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PREVENTION OF TRAFFIC ACCIDENTS

I. Introduction

Traffic accidents have probably occurred ever since men began to move from one place to another, and no doubt oxen and camels collided with each other and pedestrians were knocked down by horsemen. But on the scale of human concerns such accidents occupied a very low place.

It is interesting to note that the "bacteriological era" developed at about the same time as motorization and systems of road transportation. This inevitably led to greater importance being attached to communicable diseases than to the increase in motor vehicle accidents as a cause of death. Public health measures were devised to combat the former, as "natural" afflictions. It is essential now to deal with the latter "man-made epidemics".

Although the changes mentioned mostly affect the developed countries, an analogous phenomenon is observable in other areas where the socioeconomic conditions are changing and only the time factor is different. One important point in the general picture is that well-tried control methods exist for the communicable diseases and should now be fully applied in the developing countries. Comparable methods for the control of either traffic or other accidents have not yet been brought to a similar degree of perfection in any country, whatever its stage of development.

In public health, as in other spheres of human endeavor, the first step in approaching a problem is to study its characteristics, extent, and distribution. This epidemiological method has been applied to a greater or lesser extent in a number of countries. For example, the National Safety Council of the United States of America issues an annual report on accidents. About a third of the report deals with motor vehicle accidents and furnishes information on, for example: deaths, disabling injuries, damage to property; the time of day, week, and year in which the accidents occurred; the state, city, or town in which they were reported; the age and sex of the driver; the category of accident (collision, injury to pedestrian, etc.); the road conditions; details relating to the driver (speed of the vehicle, whether he had taken

alcohol, whether he had violated the law, etc.); and trends over various 10-year periods. Analysis of this information yields a "diagnostic" classification from which preventive measures are being derived.

One of the outstanding future needs in relation to accidents is the establishment of (a) a certain uniformity of classification and reporting, and (b) systems of information collection in countries that do not at present have data of this kind. Every country, in accordance with its social and political structure, should use a uniform classification so that the comparability of data becomes a reality.

2. Extent of the Problem

The number of deaths from road accidents in the world is constantly increasing; at present more than 200,000 are notified annually. There is unfortunately no ground for believing that this trend will change. In 26 countries of the Americas, Asia, and Europe considered to be highly developed the number of deaths from traffic accidents rose by 90 per cent between 1950 and 1966,¹ and the number of injured rose even more.

Deaths from motor vehicle accidents are also steadily increasing in the Americas (Tables 1, 2, and 3). In some countries they account for nearly 40 per cent of all accidental deaths and are among the 10 principal causes of death. In some age groups they are the principal cause of death. In countries with a large number of motor vehicle deaths from accidents (most of which are traffic accidents) are exceeded in number only by deaths from diseases of the heart, malignant neoplasms, cerebrovascular diseases, and pneumonia-influenza (Table 4, Figures 1 and 2).

Out of 21 countries, the five that recorded the highest mortality rates in 1968 were: the United States of America with 27.5 per 100,000 population; Canada with 26.4; Venezuela with 23.7; Chile with 22.7; and Trinidad and Tobago with 14.7 (1967).

The proportion of deaths to injuries in 1967 was 1:35 in the United States of America, 1:14 in Venezuela, 1:9 in Peru, and 1:8 in Argentina. The proportion in Chile in 1968 was 1:8.5.

The apparently greater lethality of traffic accidents in the Latin American countries is explained in part by the underregistration of the injuries that occur.

The number of vehicles in the world up to 1968 has been estimated at 217 million, of which 100 million correspond to the United States of America.

¹World Health Statistics Report, Vol. 21, No. 5, 1968

TABLE 1
NUMBER OF DEATHS FROM MOTOR VEHICLE ACCIDENTS WITH RATES
PER 100,000 POPULATION, 1960 AND 1965-1969

Country	Number of deaths						Rate per 100,000 population					
	1960	1965	1966	1967	1968	1969	1960	1965	1966	1967	1968	1969
Argentina ^{a)}	...	2,086	2,818	3,524	...	...	...	17.3	15.9	15.9	...	...
Barbados	8	...	17	29	30	36	3.4	...	6.9	11.6	11.9	14.2
Canada	3,700	5,049	5,410	5,522	5,488	5,696	20.7	25.8	27.0	27.0	26.4	27.0
Chile	1,264	1,288	1,328	1,438	2,123	...	16.5	14.9	14.9	15.8	22.7	...
Colombia	1,173	2,054	2,073	2,026	...	...	7.6	11.4	11.1	10.6	...	...
Costa Rica	63	166	198	155	180	201	5.0	11.1	12.9	9.7	11.0	11.9
Cuba	b) 520	767	...	...	...	...	7.8	10.1	...	...	...	...
Dominican Republic	106	171	199	203	235	286	3.5	4.7	5.3	5.2	5.8	6.9
Ecuador	...	453	504	537	...	...	...	8.8	9.5	9.7	...	...
El Salvador	168	270	261	269	297	296	6.8	9.2	8.6	8.5	9.1	8.7
Guatemala	318	326	305	261	...	...	8.3	7.3	6.7	5.5	...	...
Jamaica	151	145	153	165	176	...	9.3	8.1	8.3	8.8	9.2	...
Mexico	1,067	2,745	2,851	2,965	3,465	3,145	3.0	6.4	6.5	6.5	7.3	6.4
Nicaragua	...	147	...	...	191	...	...	8.9	...	...	10.4	...
Panama	79	136	118	131	182	114	7.9	11.5	9.2	9.9	13.3	8.0
Paraguay ^{a)}	...	72	95	101	112	...	...	6.8	8.7	8.9	9.7	...
Peru	a) b) 606	a) 877	c) 1,301	1,615	...	...	...	16.5	...	13.1	...	...
Trinidad and Tobago	...	...	67	148	...	...	...	...	6.7	14.7	...	...
United States of America	38,137	49,163	53,041	52,924	54,862	...	21.2	25.4	27.1	26.7	27.5	...
Uruguay	136	187	206	167	170	177	5.4	6.9	7.5	6.0	6.0	6.2
Venezuela	1,217	1,838	1,984	2,088	2,207	2,425	16.5	21.4	22.5	23.0	23.7	25.4

... Data not available

a) Registration areas

b) 1959

c) Medically certified deaths only

TABLE 2

REGISTERED VEHICLES IN 1969, ACCIDENTS AND INJURIES, AND DEATHS FROM MOTOR VEHICLE ACCIDENTS, WITH RATIOS TO VEHICLES

Country	Population (in thousands)	Registered vehicles	Accidents	Persons injured	Deaths	Population per vehicle	Accidents per 1,000 vehicles	Injuries per 1,000 vehicles	Deaths per 1,000 vehicles
Argentina	23,617	1,804,700	29,766	26,595	3,524	13	16.5	14.7	2.0
Barbados	247	a) 14,700	b) 2,432	d) 981	36	17	165.4	66.7	2.4
Bolivia	4,680	39,400	3,378	...	...	119	85.7	...	...
Brazil	89,376	2,490,900	129,080	b) 83,972	...	36	51.8	33.7	...
Canada	20,772	b) 7,746,800	...	...	5,696	3	...	...	0.7
Chile	9,351	254,500	19,683	18,000	2,123	37	77.3	70.7	8.3
Colombia	19,825	264,300	9,872	7,622	2,026	75	37.4	28.8	7.7
Costa Rica	1,634	51,600	8,116	2,874	201	32	157.3	55.7	3.9
Cuba	7,631	c) 265,700	...	...	767	29	...	...	2.9
Dominican Republic	4,029	51,400	7,846	5,042	286	78	152.6	98.1	5.6
Ecuador	5,695	56,300	5,975	...	537	101	106.1	...	9.5
El Salvador	3,266	47,200	6,484	3,011	296	69	137.4	63.8	6.3
Guatemala	4,717	d) 52,800	...	...	261	89	...	...	4.9
Guyana	719	19,800	...	...	...	36	...	...	...
Haiti	4,671	84,000	...	...	...	56	...	...	...
Honduras	2,495	23,500	...	...	...	106	...	...	...
Jamaica	1,912	76,700	...	...	176	25	...	...	2.3
Mexico	47,267	1,465,800	72,419	52,724	3,145	32	49.4	36.0	2.1
Nicaragua	1,783	22,900	...	...	191	78	...	...	8.3
Panama	1,372	53,200	6,767	3,018	114	26	127.2	56.7	2.1
Paraguay	2,231	13,500	...	...	...	165	...	...	...
Peru	12,772	306,900	38,547	14,571	1,615	42	125.6	47.5	5.3
Trinidad and Tobago	1,021	86,400	15,514	...	148	12	179.6	...	1.7
United States of America	199,312	99,563,400	13,700,000	1,953,100	56,400	2	137.6	19.6	0.6
Uruguay	2,818	232,300	...	...	177	12	...	...	0.8
Venezuela	10,035	863,784	75,272	33,844	2,424	12	87.1	39.2	2.8

... Data not available

a) 1966

b) 1968

c) 1965

d) 1967

TABLE 3

COMPARISON OF DEATHS FROM MOTOR VEHICLE ACCIDENTS IN
THE UNITED STATES OF AMERICA IN 1970 WITH EXPECTED NUMBER
ON BASIS OF DEATHS PER MILLION VEHICLE MILES IN 1966

	1966 ^{a)}	1970
Motor vehicle travel in miles	930,000 million	1,125,000 million
Deaths from motor vehicle accidents	53,041	55,300
Death rate per million vehicle miles	.059	.049
Expected deaths in 1970 on basis of 1966 rate		64,200
Deaths prevented		8,900

a) Year with the highest rate in the United States of America

TABLE 4

NUMBER AND PERCENTAGE OF DEATHS FROM MOTOR VEHICLE ACCIDENTS
WITH RANK ORDER IN RELATIONS TO OTHER CAUSES,
AT ALL AGES AND FROM 5-34 YEARS
(1969 OR MOST RECENT YEAR WITH DATA)

A. ALL AGES

	<u>Number</u>	<u>Per cent</u>		<u>Number</u>	<u>Per cent</u>
<u>United States of America</u>			<u>Venezuela</u>		
All causes	1,930,082		All causes	67,954	
1. Diseases of heart	753,721	39.1	1. Diseases of heart	7,534	11.1
2. Malignant neoplasms	318,547	16.5	2. Malignant neoplasms	5,387	7.9
3. Cerebrovascular diseases	211,390	11.0	3. Diarrheal diseases	5,085	7.5
4. Pneumonia and influenza	73,492	3.8	4. Pneumonia and influenza	4,693	6.9
5. Other accidents	64,240	3.3	5. Diseases of early infancy	4,577	6.7
6. <u>Motor vehicle accidents</u>	54,862	2.8	6. Cerebrovascular diseases	2,879	4.2
			7. Other accidents	2,718	4.0
			8. <u>Motor vehicle accidents</u>	2,424	3.6
<u>Chile</u>			<u>Costa Rica</u>		
All causes	84,560		All causes	11,599	
1. Pneumonia and influenza	14,806	17.5	1. Diarrheal diseases	1,405	12.1
2. Diseases of heart	9,605	11.4	2. Diseases of heart	1,205	10.4
3. Malignant neoplasms	9,500	11.2	3. Malignant neoplasms	1,146	9.9
4. Cerebrovascular diseases	5,239	6.2	4. Pneumonia and influenza	917	7.9
5. Diseases of early infancy	4,682	5.5	5. Diseases of early infancy	916	7.9
6. Diarrheal diseases	4,533	5.4	6. Cerebrovascular diseases	480	4.1
7. Other accidents	4,205	5.0	7. Bronchitis, emphysema, asthma	464	4.0
8. Cirrhosis of liver	3,522	4.2	8. Other accidents	437	3.8
9. Tuberculosis	3,150	3.7	9. Measles	322	2.8
10. <u>Motor vehicle accidents</u>	2,123	2.5	10. Avitaminosis and other nutritional deficiencies	321	2.8
			11. <u>Motor vehicle accidents</u>	201	1.7

TABLE 4 (cont.)

B. 5-14 YEARS OF AGE

	<u>Number</u>	<u>Per cent</u>		<u>Number</u>	<u>Per cent</u>
<u>United States of America</u>			<u>Venezuela</u>		
All causes	17,542	100	All causes	2,715	
1. Other accidents	4,264	24.3	1. Other accidents	407	15.0
2. <u>Motor vehicle accidents</u>	4,105	23.4	2. <u>Motor vehicle accidents</u>	309	11.4
3. Malignant neoplasms	2,589	14.8	3. Pneumonia and influenza	163	6.0
4. Congenital malformations	1,016	5.8	4. Diarrheal diseases	144	5.3
5. Pneumonia and influenza	748	4.3	5. Malignant neoplasms	121	4.5
<u>Chile</u>			<u>Costa Rica</u>		
All causes	1,892	100	All causes	418	
1. Other accidents	332	17.5	1. Other accidents	63	15.1
2. Pneumonia and influenza	273	14.4	2. Diarrheal Diseases	31	7.4
3. <u>Motor vehicle accidents</u>	255	13.5	3. Malignant neoplasms	30	7.2
4. Malignant neoplasms	163	8.6	4. Measles	29	6.9
5. Diseases of heart	84	4.4	5. Pneumonia and influenza	27	6.5
			6. <u>Motor vehicle accidents</u>	26	6.2

C. 15-24 YEARS OF AGE

<u>United States of America</u>			<u>Venezuela</u>		
All causes	41,140	100	All causes	2,969	100
1. <u>Motor vehicle accidents</u>	16,543	32.3	1. <u>Motor vehicle accidents</u>	556	18.7
2. Other accidents	6,469	12.6	2. Other accidents	518	17.4
3. Homicides	3,357	6.6	3. Suicides	249	8.4
4. Malignant neoplasms	2,731	5.3	4. Homicides	239	8.0
5. Suicides	2,357	4.6	5. Malignant neoplasms	142	4.8

TABLE 4 (cont.)

	<u>Number</u>	<u>Per cent</u>		<u>Number</u>	<u>Per cent</u>
<u>Chile</u>			<u>Costa Rica</u>		
All causes	2,720	100	All causes	377	100
1. Other accidents	620	22.8	1. Other accidents	75	19.9
2. <u>Motor vehicle accidents</u>	284	10.4	2. <u>Motor vehicle accidents</u>	63	16.7
3. Suicides	194	7.1	3. Malignant neoplasms	34	9.0
4. Pneumonia and influenza	192	7.1	4. Diseases of heart	23	6.1
5. Tuberculosis	189	6.9	5. Complications of pregnancy, childbirth, and puerperium	20	5.3
<hr/>					
D. <u>25-34 YEARS OF AGE</u>					
<u>United States of America</u>			<u>Venezuela</u>		
All causes	37,249	100	All causes	2,891	100
1. <u>Motor vehicle accidents</u>	7,727	20.7	1. <u>Motor vehicle accidents</u>	494	17.1
2. Other accidents	4,717	12.7	2. Other accidents	366	12.7
3. Homicides	3,624	9.7	3. Homicides	205	7.1
4. Malignant neoplasms	3,536	9.5	4. Malignant neoplasms	194	6.7
5. Suicides	2,855	7.7	5. Diseases of heart	162	5.6
<hr/>					
<u>Chile</u>			<u>Costa Rica</u>		
All causes	3,532	100	All causes	348	100
1. Other accidents	633	17.9	1. Other accidents	58	16.7
2. Tuberculosis	425	12.0	2. Malignant neoplasms	41	11.8
3. <u>Motor vehicle accidents</u>	340	9.6	3. Diseases of heart	37	10.6
4. Diseases of heart	229	6.5	4. Complications of pregnancy, childbirth, and puerperium	32	9.2
5. Malignant neoplasms	224	6.3	5. <u>Motor vehicle accidents</u>	29	8.3
<hr/>					

FIGURE 1

PERCENTAGE OF TOTAL DEATHS OF MALES ATTRIBUTED TO MOTOR VEHICLE ACCIDENTS,
BY AGE GROUPS, IN FOUR COUNTRIES OF THE AMERICAS, 1969

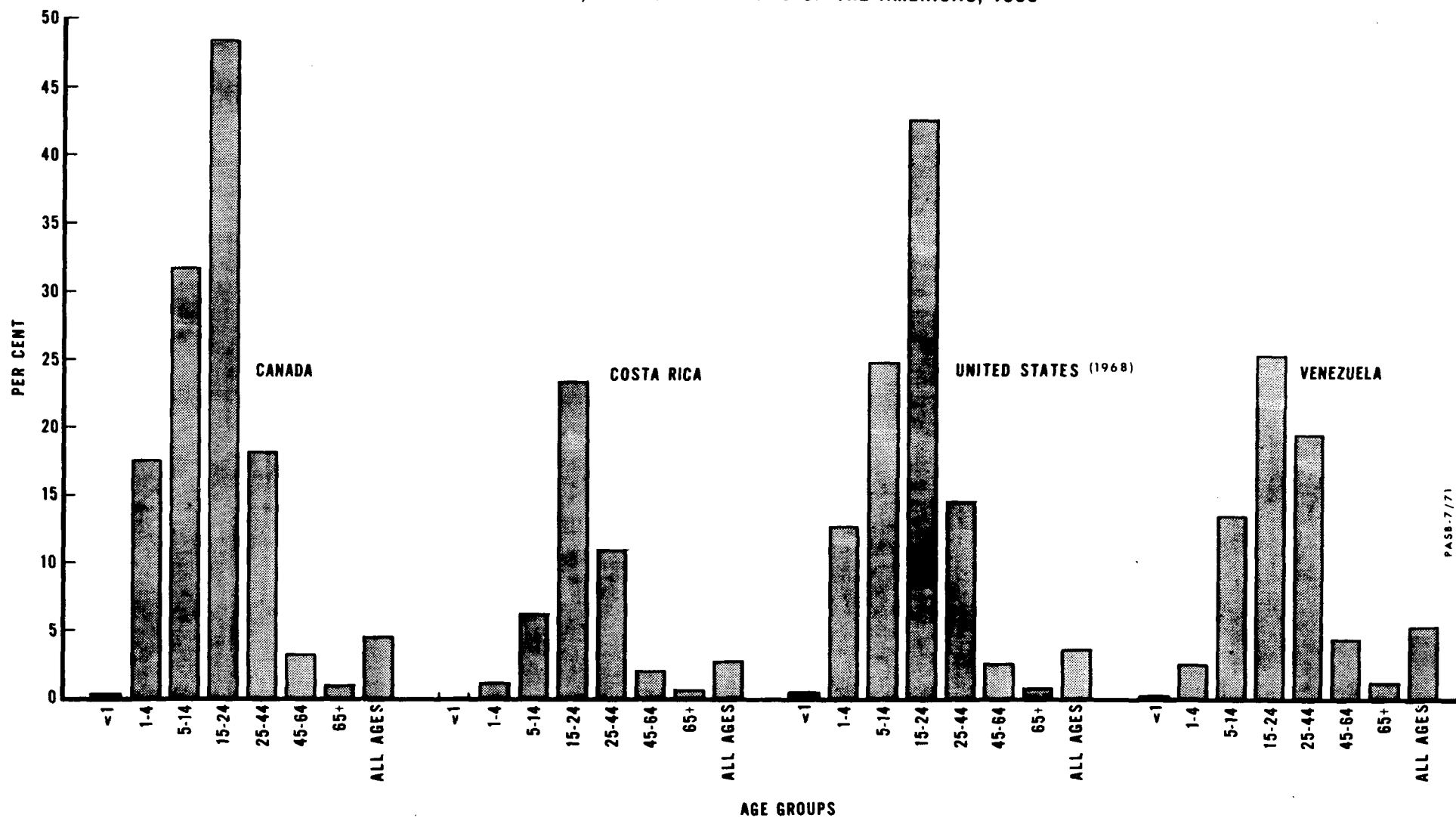
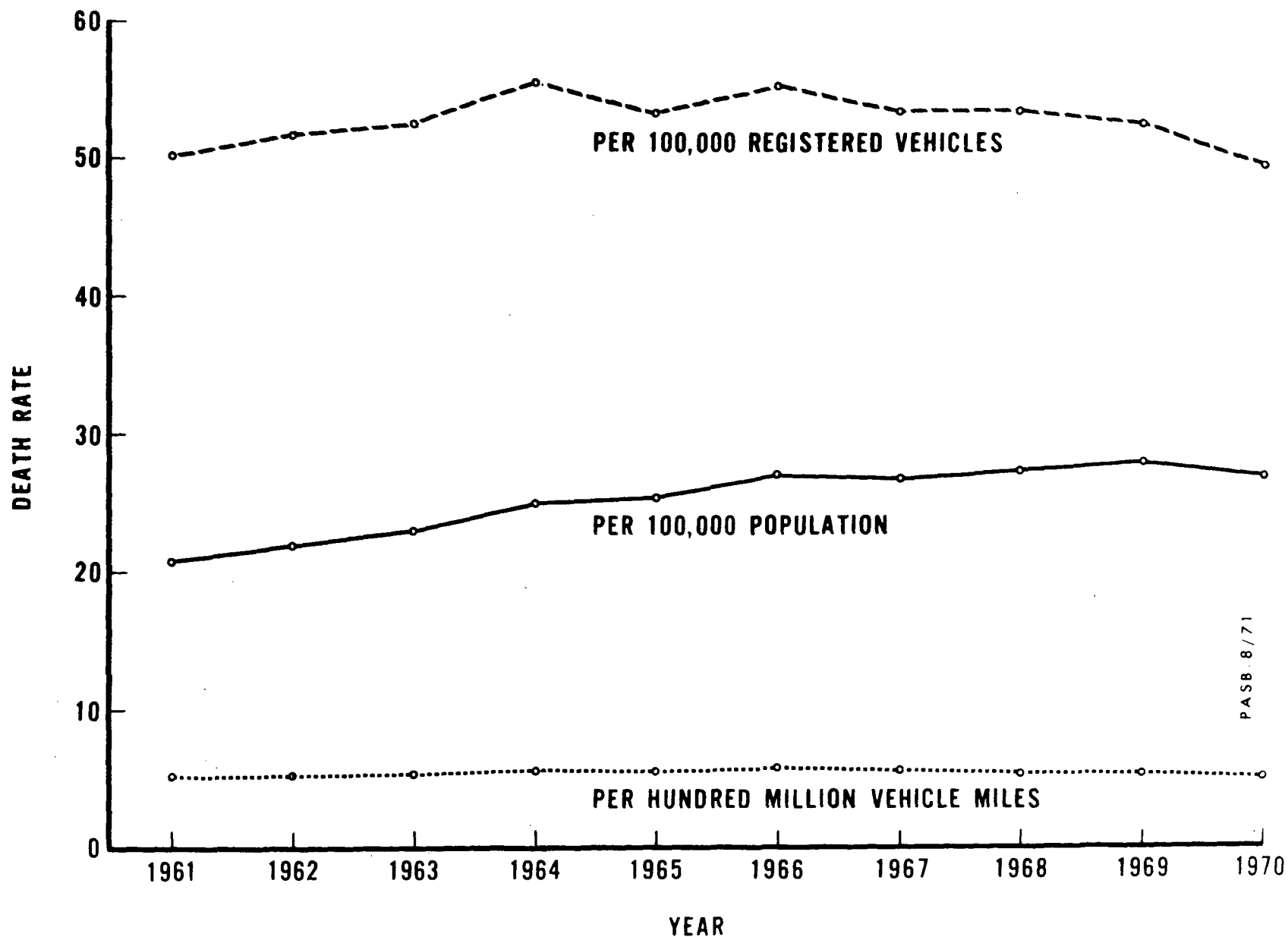


FIGURE 2

TRENDS IN DEATH RATES FROM MOTOR VEHICLE ACCIDENTS IN THE UNITED STATES OF AMERICA, 1961-1970



If the proportion of vehicles to the population is taken into account, the United States of America comes at the top of the list in the Americas, with one vehicle per 2 inhabitants. It is followed by Canada, with one per 3; Uruguay, with one per 12; Venezuela, with one per 12; Argentina, with one per 13; and Mexico, with one per 32 (Table 2). The trend is toward an increase in the number of motor vehicles, both absolutely and per number of inhabitants. The population of 20 Latin American countries was estimated toward the middle of 1968 as being more than 267 million, and it is estimated that it will double in about 20 years if it continues at its present accelerated growth rate. The increase in population will be reflected in a greater number of vehicles and people on the roads, with a potential risk of a larger number of accidents.

From this point of view it is of interest to indicate some of the findings of a good series of statistics from Venezuela (Figure 3).

In this series there is a noteworthy continuous and almost parallel rise in the number of vehicles, of traffic accidents, and of deaths and injuries from traffic accidents, which multiplied threefold and fourfold in the short period of 18 years, while the population increased at a lesser rate. This situation may be linked with or stem from the rapid modernization of Venezuela and, if so, would herald a similar trend in other countries of Latin America. It is significant to note that in Venezuela the death rate in relation to number of motor vehicles is many times higher than in the United States of America.

3. Nature of the Problem

Motor vehicle accidents are analyzed in this paper from an ecological point of view, in terms of the three factors that, working together, cause accidents.

(a) The Road

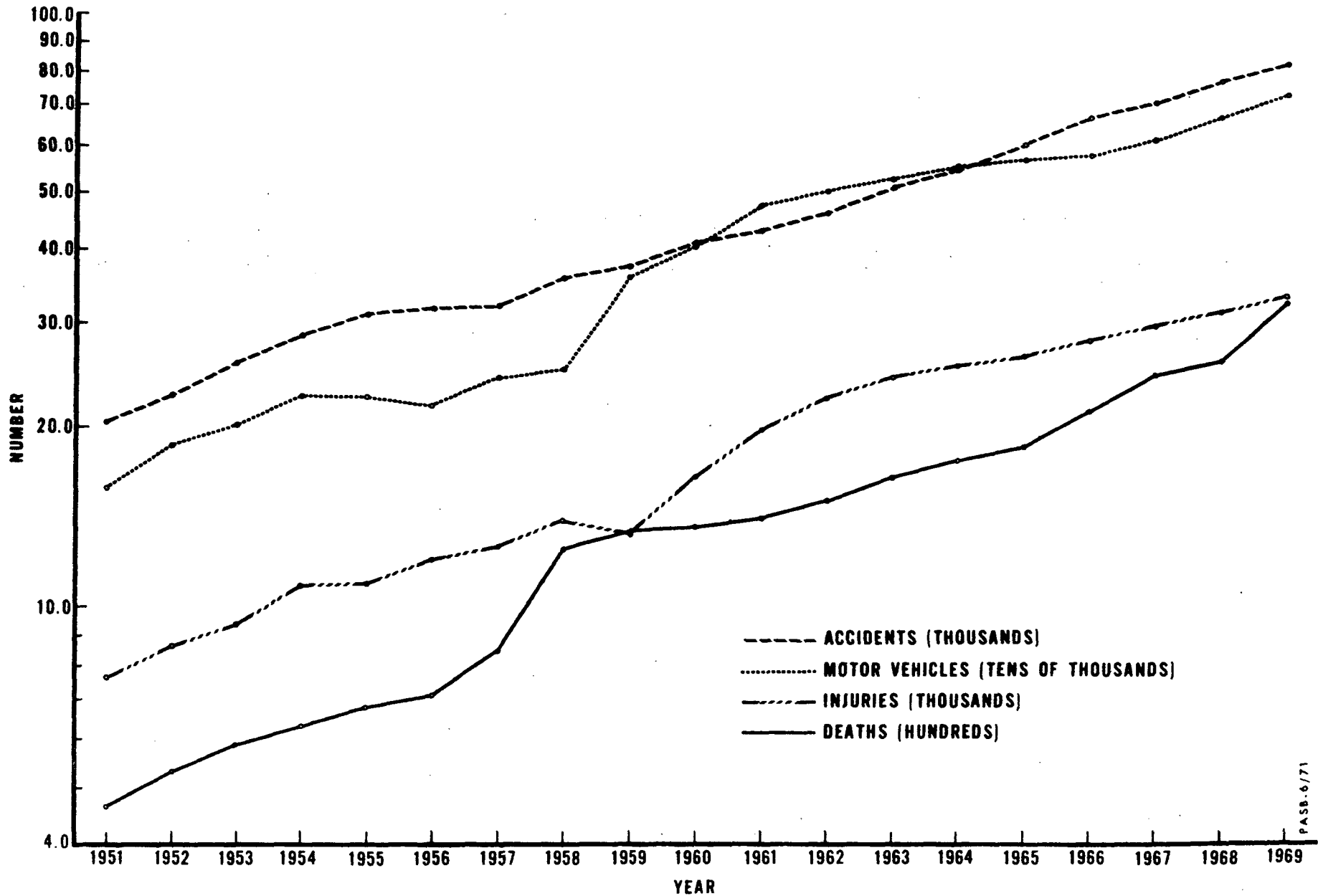
Its design, visibility, curves, varying widths, gradients, traffic conditions, single or double lanes, layout of crossings, motorways for high speeds, monotony, special paths for pedestrians and vehicles, tracks for cyclists, traffic signs and signals, their legibility and illumination, surfacing, skidproof qualities, state of conservation, etc. - all these play a part in road accidents.

(b) The Vehicle

It has been sufficiently shown that traffic accidents are linked with the lack of maintenance in good condition of all the mechanical parts of vehicles, in particular the lights, brakes, steering, tires, and exhaust and ventilation systems. Also of importance are the interior design of the vehicle (in relation to the type of injury), obstructions to the driver's field of vision, etc. The great value of safety belts in preventing injury and death has been demonstrated, but it has been shown that only one person in three on the average uses them in automobiles in the United States of America.

FIGURE 3

NUMBER OF MOTOR VEHICLES, MOTOR VEHICLE ACCIDENTS, AND INJURIES AND DEATHS FROM THAT CAUSE VENEZUELA, 1951-1969



(c) The Road User

As has been said, the most important factor in the causation of motor vehicle accidents is man, as driver, passenger, or pedestrian. The behavior of the road user and his ability to react and adapt himself are in turn the outcome of his training, experience, and system of values. Age, sex, marital state, and socioeconomic standing play a part. Any factor lowering his reactive and adaptive ability favors the occurrence of accidents: emotional instability or disturbances, the ingestion of alcohol or drugs, fatigue and skill fatigue, a reduction in his visual or auditory acuity, physical or mental defects, or acute or chronic diseases (epilepsy, diabetes, etc.).

It can be affirmed that traffic accidents are never the result of chance; there is always a reason for their occurrence. Generally there is not a single reason, but in the majority of cases, a combination that at a given moment comes into play either at the same time or by escalation.

4. Traffic accidents are a public health problem because:

(a) They are one of the main causes of death in most countries of the Americas, with a trend to both an absolute and a relative increase in their numbers.

(b) According to the statistics of countries, for every death, 10-35 persons suffer injuries that disable them temporarily or permanently.

(c) The most affected groups of the population are adolescents and young adults.

(d) Traffic accidents are often the result of defective social behavior on the part of one or several individuals.

(e) Traffic accidents are also caused by motor or sensory changes in the individuals involved, because of:

- an acute or chronic illness or toxic condition
- emotional tension
- neurosis
- a psychopathic condition

(f) Rehabilitation and prevention of death and disability in the injured require:

- high quality emergency medical attention
- medical rehabilitation

5. Public Health Functions in Traffic Accidents

If it is accepted that traffic accidents are a part of public health, it is essential to define what functions public health can or should perform.

Some of the functions belong specifically to the field of health and can be carried out only by health professionals or auxiliaries.

(a) Scientific Functions

It is a public health function to carry out epidemiological investigations of traffic accidents.

The epidemiological investigation in this case establishes the nature and extent of the damage; the distribution characteristics by sex, age, occupation, marital state, geographic location, and all the variables involved in the accidents. It is possible in this way to identify the most vulnerable population groups, the most dangerous places, the type of vehicle with the highest safety coefficient, the days, and hours associated with the highest incidence of accidents, etc. Establishing these data guides the authorities in the choice of measures to prevent or mitigate the effects of accidents.

All accidents have a multiple etiology, it being always possible to identify in them the host-agent-environment triad. Analytic methods need to be adapted to the particular circumstances of a given accident.

It is also a public health function to investigate preventive technology and evaluate its application, as well as to organize emergency and hospital care and rehabilitation.

Finally, it is a public health function to collaborate in standardizing criteria and nomenclature and to improve the records of accidents, which at present are scattered, disorganized, and incomplete.

(b) Aid Functions

It is the entire responsibility of the medical administration to provide prompt and efficient emergency medical attention, which is of decisive importance in preventing death and disability. Such attention is expensive; it would achieve greater gains if it were put on a rational basis.

It should be emphasized that much accident prevention needs neither expensive equipment nor large installations. What it does need is constant overall well-balanced action within health care programs. It should also be stressed that, as the Red Cross has shown in its sphere, private and community cooperation can attain unsuspected heights in coping with the unending public disaster of traffic accidents.

(c) Control Functions

The issue of a license to drive a motor vehicle is dependent upon the applicant's showing a certain skill in driving and knowledge of traffic and municipal regulations. Certain physical, mental, and social aptitudes are required.

Physical, mental, and social aptitudes for the purpose, i.e., a certain degree of health, are measured by medical and psychological techniques. It is a characteristic function of public health to administer, evaluate, and improve those techniques.

It should be recognized that it is an essential part of the individual's freedom that he should be able to move about freely. But the individual freedom of the driver of a motor vehicle has been curtailed for the common good because of the increasing complexity and power of the vehicle. Public health takes a share in ensuring that the driver has the requisite qualities for a just appreciation of individual and community rights and duties.

(d) Coordinating Functions

The information we have collected shows that the prevention of traffic accidents rests on legislation, regulations, and police action, on systematized education of the public, and on physical improvement of the motor vehicle and the highway. But governments, police, armed forces, private organizations, engineers, jurists, sociologists, physicians, and health specialists all concern themselves with the problem without any effective coordination, duplicating their efforts. Coordination is not facilitated by institutional zeal. Regional or local public health authorities would seem to be ideally placed to assume the leadership in this interdisciplinary field, particularly because of their ability to identify the individuals exposed to or inclined to take the greatest risks.

(e) Educational Functions

There is an educational function to be performed at every level, from the academic to public information. The aim is to convert the negligent fatalistic attitude toward accidents, which is rooted in cultural habits, into one stressing safety. Industrial management appreciates the economic value of safety in industry and takes precautions for the workers, though not without difficulty. Public health management should appreciate the epidemiological extent and nature of traffic accidents and collaborate in their prevention and in orienting the life style toward safety. Motivation to do so receives strong support from the collective emotional impact of traffic accidents.

6. Final Comments

This report which is being submitted to the Directing Council is a summary of a vast amount of information that PASB has begun to collect with the help of the countries. Annex I contains the preliminary report prepared by PASB in 1970 on traffic accidents in Latin America, and Annex II contains a WHO document presented to the Forty-third Session of the Executive Board.

Selection of the data has not been easy, since the information available is somewhat unequal in value and not always comparable between country and country. Nevertheless, it shows clearly that traffic accidents are an increasing problem and a priority question in the countries of the Americas.

The role that public health should play in solving the problem should be determined with the least possible delay.

TRAFFIC ACCIDENTS IN LATIN AMERICA¹

Introduction

In 1950 Gordon was teaching, in the School of Public Health of Harvard University, that the epidemiological-ecological approach to the various problems of health is also valid for the definition of the structure and dynamics of the process and causality of accidents. Accidents occur when the balance between the three ecological factors (host, agent, environment) is upset. In traffic accidents the host is the road user - the pedestrian, the driver, and even the passenger. The agent is the vehicle, whatever its type, its mechanical parts and equipment. The environment, natural and social, is the road or highway with all its components and conditioning features.

All those who have studied traffic accidents have concluded that it is exceptional for only one of these three ecological factors to cause an accident. In general, all are responsible and many of their component parts are in varying combinations of degree and timing. The aim of accident prevention, therefore, should be overall control of each of the causal factors. But all authors point out as well that human error is greater as a causal factor than the others put together. The U. S. National Safety Council says that faulty management of vehicles is responsible for 83.4 and 90.7 per cent of fatal accidents and of all accidents, respectively.²

Latin America is now beginning to become aware of the seriousness of the problem and of the need for concerted solutions. It is beginning to remedy the lack of systematic reporting of traffic accidents and of proper analysis and dissemination of the data and of existing knowledge; to deal with the absence of coordination between the agencies that are or should be responsible for accident prevention, and the inefficiency of the legal system in foreseeing and dealing with the legal problems of road transportation. There is a great imbalance in Latin America between the extent and seriousness of the problem of motor vehicle accidents and the concern shown for prevention, which is slight.

Extent and Seriousness of the Problem in Latin America

It should first be pointed out that Latin American statistics as available are generally based on records that utilize different definitions, are incomplete, suffer from some degree of inaccuracy, or do not cover a sufficient period to permit trends to be studied.

¹Updated version of the report prepared by PASB and published in the Boletín de la Oficina Sanitaria Panamericana, Vol. LXIX, No. 3 (September 1970), pp. 252-264

²National Safety Council, Accident Facts, 1968, p. 48

Although man and his behavior are the most important factors in causing traffic accidents and in the damage ensuing, exposure to risk depends also on the number of vehicles (compounded by their density or traffic congestion) and miles traveled (compounded by the speed or the time in which the vehicles complete their trip). Particularly useful indicators are those relating accidents and their consequences to the distances covered by vehicles in a given time. Latin America lacks statistics of that kind.

More important is the failure to record accidents because of a defect in the notification or in the systems in force. Particularly important is the failure to record deaths occurring some time after the date of the accident that caused them, either because of defects in the systems or because different criteria, some restrictive, have been adopted for classification. It is known that a significant proportion of violent deaths are not recorded in the usual registers in Latin America in terms of their specific cause.³

Table 1 shows the age-adjusted death rates for motor vehicle and other accidents for males aged 15-74 years, per 100,000 population, in 12 cities studied. These figures, which have the advantage of being based on the most thorough retrospective analysis, show that for the 12 cities the mortality rates for motor vehicle accidents are comparable in magnitude with the rates for other accidents. This is also true for women.

In the countries in which these cities are found, notifications of deaths in 1964 for all ages showed an inverse proportion of deaths from these two types of accidents (Table 2). The mortality from other types of accident was greater than that from motor vehicle accidents in a ratio ranging from 1.2:1 to 4:1. Similar ratios are the rule in Latin America.

It is very probable that the discrepancy between these ratios is due largely to the failure to specify deaths from traffic accidents in national statistics, which probably remain hidden under the vague heading of "other accidents."

The five countries that reported the highest death rates for traffic accidents per 100,000 population in Latin America in 1969 were Venezuela, Chile, Barbados, Argentina, and Trinidad and Tobago, in that order (Table 3). The rates in these countries were as high as those reported from 19 European countries (of which only six reported higher rates than the highest in the Latin American countries), in spite of the fact that the proportion of motor vehicles to the population in Latin America is low.

³Personal communication from Dr. Ruth R. Puffer, in relation to her study Patterns of Urban Mortality (Scientific Publication PAHO 151, 1967).

TABLE 1

ANNUAL AGE-ADJUSTED DEATH RATES FROM MOTOR VEHICLE ACCIDENTS
AND OTHER ACCIDENTS PER 100,000 POPULATION IN MALES
15-74 YEARS OF AGE IN 12 CITIES, 1962-1964

Cities	Motor Vehicle Accidents	Other Accidents
Bogota	42.8	28.9
Bristol	27.4	13.0
Cali	32.8	40.6
Caracas	19.8	26.0
Guatemala City	53.0	43.5
La Plata	31.7	16.9
Lima	29.1	29.4
Mexico City	37.8	34.6
Riberão Preto	26.4	30.1
San Francisco	34.3	37.0
Santiago	50.2	49.8
São Paulo	18.6	23.7
Total	31.7	30.5

Source: Pan American Health Organization. Patterns of Urban Mortality.
Scientific Publication PAHO 151, Table 82, p. 150.

TABLE 2

NUMBER OF DEATHS FROM MOTOR VEHICLE ACCIDENTS
AND OTHER ACCIDENTS IN SIX COUNTRIES, 1964

Country	Motor Vehicle Accidents	Other Accidents
Chile	1,282	5,122
Colombia	2,019	5,564
Guatemala	433	991
Peru	910	2,186
United States of America	46,930	56,913
Venezuela	1,661	2,217

Source: Pan American Health Organization. Health Conditions in the Americas, 1961-1964. Scientific Publication PAHO 138, Table G, pp. 25-26. No detailed statistics are listed for Argentina and Brazil

TABLE 3

DEATH RATES FOR MOTOR VEHICLE ACCIDENTS PER 100,000 POPULATION IN THE AMERICAS, BY AGE AND SEX, 1969

Country	Males											Females											
	Age in years											Age in years											
	Total	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+	Total	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+	
Argentina ^(b)	24.8	4.5	5.0	8.0	27.0	24.5	32.7	32.1	41.0	55.2	88.7	6.9	4.2	4.4	3.7	7.0	5.5	6.3	6.6	13.6	17.0	27.6	
Barbados	29.8	-	8.9	12.5	30.1	54.5	50.5	66.9	46.3	20.0	-	0.7	-	-	3.2	-	-	-	-	-	-	-	
Canada	39.7	4.2	17.1	17.5	74.5	48.2	31.0	34.7	43.4	54.5	61.1	14.2	5.6	10.8	9.1	21.8	11.7	10.5	13.5	17.0	24.1	20.9	
Chile ^(a)	37.4	5.2	10.8	15.1	29.4	50.0	63.2	65.8	86.5	86.7	109.5	8.6	7.0	8.5	7.1	4.4	5.5	8.1	8.9	16.4	26.1	51.1	
Colombia ^(b)	16.7	1.2	6.2	12.0	18.0	23.6	21.7	26.8	29.0	40.2	49.9	4.6	1.2	5.0	3.8	3.3	2.9	4.2	6.9	11.2	17.5	18.2	
Costa Rica	18.6	-	5.5	5.9	35.5	28.8	32.4	11.6	32.5	39.7	34.7	5.2	-	5.7	4.5	5.2	1.0	2.7	7.8	12.0	16.7	42.9	
Dominican Republic	11.0	-	5.2	4.5	15.5	15.1	14.3	14.8	15.5	23.2	20.7	2.7	-	0.7	2.7	3.5	1.4	1.1	5.1	4.3	2.9	11.4	
Ecuador	21.5	3.6	7.8	11.0	23.4	29.3	30.6	41.3	42.0	44.0	75.2	7.0	1.8	7.4	5.1	4.8	5.8	8.7	9.9	11.4	16.1	44.2	
El Salvador	12.9	-	2.1	6.0	14.9	24.9	20.8	15.1	23.9	30.9	38.7	4.6	-	3.0	5.3	3.2	3.6	3.1	7.0	8.4	18.0	10.3	
Jamaica ^(a)	14.6	-	1.3	-	10.1	11.2	28.0	21.4	27.6	30.6	29.1	4.0	-	2.6	-	3.7	5.7	1.8	2.4	2.7	8.5	3.1	17.4
Mexico	10.3	1.0	3.4	4.1	12.2	17.7	17.5	18.1	21.0	23.0	31.2	2.6	0.8	1.6	1.6	2.0	1.6	2.7	3.8	6.3	11.8	20.8	
Nicaragua ^(a)	16.5	-	2.3	6.9	25.1	36.4	19.3	22.1	22.8	31.5	24.0	4.4	-	2.4	4.0	2.3	4.9	4.6	5.6	6.1	28.0	26.5	
Panama	12.5	-	4.1	4.8	17.0	17.1	18.8	15.3	26.1	23.6	64.3	3.4	-	-	2.2	6.1	1.1	4.3	4.3	3.4	25.1	10.8	
Paraguay ^(a)	14.8	-	1.2	9.6	17.1	20.9	25.2	28.3	31.3	-	54.9	4.6	-	1.3	4.3	7.5	7.0	-	4.9	3.8	6.6	19.5	
Trinidad and Tobago	24.8	-	-	13.7	25.5	34.0	41.8	51.1	21.8	80.0	128.2	4.5	-	4.9	3.7	4.2	1.6	2.0	5.0	12.0	14.2	28.4	
United States of America ^(a)	40.8	9.2	12.2	12.9	78.9	52.5	37.7	38.4	42.0	51.3	72.4	14.7	9.0	9.9	6.9	21.7	13.5	12.9	13.8	17.0	24.1	26.6	
Uruguay	10.2	-	2.6	4.9	11.8	9.9	10.7	14.2	11.4	18.3	30.2	2.2	-	-	1.6	0.9	1.4	1.0	3.7	4.2	7.7	6.8	
Venezuela	40.0	4.9	13.4	15.8	56.9	62.8	62.6	51.8	73.1	94.0	97.6	10.3	3.6	7.1	7.7	10.4	8.9	14.1	15.4	23.3	18.9	31.0	

(a) 1968

(b) 1967

The death rates for traffic accidents show no tendency to fall. Of the nine countries that reported rates for the period 1963-1968, five (Canada, Chile, Dominican Republic, the United States of America, and Venezuela) showed increases; three (Colombia, Mexico, and Panama) remained stable, and only Uruguay seemed to show a fall. The tendency toward an increase is shown especially in the most developed countries or in those with good statistics. The increase is even more striking in view of the fall in general mortality and in the mortality from practically all causes.

Table 4 shows the deaths from motor vehicle accidents as a percentage of all deaths. It might be said in summary that, in 11 of the 18 countries reporting, mortality from accidents accounted for more than 10 per cent of general mortality in males of one or more age groups. Nine of these countries were Latin American. In two countries (Canada and the United States of America), the mortality accounted for more than 40 per cent of deaths in one age group (15-24 years). In Canada and the United States of America deaths from accidents accounted for 13 per cent of all deaths in females aged 1-4 years and for more than a third in the age group 15-24 years.

It is important to point out that, year after year, the aspiration to prolong human life is being curbed by traffic accidents.

It clearly follows that, if deaths from accidents in the total population are increasing and general mortality is decreasing, the relative importance of the former will go on increasing.

As for the number of motor vehicles in the countries of the Americas, of 26 countries, two have one vehicle to less than 10 inhabitants; six have one to 10-19 inhabitants; and five have one to 100-660 inhabitants.

The countries with one motor vehicle to less than 40 inhabitants show no negative correlation between the ratio of vehicles to population and the accident death rate. There is undoubtedly no such correlation in the Latin American countries. But the United States of America and Canada (both of which have one vehicle to less than three inhabitants) have the highest death rates.

The only known study of the economic cost of traffic accidents in Latin America is that carried out in Cuba. For 109,484 accidents from 1963 to 1966, with 76,011 injured, 2,366 deaths, and an average of eight days of disability, it was estimated that the material damage amounted to US\$28,739.301.

North American studies are not a good source of reference because of the different expenditure structure and equivalent value of money in the different countries of the Americas. An attempt can be made to list the cost of accidents by adding the detailed costs of:

TABLE 4

PERCENTAGE OF ALL DEATHS ATTRIBUTED TO MOTOR VEHICLE ACCIDENTS IN THE AMERICAS, BY AGE AND SEX, 1969

Country	Males								Females							
	Age in years								Age in years							
	Total	< 1	1-4	5-14	15-24	25-44	45-64	65+	Total	< 1	1-4	5-14	15-24	25-44	45-64	65+
Argentina ^(b)	2.5	0.1	2.4	12.3	17.4	9.2	2.2	0.8	1.0	0.1	2.2	8.1	7.5	3.2	1.2	0.3
Barbados	4.0	-	6.7	23.5	33.3	22.4	4.1	0.3	0.1	-	-	8.3	-	-	-	-
Canada	4.7	0.2	17.6	31.8	48.4	18.3	3.2	0.8	2.3	0.3	13.4	26.6	41.6	9.3	2.4	0.5
Chile ^(a)	3.7	0.1	3.3	15.6	15.4	11.0	4.1	1.3	1.1	0.1	2.8	-	10.5	3.4	2.3	0.0
Colombia ^(b)	1.7	0.0	0.5	6.3	7.1	5.4	2.0	0.6	0.5	0.0	0.4	2.3	1.9	1.0	0.8	0.3
Costa Rica	2.5	-	1.1	6.3	23.5	11.0	1.9	0.6	0.8	-	1.1	6.1	5.6	0.9	1.2	0.5
Dominican Republic	1.6	0.1	0.7	4.4	10.4	6.3	1.9	0.5	0.4	-	0.1	3.3	2.9	0.6	0.8	0.2
Ecuador	1.9	0.0	0.5	5.1	9.2	6.8	3.5	0.7	0.7	0.0	0.5	2.5	2.3	1.8	1.2	0.4
El Salvador	1.2	-	0.2	2.3	5.7	4.4	1.3	0.5	0.5	-	0.2	2.2	2.0	1.1	0.7	0.3
Jamaica ^(a)	1.9	-	0.1	-	12.1	11.0	8.9	2.1	0.5	-	0.2	-	6.7	6.7	0.9	0.5
Mexico	1.0	0.0	0.4	2.5	4.8	3.2	1.3	0.4	0.3	0.0	0.2	1.1	1.1	0.5	0.4	0.3
Nicaragua ^(a)	1.9	-	0.3	6.0	9.9	5.4	1.8	0.6	0.6	-	0.3	3.4	1.2	1.4	0.6	0.6
Panama	1.7	-	0.5	3.2	10.4	6.8	2.0	0.6	0.5	-	-	1.4	4.2	0.9	0.5	0.4
Paraguay ^(a)	1.3	-	0.1	4.7	8.1	5.6	2.1	0.2	0.4	-	0.1	2.5	4.2	1.0	0.4	0.1
Trinidad and Tobago ^(b)	3.4	-	-	18.8	16.9	13.3	2.6	1.0	0.7	-	2.4	10.6	4.9	0.8	0.7	0.3
United States of America ^(a)	3.7	0.4	12.9	24.9	43.1	14.6	2.5	0.8	1.8	0.5	12.7	21.0	32.5	7.7	1.9	0.5
Uruguay	0.9	-	1.6	8.6	8.7	3.9	0.9	0.3	0.3	0.1	-	4.5	1.2	0.8	0.5	0.1
Venezuela	5.4	0.1	2.6	13.6	25.5	19.6	4.3	1.3	1.5	0.1	1.3	8.4	7.6	4.3	1.7	0.4

(a) 1968

(b) 1967

- Medical costs
- Legal costs
- Cost of temporary, total, partial, or permanent incapacity of the injured persons for study or work
- Material damage
- General costs
- Invisible costs, in addition to the economic loss involved in the deaths of young men, who form the majority of those injured.

Finally, there is the immeasurable cost in terms of suffering and pain, aggravated by the dramatic suddenness and indiscrimination with which many innocent and valuable lives are implicated in the accidents. There can be no evaluation of the consequent frustration.

Nature of Traffic Accidents in Latin America

L. G. Norman sums up the chapter on causative factors in his book⁴ as follows: "The relative importance of the following factors differs from one road traffic accident to another. In the total of all accidents it is seldom possible at present to assess the relative importance of individual factors in accident causation and prevention."

The Road and the Vehicle

The death rate for traffic accidents by vehicle miles on 19 main highways in the United States of America was almost three times less than it was on rural roads (National Safety Council, 1968). This was partly because of the better condition and larger number of lanes and tracks and the better quality of lighting and signals on the highways. When zebra crossings for pedestrians at crossroads were generally introduced in one country, there was a significant fall in the number of accidents in a given year. The concentration of accidents in specific places, according to all the studies, reflected the influence of negative factors relating to the highway. This was also true of the concentration of accidents on roads affected by unfavorable weather conditions.

The statistics attribute little blame, in the causation of traffic accidents, to mechanical or structural defects in vehicles. Investigators, however, have the impression that they play a larger part than has been shown, though this is difficult to prove.

⁴Norman, L. G. Road Traffic Accidents. Epidemiology, Control, and Prevention, Geneva, World Health Organization. Public Health Papers No. 12, 1963, p. 59.

The consequences of accidents are aggravated by doors that open easily, windows with cutting edges, marked projections within the vehicle, or a lack of structural strength. Still more important are faulty parts of vehicles that can directly cause accidents, such as bad brakes, bad lights, bad tires, bad steering, or bad exhaust systems.

Epidemiological methods have shown the effect of these and other components of the host-agent-environment complex. Even when they are the original cause of the accident, the human factor intervenes because they could have been foreseen - the road or the vehicle could have been kept in better condition, human behavior could have been adapted to the abnormal conditions, or there could have been a more effective reaction.

The Road User

Thus, as statistics have shown, the most important ecological factor in the causation of accidents is the road user.

Two conclusions of practical value follow from this. One is that the host is the factor on which most effort should be concentrated if the risk of accidents is to be reduced to any considerable degree. The other, which follows from the first and from general observation, is that defective human behavior is not easily or rapidly changed. The conviction that this is so has led to a generally fatalistic, indifferent, or pessimistic attitude, which has held up preventive action in relation to traffic accidents and other human risks. The experience of the countries that tried to change human behavior so as to reduce the risk of accidents has nevertheless been positive.

Human behavior causing or contributing to accidents arises out of an excessive reduction of individual capacity or responsibility. This was the view of Smillie, who 30 years ago proposed the following classification of human factors influencing accidents:⁵

Somatic Factors

- (1) Inherent awkwardness (defective sensorimotor skills without actual structural disease).
- (2) Temporary impairment of skill due to fatigue, acute illness, or intoxication.
- (3) Chronic impairment of skill due to chronic structural disease (advanced loss of vision, deafness, lesions of the neuromotor system).

⁵Smillie, Wilson G., and Edwin D. Kilbourne. Preventive Medicine and Public Health (3rd. Ed.) New York, The MacMillan Company, 1963, p. 362

Psychological Factors

- (1) Preoccupations (distractions)
- (2) Emotional tension
- (3) "Psychiatric equivalents" (guilt and hostility feelings)

"The individual susceptible to these psychologic patterns is the accident-prone person of primary clinical interest."

Both Norman's and Smillie's classifications allow the inference that defective human behavior could be prevented by education, training, and rehabilitation, or by the exclusion from the right to drive of individuals who are ill or have serious defects - that is, by reducing the number of accident-prone individuals on the roads.

For some years the Traffic Accident Investigation Section in Chile has been investigating serious accidents in Santiago and other cities immediately after their occurrence. No statistics have so far been issued, although about 15,000 cases have been studied. From reports based on these cases the conclusion has been reached that human error was present in about 95 per cent of cases and in only two per cent could the blame be attributed to a mechanical defect in the vehicle.

Studies of selected groups of Chilean drivers showed that their reaction time was quick and compared favorably with what is considered normal.⁶ When the cause of the accident was attributed to the vehicle or road, the following faults were observed:

- A high frequency of motor vehicles that were old and in bad condition, or had poor equipment, or both; and
- Roads and highways that did not meet present technical requirements.

The situation in Chile could probably to some extent stand for what happens in various countries of Latin America.

⁶Lavel, Bitzel, and Berger. Road Traffic Accidents.

Public Health Services and Accident Control

The following data from 21 countries collected by PASB in February 1969 provide a conspectus of present policy in its general aspects.

Replies of 21 Countries to the PASB Questionnaire*

	<u>No. of countries</u>
<u>Question 1:</u> Is there any agency dependent on the Ministry of Public Health that is responsible for the prevention of traffic accidents?	
- No	18
- Yes	3
<u>Question 2:</u> Is there some such agency dependent on another ministry or institution and, if so, on what authority does it depend?	
- On the Department or Board of Transport (alone or jointly with the police)	9
- On the Ministry of the Interior (alone or with others)	3
- On the Ministry of Public Works (alone or with others)	3
- No such agency	3
- On the Ministry of Transport and Communications	1
- On the National Safety Institution	1
- On a private institution	1
<u>Question 3:</u> Is there coordination between the institutions responsible for the prevention of traffic accidents?	
- No	10
- No reply	6
- Yes	4
- Effective coordination is in force	1
<u>Question 4:</u> Are there trained personnel in the institutions mentioned?	

* Dated 23 February 1969 and delivered by local representatives

	<u>No. of countries</u>
- There are trained technical staff or inspectors	8
- There are trained policemen	5
- No reply	5
- There are no trained personnel	3
<u>Question 5:</u> Are there regulations for granting driving licenses?	
- There are	19
- No reply	2
Are accidents notified, recorded, and analyzed?	
- There is a record	6
- No reply	4
- There is no record or record form	3
- Both record and notification	2
- Notification	2
- Record, notification, and analysis	1
- Police summary	1
- Various, according to state	1
- Some doubts	1
Who oversees the application of the regulations?	
- A national institution	11
- Various institutions	5
- No reply	3
- The police	2
<u>Question 6:</u> Is there any publication on accidents?	
- A regular publication	7
- No reply	5
- An unspecified publication	5
- An irregular publication	2
- No publication	2

Out of these countries, 18 had no agency dependent on the Ministry of Public Health that was responsible for the prevention of traffic accidents. Only three had an agency that could assume such a responsibility. Three countries reported that no agency of that kind existed in any other ministry or in a private organization.

Ten countries reported that there was no coordination between the agencies responsible; six countries did not reply on this point, and four reported that efforts were being made or that there was partial or insufficient coordination. Only one country reported that there was effective coordination.

As regards trained personnel in the existing institutions, five countries did not reply, and three reported that they did not have trained personnel. Of the countries with facilities for training personnel, five mentioned the police and another eight added engineers, inspectors, or technical staff.

All the countries had comparable regulations in relation to obtaining driving licenses; two did not reply. Eight countries did not reply to the question about reporting and recording accidents, or replied vaguely, or had no records. The remaining 13 had either records, notification and analyses, or all of them.

In 11 countries, national institutions were responsible for the application of traffic regulations; in two, police; and in five, various institutions. Three did not reply on this point.

Finally, only seven countries issued a regular publication on accidents, roads, or vehicles; two issued one irregularly; five issued a publication but did not specify how regular it was; five did not reply, and two answered that they had no publication.

These data might be summed up as follows:

(a) Public health has played practically no part in traffic road accident control activities in Latin America.

(b) In one-sixth of the countries there are no agencies responsible for the prevention of traffic accidents, and in the others the responsible bodies are the police, the municipalities, and the ministries, with the participation of other institutions or without such participation. This last point deserves note because the predominant police and municipal attitudes in Latin America are corrective and authoritarian rather than preventive.

(c) There is virtually no coordination between the institutions concerned or systematic scientific investigation.

(d) In most countries the agencies responsible for dealing with traffic problems lack duly trained personnel to contribute to prevention.

(e) In the absence of significant action to prevent traffic accidents, the uniformity of the basic requirements for the issue of driving licenses stands eloquently alone. But its ability to prevent traffic accidents is limited and it sidetracks the feeling of responsibility.

(f) Statistical records and analyses of traffic accidents are scant or incomplete and insufficiently disseminated. A serious problem exists, and threatens to grow worse, but neither the community nor its leaders are taking due note of it. Without systematic and convincing statistical information there will be insufficient motivation for prevention and the risk will go on increasing.

Discussion

Even on the basis of existing statistics, which appear to suffer from considerable underreporting, traffic accidents are claiming a large and increasing number of victims in Latin America. It is therefore to be expected that improvement in notification will emphasize the trend toward larger numbers of victims, even without taking into account that modernization in Latin America will lead to a larger proportional increase in vehicles than in population.

Traffic accidents continue to be one of the principal causes of death in certain age groups in Latin America, especially among the young. They also cause serious temporary or permanent injury and disability. Studies by different authors and by the U. S. National Safety Council estimate the economic cost of traffic accidents in the United States of America and other countries as being very high. There is no similar study in Latin America except in Cuba, but it is certain that there too the cost is high and is increasing. It is also very probable that in Latin America, as in the United States of America, investment in prevention would be advantageous.

The prevention of traffic accidents is a multisectoral problem in which public health has an important function. On the one hand, the consequences of traffic accidents affect the life, health, and capacity of individuals and groups. On the other, the prevention of serious disability and death in the victims is a matter of emergency medical aid and medical care. Lastly, mental hygiene should be part and parcel of the prevention or elimination of faulty human behavior capable of causing accidents. One of the most promising areas in this connection is the prevention of alcoholism or rehabilitation of the alcoholic.

Apart from these specific responsibilities, public health shares a general responsibility. In the last analysis, the prevention of traffic accidents is the responsibility of every individual and every human group. Collective responsibility needs to be awakened and preventive individual and community action motivated. The first step is to assess the extent, causes, and consequences of the problem so as to be able to provide the community with timely facts in an intelligent and systematic way. Public health should assume the leadership in promoting better statistics in Latin America. There are, of course, preliminary questions in regard to definition of terms, such as the maximum period of time within which death occurring well after an accident can be attributed to it.

It is also possible that a summary investigation of every death in a traffic accident would make it possible to arrive at a probability diagnosis of the cause of the accident - the traffic or homicide. It may be that many traffic accidents concealed under the heading "Other Accidents" could appear under the proper heading.

The attention of legislation and of national and local bodies has been monopolized by traffic engineering, which concentrates on the control of the physical factors favoring the occurrence of accidents. Traffic engineering has the advantage that it is partially effective and can show its effectiveness objectively and quickly. It also has the advantage that it does not require constant and exacting behavior on the part of the community. On the other hand, it has the relative disadvantage that it is very expensive and controls the ecological factors that have least influence on the causation of accidents. Moreover, the explosive increase in the number of motor vehicles and the high speed that they can reach in even a short distance have caught up with and at times by-passed the control it has achieved. Admittedly there is a theoretically wide field of application, especially in Latin America, where the gap between theory and practice is great.

PAHO would appear to be in a very suitable position to stimulate coordination, the training of professional personnel, investigation, and education in the countries of the Americas in relation to the prevention of traffic accidents. This would be a first step toward harnessing community efforts in this field to safeguard health, which is the essential task of public health.

PREVENTION OF TRAFFIC ACCIDENTS¹

Report by the Director-General of WHO

INTRODUCTION

The Nineteenth World Health Assembly, in discussing the subject of traffic accidents and their importance, passed the following resolution:²

Believing that an important task of health administrations is the protection of people against health hazards of every kind;

Having in mind the heavy losses resulting from the ever-increasing number of traffic accidents;

Believing that further research is required, on an international basis, to elucidate the role, already demonstrated by scientific work, of human and medical factors in traffic accidents; and

Noting with satisfaction the steps already taken by WHO to inform Member States of the importance of this problem,

1. REQUESTS the Director-General to consider the possibilities of WHO playing a more active role in the prevention of traffic accidents, with special emphasis on the human and medical aspects of the problem and on the co-ordination of international research in this field; and

2. FURTHER REQUESTS the Director-General to inform the Executive Board and the Assembly of the amount of additional annual expenditure that would be entailed in giving effect to the possibilities referred to in the previous paragraph.

PREVIOUS ACTIVITIES

The Organization has, in the past, undertaken a comparatively wide range of specific activities which have in general involved:

(i) Certain epidemiological and public health aspects, including control and prevention;

¹Document EB43/35

²Resolution WHA19.36, Handbook of Resolution and Decisions, 11th ed., page 93

- (ii) The dissemination of statistical data and the making known of certain aspects of national legislation;
- (iii) The definition of medical standards for driving fitness;
- (iv) The effects of certain drugs and alcohol on driving skills;
- (v) The encouragement of the provision of better casualty, resuscitation and rehabilitation services for all forms of accidents.

The following is a brief description of the Organization's various activities in the field of road traffic accidents. It will be seen that the Organization has been active in this field and that, whilst it does not have a comprehensive programme devoted exclusively to the topic, the subject of traffic accident prevention has already received a certain amount of attention.

Epidemiological and Vital Statistics Report

In 1939, the League of Nations published the Annual Epidemiological and Vital Statistics Report showing mortality data on automobile accidents. This activity was subsequently taken over by the World Health Organization and in 1950 the Organization published for the first time data relating to deaths due to automobile accidents, for nine non-European countries, tabulated according to age and sex. Subsequently, in 1958, WHO published in this series a Report³ giving data concerning the number of pedestrians killed in motor vehicle traffic accidents in various countries and, as from 1959, one issue per year of the monthly Report showed annual mortality rates due to motor vehicle accidents.

A further issue⁴ of Epidemiological and Vital Statistics in 1965 dealt with "Mortality from Accidents, with Special Details of Motor Vehicle Accidents". Data were presented for the period 1950-1962 emphasizing that motor vehicle accidents increase in importance with the development of the country and with expanding motorization.

World Health Situation Reports

The Third Report of the World Health Situation,⁵ published in 1967, states "Accidents due to motor vehicles are taking a larger share in the

³ Epidem. vital Statist. Rep., Vol. 11, No. 1, 1958

⁴ Epidem. vital Statist. Rep., Vol. 18, No. 3, 1965

⁵ Off. Rec. Wld Hlth Org. 155, Part I, p. 15

sum total of fatal accidents. They increase in importance with economic and social development, with the opening-up of highways and expanding motorization."

World Health Statistics Reports

A World Health Statistics Report⁶ published in 1968 presented a comprehensive study giving figures relating to important considerations such as the number of fatal and non-fatal road accidents from 1950 to 1966. For countries with data available for the latest year, deaths and injuries were classified by month, by weekday, and by hour. The figures show that, in general, the largest number of accidents occur in the summer months, their most frequent occurrence being on Saturdays and Sundays. This issue also contains tables showing the number of persons killed, or injured, in a road accident by year and according to the category of road user.

Publications and Other Unpublished Technical Documents

In order to call further attention to this problem, "Accident Prevention" was selected as the theme of World Health Day in 1961 and an issue of "World Health" was published, discussing different types of accidents, which stressed that globally about 1000 people are killed on the road every day. This was followed by the publication in 1962 of a Public Health Paper "Road Traffic Accidents - Epidemiology, Control and Prevention". This gives an account of the epidemiological features characterizing motor traffic accidents, discusses their causes in relation to the road, the vehicle and road user, examines the importance of alcohol and suggests preventive measures and further research.

In 1965 WHO prepared a report on "Psychoactive Drugs and Road Safety - Medical Aspects". This was occasioned by the interest of the United Nations Commission on Narcotic Drugs in the involvement of drug abuse as a causative factor in road accidents.

In 1967 a publication entitled "Patterns of Urban Mortality" was produced by the Pan American Sanitary Bureau. A section is devoted therein to motor vehicle accidents in which an analysis is made in 12 cities in the Americas on patterns of mortality from accidents. In 1969 a further issue of "World Health" was published which was devoted specifically to road accidents and dealt with a number of major aspects thereof, including accident prevention and some of the human factors involved in accident causation.

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World Health Statistics Report, Vol. 21, No. 5, 1968

Expert Committee Meetings

The reports of some Expert Committees have called attention to the problem of accident prevention. Thus, the Expert Committee on Planning of Public Health Services,⁷ held in 1960, included "transport and communications - access to health services, accident prevention" among the services which contribute to health.

The Expert Committee on Public Health Aspects of Housing⁸ which was held in 1961, discussed measures, to be incorporated in town, village, and regional planning, for preventing road traffic accidents. It stressed the importance of studying at the early stages of such planning the traffic patterns and the need to ensure safer circulation, the location of schools, recreational grounds, cultural and health centres, away from traffic congested areas and the separation of vehicular and pedestrian traffic.

Subsequently, in 1966, attention was called to the role of drugs in the causation of accidents in the report of the Expert Committee on Services for the Prevention and Treatment of Dependence on Alcohol and Other Drugs⁹ and suggested the need for further research on this subject.

Other Meetings

In 1956, at the request of the United Nations, the Organization prepared a document, based on a meeting of a group of consultants, on "Guiding Principles in the Medical Examination of Applicants for Motor Vehicle Driving Permits". Subsequently, in 1968, as a result of a further request from the United Nations, Economic Commission for Europe (ECE), the Organization convened for the second time a meeting of a group of consultants and of representatives and observers from certain inter-governmental and non-governmental agencies to revise, in the light of recent advances in medical knowledge, the Organization's 1956 document referred to above. The revised document discusses important subjects such as the type and suggested frequency of medical examinations, eyesight testing and standards, the importance of cardiovascular conditions, alcohol, psychoactive drugs and certain diseases of the central nervous system. In 1969 the report of the 1968 consultation group was the subject of a Joint WHO/ECE Working Party on Road Traffic Safety at which national experts involved in the

⁷ Wld Hlth Org. techn. Rep. Ser. 215, 1961. Planning of Public Health Services

⁸ Wld Hlth Org. techn. Rep. Ser. 225, 1961. Public Health Aspects of Housing

⁹ Wld Hlth Org. techn. Rep. Ser. 363, 1967. Services for the Prevention and Treatment of Dependence on Alcohol and Other Drugs

development of appropriate legislation advised governments to insert in their legislation or regulations some of the recommendations contained in this document.

The Regional Office for Europe convened in 1968 a meeting of representatives of various organizations concerned with the prevention and control of road accidents in Europe. The purpose was to examine whether a need existed for better co-operation.

Technical Discussions

The Subject of the Technical Discussions at the Fifteenth Pan American Sanitary Conference/Tenth Session of the WHO Regional Committee for the Americas, in 1958, was the Prevention of Accidents in Childhood.

Seminars and Symposia

An Inter-regional Seminar on the Epidemiology, Control and Prevention of Road Traffic Accidents was held in 1965 in Alexandria, United Arab Republic, with participants from 22 countries. The epidemiology of road traffic accidents, safety problems in relation to road and vehicle design, psychology and behaviour of drivers, medical considerations in the issuing of driving permits, the role of public health and voluntary agencies, prevention of road accidents as an increasingly frequent cause of death and injury, and prevention of road accidents in developing countries were discussed. Noting that road accidents are an increasingly frequent cause of death and injury, even in developing countries, it was pointed out at the Seminar that the public health authorities can do useful preventive work by carrying out epidemiological studies of accidents and by safety education of the public. It emphasized the need for better co-ordination of efforts at prevention among official and voluntary agencies concerned with road construction, vehicle control, driver training and licensing, safety education and emergency treatment.

A Symposium, organized in 1967, by the European Regional Office of WHO was convened in Rome on Human Factors in Road Accidents in order to discuss the physical and psychological aspects thereof with a view to suggesting preventive measures. Experts from 23 countries attended the Symposium. Main subjects dealt with were the epidemiology of road accidents, analysis of driving behaviour, physiology of driving, the role of internal diseases in driving, social and cultural aspects of driving, ophthalmological problems of driving, psychiatric conditions and driving, the medical and psychological methods of selecting drivers, drugs and driving.

Liaison with Other Organizations

Since 1956 the Organization has been in close liaison with the Economic Commission for Europe of the United Nations in connexion with

the medical standards required for the licensing of motor vehicle driving permits. As mentioned in the foregoing text, two consultation groups have already been convened on this subject to establish such standards, and a joint ECE/WHO meeting held to recommend appropriate legislation to governments. Since 1956 there have also been working relations with the Inter-Agency Working Group on Housing and Urbanization of the Administrative Committee on Co-ordination (ACC) on matters of city planning, sometimes involving the question of road traffic accidents.

WHO Assistance

During 1966 and 1967, three fellowships, totalling approximately six months, were given to Ceylon, Czechoslovakia and Italy, to study different aspects of transport, medicine and road accidents and in 1968 a Consultant was recruited to advise the Tunisian Government on methods of control and prevention of road traffic accidents.

PLANNED FUTURE REGIONAL PROGRAMMES

While the Regional Office for Africa has no immediate plans for activities in this field, they have indicated that there is an increased interest in this subject in the region, as recently manifested at the conference of the Association of Surgeons of West Africa where the problem "Trauma in West Africa" included discussions on road traffic accidents.

It is the intention of the Pan American Sanitary Bureau/WHO Regional Office for the Americas to obtain, over the next few years, the services of a consultant for visiting countries and obtaining data for the development of their programmes in this field. A document for introducing the subject of road traffic accidents to the Directing Bodies is also in the process of being prepared. It is hoped, by this means, to elicit more active interest in the subject, which is now growing so much in importance in that region.

In 1969 the Technical Discussions at the Regional Committee for Europe will deal with Road Traffic Accidents as a Public Health Problem. A basic document regarding a survey of international organizations concerned with the prevention and control of road accidents will be distributed to governments and will outline future action for public health authorities.

The Regional Office for Europe is also taking steps with respect to future co-ordination with European organizations active in the field of control and prevention of road accidents, including the Economic Commission for Europe of the United Nations, and particularly its Working Party on the Construction of Vehicles. Although the latter basically deals with engineering problems its future activities will have important medical overtones.

The Regional Office for the Western Pacific intends to place road traffic accidents on the agenda of the Twentieth Session of the Regional Committee, with the object of determining the possible interest of Member Governments in a regional programme, perhaps starting with a seminar in 1972.

SUGGESTIONS FOR FUTURE ACTIVITIES

Pursuant to the resolution at the Nineteenth World Health Assembly, it is suggested that if the Organization wishes to increase its activities in relation to the prevention of motor vehicle accidents with due consideration being given to the human factors, the following activities should be carried out by the World Health Organization at Headquarters as most likely to bring additional clarification in regard to some of the major problems of road traffic accident prevention.

Alcohol and Psychotropic Drugs

Immoderate use of alcohol has been shown to be associated with a substantial proportion of highway accidents in some countries. It is therefore important that there be as complete an understanding as possible on the prevalence of alcohol-related road accidents and the relative role of alcohol and other factors in their causation, and on the role of persons suffering from alcoholism in the total alcohol-related accident picture, since it is quite probable that such persons constitute a high risk group.

It is suggested that, as an initial step, a scientific group be convened to:

- (a) Draw such conclusions about the above problems as are warranted by available data;
- (b) Offer suggestions designed to facilitate uniform reporting of alcohol-related road accidents;
- (c) Develop proposed guidelines for the implementation of prevention programmes; and
- (d) Outline fruitful areas for further research and study.

The problems of the use of psychotropic drugs are closely related to those of alcohol. Clearly, some of these drugs, especially in large doses, render a person incapable of safe driving. They are not infrequently used in combination with alcohol and studies of the effects on driving ability of such dual usage are under way. Further work in this area is also needed.

It is therefore suggested, as an initial step, that the scientific group proposed on the subject of alcohol include the problem of psychotropic drug use in the discussions.

The conclusions of the scientific group would be the basis for research carried out in the countries best equipped for such a purpose. After a period of two to three years those carrying out research in these countries would be brought together in a meeting of investigators to review the results obtained.

The Assessment of Driver Performance

Despite some progress in recent years in the analysis and objective measurement of driver performance, a satisfactory analysis of the driving tests has yet to be accomplished. There is need for the development of driving simulators comparable to those used in aviation. Monitoring the operator performance, perhaps under different environmental conditions, is fundamental and would form the basis of a more precise quantitative study of the human problems in highway traffic.

It is suggested that WHO select a suitable institution to develop, under contract from the Organization, a driving simulator for mass examinations. It is expected that such a simulator might be developed in one year and properly tested out, under different environmental conditions, within another two or three years.

Psychological Tests

In general, assessment of mental and physical qualifications to drive safely has so far been related to the influence of pathological conditions per se, rather than to the performance of the driving task. However, many accidents are believed to be due to human failure such as carelessness, inattention and lack of concentration. Unfortunately, many psychological tests for evaluating driving behaviour are complex and require continuous control over many hours. While their routine use is considered desirable for accident repeaters driving light vehicles, heavy motor vehicles and other vehicles, such as those for the professional transport of passengers, simplified tests, including those suitable for mass examinations, are not available.

It is proposed that the Organization assist in the necessary research to develop such psychological tests through the holding of a meeting of investigators. This meeting would bring together scientists from the most suitable countries to discuss and agree on the proposed standardization of psychological tests for the assessment of driver capability and to carry out research, the results of which would be reviewed after a period of two to three years.

The Ergonomic Design of Motor Vehicles

The motor vehicles used in most developing countries are usually designed elsewhere. To date insufficient attention has been given in vehicle design to anthropometric differences in populations which, in some instances, can be an important factor in relation to driver performance and safety. Since this matter may require further study, it is suggested that a scientific group be convened to review the subject and make appropriate recommendations.

The Role of the Public Health Service in the Prevention and Control of Road Accidents

This subject was discussed at the 1965 WHO Seminar on the Epidemiology, Control and Prevention of Road Traffic Accidents, Alexandria, mentioned previously. However, there is no doubt that increased attention needs to be given to the health aspects of the problem. In many countries there is at present no organizational arrangement, whether in central or local public health agencies, directly concerned with the prevention and control of road traffic accidents. It is suggested that an expert committee be convened to discuss the above subject, including the role of the public health service in traffic safety education and the need for such education, preferably in childhood. It is further suggested that an inter-regional seminar on the prevention and control of road traffic accidents be organized at a later date with special reference to the needs of developing countries.

In addition to the above-mentioned headquarter activities, the regional offices are in a position to provide assistance to those countries which wish to implement programmes dealing with the prevention of road traffic accidents. They may also wish to consider, at a later date, the advisability of organizing regional seminars on this subject.