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# THE ROLE OF HEALTH SERVICES IN THE PREVENTION OF ROAD TRAFFIC ACCIDENTS

Report of a WHO Technical Group

London  
19-21 February 1980



WORLD HEALTH ORGANIZATION  
Regional Office for Europe  
COPENHAGEN

English only

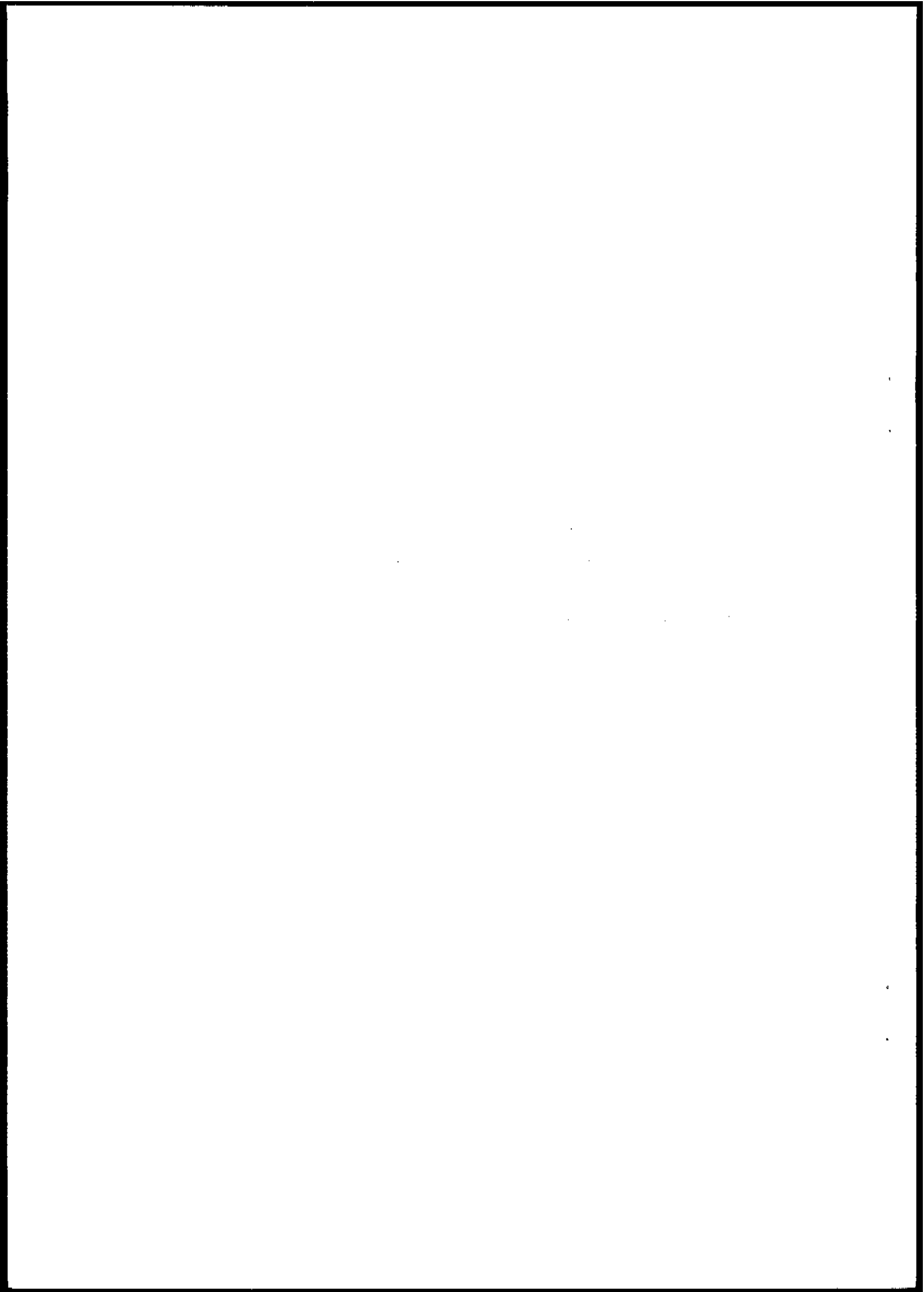
ICP/ADR 038  
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## 1. Introduction

The meeting was convened by the WHO Regional Office for Europe in collaboration with the Government of the United Kingdom. Its purpose was to consider aspects of the prevention of road traffic accidents to which health authorities could make a contribution, to make proposals on how this could be achieved, and to identify the personnel who should be concerned.

The meeting brought together experts from 11 countries, representing the following disciplines as they relate to road traffic medicine, road traffic accident causation and prevention, road safety engineering and public health: medicine and other health care professions, economics, administration, statistics, engineering (see Annex II).

The Technical Group elected Dr J.T. Jones as Chairman and Dr K.S. Cliff as Rapporteur. Dr C.J. Romer acted as Secretary.

## 2. Background

Road traffic accidents have many causes and involve the interaction of the road user (cyclist, pedestrian, vehicle occupant) with the road environment and/or a vehicle. The prevention of road traffic accidents requires a knowledge of how this interaction comes about. In the last 30 years, transport authorities have made major advances in road engineering and vehicle design, and thereby have improved road safety and reduced the number of road traffic accidents.

One branch of engineering - biomechanics - has helped specifically in vehicle design, both internally and externally, in the last decade. It has investigated the stresses applied to the human body during collision and designed crash protective systems on the basis of research on human tolerance.

In respect of road traffic accidents, health authorities in the last 30 years have been concerned principally with setting up treatment services. This is understandable because as technology has increased, with more vehicles and more intensive mechanization in industries, accidents have become more frequent and in some cases more severe. As accidents have multiple causes, the concern of health authorities is to provide treatment for people injured in accidents while other authorities identify the etiological factors. Health authorities recognize that they have a responsibility to prevent accidents, but much of their work has concerned accidents in the home.

Little progress has been made in road traffic accident prevention. In many countries, such prevention has become a statutory function of transport authorities, but there are aspects on which transport authorities now need the help and expertise of health authorities.

Internationally, there is no forum for liaison between health and transport authorities, and WHO has a definite role to play with regard to this situation. A few countries have set up liaison groups in government departments to produce joint policies and programmes for preventing road traffic accidents, but health ministries and other health authorities have contributed little to these groups, mainly because they lack commitment and a committee structure which would allow the exchange of information and ideas that could lead to strategies and action.

Nevertheless, there is growing concern at the rising trend in mortality and morbidity from road traffic accidents because of their effect on health care resources and budgets. In some countries, clinical specialists in trauma and orthopaedics have led the way in having effective countermeasures introduced (1). A framework for comprehensive examination of the etiological factors is urgently needed in road traffic accident prevention: it would help in defining priorities for countermeasures and assessing their impact. Health authorities would need to establish formal channels of communication between all authorities and agencies concerned with such countermeasures.

Health authorities can gain experience of the problems faced by other agencies only by assuming responsibility for the health aspects of control and supporting such agencies in their spheres of action. The specific areas of concern of health authorities have to be identified, i.e. those areas which are necessarily their exclusive concern. Road accident prevention, therefore, has to be a balanced responsibility of health, transport and other agencies acting jointly or singly, but with the full knowledge and agreement of the other parties. This liaison is essential if scarce resources, particularly of manpower, are to be fully used in applying countermeasures.

Health authorities need to define their own policies and objectives in road traffic accident prevention and their methods of achieving these objectives by identifying the areas of concern and the priorities for action, describing the countermeasures to be taken, formulating programmes and activities to implement the policies, measuring their impact and integrating their own efforts with those of other authorities and agencies.

As part of the WHO programme on the prevention of road traffic accidents, several technical groups have examined areas of concern, particularly the following: epidemiology applied to road traffic accidents, statistical data, public health aspects of road traffic accidents, medical monitoring, restraint systems, education, alcohol and drugs (see Annex I).

Health authorities need to examine and discuss the reports of the technical groups and other sources of information to enable them to make policy decisions and to identify their own role in road traffic accident prevention.

The Group agreed to approach the subject by:

- (1) defining areas in which health authorities can make a contribution either because they are the only authorities with the expertise needed or because they can complement and strengthen the efforts of the other authorities;
- (2) outlining a frame of action to guide health authorities in organizing themselves as full partners in formulating and implementing policy on traffic safety;
- (3) suggesting a form of organization for local supportive services; and
- (4) suggesting a form of organization for services for the prevention of road traffic accidents within health services in general.

The Group concluded that, although transport authorities have the primary responsibility to make policies and enact legislation for road traffic safety, health authorities have to be closely concerned with road traffic accidents since they provide treatment and rehabilitation for victims of these accidents. They are, therefore, also responsible for setting up programmes for the prevention of road traffic accidents. This requires them to examine their own functions in relation to these accidents and ways in which they could contribute to their prevention.

### 3. Areas of concern for health authorities

#### Extent and nature of the problem

In 1977 in Europe approximately 87 500 persons were reported to have been killed and 2.1 million injured in road traffic accidents (2). These figures are probably an underestimate, according to the findings of a WHO Technical Group on Road Traffic Accident Statistics (3). Road accident deaths and injuries in the European Region show a downward trend. Countries show a wide variation from +85% to -62% for mortality, but more detailed epidemiological studies are needed to explain this variation and identify who is being killed, where, when and why.

Statistical data of the Department of Transport of the United Kingdom, as reported by Sabey & Staughton (4), answer some of these questions. They show that 50% of all road traffic accident deaths in urban areas are of pedestrians and that 60% of road traffic accident deaths in rural areas are of car occupants. Of all casualties, 20% are pedestrians, 25% are pedal- or motorcyclists and 40% are car occupants. With regard to the location of road traffic accidents, 75% are in urban areas, 65% of urban accidents are at junctions, 33% of accidents occur in darkness and 33% occur on wet roads.

Sabey & Staughton (4) found that many of the road traffic accidents they investigated had multiple causes, and they were able to quantify the interaction between the three principal factors involved, i.e. human factors (the road user), the road environment and the vehicle. Human factors contributed to 95% of road traffic accidents, the road environment to 28% and the vehicle to 8.5%. The road user was the sole cause in 65% of accidents; in 24% the road user and the road environment were found to interact; and in 4.5% the road user and the vehicle interacted.

According to the criteria laid down for this study, human factors predominated in the causation of road traffic accidents. This strongly indicates that health authorities, because of their existing responsibilities, should have active preventive programmes in this field. Highway engineers of transport authorities have been able to study many of the problems which could be related to the road environment and, by improving street lighting, junction layouts and road

surfaces, have contributed to reducing those accidents that are due primarily to the road environment. Vehicle engineers, applying new knowledge of biomechanics, have raised standards of safety by, for example, improvements in tyres and braking systems, the use of collapsible steering components and the introduction of restraint systems for car occupants.

Research on the role of the human factor has made less progress. Epidemiological studies have identified particular groups of people who are at high risk of death or injury from road traffic accidents - an important step if countermeasures are to be effective. Some of the important variables associated with road traffic accidents and road users have been identified as age, sex, social environment, state of health, drugs, alcohol, marital status and mental state. One of the classic epidemiological investigations has been that of Borkenstein et al. (5) in the United States of America. More recently, OECD (6) made a further comprehensive appraisal of the problem of alcohol-related road traffic accidents and recommended countermeasures, but in neither case did health authorities take a predominant part; transport and police authorities took the initiative.

#### Further action in road traffic accidents

The potential benefits from road engineering, vehicle safety measures and modification of the behaviour of road users can be quantified. In assessing their potential, Sabej & Taylor (7) considered proven remedies as well as measures that showed strong evidence of potential benefit regardless of assessment of blame or the resources required. They found the following potential for reduction in accidents: inexpensive road engineering measures, such as improvements in road surfacing, in road lighting and in junction design, could prevent 20% of road traffic accidents; vehicle safety measures, such as improved crash protection systems, could reduce casualties by 25%; and the use of crash protection systems, e.g. seat belts, could reduce casualties among road users by 30%.

The study also identified many countermeasures, some of which had already been taken or could be taken. The researchers estimated that, if the measures already known but not yet put into effect were to be implemented through health authority programmes or by health authorities in conjunction with transport authorities, accidents that produced injury could immediately be reduced further by approximately 60%.

#### Interaction of human and environmental factors

The Group considered three principal factors that caused road traffic accidents: the road user (the human factor), the road environment and the vehicle. In identifying broad areas for health authorities to plan policies relating to accident prevention, the Group considered in more detail the cause or effect of the interaction. Much of the initial work on this question has been undertaken in the United Kingdom by the Transport and Road Research Laboratory. It has identified, for different types of road user, the errors or deficiencies that contributed to accidents. In respect of drivers, four main areas have been identified: (a) manner of execution: driving too fast, deficiency in action and behaviour; (b) errors of perception: failure to observe, distraction from task, misjudgement; (c) impairment of driver: illness, alcohol, drugs, fatigue or combinations of these factors; and (d) lack of skill: inexperience, wrong action, wrong decision. Impairment of driver is one human factor that health authorities have the major responsibility for investigating, and one requiring special programmes; errors of perception is another.

With regard to psychological factors and motivation, as they affect community acceptability or rejection of accident prevention programmes, coordinated research is needed, and the Group identified a role for WHO in this area.

#### Interaction of vehicles and road users

Biomechanics is an important source of measures to prevent injuries from accidents. It is a rapidly developing science, and the cooperation of health authorities and biomechanics specialists will be required to ensure that its full potential can be brought to bear on the problem. Information is needed on crash configuration, collision speeds and precise causes of injuries. Health authorities have both the information and the specialists to advise on the interpretation of research findings. Advances in car design to lessen injury from accidents include changing the exterior of the car to make it less injurious to the pedestrian, improving windscreen design, installing restraint systems, and improving steering wheel design and car structure.

Three recommendations emerged from the discussions on the interaction of vehicles and road users.

(1) Health authorities should cooperate with biomechanics scientists to evaluate and improve crash protection measures. Health authorities have valuable clinical information in this respect. Epidemiological studies on the effectiveness of restraint systems should continue (1,8). A structured form of collaboration is needed between health and transport authorities. Specialists employed by health authorities, such as anatomists, pathologists, physiologists and traumatologists, should collaborate in research with engineers in biomechanics.

(2) Health and transport authorities should, together, take responsibility for educating the public on crash protection measures designed by engineers and transport authorities. Since public response to legislation is often low for some measures, education is needed before, during and after the enactment of the legislation, and health authorities should take responsibility for it.

(3) Health authorities should educate their own staff (doctors, nurses) on the role of biomechanics in the prevention of injury and in crash protection design, and train them to cooperate with biomechanics specialists. Special courses and seminars for health staff alone, and jointly with transport staff, could lead to health authority staff becoming coordinators of epidemiological studies and research and advisers to road safety committees concerned with policies on the prevention of road traffic accidents.

#### Epidemiological methods and their use

Health authorities could make a major contribution to the understanding of road traffic accidents and their effects by epidemiological studies. This would ensure that the extent of the problem is measured both nationally and locally.

Many aspects of road traffic accidents can be studied epidemiologically, such as mortality and morbidity by age or age groups. Analysis of routine data in the United Kingdom has shown that 50% of all male deaths in the age range of 15-19 years are moped and motorcycle riders (9). Other studies have looked at broader age groupings, e.g. the study by Havard (10), which examined mortality in the 15-24 years age group.

Health authorities that have used epidemiological studies have found a need for agreed definitions. For example, the use of mortality data in relation to road traffic accidents in different countries has highlighted the problem of different definitions of the interval between accident and death. Within countries, transport and police authorities sometimes define a road traffic accident death differently from health authorities.

Morbidity data present greater difficulties than mortality data, principally in the classification of "severity of injury". WHO receives from countries road traffic accident data based on the "E code" of the International Classification of Diseases (11), which provides information as to causes and can give useful epidemiological information. Data provided using the "N code" in relation to "nature of injury" do not provide reliable information as to the severity of injuries.

Other measures of severity have been tried, e.g. the abbreviated injury scale (12) and length of stay (13). The importance of defining severity of injury by some measure is shown by the linkage of health and transport records. Such linkage has been adopted in Norway. It correlates severity of injury with severity of accident and the forces that are exerted at the time of the accident to produce the injury. Epidemiological studies, using the linked data, can indicate the "risk of injury" for a given type of collision damage, relating it to age. As age increases, injuries increase in severity for the same forces applied. Epidemiological studies, which might be either part of a planned series or ad hoc, can be used also to derive the "risk of injury" by age. In the younger age groups, the mortality risk is 1:20 for injury-producing accidents; for people aged 65 years and older, the risk is 1:4.

Health authorities have epidemiological data already available in the form of "clinical notes related to patients". Their accessibility and relevance for both doctors and statisticians are often limited, and problems of medical confidentiality and ethics have to be overcome. For this reason, clinicians should take part in the design of epidemiological studies. The Group identified the following points in relation to epidemiological studies.

(1) There is a need to improve and extend epidemiological studies of road traffic accidents, but health authorities need not wait for these studies to put into effect programmes and activities aimed at accident prevention.

(2) Epidemiological studies require a multidisciplinary approach, both within health authorities and between them and other authorities. This involves a careful exploration of the possibilities of linking data between and within the different authorities. Health authorities have to work with confidential data and can, therefore, help other authorities to design systems that use such data.

(3) Epidemiological techniques are needed for short-term studies to monitor what is happening in specific groups of road user, both locally and nationally. For example, increased sales of motorcycles could raise the number of fatalities and serious injuries in a particular age group.

Health authorities should begin and take part in epidemiological studies to obtain baseline data on road traffic accidents locally and nationally. There is an urgent need for government health and transport departments to establish record linkage.

#### Conclusion

The Group accepted the evidence that human factors contribute to 95% and are the sole cause of 65% of road traffic accidents. It concluded that accidents could be reduced substantially if health authorities, with the cooperation of transport authorities, were to establish programmes in this field. It also agreed that a structured form of collaboration is needed between health and transport authorities.

#### 4. Areas of action for health authorities

For the establishment of priorities for health services, account must be taken of three levels of accident prevention: primary, secondary and tertiary.

Primary prevention means prevention of the accident. The factors that need attention in this category may be grouped under three headings - road users, traffic environment and road environment. Under road users, the factors include driver selection procedures, education and legislation; under traffic environment, they include vehicles (primary safety techniques), the ergonomics of driving, vehicle design, vehicle tests and legislation (safety standards); under road environment, they include primary safety techniques, highway markings, signs and signals, street lighting, highway infrastructure, transport and town traffic flows, town planning, information techniques (by radio, etc.) and legislation.

Secondary prevention means the reduction of injury. The relevant factors, grouped under the headings of road users, vehicles and the road environment include, under road users - biomechanics and legislation affecting the road user; under vehicles - secondary safety techniques, seat belts and crash helmets including standards; and under road environment - highway infrastructure and secondary safety techniques.

Tertiary prevention is the treatment of injuries. The factors to be considered are grouped under road users and traffic environment. They include, under road users - emergency rehabilitation and traumatology services, emergency services, rehabilitation services for the incapacitated, social services, occupational retraining, legislation and equipment standards; and under traffic environment - a technology of emergency transport for accident victims and logistic support for emergency services, telecommunications, town traffic, etc.

The Group identified eight essential and urgent areas of concern for health authorities.

#### Information systems

Preventive programmes depend on accurate and comprehensive information about road traffic accidents. There is at present an under-reporting of accidents, and the data on the long-term effects of accidents on victims are inadequate. The Group recommended high priority for information systems. They should be organized both locally and nationally. Local community systems need the close collaboration of transport and other authorities, statutory and voluntary. The establishment of common information systems would facilitate participation by clinicians and public health officers. The information, which should be simple in style and content, could form the basis of national information systems and be used to evaluate local and national programmes.

The practice of classifying road traffic accident injuries by "severity" should be instituted because of its value in examining long-term disability resulting from road traffic accidents and in supporting biomechanics programmes. This would also bring clinical staff into the system. In addition, this approach would make it easier to link data of transport, police and health authorities.

An important function of an information system is to enable local authorities to monitor the effectiveness of programmes.

#### Human factors

State of health of road users. The state of health of road users can increase the risk of injury-producing road traffic accidents. As a result of advances in health care, many more patients under long-term care and handicapped and elderly people retain their mobility. Health staff must be made aware of the risks their patients run as road users so that, when arranging care for them, they can advise them accordingly.

The need to assess the health of learner drivers is still under discussion; whether it is done depends on the state of development of a country's health services and on the attitude to screening generally. Whatever the outcome, there are issues of medical ethics that arise when patients refuse to accept medical advice.

Health authorities should ensure that licensing authorities receive advice on health conditions which could affect drivers, especially professional drivers.

Psychosocial factors. Psychosocial and sociological factors that may influence adversely the behaviour of road users were reviewed extensively by a WHO Symposium on Human Factors in Road Accidents (14). It concluded that there is evidence that a driver's cultural background can affect his risk of being involved in an accident; that there are important differences in the causes of accidents between different geographical areas; and that socially maladjusted drivers (e.g. those with repeated criminal convictions, incipient financial crisis, attendance at venereal disease clinics) constitute a large proportion of drivers involved in road traffic accidents.

Alcohol. It is now widely accepted that taking alcohol increases the risk of injury-producing road traffic accidents. Transport authorities have probably done as much as they can to prevent alcohol-related road traffic accidents and are now turning to public health authorities for further action. Attention has been focused primarily on the effect of alcohol on driving, but a high proportion of pedestrians injured in road traffic accidents also drink to excess. Health authorities have a direct interest in supporting measures, including legislation, that reduce "drinking and driving", firstly because of their concern about reducing road traffic accidents and, secondly, because any measures that reduce the problem of alcohol-related harm are important. Adolescents and young adults (the 15-24 years age group) are at particularly high risk and programmes are needed urgently for them; such programmes should be supported especially by educational programmes. Health staff concerned with the problem of alcohol-related harm should work closely with transport and police authorities.

Drugs. The metabolism of many drugs is not fully understood, since the serum levels of the drugs may show little relation to observable clinical effects. Various drugs increase the risk to all road users, including drivers, of involvement in injury-producing road traffic accidents, whether prescribed or obtained otherwise. The Group recommended that, when drugs are likely to cause impairment of road use, this should be stated on the containers. Since health authorities have clinical information on the interaction of drugs and alcohol, they should ensure that their staff who have the expertise in this field cooperate with the corresponding staff of transport authorities and take part in research in this field. Also, health authorities should cooperate with drug manufacturers to draw up a code of practice to identify those drugs that may directly or indirectly affect the ability of road users.

#### High-risk groups

Epidemiological studies have identified several groups of the population at risk as road users.

Children. The increase in the fatal accident rate among children in Europe is attributable mainly to road traffic accidents. Various studies show considerable under-reporting of nonfatal injuries to child pedestrians and cyclists, with consequent underestimation of the risk.

Young people at risk. Almost half of all male deaths in the 15-24 years age group are caused by road traffic accidents; they occur mostly among drivers or passengers of motor vehicles, including mopeds and motorcycles. Health authorities should take part in studies to determine the reasons for the high risk of death or injury in view of the importance of this group to the community.

Pedestrians. There are indications that, despite increasing numbers of both road users and motor vehicles, pedestrian accident rates are not increasing and may have declined in some countries. However, in most countries, the mortality and morbidity rates for pedestrians over the age of 65 years are much higher than those for younger persons, and the proportion of pedestrians over the age of 65 years killed in Europe is greater than that of those between the ages of 25 and 64 years. However, the data on the morbidity patterns for pedestrians are inadequate, and this is a further reason for health authorities to improve data collection in hospitals and also to include this age group in education programmes.

Cyclists. Traffic fatalities involving both pedestrians and cyclists amount to 30%-40% of the total in many European countries and, despite the improved rates for pedestrians generally, the position is less clear for users of two-wheelers; accidents to them are under-reported and information on morbidity is deficient.

With regard to priority action by health authorities, children and young people, and the elderly, are particularly at risk. Preventive programmes directed at these two groups should be concerned with all aspects of their use of the road - as drivers, cyclists, motorcyclists and pedestrians (15). The higher priority should be given to children and young people. Most countries have a maternal and child health service whose staff could help transport authorities and draw up strategies and run programmes to prevent road traffic accidents in this high-risk group. The strategy of health authorities should include the promotion of committees to prevent accidents to children (16,17). Recent examples of these are to be found in Sweden and the United Kingdom.

#### Traffic environment

The areas of activity in the traffic environment in which health authorities can support transport authorities are as follows.

Vehicle design, internal and external. The Group recommended that public health technical experts cooperate with engineers, particularly those concerned with biomechanics; public health staff should take part in designing and conducting research on safety measures related to the prevention of injury-producing road traffic accidents.

Seat belts and crash helmets. The wearing of seat belts is considered to be the most important single factor in reducing mortality and morbidity from road traffic accidents. Similarly, the wearing of crash helmets by motorcyclists reduces the risk of deaths and severe head injury. The design of seat belts and crash helmets and the setting and evaluation of adequate standards need the cooperation of health workers, especially clinicians. The Group recommended that health workers participate in the planning, conduction and evaluation of design changes and new legislation related to seat belts and crash helmets.

Action by health authorities. Clinical staff in accident and emergency (traumatology) services can provide information about the severity and types of injury that result from road traffic accidents. Teams that carry out the essential research into vehicle design and safety should include anatomists and physiologists.

Joint action. There is an urgent need for exchange of information and ideas between engineering and health personnel, for example by means of joint seminars.

Other environmental factors. Health authorities should also pay close attention to other environmental factors. They should explore ways of helping highway engineers and urban planners to establish policies on transport and town traffic flows, and town planning in general, and any legislation that would support this. Factors that need attention in this respect include mobility of the elderly and the handicapped, the siting of schools and hospitals, housing developments and lorry routes.

#### Education in the prevention of road traffic accidents

Education contains several elements: safety education, education on the traffic environment and health education. It should be aimed at all road users, but especially at parents and young children, schoolchildren and known high-risk groups. Health authorities and their staff are in contact with most of these through their health education programmes.

Action by health authorities. Health authorities should help transport authorities to prepare educational material for parents and young children, to design school curricula and to operate campaigns to reduce drinking and driving, to encourage transport authorities to include health topics in the highway code, to expand the training of learner drivers so as to include such health

topics as the effects of fatigue, alcohol and drugs on driving skills and ability, and to support transport authorities in educating the public to accept seat belts and crash helmets.

Education and training of staff. The cooperation of health workers, road engineers, planners, educationalists, psychologists, social workers and others in all aspects of a comprehensive traffic education programme is an ideal way of introducing a coordinated approach locally and nationally. Health and transport staff, schoolteachers, police and driving school instructors should be trained in all aspects of prevention of road traffic accidents. Health staff can make a contribution on such subjects as the effects of fatigue, drugs and alcohol on use of the road.

Education of policy-makers. Those concerned with making policy decisions related to health and transport should be educated in the causation, effects and prevention of road traffic accidents.

International coordination. The Group recommended that WHO consider, with other international bodies such as OECD, ways of coordinating traffic education internationally.

#### Evaluation

Health authorities should take part in the evaluation of road traffic accident prevention programmes.

#### Research

Participation in research into road traffic accidents covering the whole range of factors described previously is part of the responsibility of health authorities in relation to the prevention of road traffic accidents. Health authorities should encourage their specialists, advisers and researchers to participate in teams investigating etiological factors and safety measures, especially in respect of drugs, alcohol and biomechanics.

#### Legislation

Health and transport authorities need to advise on the drafting of legislation designed to prevent road traffic accidents, as well as on educational programmes to explain the purpose of legislation and its application.

#### 5. Organization of supporting services

In its discussion of the framework within which health authorities should work, the Group identified specific targets and also considered how health authorities could facilitate the organization of supporting services for their accident prevention policies and programmes.

Health authorities should establish formal links with transport and other authorities, particularly in relation to biomechanics and crash protection. One way of doing so could be through committees at all levels. Such committees could:

- formulate local policies;
- establish an information system, linking them where possible with transport and other authorities;
- identify areas of concern, e.g. high-risk groups, on the basis of local information systems, so that local policies and programmes would then reflect local needs;
- take responsibility for the health aspects of educational programmes in communities, and for health personnel, police, teachers, road safety officers and other transport authority staff;
- cooperate with local education authorities in joint educational programmes for schools and colleges, directed at particular types of road user among schoolchildren and college students: pedestrians, cyclists and motorcyclists;
- monitor and evaluate their programmes and activities;
- aid in research and take action on the reports of research teams.

#### Participation of health authority staff

Health authorities should enable their staff to participate in planning and organizing services and in serving as members of joint health and transport authority research teams.

Health authorities should provide expert advice to car designers, relating, for example, to the reduction of injuries in collisions between pedestrians and vehicles, and participate in research on crash protection devices. The Group recommended that this field of activity should be coordinated by WHO.

Doctors in clinical practice, including not only hospital-based specialists but also general practitioners (family doctors), also have a role to play. They have experience in the treatment of injuries and have access to clinical records which could be used for epidemiological studies. There are also other clinicians with expert knowledge of human factors, in particular those concerned with high-risk groups, such as paediatricians and geriatricians.

#### 6. Coordination of policies and programmes

The success of health authority programmes for the prevention of road traffic accidents depends upon the contribution of many health service and transport authority workers and on the availability of established preventive programmes, such as those directed to children and the elderly. Public health authorities should integrate their programmes for prevention of road traffic accidents with their general preventive strategy, and they should begin immediately to integrate their activities with those of transport authorities and other concerned agencies.

#### 7. Summary of conclusions and recommendations

##### General

Transport authorities have the primary responsibility to develop road traffic safety policies and legislation. Public health authorities, however, are closely involved in the problem of road traffic accidents, since they provide treatment and rehabilitation services for those injured in such accidents. Consequently, they have a responsibility to examine their own function and the contribution they can make to solving the problem of road traffic accidents.

Public health authorities, in developing strategies and activity programmes in the field of road traffic accident prevention, should do this as part of their overall programme for accident prevention.

Public health authorities should begin immediately to effect the integration of their efforts with those of transport authorities and other agencies working in the field of road traffic accident prevention. This integration is essential if public health authorities are to understand the problems and thus make an effective contribution. Strategies and activity programmes should be developed in the priority areas outlined by the Group.

##### Information systems

Public health authorities require knowledge of the extent and nature of the problems resulting from road traffic accidents. Thus, epidemiological studies should be continued and should form part of a general information-gathering process, and information systems should be developed at national and local levels. In developing these systems, consultation should take place with transport and other authorities to identify common areas of concern.

WHO should continue to support and extend the work currently proceeding at the international level on medical monitoring and the improvement of data collection related to road traffic accidents.

Work on the development of a system to classify road traffic accidents by degree of severity should proceed as a matter of urgency, especially in view of its value in examining long-term disability resulting from road traffic accidents.

Public health authorities should cooperate actively in measures which provide a linkage between their data and those of the transport and police authorities, particularly data related to road traffic accidents resulting in injury. They should coordinate such data at national and local levels and ensure the confidentiality of medical data.

The development of information systems is a major priority and would lead to an early involvement of clinicians and public health personnel in a review of existing information systems. This review is essential to ensure that the data collected for epidemiological or other purposes fulfil their purpose. The development of information systems at the local level is a high priority. The data gathered should be reliable, accurate, repeatable and as simple as possible. The data base used should be compatible with that of other local public health authorities within the same country to allow for comparisons. The data thus collected should form the basis of national information systems, and local information systems should be developed in consultation with transport authorities, police and other agencies, both statutory and voluntary. Information systems should be designed in such a way as to allow public health authorities to monitor the effectiveness of their programmes and to provide information to other authorities for a similar purpose.

#### Human factors (medical conditions, drugs, alcohol)

Medical advice should be available and given to those authorities concerned with legislation which propose to limit the activities of road users suffering from certain medical conditions.

The possibility should be considered of establishing a limited number of reference treatment centres on an experimental basis in order to study the etiological factors involved in respect of those road users who either exhibit persistent breaches of traffic legislation or are involved in repeated road traffic accidents.

The metabolism of many drugs is not fully understood. Experimental studies have shown that a number of drugs, particularly psychoactive drugs, impair driving. There is also evidence of drugs not prescribed by a doctor (i.e. "over-the-counter" drugs) being of potential danger to a vehicle driver. Public health authorities possess clinical information related to the interaction of drugs and to the interaction between drugs and alcohol. They should ensure that their staff who have expertise in this field work in cooperation with the transport authorities.

Transport authorities have probably proceeded as far as they are able in their efforts to prevent alcohol-related road traffic accidents and now look to public health authorities to carry this work further. Hence, epidemiological studies should continue on a national basis; the promoting and coordinating role of WHO in this field should be emphasized; the problem of alcohol-related road traffic accidents should be seen in the context of the overall preventive programme dealing with adverse effects of alcohol; public health authorities should work closely with police and transport authorities to develop integrated programmes for the reduction of alcohol-related road traffic accidents; and they should also support legislation aimed at the reduction of accidents of this type through educational programmes. The public health authorities' personnel concerned with the problem of alcohol-related damage should work in close liaison with transport and police authorities when developing their preventive programmes.

#### Environmental factors (vehicles, the external environment)

Public health authorities should provide technical expertise to engineers, particularly in the field of biomechanics. WHO should cooperate with other interested agencies in coordinating work in this field at the international level.

Public health authorities should be involved at an early stage in the design of and research into safety measures related to the prevention of injury-producing road traffic accidents. They have a unique opportunity to cooperate in this field through their clinicians working in the accident and emergency (traumatology) services. This group of clinicians could provide information related to the severity and type of injury resulting from road traffic accidents.

Teams established to carry out the essential research into vehicle design and safety should include specialists in anatomy and physiology. There is an urgent need for an early exchange of information and ideas through seminars, etc., and WHO should play a facilitating role in this respect.

Public health authorities should involve themselves at the earliest possible stage in planning decisions affecting road safety (e.g. the siting of schools).

#### High-risk groups

Epidemiological studies have helped to identify certain groups of the population towards which public health authorities need to direct their preventive policies. Two priority groups particularly at risk are (a) children and young people and (b) the elderly.

Most countries have maternal and child health services whose personnel could provide assistance to transport authorities in the formulation of strategies and programmes related to the prevention of road traffic accidents among this group. At both national and local levels, child accident prevention committees should be established. Such committees are already operating successfully in some countries of the Region. They provide a useful model on which committees for the prevention of accidents among the elderly could be based. Public health authorities should promote these committees as part of their strategy for accident prevention as a whole.

#### Traffic education

This is a priority area for public health authorities. There is a need to provide health and transport personnel, schoolteachers, police and driving instructors with training in traffic education.

Those concerned with making policy decisions related to both health and transport should receive education regarding the causes, effects and prevention of road traffic accidents.

There is a special need to extend the training of learner drivers of powered vehicles. This training should include such aspects as the effect of fatigue, drugs, and alcohol and drugs combined, on driving skills and ability.

There is a need for public health authorities to increase the knowledge of their staff concerning the problem of road traffic accidents and the preventive measures available.

#### Research

Research into road traffic accidents is a fundamental part of public health authorities' responsibilities in relation to road traffic accident prevention. The following personnel belonging to those authorities should be involved in research: specialist advisers and researchers on teams investigating etiological factors and safety measures, and health personnel with a broad knowledge and understanding of the interrelationships involved in road traffic accidents.

WHO should promote, on an international basis, public health research into accident prevention, giving special consideration to road traffic accidents.

#### Legislation

Health and transport authorities should discuss legislation related to road traffic accident prevention. They should not only consider the form of legislation, but also develop programmes of education to explain the need for and purpose of such legislation.

#### Implementation

WHO should call a meeting of representatives of ministries of health of Member States in the European Region to discuss the implementation of the Group's recommendations.

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Annex I

LIST OF WHO REPORTS ON ROAD ACCIDENT PREVENTION

	<u>Reference</u>
<u>Accidents in childhood: facts as a basis for prevention: report on an Advisory Group (Geneva, 1956), 1957</u>	Technical Report Series No. 118
<u>The prevention of accidents in childhood: report on a Seminar (Spa, 1958), 1960</u>	EURO 102.2
<u>The organization of resuscitation and casualty services: technical discussions held during the thirteenth session of the WHO Regional Committee for Europe (Stockholm, 1963), 1963</u>	EUR/RC13/Tech.Disc./9
<u>The organization of resuscitation and casualty services: report on a Seminar (Leningrad, 1967), 1968</u>	EURO 0256
<u>Human factors in road accidents: report on a Symposium (Rome, 1967), 1968</u>	EURO 0147
<u>The prevention of accidents in the home: report on a Symposium (Salzburg, 1968), 1969</u>	EURO 0345
<u>Organizations concerned with prevention and control of road accidents in Europe: report on the First Liaison Meeting (Copenhagen, 1968), 1969</u>	EURO 411.3(1)
<u>Road traffic accidents as a public health problem: technical discussions held during the nineteenth session of the WHO Regional Committee for Europe (Budapest, 1969), 1970</u>	EUR/RC19/Tech.Disc./6
<u>Organizations concerned with prevention and control of road accidents in Europe: report on the Second Liaison Meeting (Copenhagen, 1971), 1973</u>	EURO 5701(2)
<u>The epidemiology of road traffic accidents: report on a Conference (Vienna, 1975), 1976</u>	WHO Regional Publications European Series, No. 2
<u>The prevention and control of road traffic accidents: report on the Third Liaison Meeting (Copenhagen, 1976)</u>	ICP/HSD 009
<u>Medical fitness of drivers: report on an Advisory Group (Copenhagen, 1976), 1977</u>	ICP/SHS 059
<u>Prevention of traffic accidents in childhood: report on a WHO/International Children's Centre/University of Uppsala Collaborative Study</u>	EURO Reports and Studies No. 26
<u>Education in traffic safety: report on a WHO/University of Essen Collaborative Study (mimeographed)</u>	ICP/ADR 013
<u>Medical monitoring of road traffic accidents: report on an ad hoc Technical Group (Odense, 1978), 1978</u>	ICP/ADR 006
<u>Road traffic accident statistics: report on an ad hoc Technical Group (Prague, 1978), 1979</u>	EURO Reports and Studies No. 19
<u>The influence of alcohol and drugs on driving: report on an ad hoc Technical Group (Monaco, 1978), 1981</u>	EURO Reports and Studies No. 38

<u>Prevention and control of road traffic accidents:</u> summary report on the Fourth Liaison Meeting (Copenhagen, 1979), 1979	ICP/ADR 001(S)
<u>Planning and organization of emergency services:</u> report on a Technical Group (Toulouse, 1979), 1981	EURO Reports and Studies No. 35
<u>Protective devices and restraint systems in traffic accident prevention:</u> report on a Technical Group (Meknès, 1979), 1981	EURO Reports and Studies No. 40
<u>Education in traffic safety:</u> report on a Technical Group (Essen, 1979), 1981 (mimeographed)	ICP/ADR 013
<u>Psychosocial factors related to accidents in childhood and adolescence:</u> report on a Technical Group (Brussels, 1980)	EURO Reports and Studies No. 46
<u>Role of health services in the prevention of road traffic accidents:</u> report on a Technical Group (London, 1980), 1981 (mimeographed)	ICP/ADR 038

Annex II

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<sup>a</sup> Participation expenses not paid by WHO.