment as the result of an accident.

Traffic accidents are responsible for a considerable number of child hospital admissions. In the United Kingdom, 20% of total child admissions are linked to accidents - half of them traffic accidents; accidents account for 10% of admissions in Finland (where they rank second after respiratory infections) and also account for 15% of outpatient consultations. The proportion of children injured in accidents is clearly greater if statistics for surgical treatment alone are considered: 40% of children admitted for surgery in Hungarian hospitals are the victims of accidents, half of them traffic accidents; 64% of children requiring surgery in Bratislava are accident victims (86% of children admitted to hospitals in the afternoon or at night) and, once more, roughly half the children have been involved in traffic accidents.

Although it is pointless to attempt to make generalizations on the basis of such sketchy data, it can be seen that each year 1 in every 6-15 children requires medical treatment as a result of an accident, and half of them have been involved in a road accident. Accidents account for 10-20% of all

child admissions to hospital and roughly half the admissions for paediatric surgery. Traffic accidents account for about half the total number of accidents needing surgical treatment.

It is important to have figures for each country on the proportion of children injured and killed, while remembering that reports are likely to vary according not only to the seriousness of accidents, but also to the quality of health care. Statistics compiled in 1976 for England and Wales show that, for every child killed in a road accident, 18 are seriously injured and 66 are slightly hurt. The proportions are more or less the same for children on foot, on bicycles and in vehicles (Table 2).

Table 2. Number of children killed and injured in road accidents in England and Wales, 1976

	Killed	Seriously injured	Slightly injured
Pedestrians	405	7 461	21 072
Cyclists	102	2 022	7 937
Passengers in vehicles	100	1 759	10 209
Drivers or passengers of mopeds, motorcycles, etc.	2	94	266
<b>Total</b>	<b>609</b>	<b>11 336</b>	<b>39 484</b>

Source: Department of Environment, London.

In Belgium in 1975, out of 43 622 road users aged between 0 and 24 years who were involved in accidents, there were 12 seriously injured and 43 slightly hurt for each one killed; these 43 622 road users accounted for almost 40% of all people involved in traffic accidents.

The proportion is high, judging only from accidents involving pedestrians and cyclists; in Gothenburg from 1969 to 1972, children aged 0-14 years accounted for two thirds of the victims of such accidents.

### 1.3.3 *Road accidents involving children and resulting in handicaps*

Road accidents are clearly the cause of an increasing number of handicaps, especially motor handicaps, and this problem seems particularly serious at a time when poliomyelitis has been eradicated in most countries, and a number of other disabilities which develop in the perinatal period have now been brought under control.

Unfortunately, there has not been enough study on the question, although such information would seem to be of major importance to public health authorities, and epidemiological research in this field must be increased. This should be rendered comparatively easy by the fact that serious disabilities usually lead to some social security involvement, and such cases are therefore well documented.

### 1.3.4 *Childhood accidents and family health*

Research on family reactions after a child has been involved in an accident has shown that the accident may cause far-reaching disruptions in the family, linked with possible feelings of guilt, blame, the existence of a handicap caused by the accident, the need for hospitalization, treatment and rehabilitation, etc. In most cases the family of a child injured in an accident goes through a difficult period following the accident and needs psychological support.

## 1.4 **Changes in the situation during the last 10 - 20 years**

The situation varies considerably from country to country. Some countries can boast a fall in accident mortality and a drop in the frequency of traffic accidents involving children or adults. For example, in Switzerland from 1971 to 1976 the number of children under 15 killed in road accidents fell by 37% (the number injured remained constant) (see Table 3).

Sweden has for some time been achieving good results in the campaign against road accidents involving children (Fig. 1). Finland has also obtained a significant reduction in the number of children killed in accidents, whereas the number of injuries has remained constant (Table 4).

However, in nearly all countries and even in those where satisfactory results have been achieved, optimism must be tempered by these two remarks. Firstly, there is a disparity between the very promising trends in disease mortality and trends observed in accident mortality, which is increasing, remaining constant and even falling, but at a slower rate than that of disease mortality. Secondly, in most countries trends are less promising where road traffic accidents are concerned than they are for other types of accident involving children. Thus, in Norway, while total accidents are decreasing, the number of traffic accidents is still rising; the same is true of Portugal (Fig. 2) and many other countries.

Table 3. Number of children under 15 killed or injured in road accidents in Switzerland

Year	Injured	Killed		Total killed
		Pedestrians/ cyclists	Passengers	
1971	3 525	159	34	193
1972	3 529	139	28	167
1973	3 157	127	24	151
1974	3 131	107	20	127
1975	3 629	100	28	128
1976	3 608	87	34	121

Table 4. Number of children aged under 15 killed or injured in road accidents in Finland.<sup>a</sup>

Year	Age			
	Killed		Injured	
	0-6	7-14	0-6	7-14
1960	69	74	448	945
1962	55	67	549	1 013
1964	72	72	598	1 022
1966	62	98	619	1 174
1968	60	63	703	1 159
1970	55	77	655	1 172
1972	54	99	597	1 197
1974	26	70	452	1 075
1975	29	55	444	1 031

<sup>a</sup> Ruusinen, A. *Childhood accidents in Finland* (paper presented at the meeting).

Fig. 1. Accidental deaths per 100 000 mean population in the age group 0 — 14 years. Sweden, 1951 — 1976

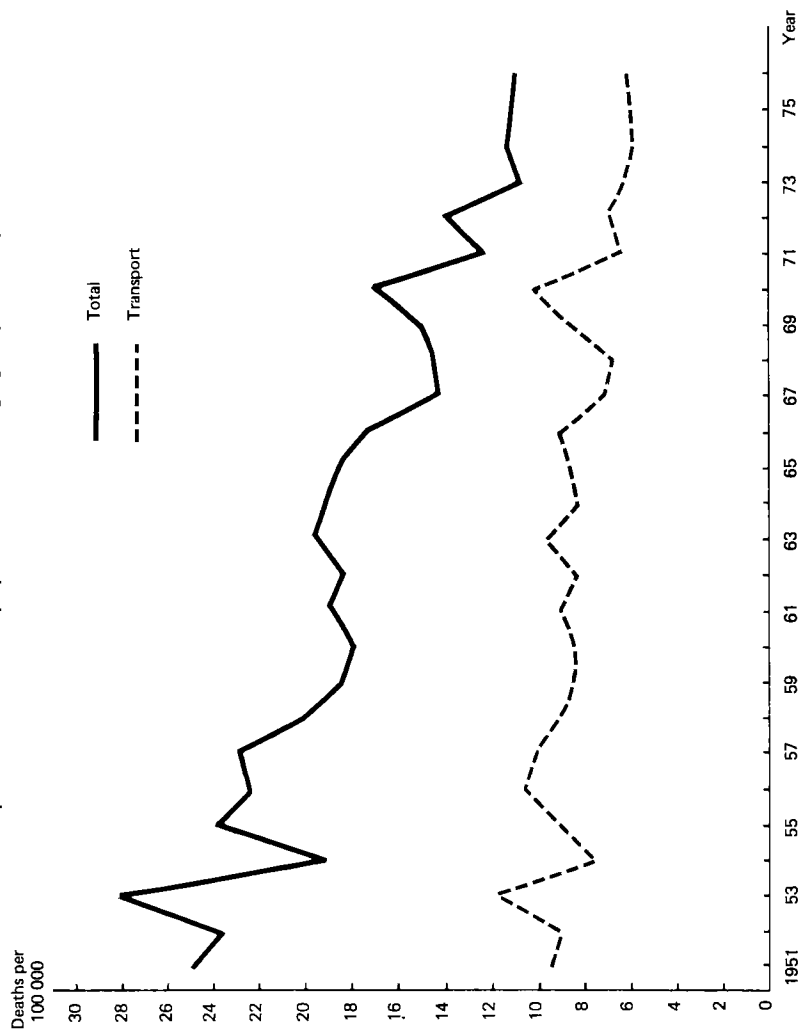
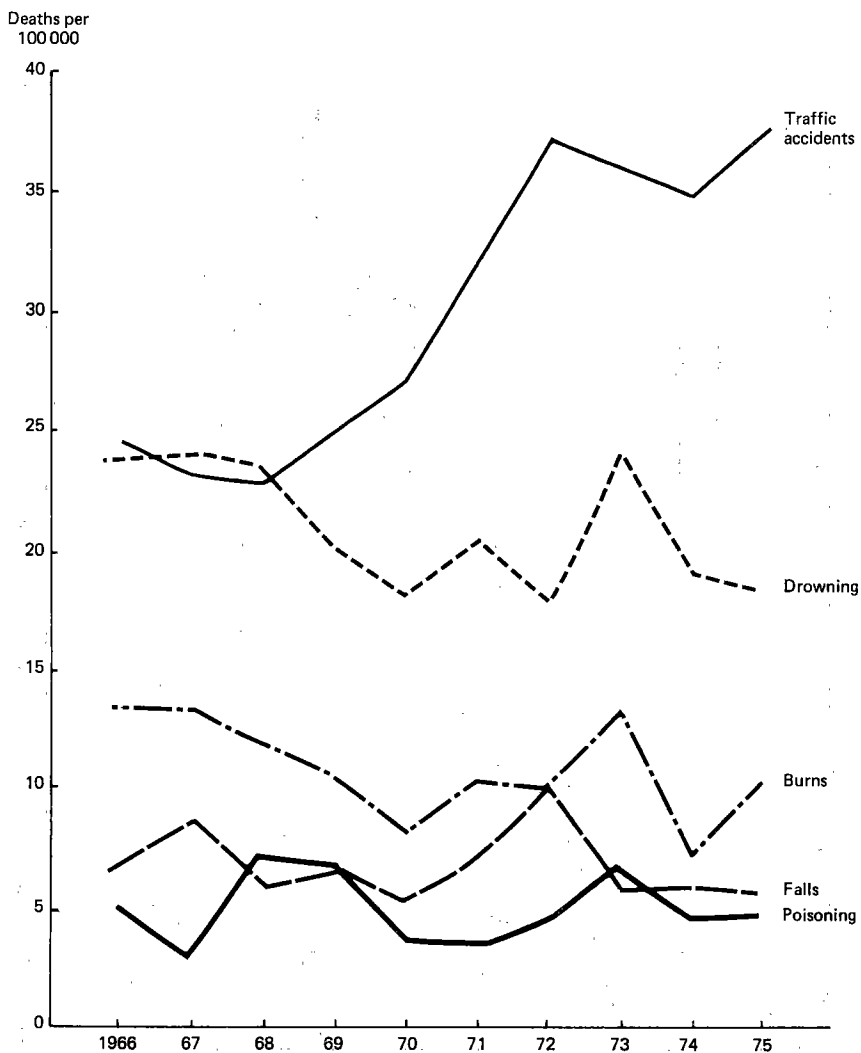


Fig. 2. Accidental deaths per 100 000 mean population in the age group 0–14 years. Portugal, 1966–1975<sup>a</sup>



<sup>a</sup> Epinosa Gomes da Silva, L.P. *Childhood accidents in Portugal, with special reference to road accidents* (paper presented at the meeting).

The principal conclusion is that almost everywhere the proportion of accidental deaths *vis-à-vis* other causes of death in childhood is increasing and that the proportion of road accidents in accidental deaths is also growing.

There are numerous examples. In Bratislava in the past 40 years, the proportion of deaths caused by accidents has risen from 12% to 38%, from fourth to first place; in the 20 years from 1955 to 1975 the number of accident victims as a percentage of the total number of children being admitted to hospital for surgery rose from 39% to 64%.<sup>a</sup>

In Spain, from 1965 to 1974, the proportion of accidental deaths increased, particularly among children in the 1-4 and 10-14 years age groups (Table 5).<sup>b</sup>

Table 5. Accidental deaths as a percentage of total deaths.

Age (in years)	1965	1970	1974
0-1	1.6	1.1	2.4
1-4	14.7	18.8	22.5
5-9	26.0	28.4	31.2
10-14	30.7	31.3	33.8
15-19	32.4	41.7	51.6

Source: National Institute of Statistics, Spain.

The varying trends in different age groups can be seen even more clearly in England and Wales where, from 1951 to 1974, the proportion of accidental deaths in the 1-4 age group rose, then dropped, while it fluctuated little in the 5-9 age group, and rose steeply in the 10-14 and 15-19 age groups (Table 6).

It is significant that in a country like Finland, where the number of child accident deaths has dropped considerably (Table 4), the number of accidental deaths as a percentage of total deaths rose from 16% in 1965 to 21% in 1974.

Figure 3 shows trends noted in France between 1950 and 1969. The most striking fact is the rise in the overall mortality rate in the 15-19 years age group among boys. This rise is linked to the growing number of fatal traffic accidents.

<sup>a</sup> Janec, M. *The rate of injuries in the morbidity and lethality of children (Czechoslovakia)* (paper presented at the meeting).

<sup>b</sup> Najera, P. *Accidents in children (Spain)* (paper presented at the meeting).

Fig.3. Trends in accident mortality from 1950 to 1969 in the 1-4 and 15-19 years age groups

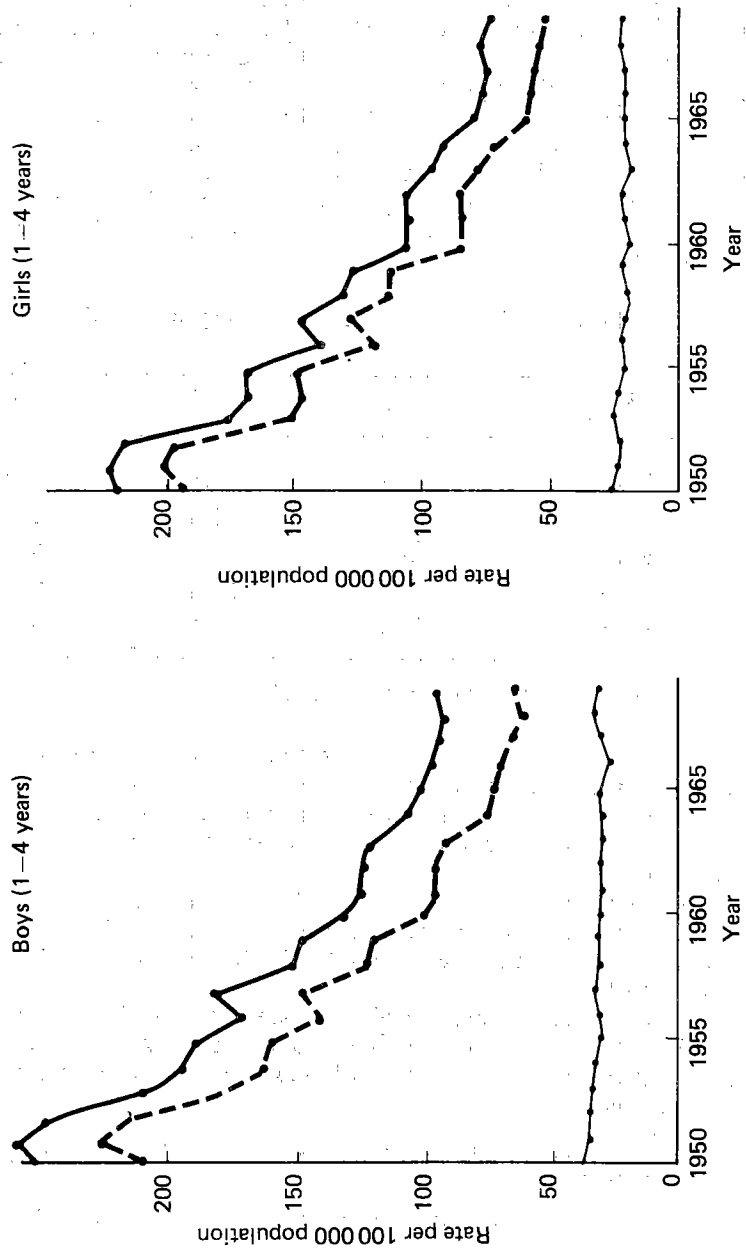
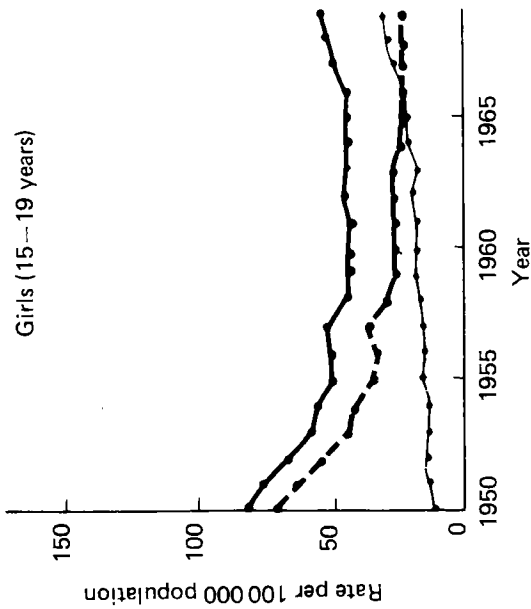
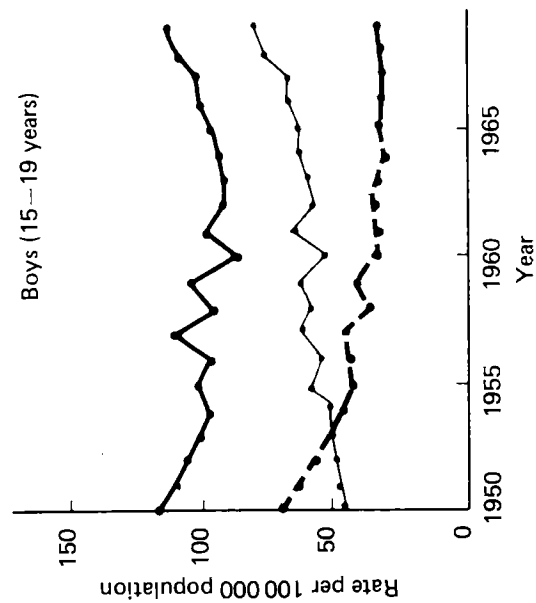


Fig. 3 (contd)



Key:

- All causes
- - - Diseases
- - - Accidents and violent deaths

Source: National Institute of Health and Medical Research, France.

Table 6. Number of accidental deaths (and of traffic accident deaths) in different age groups in England and Wales.<sup>a</sup>

	1951	1966	1971	1974
Mortality 1-4 years	4 133 583	2 662 605	2 204 617	1 922 447
	14.1%	22.7%	27.9%	22.25%
Mortality 5-9 years	1 771 565	1 320 437	1 484 552	1 225 442
	31.9%	33.1%	37.2%	36.1%
Mortality 10-14 years	1 328 323	1 186 364	1 109 439	1 090 468
	24.3%	30.7%	39.5%	42.8%
Mortality 15-19 years	2 061 545	2 137 1 105	2 169 1 195	2 212 1 222
	26.4%	51.7%	55.1%	55.2%

<sup>a</sup> Jackson, R.H. *Childhood accidents in the United Kingdom*. (paper presented at the meeting).

## 2. ETIOLOGICAL FACTORS IN TRAFFIC ACCIDENTS IN CHILDHOOD

### 2.1 The traffic accident — a complex process

It is impossible to prevent accidents unless one knows where and when and how accidents occur. It is relatively simple to answer the first two questions, Where? and When? and a number of investigations have been carried out on these subjects. It is much more difficult to answer the question How? The methodological problems encountered are numerous.

Furthermore, an accident seldom has one simple cause: it is a complex process involving the interaction of a number of factors.

The accident process has been compared to the course of an infectious disease: they both involve a victim with his own physical and psychological peculiarities, an aggressive agent that has developed in a particular material environment, and a given human environment.

In applying this to traffic accidents the following factors must be considered:

- the child itself, its basic skills and its behaviour, particularly in traffic;
- the physical environment with, on the one hand vehicles likely to cause an accident, and on the other hand the road and urban infrastructure, etc., the way they work, as well as climatic factors (time of year, weather), time of day, of week, etc.;
- the human environment, i.e., persons associated with the child at school and in the home — their knowledge, their teaching skills and motivation with regard to traffic accidents, but also the road environment, i.e., other road users — children and adults — and their behaviour.

It has been suggested that these various factors may be expressed in an equation; the probability of an accident occurring depends on the relative importance of environmental factors and the child's behaviour, as against education and parental supervision. The four following groups of factors have thus been devised:<sup>a</sup>

H: the environmental *hazard* — i.e., the sum of all the factors in a child's environment.

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<sup>a</sup> Gustafsson, L.H. *Childhood accidents; three epidemiological studies on the etiology* (paper presented at the meeting and previously published in *Scandinavian journal of medicine*, 5: 5-13, 1977).

- P: accident *proneness* – depending upon the individual physical and psychological characteristics of the child;
- S: the extent and adequacy of the *supervision* of the child;
- E: the quality of *education* about risks and behaviour in hazardous situations which a child acquires.

The relation between these four groups of factors is difficult to establish. Every group consists of a number of different subfactors. The relative significance of these individual factors is difficult to measure.

The equation suggested in an investigation carried out in northern Sweden on the causes of accidents in childhood is as follows:

$$H \times P \rightleftharpoons S \times E$$

In simple terms, an equilibrium is established between the risks to which the child is exposed and the child's accident proneness on the one hand and education and supervision on the other. If the equilibrium is disturbed so that  $H \times P$  is greater than  $S \times E$ , the risk of an accident will increase.

The advantage of this simplified presentation, apart from its clarity, is that it shows that compensatory mechanisms can be established so that, for example, accident frequency in a given region is not an accurate indicator of the environmental risks in the region; in a very high risk area better education and greater supervision may lead to a lower accident frequency than in another area which is less dangerous.

Epidemiological research into the etiological aspects of childhood accidents may therefore encounter certain difficulties, and methodological precautions must be taken in order to avoid errors in interpretation.

## 2.2 Geographic and chronological risk factors

These are the most widely recognized factors, but they are not the most useful when working out an accident prevention policy.

The seasonal and daily pattern of traffic accidents is well established and can be observed in almost all countries. A histogram of annual accident frequency usually shows two peak periods, corresponding to the spring and summer holidays – periods during which exposure to risk is greater, traffic is heavier and supervision is less strict. Thus, in Kharkov (USSR), such peak periods in accident frequency are observed in April and September (September is the month when many children return to town after holidays in the country), and in Uppsala (Sweden), they occur in May and September.

During the day the majority of traffic accidents involving children occurs in the afternoon, with regional variations related largely to differences in school timetables. In Kharkov, the peak accident period is between 12 p.m. and 4 p.m., and it is between 2 p.m. and 5 p.m. (50% of accidents occur in this period) in Uppsala.

These peaks are also related to a greater exposure to risk as a result of leisure activities and the relaxation of supervision, owing to the fact that many children play alone while waiting for their parents to return from work. A degree of nervous and sensory fatigue, leading to a loss of concentration, may also play its part.

There is also a high accident frequency while children go to and from school, when the exposure to risk is very great. In Denmark, 10% of traffic accidents involving children take place on the way to and from school.

The prevalence of traffic accidents involving children in industrial towns and regions is well recognized. This trend is found in all towns. Here again the higher exposure to risk in towns, in comparison to rural areas, easily accounts for the difference. Accidents taking place in town and country are, however, of a different kind, and it has been observed in Denmark that rural accidents are more often fatal than accidents occurring in urban areas.

## **2.3 The child**

### *2.3.1 General characteristics*

It is often said when discussing their vulnerability to accidents, that children are not mini-sized adults. They have characteristics which result in special vulnerability and/or risk-taking behaviour when the environment is not as safe as they might expect it to be.

Detailed studies (3) carried out in recent years have established the reasons for the special vulnerability of the small child. The child is not equipped physically or psychologically to cope with traffic hazards. This is the result of the child's small size (which severely restricts vision in traffic), sensorial and psychomotor difficulties (difficulty in locating whether a sound comes from one side or the other, in assimilating a large number of stimuli at the same time, and knowing which way traffic is moving in one-way streets, etc.), and of the child's inability to interpret the symbols on road signs, etc.

It must be borne in mind that the natural behaviour of the child is, to a large extent, characterized by its play activities – running, jumping, hiding, etc.

These specific features, which adults – parents, drivers, administrative authorities – too often fail to recognize, explain the epidemiological characteristics of childhood accidents: high frequency among preschool children and the 6–9 years age group, high frequency when vision is reduced and at crossroads and junctions where the child is crossing.

These studies have shown that it is wrong to consider that, in an accident, the child has rushed out in front of a car; from the child's point of view it is the car which has rushed up on him, and in reality neither of the two parties has anticipated the encounter with the other. It must be stressed

that adults tend too often to blame an accident on the inadequate behaviour of a child, while the real cause is an imbalance between the skills of the child on the one hand, and the demands of the environment and the behaviour of road users on the other.

### 2.3.2 *Vulnerable groups*

All children, because of their normal characteristics, are vulnerable to accidents. Children and adolescents are a high-risk group. However, the question remains as to whether children who face an increased risk of being involved in a traffic accident can be identified. Attempts have been made to compare accident proneness (P) in a group of children who have been involved in an accident and in a control group. In both groups factors such as weight at birth, psychomotor development, and the possible existence of behavioural problems or handicaps were all compared; no significant differences were detected. Moreover, the parents of "accident" children did not consider their children to be any more accident-prone than parents of children in the control group. Finally, the frequency of previous accidents in both groups was identical. These results would appear to indicate that there is no special proneness to accidents. However, investigation has shown that the frequency of children treated for more than one accident in a year is higher than the general frequency. This apparent contradiction can be explained by the following hypothesis: accident-proneness is not a constant characteristic, but a transitory feature, likely to fluctuate occasionally according to phases in development, changes in the child's environment, and the level of supervision. Thus, there would be no particularly accident-prone children, but all children have "high-risk" periods, during which accidents may be more common.<sup>a</sup>

In addition to what one might term "periodic vulnerability", there are several other constant risk factors. The most obvious and the most widely recognized is that of being a boy. There is no point in saying anything more about this.

A further risk factor often discussed is that of socioeconomic background. The majority of inquiries show that accident frequency is at its highest among children from a lower socioeconomic background (it is not precisely known whether this frequency is the result of environmental factors, the degree of parental supervision, higher exposure to risk, or a combination of several factors). It is in the 1 - 4 years age group that social factors seem to be most significant (this would imply, however, that the level of supervision plays a major role); on the other hand, the effect of social background seems to be stronger where accidents in the home (poisoning, falls, burns, etc.) are concerned than in the case of road traffic accidents.

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<sup>a</sup> Gustafsson, L.H., *op. cit.*

### 2.3.3 *The child cyclist*

Bicycle accidents account for a large proportion of traffic accidents involving children. In a study carried out in Sweden on a sample group of children aged 0-10 years, it was observed that of 1906 road accidents roughly one third involved a child cyclist (not including simple falls which were not taken into account in the study). While the majority of accidents involving child pedestrians occur between 7 and 8 years, the number of child cyclists injured rises sharply after the age of 7. Other investigations show that the peak for cycling accidents occurs between 10 and 14 years, and that for the whole 0-20 years age group bicycle accidents account for 55% of all traffic accidents. This proportion varies from one country to another depending on how much bicycles are used. It is extremely high, for example, in Denmark where children start using bicycles very early, whereas it is only 9% in Kharkov.

Moreover, in order to cycle, children require a degree of skill, which parents often fail to appreciate fully. A study in the United Kingdom showed that 20% of the children injured in cycling accidents had had their bicycles for less than four weeks.

### 2.3.4 *The child passenger*

The child passenger in a motor vehicle is especially vulnerable. Its size means that it is more easily thrown against the inside surfaces of a vehicle involved in an accident, especially when sitting in a front seat or when left in the back of an estate car without being strapped in. Seat belts designed for adults are not properly adapted and may even be dangerous for the small child, and too few parents use safety equipment specially designed to suit the child's shape.

In addition the child's head, which is large and heavy in proportion to the rest of the body and to the size of the adult, is also less securely attached to the body because of weak muscles, and it is therefore thrown forward more easily when the brakes are applied rapidly, and this causes severe cerebral and medullary injuries. The centre of gravity in the child, the softness of the skull and the rib cage are other specific weak points in the young child.

## 2.4 **The human environment**

The most important people in the child's immediate circle are its parents. As far as accidents are concerned, parents are involved in the following ways:

- by the knowledge and awareness they possess of the risks to which the child is exposed;

- by their motivation and ability to teach the child about accident risks;
- by their supervision of the child.

Various studies have shown that parents are, generally speaking, aware of the dangers facing their children, but that they do not know how to counter them. They are aware of environmental hazards; a study carried out in Sweden as a prelude to a major information campaign showed the ability of parents to assess environmental road hazards and to make proposals to reduce them.

However, parents frequently overestimate the ability of their children to cope with the restrictions and risks caused by road traffic.

They have, like many other adults, a false, overoptimistic attitude to their children's abilities. Thus, in the United Kingdom, 50% of mothers with a child of 5 years think that the child can cross a busy road without excessive risk, and 19% of mothers of 3-year-olds and 13% of mothers of 2-year-olds also think this.

It is difficult to assess the precise value of supervising the child. While it has been shown that a lack of supervision is a factor in 20% of children's accidents, it has not been possible to show any significant difference in the supervision of "accident" children and those in a control group. It is also known that a quite considerable number of accidents occur when pedestrian children are accompanied by an adult.

Similarly, it is not easy to assess the teaching ability of parents with regard to accidents. The same study showed no difference in the awareness of hazards between parents of a group of "accident" children and a control group; however, awareness does not necessarily reflect the teaching skill or the motivation necessary to educate children.

Changes in lifestyle, characterized by greater independence between the generations and by changes in the interdependence between parents and children, often lead to a breakdown in the family unit. Consequently, no one is on hand to give the very young the benefit of their experience or helpful advice. It may also be the case that we are currently witnessing a dulling of the individual's sense of responsibility, everyone being convinced that safety is a right that should be guaranteed by public authorities and society.

The human environment of children involved in accidents also includes other road users involved. They may intervene in two ways:

- by failing to observe the basic traffic code (i.e. not giving priority to a child on a zebra crossing, or ignoring traffic lights, etc.); this sort of behaviour is most common among young car drivers;
- by not being aware of the specific behaviour of a child in traffic; many drivers expect the child that they have seen to react as they want it to or as an adult would.

## 2.5 The material environment

It is clear that traffic accidents involving children result basically from an imbalance between the skills of children and the demands made on them by the road environment. It is therefore essential to highlight, eradicate or compensate for the shortcomings of the traffic environment from the point of view of children's needs and abilities.

It can be assumed that the organization of traffic and the road environment has both a direct and an indirect influence on the occurrence of accidents, the indirect influence being determined by the effect the traffic environment has on the behaviour of various road users (adults and, above all, children).

In order to study the direct effects of the road environment, the most simple method is to compare stretches of road where several accidents involving children have occurred with other stretches where no such accidents have taken place (one must nevertheless bear in mind the comments made earlier about a high-risk situation caused by the environment being compensated for by greater supervision of children, and consequently that a high accident frequency in a given place is not necessarily an adequate indication of environmental risks).

The factors to be examined fall into various groups:

- road design: type of street or road, existence of junctions, pedestrian crossings, traffic lights, etc.
- traffic characteristics: traffic density, speed, number of pedestrians (especially children) crossing the road, etc., possible differences between present traffic density and the volume of traffic the road was originally designed to cope with;
- environmental conditions not directly linked to the type of road: old or new area, urban, suburban or rural area: residential area or area designed for traffic; population density in the area; number of children; facilities such as playgrounds, car parks; siting of schools and nursery schools, shops, etc.

By comparing different traffic zones in this way it is possible to identify the ecological features which are likely to point to "black spots" and to assess the effect of differences observed from place to place.

Thus it was shown in Gothenburg that the frequency of accidents involving children (pedestrians and cyclists) was 2-5 times higher in areas with "internal traffic" (i.e. areas crossed by main roads) than in areas with "external traffic" (i.e. an area with traffic skirting it), and that there were very few accidents in cul-de-sacs.

Having to cross a road or street in order to get to a school or nursery school is a major risk factor. Other risk factors include difficulties for pedestrians trying to reach pedestrian crossings or footbridges, restricted vision at bus stops, and the failure to draw a clear distinction between traffic zones and places where children play (e.g. children playing in the street, or cars being parked on pavements).

The indirect effects of the road environment, i.e. behaviour specifically caused by the environment, are more difficult to assess. It is, however, likely that ecological factors which limit the child's sphere of activities to a greater or lesser extent also determine its behaviour in traffic (e.g. the impression of safety or danger he may experience in certain situations). Similarly, the behaviour of adult road users also depends to a certain extent on the road environment.

### **3. THE PREVENTION OF ROAD ACCIDENTS IN CHILDHOOD**

#### **3.1 General problems**

It is said that "accidents are easier to prevent than diseases"; yet public attitudes would seem to indicate the reverse. The fatalistic attitude with which many people regard accidents is as great an obstacle to accident prevention as any technical or administrative problem. It is of the utmost importance that everyone should be convinced that traffic accidents involving children can be avoided and that the effect they have on child mortality and morbidity as well as on the economy of the country is horrifying and intolerable.

Awareness of this problem must be developed before any preventive measures can be implemented. One of the most serious obstacles encountered in accident prevention is the difficulty in making decisions at different levels of responsibility, as well as the difficulty in implementing measures which are clearly both necessary and feasible.

A clear enough idea exists of how accidents could be prevented, and while research on this subject must continue, it is also essential that people who understand the problem should find a way of applying the necessary measures. Research should not be limited to epidemiology or the development of technical solutions; it must also look into ways to transform existing knowledge and techniques into workable and effective solutions.

In considering child accident prevention the following factors must be examined:

- the child's abilities and behaviour,
- adult behaviour,
- the urban and road environments.

Here we again encounter the etiological trilogy that made it possible to compare accidents and diseases; this approach may make it easier to make officials aware of the opportunities for accident prevention, since society today is able to prevent diseases which caused problems in the past, similar to those which accidents cause today.

On the one hand traffic must be adapted to the child (i.e. by changing the environment and the behaviour of other road users), and on the other hand the child must be adapted to traffic (i.e. by teaching him and helping him to acquire suitable behaviour).

Accident prevention should be given a high priority by health services and governments in all countries, especially in the developing countries where, as it has been noted above, the extent of the problem is often not fully appreciated; it is essential that technological development (especially the development of transport) and a campaign against the accident hazards which tend to increase with it, should be carried out hand in hand.

A further problem to consider in child accident prevention is that of coordinating and evaluating prevention programmes. It is often the case that different groups and organizations or governments take steps which are in theory very important, but which are badly coordinated. In this way, effort and financial resources are wasted and governments are likely to come to the conclusion that all such endeavours are in vain. Similarly, the failure to evaluate programmes undertaken often leads to the retention of inefficient measures which could be replaced by other solutions, and to the expenditure of much energy and manpower which gives the false impression that the maximum is already being done.

## **3.2 Information and education**

### *3.2.1 General*

Education alone cannot solve the accident problem. It is, however, an essential aspect of any preventive activity.

Education and information programmes on child safety are often criticized for the slight effect they have on accident rates. There are several reasons for this:<sup>a</sup>

- education and information are sometimes used instead of other methods because they are easily accepted by decision makers;
- education and information tend to benefit the sector of the population which is already best informed;

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<sup>a</sup> Westius, S. *Education and information for child safety* (paper presented at the meeting).

- education and information are multistage processes with pitfalls at every stage;
- evaluation of the programmes is often poor or even nonexistent.

Another problem is that of choosing aims. Education and information programmes can be considered to have three basic target levels:

- increasing knowledge,
- improving behaviour,
- reducing the number of accidents.

The third level is really the crucial one, since this target is fundamental, the other two being only intermediate.

There is not necessarily a close link between the first and second levels, since the child's behaviour is influenced by emotional factors which may outweigh the rules it has learnt and understood. Similarly, there is no clear relationship between the second and third levels. It can be particularly difficult to define with any accuracy the factors which lead to an accident in one set of circumstances and only to an incident in another set of circumstances. Given this, it may be difficult to define good behaviour and one must be sure to take into account all the variables involved.

As far as evaluation is concerned, the main difficulty lies in the fact that participation in accident prevention programmes is voluntary and, as a result, nonparticipants do not constitute a good control group. Experience gained in Scandinavian children's traffic clubs shows that membership is closely linked to socioeconomic factors; it is much higher in areas with a higher socioeconomic level. Moreover, there is clearly an initial difference in the motivation and abilities of children and families who take part. Evaluation studies must take these factors into account.

### 3.2.2 *The targets of educational programmes*

The target groups of educational programmes are the following:

- children themselves in their homes and at school,
- parents of young children,
- teachers,
- adult road users,
- administrative decision makers and those responsible for environmental and traffic planning,
- health staff and administrators.

Educational programmes involving one or other of these groups have been carried out in most countries. Coordinated educational programmes aimed at the whole population through national or regional campaigns are few and far between; programmes of this sort carried out in Scandinavia and in some other countries will be described later.

Some of these theoretical target groups are often taken for granted in educational programmes, while their needs are in fact great. Thus, teachers (from nursery to secondary school level) require information on child safety and are very willing to participate actively in accident prevention programmes as soon as they are informed. Similarly, those responsible for the environment and for traffic (town planners, architects, civil engineers, local authority technicians, etc.) are keen to receive detailed information on child traffic accidents from those responsible for health care (the exchange of information should, in this case, be a two-way process, and the lack of liaison between technicians and health workers, all of whom very much need this sort of information, should be stressed).

### 3.2.3 *Teaching methods*

There are many methods which can be used, especially when attempting to reach the layman, and it is essential that all the available means of spreading information are exploited.

Radio and television are used in several countries to convey a particular message for the purpose of education. The special broadcasting times set aside for children's programmes are often used for this purpose.

In some countries, official and semi-official bodies sponsor games or drawing competitions on the theme of road accidents. The children's press publishes information on the highway code, or games on the same theme. In other countries, "young pedestrian" and "young cyclist" schemes are organized, backed by the award of badges and certificates. Thus, the Royal Society for the Prevention of Accidents (ROSPA) in the United Kingdom has, since 1958, as part of its national cycling proficiency scheme, run courses for 3 million young cyclists, and it has introduced a training scheme for young moped riders, to be operated in educational establishments. *La Prévention routière*, the French road safety council, has run a similar scheme.

Generally speaking, however, the mass media are not exploited enough. A study performed in France on the children's press showed that the accident problem was rarely touched upon and when the topic was dealt with it was usually from the point of view of emergency services or first aid, rather than that of accident prevention. Much better use could be made of television. Tests have shown that young children are very susceptible to short, lively television sketches, such as those used in television advertising. Frequent repetition of short sequences featuring a personality known to children is likely to be effective.

Specific teaching aids and materials for children, their parents or teachers have been produced in most countries: leaflets, slides, posters, games, colouring books, cut-outs, etc. It must be understood that these are only secondary means designed to back up a more general, direct and personalized programme; all too often pamphlets and posters are produced in isolation without being integrated into an overall programme. These measures therefore have little effect and only reach a sector of the public which is already well informed and motivated.

Other schemes are more original: for example, in Finland, a "traffic book" is sent to all families with a child of 4-5 years. In the United Kingdom, under the aegis of ROSPA's education and safety department, a magazine is sent to all schools, and has a circulation of more than 41 000 copies for each issue; educational material designed for the mothers of young children from a low socioeconomic background is available; and a series of three books entitled "Children and traffic", each designed for a different age group, has been issued.

Finally, in several countries, scaled-down practice circuits have been made in which the real road environment with its streets, junctions and traffic signs is reproduced. Children are invited to go round them as pedestrians or cyclists or even as the drivers of toy cars. Children tend to enjoy these methods. However, some people have questioned their usefulness and pointed to possible drawbacks: they may lead the child to think that road traffic is a game presenting no real danger and may ultimately give the child a false sense of security.

### *Educational programmes designed for preschool children*

Road safety education must clearly begin at an early age, firstly because preschool children are directly threatened as pedestrians and secondly, and most importantly, because good attitudes to safety should be impressed upon children at an early age, when it is all the easier for them to assimilate them.

This is why, in the last few years, educational programmes aimed at very young children (from nursery school or infant school age) have been introduced in a number of countries. These programmes, even though they are sometimes linked to preschool education, always involve the parents, who are the educational "go-betweens" for their young children.

The best known of these programmes are the children's traffic clubs in Scandinavia and the Tufty clubs organized by ROSPA in the United Kingdom.

Tufty the Squirrel is the central figure in a series of small pamphlets on road safety designed for children aged up to 8 years. Since 1961, more than 3 million children have been members of Tufty clubs, and there are more than a thousand new members every week. The clubs bring together mothers and young children and sponsor activities in infant schools.

In Norway, the first children's traffic clubs were founded in 1966; any child over 3 years may become a member on payment of a small fee and can remain a member until the age of 7 years. Thirty to forty percent of Norwegian children are members of the clubs, and twice a year they receive leaflets and games to discuss and play with their parents. The clubs aim to provide the parents with an awareness of their children's limitations when facing traffic hazards, and to help them teach their children about road safety. An evaluation study was made in 1974 (4). The skills, behaviour and accident rates of children who were members of the clubs were compared with those of a control group, as were the attitudes of both sets of parents.

Swedish and Danish children's traffic clubs are very similar to those in Norway. In Sweden, 25% of children aged between 3 and 7 years take part. As in Norway, a small membership fee is paid for each of the two two-year periods. Twice a year parents receive material with detailed instructions on how best to use it. The material is designed to be attractive and to encourage a pleasant interchange between parents and children. One evaluation study has been carried out on the level of road safety knowledge and the results were promising. Another phase in the evaluation process is under way, looking into behaviour and accident rates, as well as a study designed to explain possible distortions linked to initial differences between members and non-members.

Girls attain a higher level of skill; that of boys does not vary significantly except where spatial orientation is concerned or recognizing road signs and understanding the different factors in a mock-up traffic situation.

The overall study did not reveal any significant difference in behaviour in traffic. However, when the child is alone, the behaviour of traffic club members is clearly better (especially that of boys) but it is still unsatisfactory: two thirds of the children (in both groups) did not look before crossing the road, and only a third walked on the correct side of the road when there was no pavement. It does not seem, however, that club members behave better in more complex traffic situations.

Finally, a comparison in accident rates between children in the clubs and in the control group shows the accident rate among children in the clubs to be some 20-40% lower than in the control group. This difference cannot be attributed to differences in the environment of the two groups or a greater exposure to risk, or higher intelligence or greater parental motivation with regard to traffic accidents.

In Finland a few years ago, the Folkhälsan Organization started an educational programme aimed at school-age children (5), but now that road safety training takes place in schools, the Organization directs its activities towards children in day nurseries and infant schools. This reflects a characteristic trend in road safety education in a community.

## *Teaching children about road safety at school*

The now unanimously accepted concept of integrating road safety into school syllabuses gained ground only slowly at first. The widespread overloading of school timetables, and some resistance from teachers, had a lot to do with the slowness of this process. Since 1961, the Parliamentary Assembly of the Council of Europe has been concerned with this problem; two conferences organized jointly with the European Conference of Ministers of Transport (Paris, 1963; Vienna, 1971) proposed recommendations to all governments concerned and made suggestions on the place of road safety within school syllabuses. Considerable experience on this subject has been gathered, which should be shared and exchanged; a third conference is soon to be held.

Several countries have made road safety training part of the school curriculum; this training is given by teachers, or by specialists from outside the school, e.g. from the police, civil defence, national road safety organizations, etc.

The aims of this training can be summed up as follows:

- to increase knowledge of the road environment, the highway code, the behaviour of different road users;
- to develop skills which allow people to cope with the various situations which crop up in traffic;
- to encourage good behaviour *vis-à-vis* the highway code and other road users;
- to create a situation where the child can use the street and the road with confidence.

In several countries traffic safety education at school has been made compulsory by law.

In France, a law passed in 1957 enforces teaching of the highway code and traffic safety. This teaching, according to the legislation, includes theoretical training as well as practical activities. It is given in primary schools by primary teachers, and in secondary schools by teachers responsible for civic education; physical education and sports teachers are responsible for practical activities. A school certificate in road safety has been introduced.

Sometimes road safety education continues throughout schooling, and it is graded according to the age of the children. Thus, in Switzerland, education for the young pedestrian is part of the curriculum at nursery schools and during the first years of primary school. It continues in junior school classes (8-9 years), alongside education on cycling. Training on the use of the bicycle is stepped up for children aged 10-11 years and they also have classes on the responsibility of the individual to other road users. Secondary schools give information on motorized vehicles and on road behaviour seen

as an important part of social behaviour. Teaching materials, also graded according to age, are produced to accompany teaching. At preschool age such material consists of illustrations, and pictures to colour. Then there is a series of textbooks designed for each of the age groups outlined above, which represents about ten teaching hours a year, with exercises and quizzes to help assess progress made. This teaching is undertaken by the teacher at primary school level, by the head teacher in the first few years of secondary school and thereafter by the mathematics teacher. Police officers help considerably in this task. Teachers have access to teachers' handbooks, describing the aims of teaching road safety, giving advice on teaching, and making suggestions on how to work, etc.

In Sweden, road safety training also takes place in the nine years of compulsory schooling, especially in the first six years, with special emphasis on the beginning and end of the autumn and spring terms. Schoolchildren gradually become familiar with rules, symbols, road signs, etc. Police officers play an important part, notably in practical exercises or demonstrations in the road environment itself. For younger pupils, training is primarily concerned with local traffic problems facing young pedestrians and cyclists, and includes exercises which take place in the streets and roads used daily by the children. In the upper forms teaching covers the problems of young moped riders and future car drivers, and it includes numerous practical tests: braking distance in different circumstances and on different types of road, driving in conditions of poor visibility or twilight, on icy roads, etc. A section of the teaching is devoted to disabled people and the specific problems they face in traffic. Traffic safety education is closely linked to overall teaching, i.e., for the younger children it is linked to the study of the environment, and for older children to the natural and social sciences and to sport.

In France, road safety programmes are very similar to those outlined above for Switzerland and Sweden. The first few years of primary education are set aside for acquiring a basic knowledge of safe behaviour; in the first two years of secondary education the aim of the teaching is to improve behaviour and to give children a sense of their responsibilities as pedestrians and cyclists; for older children the main topics covered are the use of mopeds and cars, but the economic aspects of accidents are also dealt with at this time. The school road safety certificate, awarded to children at the age of 14 years, is compulsory for those wishing to ride a moped at this age. Children without the certificate cannot ride mopeds until they are 16 years old.

Road safety training at school is also compulsory in Belgium, the Federal Republic of Germany, and the Netherlands.

Integrating road safety training into basic education should be considered as a matter of primary importance and this applies to all aspects of health education. For this reason it is to be hoped that teachers will not shift the responsibility to specialists from the police service or other bodies, but that they themselves will be directly involved in road safety with the aid and

support of various experts. The police play a large part in road safety education in schools, not only in Sweden and Switzerland, as mentioned above, but also in France, Portugal and the USSR. In some countries the police were the first body to organize road safety training, and to compile suitable teaching material to this end (slides, scaled-down traffic circuits, etc.).

The French police also take part in road safety training, as well as *La Prévention routière*, a private organization which has arranged teaching in this sphere since 1963.

In some countries, to complement road safety training provided at school, "school patrol groups" are being formed; they are made up of pupils whose task it is to ensure the safety of children entering and leaving school, working on a rotational basis. Sometimes they can train for a "school patrol certificate". Countries which have experimented with this idea are on the whole pleased with it. However, before using such school patrols the cooperation and good citizenship of adult road users must be secured.

### 3.2.4 *Teacher training*

The effectiveness of road safety in schools clearly depends on the training of teachers. Road safety training usually takes place at postgraduate level, either through lectures or education programmes, or the provision of manuals or "teachers' books". In France, three lectures or practical demonstrations are held for student teachers during their initial training. In most countries instruction on aspects of road safety is given in teacher training schools. The police and representatives of specialist road safety organizations are also willing to help them in this task.

### 3.2.5 *Educating adult road users*

Training children and young people in road safety has another aim apart from its immediate impact: that of moulding the behaviour of the future adult in traffic. It is, however, quite clear that for those adults who did not receive such training as children, and even for those who did, there should be a system of continuing education which would allow them to change their attitudes in accordance with the safety needs of children and other road users. Drivers especially should be aware of the particular reactions of children.

In most countries the mass media are used for this purpose, as are roadside hoardings. Information is often conveyed through intensive campaigns at regional and national level. Thus, a national information campaign aimed at drivers on the subject of the behaviour of children in traffic was launched in Sweden. An evaluation survey undertaken in a limited area showed that the motivation of the target group was just as important as the content of the information. It would seem that the public does not take much notice

of this sort of activity, perhaps because they consider themselves to be well informed already, and also that what they are being taught is self-evident.

Another major campaign to inform adults was carried out in the USSR; tens of thousands of meetings were held, many documents were distributed, and radio and television broadcasts were made.

In many countries, however, information campaigns on road safety directed towards adults tend to convey more general messages (traffic rules, the dangers of drinking and driving, etc.), without sufficient attention being paid to telling road users about the behaviour and particular needs of children in traffic. Much remains to be done in this sphere.

Finally, it should be noted that in some countries, especially the USSR, there are special pedestrian training schools which train traffic inspectors who are particularly concerned with traffic problems and the improvement of road safety.<sup>4</sup>

### 3.2.6 *Large-scale coordinated traffic safety campaigns*

In some countries, large-scale road safety campaigns have been carried out. A typical example of such a campaign is that conducted in Sweden between 1970 and 1976, under the auspices of a Swedish insurance company. The survey covered 300 000 adults (parents, teachers, representatives of various organizations, public authorities, the mass media, etc.). The campaign was conducted on the basis of a preliminary survey carried out in 1968-69 (3). Parent-teacher associations were the main intermediaries in this campaign which was directed especially towards children in their first four years at school and was aimed at stimulating the active interest of parents with regard to the road environment of their children, and at leading them to suggest improvements to it, thus making them aware of their own responsibilities with regard to the safety of their children in traffic.

By way of preparation for meetings, parents were asked to scrutinize carefully the route taken by their children between home and school to detect possible hazards. Thanks to the participation of 1200 local associations, 20 000 class meetings were held, bringing together the parents and teachers of 300 000 pupils. The suggestions made during the meetings were sorted and categorized by the local associations, and regional and national authorities were then contacted. A study made in a suburb of Gothenburg showed what a local community could do when faced with the problems of child traffic safety (i.e., choosing to have a subway built under a busy road,

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<sup>a</sup> Trubnikov, V.F. *Features of childhood motor vehicle traumatism, effectiveness of education and training of children in problems of highway security (USSR)* (paper presented at the meeting).

rather than an ice hockey stadium). In 1975, following a questionnaire survey of local associations, it was noted that out of 2300 proposals for improvement, 866 were being or had already been implemented.

This sort of campaign involves relatively little extra work or expenditure, since the main work is done by parents whose involvement turned out to be very active and effective; the support of the authorities and the mass media is, however, a prerequisite to this sort of campaign. The campaign was extremely effective; instigated by a non-official body, it made it possible to bring together all the individuals and administrative bodies concerned in a joint project with a common aim. In this way, such a campaign does not merely inform – it invites participation.

### **3.3 Environmental planning**

Almost everywhere the urban and road environments are dependent on a number of trends and requirements (rapid development of motorized transport, the use of road and urban structures designed before this development took place, the high cost of certain structures, etc.). On the other hand, the wellbeing of road users has been considered to be less important than the demands of the car, and this is particularly true where vulnerable road users (pedestrians, children, elderly people, the disabled) are concerned.

In most countries, much remains to be done in adapting the road environment to the needs of child safety, but interesting material on possible changes and principles to be observed in new buildings has been provided by fairly recent experience at local level.

#### *3.3.1 General principles that can be applied to urbanization and road traffic*

The road environment can and must be adapted to the needs and characteristics of children.

It is impossible to expect a small child to adapt itself to the road and car environment (3); traffic and cars must therefore be adapted to children (this will also help to protect other vulnerable groups such as the elderly or the disabled). Safety should be the fundamental aim of those responsible for the planning of the road environment.

Thus, children's areas (playgrounds, schools, bus stops, residential areas) must be clearly separated from traffic zones; cyclists, pedestrians, and motorists should also be separated. It has been shown that the risk of a road accident is 5 - 10 times greater for children living in old areas than for those living in modern residential zones with separate traffic areas.

It should be noted that parents are generally aware of the risks which the child faces in built-up areas and in traffic. It is, however, striking to see the number of facilities – day nurseries, schools – recently built close to extremely busy and dangerous roads. In one Swedish town, day nurseries

built before 1970 were better sited as far as traffic is concerned than those that have been built since then.

It has been shown that of 15 accidents involving children in Gothenburg between 1970 and 1974, in 9 cases parents were aware of the risks; in these 9 cases the parents had asked the local authorities, before the accident occurred, to take steps to improve safety. It is therefore of fundamental importance that the authorities involved listen to worried parents and do not fail to act when parents ask for further safety measures.

However, changing towns and road systems to make them safer may place a heavy financial burden on the community. It is therefore sometimes difficult for administrators to choose between road safety measures and other programmes.

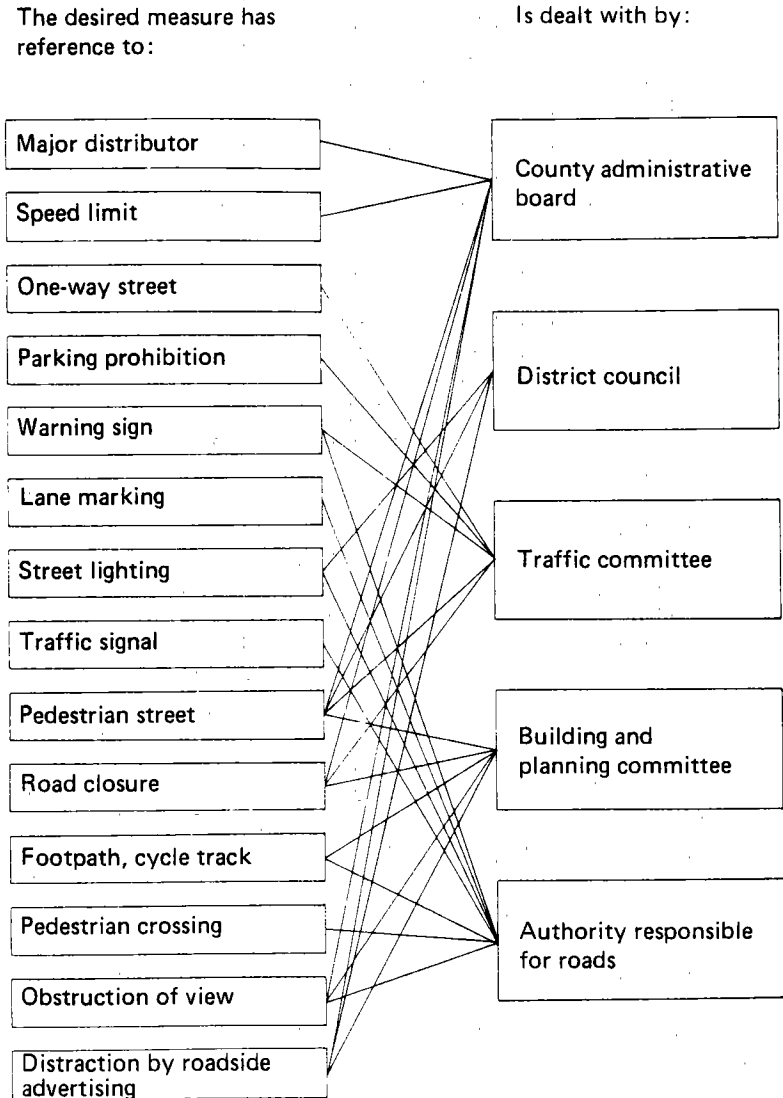
A considerable number of accidents could be avoided if simple and inexpensive alterations in the environment were made. A typical example of this came to light in 1977 in a Turkish village crossed by a very busy road which divided the town into two unequal parts, in one of which four fifths of the population lived. The school was situated in the smaller part of the village, where only a fifth of the population lived. Therefore, a large number of children had to cross the main road every day, and a number of serious and even fatal accidents occurred every month. Local medical students suggested that the school be transferred to the other part of the village, so that the children would no longer have to cross the road, but the village could not afford the financial cost of building a new school. However, there were some buildings in the larger part of the village occupied by the agricultural cooperative. The medical students suggested a swap of premises, which required only a few inexpensive changes that the council could easily afford. Thus a smaller number of children were exposed to risk.

It is unfortunately only on rare occasions that such an ideal solution is found. In fact, even when the financial cost is low, numerous administrative obstacles stand in the way of measures to improve road safety. It is generally estimated that in various European countries it takes an average of two years of administrative red tape to get another set of traffic lights or a new pedestrian crossing installed. Technically, these operations can be performed very rapidly: in Gothenburg it was observed that an item of traffic safety equipment, long requested by road users, was sometimes installed immediately after a fatal accident.

All too often, too many bodies and administrations are involved in traffic safety. This leads to a delay in decision making, made worse by the bureaucratic procedures connected with it, and also to a long delay before decisions are implemented.

Figure 4 takes as an example the administrative complexity existing among authorities dealing with measures likely to improve the environment (6).

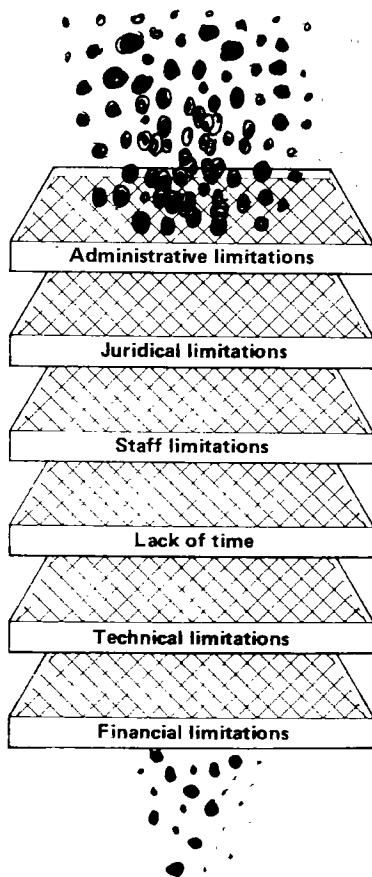
Fig. 4. Review of authorities and bodies dealing with traffic regulation questions (5)



This state of affairs can also be illustrated by a series of six “screens” which slow up the implementation of safety measures<sup>a</sup> (Fig. 5):

- administrative limitations (“this is not our responsibility”);
- juridical limitations (“this is not legal”);
- staff limitations (“we have no one who can handle this”);
- time limitations (“we have no time”);
- technical limitations (“this is technically impossible”);
- economic limitations (“we cannot afford it”).

Fig. 5. The six screens



<sup>a</sup> Gunnarsson, S.O. *Child safety and society* (paper presented at the meeting).

A detailed study (6) by the same author on the installation of a pedestrian crossing with traffic lights activated manually in front of a school, shows the complexity of the procedure followed and the resultant delays (Fig. 6).

Thus, improving the environment is not simply a technical problem: the process of decision making must be made more appropriate and more efficient by adopting the following measures:

- encouraging all local communities to draw up a detailed, forward-looking plan of action to improve the road environment;
- fostering better coordination between the authorities involved;
- encouraging a greater public involvement and closer links between the public – particularly parents – and decision-making bodies.

### 3.3.2 *The planning of residential areas*

Where new residential areas are concerned, town planners should give priority to reducing accident hazards facing children as pedestrians and as they play.

To this end, the following steps should be taken:

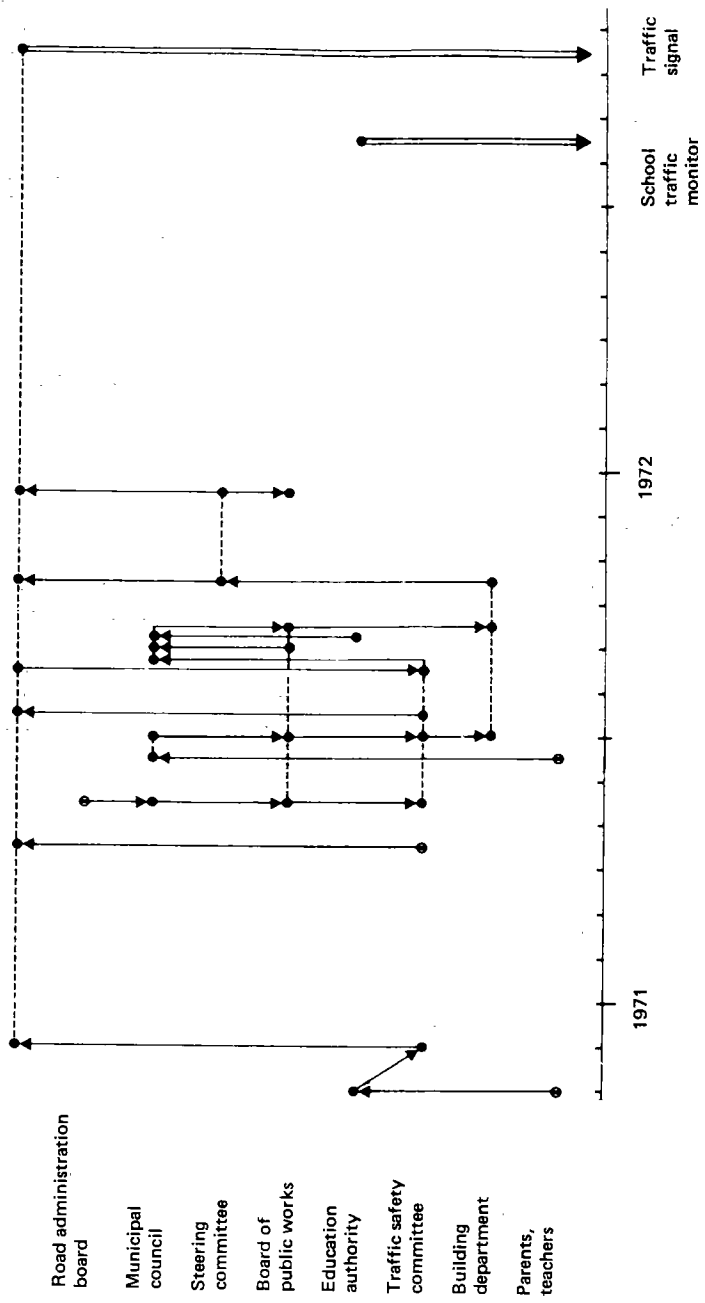
- separating different types of traffic: pedestrians, cyclists, motor vehicles;
- planning the siting of social facilities (schools, day nurseries, youth clubs) so that children do not have to cross or walk along roads with heavy traffic, and in general cutting back traffic as much as possible in these areas;
- providing sufficient pedestrian areas and play areas within easy reach of houses and social facilities.

It must be stressed here that the risk of an accident is reduced 5 - 10 times when pedestrians, cyclists and motorists are separated.

Factors which may seem self-evident are not, however, reflected in the work of town planners. The importance of the car as a means of transport for the family has led to the current trend of building schools and day nurseries next to main roads to make access easier for parents. This arises also from the fact that the best land in residential areas is used by property developers to build houses while land with a lower value (such as that near busy roads) is left for the building of social facilities.

Today there is much technical material available on the best way to design towns so as to reduce the risk of accidents. Town planners have at their disposal a number of technical solutions. Recommendations on their use have been made in several countries. Furthermore, more notice should be taken of medical opinion.

Fig. 6. The procedure for dealing with the case of the pedestrian crossing outside a school in Sweden



As far as old districts of towns are concerned, improvements to safety require more imagination, but just as many possible solutions are available.

Some of them are, however, quite straightforward to implement – zebra crossings, footbridges and subways, traffic lights, barriers at school entrances to stop children crossing the road directly, wider pavements, restriction on parking in streets and especially on pavements.

Other solutions are more complex and call for reconsideration of the traffic and road networks and a change in accepted habits: pedestrian streets, safety paths near schools, and improvements in residential areas, where the roads can be divided into three categories:

- roads with fast-moving traffic which children should not cross or walk along;
- roads with slow-moving traffic, to serve isolated residential areas where regulations and special measures (road layout, road design and green spaces) force motorists to keep their speed down;
- pedestrian streets.

Thus in the Netherlands the Ministry of Transport and Public Works has encouraged the creation in existing residential areas of special precincts known as *woonerf*, where the residential function is given greater importance by special planning and where traffic is severely limited; the government aids and subsidizes town councils who develop their residential areas in this way (7).

These measures are based on the fact that 80% of accidents involving children take place very close to their homes, on roads where traffic is light, because children play in such streets. The primary function of the street should not merely be the movement of traffic; it should also be a place where children can play and adults or elderly people can stroll. The way in which these roads have been given over entirely to traffic is an anomaly which has deprived children of the use of urban space near their homes. Therefore these areas should be redeveloped so that all the potential users benefit: drivers wishing to go home at low speed or to find a parking place, pedestrians and children who wish to move about, play, meet each other, etc. This sort of urban policy would undoubtedly lead to an improvement in the life of the community.

The following principles are involved:

- no longer giving priority to the car;
- no longer forbidding play on public streets (as soon as the first principle is achieved);
- not allowing cars to park along the whole length of the pavement (and, most important of all, not on pavements);
- lowering the maximum speed limit.

Space is ordered according to these principles.

*Woonerf* are not limited exclusively to residential areas — the principles can also be applied in mixed areas with churches, schools, play areas, etc. Their main characteristic is that moving vehicles take second place to pedestrians. The road layout is designed to accentuate this feature — trees, lawns flower beds and “furnishings” are designed to brighten up the street. Obstacles prevent random parking. Rectilinear roads and pavements are avoided, since they imply that motor traffic has priority; it is preferable to provide for narrow stretches and sharp bends.

Experience has shown that these arrangements do not cause motorists any significant delays, and that they are accepted by them as long as they have no more than 500 metres of *woonerf* to go through from the main road to reach their home.

In existing residential areas the cost of creating *woonerf* is only 50% higher than the cost of conventional road upkeep. In order to succeed in making these modifications the full motivation and support of all the residents is required.

Clearly, the principles of *woonerf* can be applied equally well in new areas being built; in this case the cost is no higher than that of building ordinary roads.

It should be noted that measures such as those applied in *woonerf* do not solve the problem of mopeds which are not slowed down by the layout described above, and the new layout may even lead to spectacular and dangerous “stunts” on the part of adolescents in particular.

### 3.3.3 *Different types of road design*

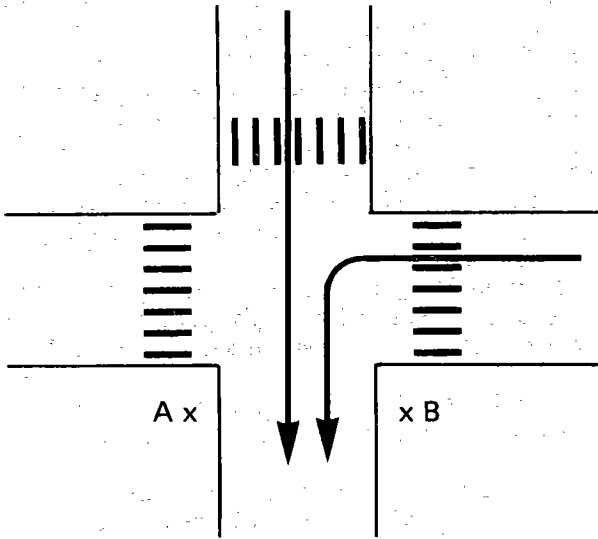
An effort must be made to improve existing roads, especially by introducing cycle lanes, developing new junction layout, and improving road signs, especially near schools and day nurseries.

Road layout and the siting of pedestrian crossings must take into account the special needs of pedestrians (and especially children) and not just be designed to facilitate traffic movement (Fig. 7 and 8).

The idea of traffic travelling from town to town, bypassing built-up areas, could be applied more often. There are many old towns and villages which are totally unsuited to a level of traffic they were not designed to cope with. Consequently, there are no alterations which could bring them into line with current needs, so they must be reserved for local traffic, while traffic “passing through” is kept outside the town on roads to which pedestrians and cyclists have no access.

In other words, it must be realized that while some roads can be improved and adapted, others must be considered as totally unsuitable for motor traffic and should be reserved for pedestrians, cyclists, and slow-moving traffic if the creation of inevitable hazards to children is to be avoided.

Fig. 7



A pedestrian should not have to cross several roads to get from point A to point B (a layout seen all too often).

The arrows show the direction of traffic flow in the streets.

### 3.3.4 *Improving vehicle safety*

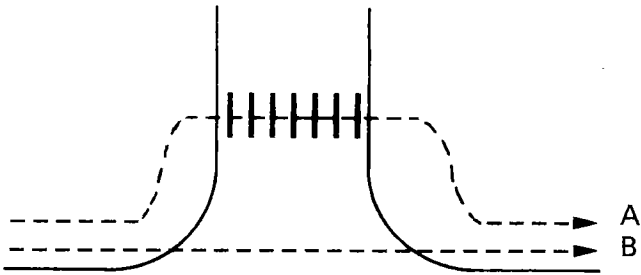
First it must be emphasized that any vehicle in which children travel must be specially checked for technical safety and have fittings adapted to the characteristics of the passengers.

This applies particularly to vehicles used for taking children to and from school. In fact a number of accidents occur involving these vehicles, since the transport of children to and from school is often left to small firms with old and even dilapidated vehicles, who do not always adhere strictly to the regulations on checks and safety.

The problem concerns also private cars, especially the safety devices for children inside these cars.

In several countries it is already forbidden to allow children aged under 10-12 years to sit on the front seat of a car next to the driver. This is a

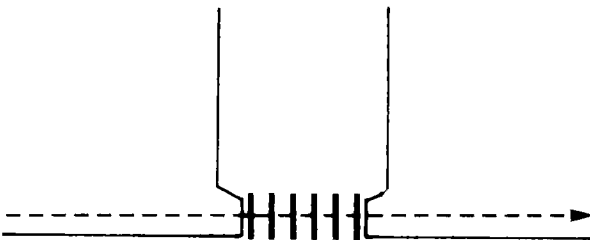
Fig. 8



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The siting of the zebra crossing should not compel the pedestrian to make the detour (A) for, unless barriers have been put up to prevent it, he will tend to follow route B.

The optimum siting of the crossing is that shown below.



straightforward step, and a genuinely effective one, since it has been shown that children of this age are not properly protected by seat belts designed for adults; the front seats of cars are, therefore, especially dangerous for them.

Even in the back seats of cars children should be protected by safety devices adapted to their age. Much progress has been made in recent years in developing this sort of equipment; these successes have been achieved largely as a result of the development of "accidentology" and of laboratory research carried out as part of this new discipline.

These safety fittings must effectively prevent the child from being thrown around inside the car or from being thrown out of the vehicle, and they must be intrinsically safe.

In the case of very young babies a carry-cot placed in the back of the car can be used. It can be placed across the width of the car, well wedged in behind the front seats or fastened down at the points where the back seat belts are attached; it may also be placed lengthways so that the child is lying with its feet facing forward. It is recommended that the cot be covered with a net so that the child is not thrown out in the event of a collision.

For children aged between 9 months and 4 years there are already well-designed safety seats available which can be fixed to the back seat where the back seat belts are attached. The child is prevented from being thrown forward by the specially designed front section of the device. Furthermore, as an exception to the rule quoted above, these seats can be put on the front seat provided the child is sitting with his back to the road, and that the seat is properly fixed to the front seat belt attachments.

For children aged between approximately 4 and 8-10 years a harness fixed to the back seat belt attachments can be used, with broad straps round the pelvis and chest, which give the child a certain freedom of movement. Children can also be left in the back seat without a safety harness provided they wear a helmet designed to protect the head should there be an impact.

For children of more than 8-10 years (or those who weigh more than 30 kilos) the back seat belt can be used (the shoulder strap should not be used if the child is less than 1.35 m tall) but the best device is a racing harness with two vertical chest straps and a broad strap across the pelvis and abdomen.

Clearly these devices will only be used if an effort is made to improve the health education which families receive, or possibly if the legal measures mentioned in 3.4 are introduced.

### *3.3.5 Safety devices worn by children outside vehicles*

The essential piece of equipment is a helmet which all moped and scooter riders should wear. The helmet should preferably be of the full-face variety, to protect against frontal and lateral impact. The wearing of helmets should be compulsory.

Young pedestrians can benefit from using various reflective devices: clothes and school bags with reflective strips, armbands, pendants, etc.

### 3.4 Legislative measures

Most countries have a very advanced legislative system concerning accident hazards, especially traffic accidents. Legislative measures are intended to protect the whole population; in fact they are largely concerned with adults and do not take into account the particular hazards facing children. It can be said that there is frequently a "legislative vacuum" with regard to child road safety.

People often discuss the merits of the alternative education/legislation. Is it better to explain the danger of seating children in the front of a car or should it be banned by law? Each country must be able to answer this question, taking into account the level of health and civic education in the population and the motivation of those people (i.e. doctors, etc.) who are in a position to inform the public. Experience has shown that it is usually necessary to introduce basic legislation centred on specific hazards, which does not mean that one can dispense with educational activity in areas where it is harder to legislate.

It would take too long to list the legislative provisions currently in force or desirable. General measures include all the regulations relating to road traffic (and the system for checking that they are adhered to); the possible range of punishments imposed on offenders; the campaign against drinking and driving; speed limits on main roads and in urban areas; and regular vehicle inspections. A more positive measure is the lowering of insurance premiums for drivers who have not had an accident.

The following are examples of legal provisions more specifically designed to safeguard children:

- teaching learner drivers about the specific reactions and needs of children;
- town planning regulations on the siting of schools and day nurseries at some distance from busy roads;
- legal recognition that pedestrians walking and children playing have as much right to use streets in residential areas as cars have;
- the legal recognition of pedestrians' rights *vis-à-vis* the all pervasive power currently accorded to motor traffic;
- making it compulsory to seat children aged up to 10 or 12 years in the back seats of cars;
- making it compulsory to have approved safety devices for babies and young children fitted in cars;

- making it compulsory for moped and motorcycle riders to wear crash helmets;
- the adoption of standards for inspection and safety applicable to vehicles used for transporting children to school.

Clearly, some of these measures do not only affect children but all individuals especially vulnerable to the dangers of traffic: elderly and disabled people, etc.

### **3.5 Bodies and organizations working in the field of road accidents in childhood**

#### *3.5.1 At national level*

##### *Governmental and semi-public bodies*

Most countries have specialist road safety organizations attached to various ministries (home affairs, transport, justice, education, health and public works). Other institutions function independently while receiving state subsidies and have a semi-private structure. It is not unusual that several organizations exist side by side in the same country, with poor coordination among them.

These bodies usually have the following aims:

- to increase knowledge of traffic accidents, their epidemiology, their cost, their consequences;
- to carry out and to encourage research into traffic accidents;
- to propose to decision-making bodies practical or legislative steps designed to improve road safety;
- to carry out or to encourage road safety education programmes directed at the main target groups.

These bodies usually pursue some activities specially directed at the prevention of child accidents.

##### *Other bodies*

Many other organizations pursue accident prevention activities – touring clubs, parental and medical groups (especially traffic medicine associations), car manufacturers, consumer groups (associations to defend pedestrians' rights, etc.).

## *Insurance companies*

Insurance companies, both state-run and private, deserve special mention since many of them have played an important role in preventing child accidents.

The best examples of this come from the Scandinavian countries. In Sweden the insurance companies have been running campaigns to improve road safety for many years. In the period 1930-1940 they helped to found the national road safety association (NTF) to which they continue to give large subsidies. However, each company controls the projects and campaigns it launches. One of the companies took a particular interest in traffic accident prevention among children and organized the massive campaign undertaken between 1970 and 1976 which has already been mentioned several times.

### *3.5.2 At international level*

The Fourth Liaison Meeting on the Prevention and Control of Road Traffic Accidents (Copenhagen, 29-31 January 1979) discussed a 1973 inventory of international organizations in Europe, both governmental and nongovernmental, working on traffic accident prevention (8).

International cooperation is of particular importance today when the problem of accidents involving children is becoming increasingly serious in the developing countries.

## **4. CONCLUSIONS AND RECOMMENDATIONS**

The prevention of traffic accidents, particularly those involving children, is a major public health priority in all countries. There are many ways to conduct campaigns. They must always be implemented:

- on the basis of a detailed knowledge of needs,
- after decision makers have been informed, and
- with linkage of various types of action as far as possible.

A few years ago the Council of Europe adopted a series of general recommendations on child safety and accident prevention. The meeting in turn examined these recommendations and drew from them a more detailed strategy,<sup>a</sup> the text of which is reproduced below.

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<sup>a</sup> **Petersson, O.** *The role of international agencies in child safety* (paper presented at the meeting).

## I. Organization

1. A national body (governmental or nongovernmental) should be responsible for:
  - problem analysis;
  - policy;
  - formulation of guidelines.
2. The national body should develop effective means of communication with local or regional (governmental or nongovernmental) authorities which would be responsible for:
  - collection of information;
  - programme development;
  - programmed activities;
  - research, etc.
3. The national body, to be effective, should have at its disposal the means necessary to carry out its agreed responsibilities.

## II. Study and research

1. Research related to child safety should be problem-oriented or service-oriented.
2. It should not only be concerned with mortality but rather with child accident morbidity, with reference to:
  - age groups;
  - locations;
  - factors.
3. It should be developed to identify the consequences of injury in terms of long-term and permanent disability.
4. It should show the cost-effectiveness of child safety programmes.
5. It should be based on modern epidemiological methods to ensure that ecological circumstances are taken into account.

## III. Education and training

1. Health education should stress the importance of safety and to this end should emphasize the need for training of the child, the parent and the teacher and also ensure active involvement in safety behaviour by the child at all ages. Such programmes of education should constantly be related to the psychomotor development of the child, because of the different risks faced by each age group.
2. The responsibilities of doctors and nurses and other health personnel in the promotion of child safety should be clearly stated, and this should be reflected in their training.

3. School curricula should be designed in such a way as to include appropriate instruction and practice in safety measures and life-saving procedures throughout schooling.

4. Educational measures developed to promote child welfare should stress the importance of active community participation and the implementation of child safety programmes.

#### IV. Legislation

1. Programmes should be constantly reviewed and developed. They should be related to changing lifestyles and to information derived from research and studies.

2. A standards institution should be designated in each country with the means to assess the design and safety aspects of manufactured articles, to develop standards, to keep these standards under close review and to keep close contact with industry for this purpose.

3. Whenever possible the national standards should be applied internationally.

With regard to traffic accidents in particular, the participants laid emphasis on the following points and measures which they felt should be studied or implemented.

#### 4.1 Knowledge

The gaps in knowledge observed in several countries with regard to the epidemiology of traffic accidents must be bridged:

- knowledge of morbidity, the effects of accidents (especially resulting disabilities), the psychological problems of the family following accidents involving children;
- information on “near accidents”;
- the immediate recording of new types of accident.

The available data must be better exploited through better cooperation among the police, insurance companies and health services.

#### 4.2 Information and education

Health services should examine all possible ways of conveying information as effectively as possible to the authorities responsible for initiating steps to counter accidents, at both the technical and administrative levels. This “information” should aim to convince decision makers that child safety (and consequently the safety of other groups of the population) should be considered as a question of priority in any project (technical, environmental, legal) concerning traffic.

This information should, in particular, reach local authorities, the police, town planners and engineers responsible for traffic planning.

Four groups in the adult population should be seen as priority target groups for information on child road safety:

- *parents*, especially on the hazards facing their children and the true abilities of their children;
- *teachers*, so that they can give their pupils instruction on road safety; the subject should be taught at teacher training colleges and during continuing education;
- *drivers*: information on the needs and special problems of children with regard to road safety should be incorporated in the preparation of learner drivers for the driving test;
- *health staff*, who should be motivated to feel concerned about preventing traffic accidents threatening children, and should be mobilized to prevent such accidents; to this end the problem should be given the same priority as infectious diseases.

Road safety education for preschool children should be continued and strengthened by programmes inside school and in organizations outside school.

It is essential that the effectiveness of these information programmes be evaluated.

#### **4.3 Improving the road environment**

Creating a safe road environment for children should be a priority aim. An effort must be made to adapt the road environment to the child and not the reverse.

In newly developed residential areas the separation of motor vehicle and pedestrian traffic or the implementation of measures that make it possible for pedestrian and motor traffic to exist safely side by side should be made compulsory. Facilities used by children (day nurseries, schools, playgrounds, etc.) should be sited in such a way that children do not have to cross or use busy roads to reach them.

In old areas research into new developments (such as special precincts) as well as the idea of re-routing through-traffic away from town centres should result in a reduction in traffic risks.

As a general rule, road users, especially pedestrians, should be consulted about any planned developments. The rights and needs of motor traffic should not be considered to take priority over the rights and needs of pedestrians in residential areas, shopping areas and town centres.

Vehicle safety and protective devices should be improved:

- by launching a campaign against the poor upkeep of vehicles, and by ensuring regular government checks on the working of parts of the car essential to safety – brakes, tyres, lights, etc.;
- by improving safety devices for children in cars, and helmets for users of two-wheeled vehicles;
- by providing information which ensures the effective use of the devices.

#### **4.4 Organization - Legislation**

Road safety should be subject to the following measures:

- better coordination between the authorities and services responsible;
- reduction of delays in taking action;
- reduction and simplification of the necessary administrative procedures.

More attention should be paid to the comments, requests and suggestions of road users, especially parents.

Legislation is necessary when education is not sufficiently effective (examples: compulsory use of seat belts in cars; ban on placing children on the front seat; compulsory use of crash helmets for riders of two-wheeled vehicles) and when the risks of certain dangerous situations must be reduced (this would justify, for example, measures to limit or regulate the advertising of high-powered motorcycles, or their sale to young people).

#### **4.5 Developing countries**

Special recommendations apply to the developing countries. It is vital that in spite of the size and gravity of all the other problems they face, traffic accidents should from now on be considered as a public health priority. Health staff in these countries should be informed about the extent of this problem, and about their role in preventing accidents. Teachers should be given the necessary training, so that through them educational activities concerning road safety can be organized in schools. Finally, infrastructure and town-planning projects must take into account the requirements of road safety; this is a real possibility in those countries where infrastructure and industry are being developed at a rapid rate.

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