*Each nation in the Western Hemisphere has a concern with childhood accidents, which vary in nature according to geography, technology, and custom.*

# Accident Prevention in Childhood

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ACCIDENTS are the leading cause of death in children 5 to 14 years of age in 13 countries of the Western Hemisphere. If trends of the past two decades continue, we shall find within 20 years that in many nations of the Americas accidents will constitute the leading cause of death for all age groups 1 to 15 years.

Granted the urgency of organizing a broad attack on the childhood accident problem, how shall we proceed?

Once the established techniques of factfinding and casefinding have defined the task of preventing childhood accidents in any given area or community, the procedure eventually emerges.

Each specific accident hazard requires specific methods of prevention. The traffic-filled street in New York or Rio de Janeiro, the Texas ranch, or the Peruvian mountain village contains unique hazards in a unique setting, requiring its own preventive program.

## Mortality and Morbidity

Nothing illustrates more clearly the geographic variation in the relative significance of accidents to children than an analysis of mortality tables for the 17 countries of the Americas and Puerto Rico, Jamaica, and Trinidad. Data on the five principal causes of death, with rates per 100,000 population, for children in two age groups, 1–4 and 5–14 years, for 1956 are given in figures 1 and 2. In considering death rates in these two age groups, it should be noted that the rates are much lower for the age period 5–14 years than for the age period 1–4 years in many countries where disease still takes a high toll.

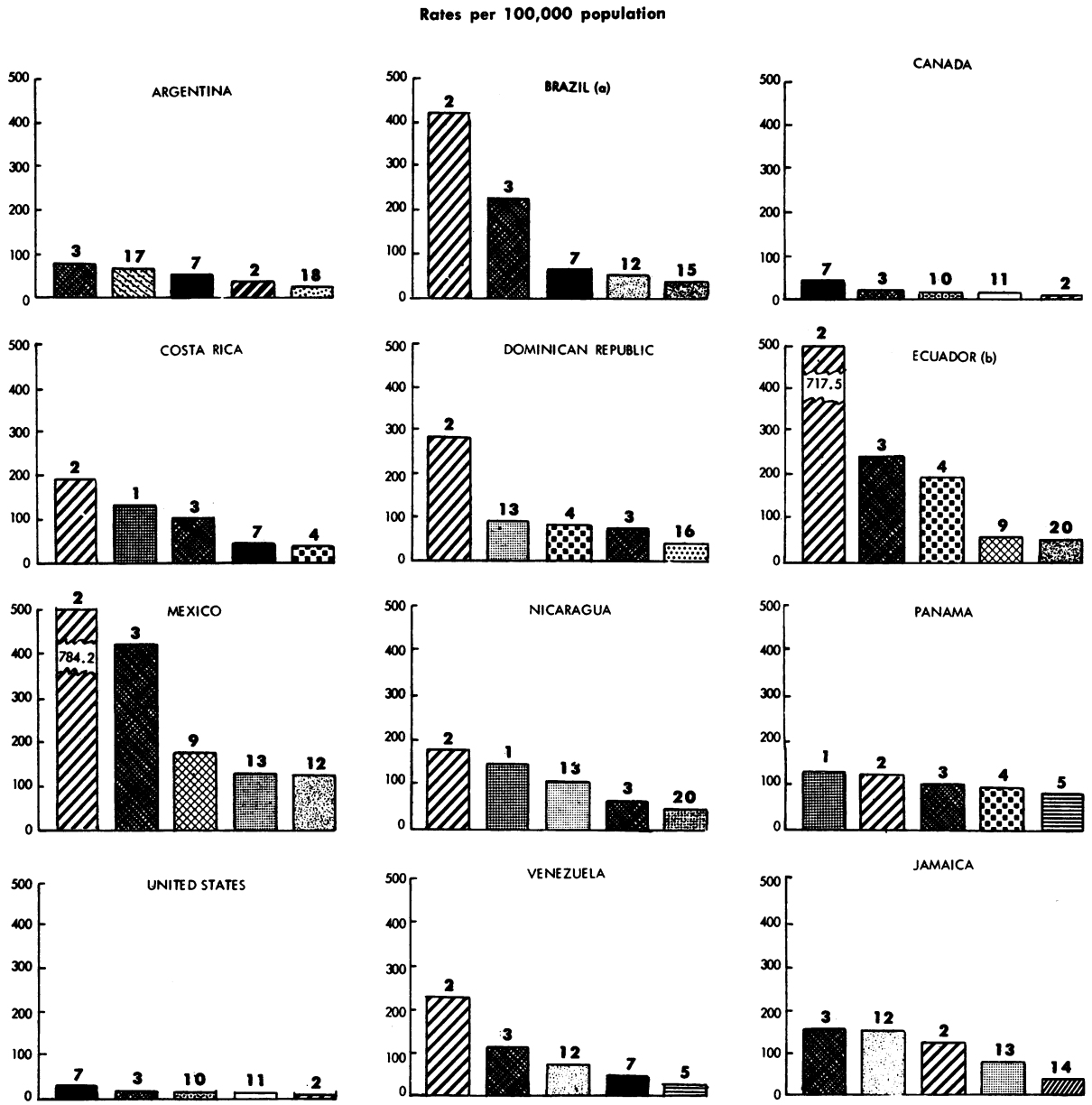
Only in the United States and Canada were accidents the leading cause of death in the 1–4 age group. In only eight of the remaining countries were accidents even listed among the five leading causes of death. In the 5–14 age group, however, accidents are the leading cause of death in two-thirds of the countries reporting, and only in Guatemala are accidents missing from the five chief causes of death. The highest rate given is for Ecuador, where the figure (39.7) is almost double the United States rate of 20.

The California Health Survey of 1954–55 reveals that incidence of illness from accidents ranks second only to diseases of the respiratory system for children under 15 years of age (table 1).

For those who survive the common diseases of infancy and childhood, there is the ever-

*Dr. Goddard is chief of the Accident Prevention Branch, Public Health Service.* *This article is based on a paper presented at the 15th Pan American Sanitary Conference held in San Juan, Puerto Rico, September–October 1958.*

**Figure 1. Principal causes of death among children 1–4 years of age in the Americas, 1956.**




[a] Includes only Federal District and seven State capitals. [b] Includes only capital cities of provinces.

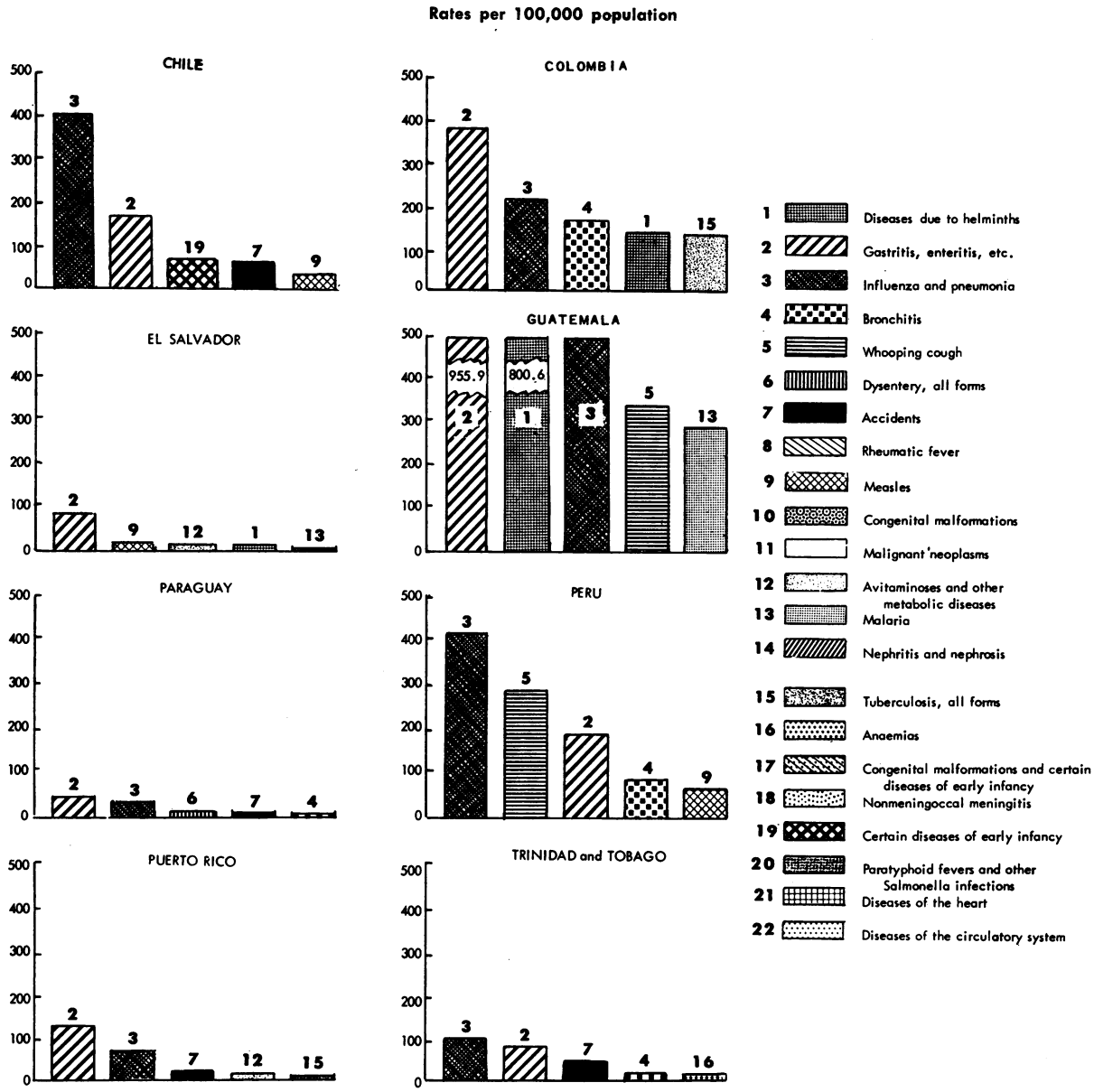
SOURCE: Summary of Four-Year Reports on Health Conditions in the Americas, Scientific Publication No. 40, Pan American Sanitary Bureau, June 1958.

present threat of death or injury from accidents. This threat is both widespread and complex.

On the basis of the first 6 months' report of the National Health Survey in the United States, it is estimated that approximately 16 million children are injured each year, with the rate about twice as great in boys as in girls. Of girls under 15 years of age, one child in three is injured each year, and most of them are injured in and around the home.

Throughout the Americas, frequently encountered causes of accidental death in children are motor vehicle accidents, drowning, burns, poisoning, falls, and bites from poisonous insects or snakes.

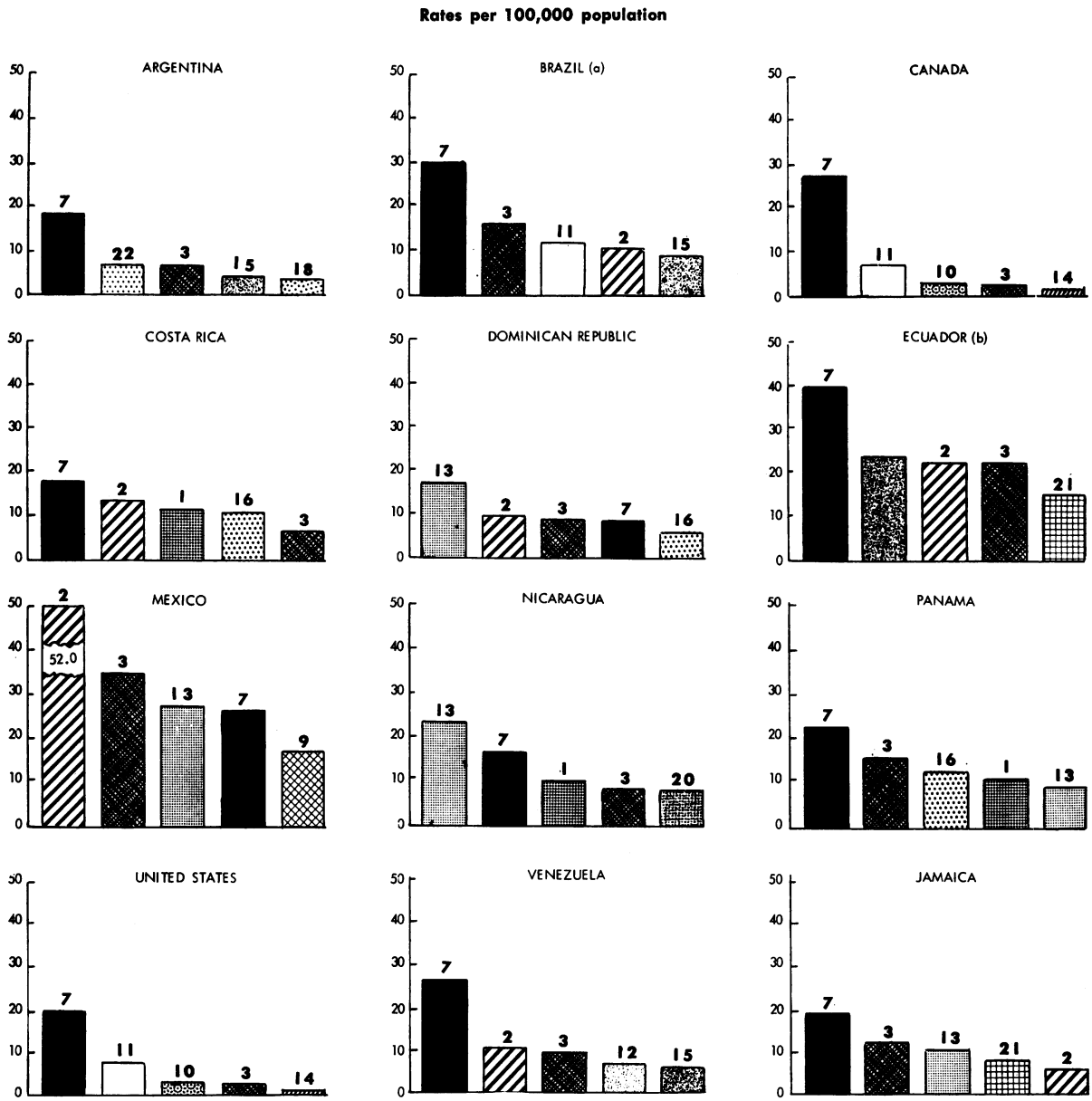
**Figure 1. Principal causes of death among children 1–4 years of age in the Americas, 1956—Continued.**




The number of reported deaths of children 1–4 and 5–14 years of age from accidents, with rates per 100,000 population, in the Americas is presented in table 2.

Analysis of specific causes of mortality for the United States and Venezuela reveals a greater number of both fatal and nonfatal injuries among boys. It is generally assumed that the growing boy is more active and more inclined to take risks than a girl of the same age. There are also other striking differences. In the 5- to 14-year-old girls in Venezuela, for example, burns are the most frequent cause of accidental death. In boys of the same age, drowning is the most frequent cause, and burns rank fifth. Obviously such differences are related to exposure factors. The risk of drowning is greater for boys because more boys are exposed to the risk. Burns are more frequent for girls because they spend more time in the

**Figure 2. Principal causes of death among children 5–14 years of age in the Americas, 1956.**




[a] Includes only Federal District and seven State capitals. [b] Includes only capital cities of provinces.

SOURCE: Summary of Four-Year Reports on Health Conditions in the Americas, Scientific Publication No. 40, Pan American Sanitary Bureau, June 1958.

home at this age, learning how to cook and, of special importance, wearing clothing more susceptible to fire hazards (table 3).

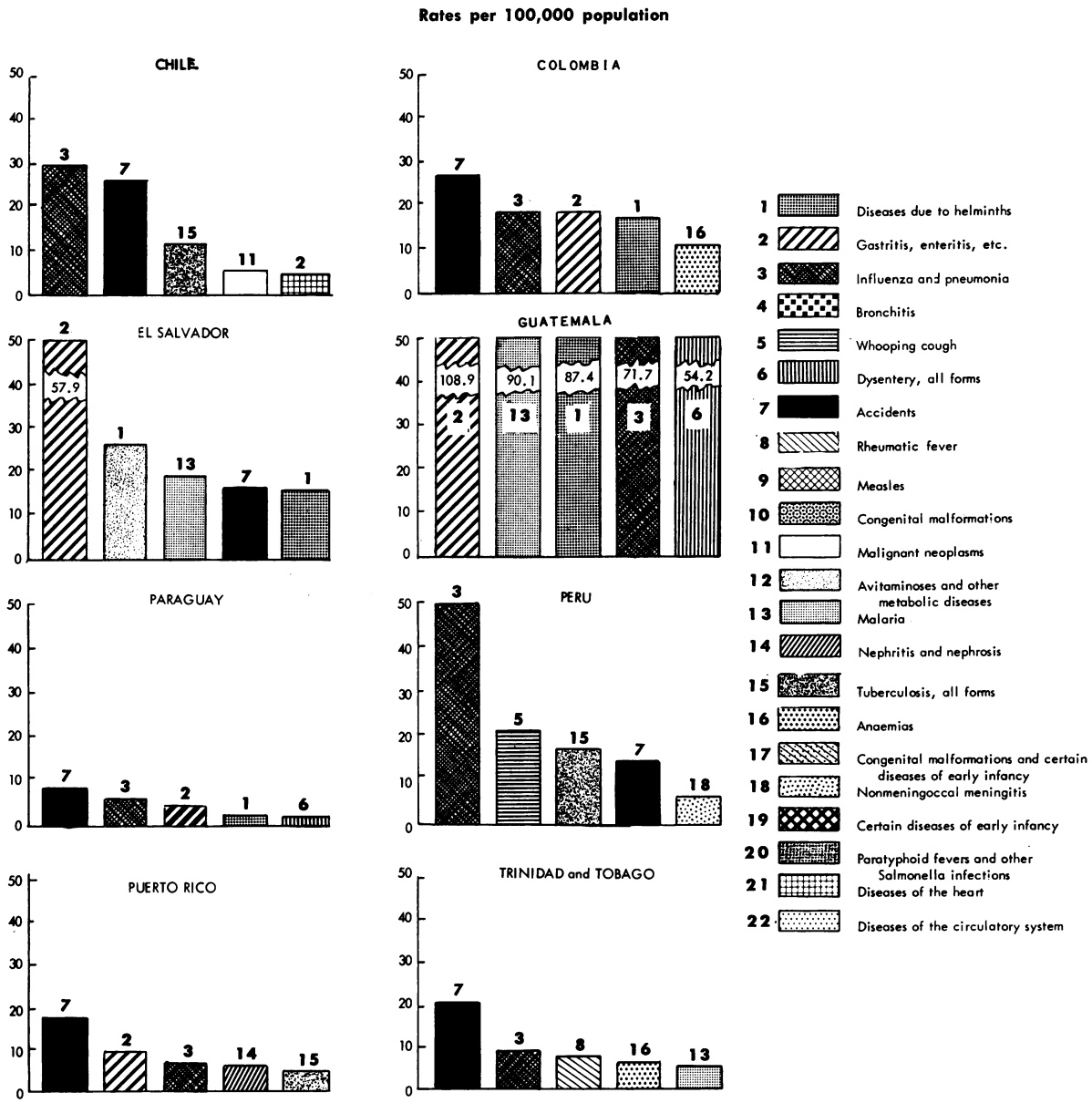
In Puerto Rico, a slightly different pattern is noted for the age group 1–4. Poisoning is the leading cause of accidental death, followed by burns, motor vehicle accidents, drowning, and falls.

In Mexico, deaths from tetanus are frequent in the age group 5–14. Most cases of tetanus are preceded by an untreated injury, usually a laceration or puncture wound of the foot.

## Poisonings

Accidental poisoning is a special threat, particularly to children under 2 years of age. The

**Figure 2. Principal causes of death among children 5–14 years of age in the Americas, 1956—Continued.**




common agents responsible for fatalities in the United States are petroleum products, aspirin and salicylates, arsenical compounds, and lead and its compounds (table 4).

Central and South American countries also report that petroleum products and pesticides are frequently the cause of fatal poisonings.

Better definition of the problem of accidental poisoning is possible when hospitals and emergency centers keep simple but accurate records of the causative agents. The experience of 23 poison control centers in the United States is summarized by type of substance in table 5.

In approximately 25 percent of those cases involving medicine, aspirin or other salicylates were ingested. Aspirin may not be quite so widely available elsewhere. In 230 poisoned patients seen in 1 year at a children's hospital in South America, only 2 had swallowed aspirin or salicylates. Petroleum products and bleach-

**Table 1. Selected measures of illness by diagnosis for children under 15 years of age, California, 1954–55: Rates per 1,000 children per year**

| Diagnostic group | Incidence of illness | Days of disability | Hospital admissions | Hospital days |
|---|---|---|---|---|
| Total | 5, 243 | 17, 340 | 41 | 229 |
| Infectious and parasitic diseases | 260 | 2, 680 | 2 | 29 |
| Neoplasms | 10 | 120 | 1 | 4 |
| Cardiovascular diseases | 20 | 380 | ------ | ------ |
| Diseases of respiratory system | 2, 520 | 8, 810 | 16 | 36 |
| Diseases of digestive system | 635 | 1, 590 | 5 | 38 |
| Accidents | 1, 033 | 700 | 6 | 31 |
| All others | 765 | 3, 060 | 10 | 93 |

SOURCE: California Health Survey, Health in California, California State Department of Public Health, September 1957.

ing fluid were the two most frequent poisons reported by this institution.

### Site of Accidents

Although detailed data on the sites of childhood accidents are not now available, preliminary analysis of the U.S. National Health Survey data for all age groups shows that 45 percent of all accidental injuries occur in the home, 30 percent in public places, 14 percent at work, and 10 percent on the highway. A study of accident cases treated in the emergency room of the municipal hospital in San Juan, Puerto Rico, had a somewhat similar pattern of results: 56 percent of all injuries were caused by home accidents, 34.5 percent were accidents at public places, 6 percent were motor vehicle accidents, and 3.5 percent were work accidents.

The use of a uniform accidental injury report, such as form PHS–2916, obtainable from the Accident Prevention Branch, Public Health Service, Washington 25, D.C., can provide a wealth of data in a short time. On the basis of data gathered, preventive measures can be designed to meet the specific preventive needs.

### Causative Factors

Accident causation is beginning to inspire formal research programs of an increasingly elaborate nature. Almost every one of the physical, natural, and social sciences has something to contribute to our understanding of this problem.

There is some risk at this stage, therefore, of being overwhelmed by the complexity of re-

**Table 2. Number of deaths from accidents in children 1–4 years and 5–14 years in the Americas, with rates per 100,000 population, 1956**

| Area | 1–4 years | | 5–14 years | | Area | 1–4 years | | 5–14 years | |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Rate | Number | Rate | | Number | Rate | Number | Rate |
| Argentina [1] | 690 | 42. 9 | [2] 670 | 18. 6 | Mexico [3] | 2, 056 | 56. 5 | 2, 091 | 26. 7 |
| Brazil [4] | 324 | 61. 8 | 309 | 30. 1 | Nicaragua | 40 | 25. 6 | 59 | 16. 8 |
| Canada [5] | 702 | 45. 5 | 895 | 27. 7 | Panama | 30 | 26. 5 | 52 | 23. 1 |
| Chile | 423 | 61. 9 | 416 | 26. 2 | Paraguay | 29 | 14. 1 | 37 | 8. 4 |
| Colombia | 897 | 53. 2 | 904 | 27. 0 | Peru [1] | 289 | 30. 3 | 310 | 14. 6 |
| Costa Rica | 47 | 37. 2 | 47 | 18. 1 | United States [3] | 4, 791 | 32. 6 | 6, 099 | 20. 0 |
| Dominican Republic [3] | 76 | 21. 7 | 56 | 8. 3 | Venezuela | 329 | 43. 2 | 369 | 25. 6 |
| Ecuador [3 6 7] | 56 | 49. 7 | 89 | 39. 7 | Jamaica [8] | 46 | 29. 9 | 67 | 18. 4 |
| El Salvador [3] | 61 | 23. 5 | 93 | 16. 6 | Puerto Rico [3] | 61 | 20. 2 | 102 | 16. 9 |
| Guatemala [3] | 61 | 14. 2 | 145 | 17. 5 | Trinidad and Tobago | 38 | 44. 3 | 34 | 20. 9 |

[1] Year 1953.
[2] Detailed list numbers E800–E999.
[3] Year 1955.
[4] Federal District and 7 State capitals.
[5] Excluding Yukon and Northwest Territories.
[6] Capital cities of provinces.
[7] Rates based on population estimated by the Pan American Sanitary Bureau.
[8] Year 1954.
SOURCE: Summary of Four-Year Reports on Health Conditions in the Americas, Scientific Publication No. 40, Pan American Sanitary Bureau, June 1958.

search needs or confused by the tremendous scope of research possibilities. Every aspect of the classic epidemiological trinity (host, agent, environment) undoubtedly contains secrets that will ultimately yield to study and enhance our understanding of accident causation.

To help define the child as an "accident host," clearly we need to learn as much as we can about his growth and development, about the relationship between his mental and physical condition and accidents, about his educational background and progress.

The "agent" in childhood accidents can be almost anything he contacts, and this group of causative factors must be studied in a systematic and specific way if even limited progress is to be made. The motor vehicle is a prime example of an accident agent that is readily identified and isolated for study. Specific toxic substances that cause accidental poisoning offer a similarly delimited field of study.

In general, advances will be achieved by careful pursuit of specific study goals.

The child's "environment," the third element in the epidemiological triad, is as small as the crib or as large as the whole community, depending upon the age of the child. Geography, climate, economics, sociology, even history and politics play a part in molding the child's environment and in creating the causative relationship between that environment and accidents.

Since space does not permit an exhaustive analysis of this multitude of causative factors, we must be content with calling attention to a few dynamic factors. Common to all accidents are the person and the environment; their respective susceptibility and potential; habits, attitudes, and patterns of operation; specific changes, events, or irregularities in the pattern; and the built-in protective factors or feedbacks which may affect or avert the trigger action.

"Accident susceptibility" is obviously strong in a child because this factor is conditioned by training, experience, and judgment. Also, such special physiological and mental factors as illness, emotional upsets, and the like may be expected to affect children even more drastically than adults.

Finally, the "unsafe act or trigger mechanism" is clearly illustrated when a child starts a fire while playing with matches, or swallows poison while in search of candy.

In short, close study of such dynamic factors will well repay all who are professionally or personally concerned with improved accident prevention techniques based on better understanding of the causative factors. These have been charted graphically (*1*).

### Prevention

Effective programs for the prevention, control, and amelioration of the effects of childhood accidents will be achieved through definition of the problem, formulation of specific hy-

**Table 3. Accidental deaths in children according to the five principal types in the continental United States, 1956, and in Venezuela, 1954, by sex and age group**

| Type of accident | Continental United States | | Venezuela | |
|---|---|---|---|---|
| | Males | Females | Males | Females |
| | 1–4 years | | | |
| Motor vehicle | 800 | 638 | 28 | 22 |
| Drowning | 463 | 191 | 47 | 38 |
| Fire and explosion of combustible material | 443 | 472 | ------ | ------ |
| Poisonings, solid or liquid | 196 | 140 | 28 | 19 |
| Falls | 155 | 99 | ------ | 7 |
| Burns | ------ | ------ | 26 | 27 |
| Poisonous bites by venomous animals | ------ | ------ | 6 | ------ |
| | 5–14 years | | | |
| Motor vehicle | 1, 785 | 855 | 44 | 28 |
| Drowning | 981 | 204 | 55 | 15 |
| Firearms | 357 | 72 | ------ | ------ |
| Fire and explosion of combustible material | 263 | 404 | ------ | ------ |
| Falls | 138 | 50 | 19 | 4 |
| Poisonous bites by venomous animals | ------ | ------ | 39 | 6 |
| Burns | ------ | ------ | 15 | 31 |

SOURCES: For continental United States, U.S. National Office of Vital Statistics, Vital Statistics of the United States, 1956; for Venezuela, unpublished data from División de Epidemiólogia y Estadística Vital, Dirección de Salud Pública, Ministerio de Sanidad y Asistencia Social, Républica de Venezuela.

potheses, testing and validation of the hypotheses, and translation of findings into action.

Since each accident results from a multiplicity of causative factors, no single solution can be expected. Diversities in cultural patterns, environmental conditions, and host factors necessitate careful selection of preventive activities.

Recommended activities are presented here with respect to principles of primary and secondary prevention. Many principles are, of course, applicable to both.

### *Primary Prevention*

DEFINITION: There is a serious lack of sufficient data concerning accidents in childhood. Mortality and morbidity data, supplemented by special epidemiological studies, are the conventional sources of such information. In those Latin American countries where hospital and emergency services are provided by the government, data on accidental injuries may be obtained more readily than in voluntary or private institutions in Canada and the United States.

The minimum requirements of an accident reporting system include the following items for each injured patient: age, address, sex, race, marital status, occupation, hour, day, and date of the accident, activity of the injured person at the time of the accident, nature of the injury, part of the body injured, severity or condition of the patient, name and address of the

**Table 5. Accidental poisoning cases by type of substance ingested, reported by poison control centers in 23 areas of the United States [1]**

| Type of substance | Treated cases | | Telephone inquiries | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Medicines | 3,354 | 52.3 | 449 | 28.2 |
| Internal | 3,063 | 47.8 | 354 | 22.2 |
| External | 291 | 4.5 | 95 | 6.0 |
| Household preparations | 687 | 10.7 | 430 | 27.0 |
| Petroleum distillates | 484 | 7.6 | 29 | 1.8 |
| Cosmetics | 69 | 1.1 | 163 | 10.2 |
| Pesticides | 800 | 12.5 | 214 | 13.4 |
| Gases and vapors | 5 | .1 | 10 | .6 |
| Plants | 59 | .9 | 61 | 3.8 |
| Paints, solvents, etc | 159 | 2.5 | 83 | 5.2 |
| Other | 739 | 11.5 | 151 | 9.5 |
| Not stated | 51 | .8 | 4 | .3 |
| Total | 6,407 | 100.0 | 1,594 | 100.0 |

[1] Various time periods from July 1954 through November 1957.

SOURCE: Tabulated reports submitted to the National Clearinghouse for Poison Control Centers from local poison control centers.

**Table 4. Number of deaths due to accidental poisoning by type of solid and liquid substances among children under 15 years of age, continental United States, 1952–56**

| Type of substance | 1952 | 1953 | 1954 | 1955 | 1956 |
|---|---|---|---|---|---|
| Morphine and other opium derivatives | 5 | 5 | 3 | 5 | 2 |
| Barbituric acid and derivatives | 9 | 11 | 14 | 8 | 16 |
| Aspirin and salicylates | 86 | 71 | 86 | 75 | 71 |
| Bromides | | 1 | 1 | | 1 |
| Other analgesic and soporific drugs | 6 | 13 | 3 | 8 | 10 |
| Sulphonamides | 1 | | | | |
| Strychnine | 14 | 15 | 9 | 9 | 4 |
| Belladonna, hyoscine, and atropine | 4 | 4 | 2 | 2 | 1 |
| Other and unspecified drugs | 47 | 44 | 49 | 36 | 34 |
| Noxious foodstuffs | 1 | 1 | 3 | 2 | |
| Alcohol | 6 | 10 | 6 | 4 | 4 |
| Petroleum products | 111 | 102 | 83 | 71 | 88 |
| Industrial solvents | 10 | 11 | 9 | 11 | 8 |
| Corrosive aromatics, acids, and caustic alkalies | 30 | 30 | 21 | 16 | 16 |
| Mercury and its compounds | 4 | | 1 | | 1 |
| Lead and its compounds | 45 | 52 | 34 | 49 | 34 |
| Arsenic and antimony, and their compounds | 23 | 27 | 22 | 24 | 40 |
| Fluorides | | | | 1 | |
| Other and unspecified solid and liquid substances | 60 | 71 | 72 | 68 | 96 |
| Total | 462 | 468 | 418 | 389 | 426 |

SOURCE: Unpublished data from the U.S. National Office of Vital Statistics.

hospital and attending physician, and identification of the reporter.

Such data may be supplemented by analysis of death certificates. As programs are developed, routine specification on the death certificate of the type of fatal accident will be required.

The study of accidents by type (motor vehicle, falls, drowning, poisoning) and by type of injury (burns, lacerations, wounds) helps to suggest remedial measures. Defects in design of equipment or environmental hazards are frequently exposed by such analysis.

The redesign of refrigerators has been undertaken as a consequence of studies which revealed how many children crawled into discarded iceboxes and were locked in.

The Cornell University Automotive Crash Injury Research project has profoundly influenced the design of passenger cars in the United States. The importance of the safety belt, validated by the Cornell studies, has altered the thinking of automotive safety engineers.

In a rural area of Georgia, an epidemiological study, inspired by the high incidence of burns reported among children there, formed the basis for a public health program to encourage the use of screens in front of fireplaces.

A Latin American analogy may be found in rural Chile where a brazier on the floor or the ground is the usual equipment for cooking. Protective devices, coupled with public health educational campaigns, could diminish this particular threat.

Knowledge of the relationship between childhood growth and development and accident patterns at different ages is necessary for educational programs directed to parents and schools. Longitudinal studies, while expensive and time consuming, will always be necessary.

The discriminate use of surveys on cross sections of population groups also helps in identifying and defining needs.

Retrospective study of deaths from accidents using supplemental death certificate forms has been made for years in different parts of the United States. The data have been useful in educating the public and in alerting health workers to hazards.

EDUCATION: Education is an elementary step in accident prevention. In all fields, education progresses as distribution of information is fortified by experience.

Public health agencies need to be equipped with appropriate information and skills and motivated to accept educational responsibility when they attempt accident prevention.

The staff of a health agency may help other groups in the community and the citizens of the community themselves to acquire the necessary facts, equipment, and habits.

Physicians are one of the essential groups in accident prevention. They become excellent teachers. No medical practitioner speaks with more authority on safety for children than the pediatrician. Dr. Harry F. Dietrich defines the pediatrician's role as follows: (*a*) he must gain an enlightened awareness of the problem; (*b*) he must attempt to immunize his patients against serious accidents by providing parents with the theory of accident prevention and sufficient advice and encouragement to apply it; (*c*) he must alert the entire medical profession to the gravity and needs of the problem; and (*d*) he must enlist the aid of all available organizations in a continuous community and national campaign to prevent childhood accidents.

To this, perhaps, should be added: (*e*) he can alert us to new hazards; and (*f*) he can, by virtue of his detailed knowledge of the patterns of growth and development (both mental and physical), advise us as to the appropriateness and acceptability of preventive measures.

The school teacher is also important in accident prevention, as are all key leaders in the community.

It is the opportunity of the health agency to organize, stimulate, coordinate, inspire, and, sometimes, to finance cooperative efforts by all components of the society.

COORDINATION OF ACTIVITIES: The prevention of childhood accidents is of concern to many governmental agencies, traffic departments, and departments of education, health, social security, and labor. There is clearly a need for closer coordination between agencies engaged in this common effort. The role of the health agency in some instances actually may be limited to coordination; in other situations, the health department may play a direct role as well.

Coordination of health agency activities with educational departments is particularly important. The teaching of safe living has long been accepted as a responsibility of the schools in the Americas. In this work, health agencies assume a subordinate role, which initially may be limited to provision of suitable and up-to-date material. Later it may be possible to propose and assist in the development of preventive activities, such as swimming classes for preschool children as well as school children.

The frequency of traffic accidents suggests the need for coordination among several agencies. In countries such as the United States, Canada, and Mexico, where school-boy patrol activities have been initiated, liaison has been effected between the education and traffic departments. Extension and improvement of such programs is a goal of many health agencies.

Another civic activity is the development of adequate recreational facilities for children. A well-planned recreational program helps in keeping youngsters off the streets and away from traffic hazards. Again, such a program is seldom the direct responsibility of the health agency, but the demonstration of the need and recommendations for action could be.

LEGISLATION: In many instances, special hazards to children have been eliminated or controlled by the enactment and enforcement of legislation.

For example, in the United States flammable fabrics in children's clothing were brought under Federal regulation by act of Congress. The U.S. Congress has similarly acted to protect the public by legislation on the manufacture and sale of insecticides.

There are similar problems throughout the Americas, and as the reporting of injuries is improved, new hazards will be exposed which may warrant legislative control.

RESEARCH: There is obviously a need for developing and continuing operational research, as exemplified by surveys, analyses of hospital data, and analyses of death certificates. In addition, it is essential to initiate and expand basic research on human factors in accidents.

As has been mentioned, the epidemiological technique lends itself readily to studies in the accident field. McFarland, Gordon, and others have pointed out the value of applying the principles of epidemiology to the study of accidents. Use of this technique already has led to reductions on a limited scale in certain types of injuries and deaths. In the past, these have been related usually to environmental factors or agent factors immediately associated with accidents.

One value of the epidemiological approach is that it facilitates appraisal of the data collection process. Epidemiological studies provide the basis for determining the value of data currently being collected, as well as pointing out the need for routine collection of additional data.

A second type of important research is related to improving education. Practically nothing has been done as yet to increase understanding of why people accept or reject recommendations for their own safety, or how various cultures are influenced in acceptance or rejection of specific practices.

A third type of essential research relates to improvement in treatment of injuries, through planned cooperative study involving several hospitals or treatment centers. One example is the study of kerosene poisoning now being conducted in the United States by the American Academy of Pediatrics, the American Public Health Association, and the Public Health Service. By pooling data from numerous hospitals, it is hoped that the question of the value of lavage in these cases can be reliably determined. Another such study could be carried out to compare the results from various treatments for serious burns.

The clinical study or case study will also be valuable in childhood accident prevention. The individual clinician, and particularly the pediatrician, can make a significant contribution through careful observation and analysis of patients seen day-to-day.

### *Secondary Prevention*

Hazards to children are not wholly eradicable. Thus efforts must be directed not only toward a reduction of fatal accidents but also toward amelioration of the effects. Prevention of deaths from secondary causes and prevention or modification of disabilities are, there-

fore, aspects of the accident problem that cannot be neglected.

IMPROVEMENT OF EMERGENCY SERVICES: It was conclusively demonstrated during World War II that survival rates, length of hospitalization, and even the degree of disability could be related to the quality and distribution of emergency care.

The significance of careful handling of the victim, from the time of injury until definitive care begins, is appreciated by the medical profession. Unfortunately, their concern has not always been communicated to those responsible for emergency services.

There are three major elements involved in the care and transport of the injured: training of personnel, adequacy of equipment, and distribution of services in relation to population and the facilities used by the population.

Untrained ambulance attendants, inadequate equipment, speeding ambulances, lack of services in rural areas (as well as in some urban areas) are common throughout the Americas. Curry and Lyttle (*2*), in their excellent description of how one community was successful in overcoming these difficulties, provide a blueprint that can be adopted by others.

Adequate emergency room services are vital to secondary prevention. The controlling factors are again the training of personnel, the adequacy of equipment, and the availability of services. The special problem presented by accidental poisoning demonstrates the importance of recognizing these factors. Not only must the physician be capable of directing or providing general treatment for the child, he must, because of the multitude of possible toxic agents, be able to track down the specific ingredient.

The prevention of secondary complications is not limited to proper treatment for poisoning. Lack of treatment or inadequate treatment may introduce further stresses. For example, in Mexico, as has been pointed out, there are a significant number of deaths each year caused by tetanus in the age group 5–14 years.

REHABILITATION SERVICES: Applied early, rehabilitation services contribute to reduction in the degree of disability following severe injury. Indeed, the caseload of rehabilitation centers in the Americas is comprised largely of accident victims. As more of these facilities are developed and the time lag between injury and rehabilitation services is decreased, a marked improvement can be expected. Although the expense of rehabilitation is usually well justified, the prevention of serious injury is even more economical.

## Summary

Extension of current trends suggests that accidents will, within the next two decades, be the leading cause of death in children 1 to 15 years of age in many nations of the Americas.

Rehabilitation centers in the Americas report that caseloads are comprised largely of accident victims.

Each specific hazard must be identified and prevented on an individual basis, but traditional public health procedures, such as epidemiology, provide tested methods.

Although diseases such as gastritis and enteritis are the first cause of death for half the countries of the Americas in the 1 to 4 age group, accidents are the leading cause in two-thirds of these countries in the 5 to 14 age group. Nonfatal accidents are found to cause great economic loss because of resultant disabilities and longer and more expensive hospitalizations. Motor vehicle accidents, drowning, burns, poisoning, falls, and bites of insects and snakes are leading causes of accidental death. With significant exceptions, boys have more accidents than girls. More than one-half the accidental poisoning cases occur under 2 years of age, the toxins varying from country to country.

Mortality and morbidity data gathered from surveys are essential bases for initiating accident prevention activities by health departments. U.S. National Health Survey data indicate 45 percent of all accidental injuries occur in the home.

Accident survey data help to define epidemiological study areas and aid evaluation of programs. Accident causation, the subject of increasing study, is extremely complicated and awaits the application of a multidiscipline approach. The host-agent-environment triad of the epidemiological method is relevant. Accurate record systems are essential to accident studies. Analysis of accurate records has made

possible specific successful prevention activities in the United States and can serve other nations of the Americas.

Both longitudinal and retrospective studies of childhood accidental deaths and injuries contribute to prevention.

Primary and secondary prevention benefit equally by educational activities. Education in accident prevention is also a major duty of a public health agency. Physicians can perform valuable educational work in this field.

Health departments can establish leadership in accident prevention and coordinate the work of other community groups.

Research is needed in epidemiology, educational techniques, and emergency treatment and first aid. Emergency treatment services can be greatly strengthened as a secondary prevention technique.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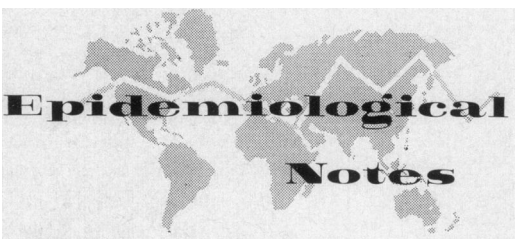


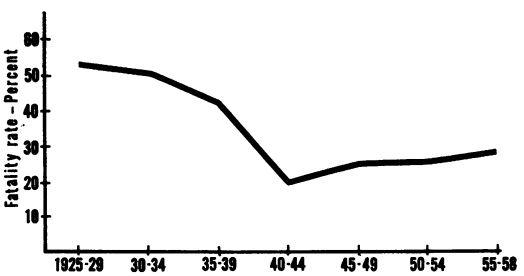

## Meningococcal Infections

A progressive decline in mortality from certain bacterial infections followed the introduction of sulfonamides in 1937 and of antibiotics in the next decade. The fatality rates for meningococcal infections declined from a level of about 40 percent just prior to the use of sulfonamides to about 20 percent during the next few years. However, in the past 15 years the fatality rate has remained at a slightly higher but relatively constant level of about 25 percent, as shown in the chart.

The two principal classes of meningococcal infections are meningitis and septicemia. The number of deaths for each of these types has fluctuated with increases and decreases in reported incidence of cases. About 1950 approximately two-thirds of all deaths from meningococcal infections were attributed to meningitis, but during the past few years there has been about the same number ascribed to meningococcemia as to meningococcal meningitis. Since no morbidity data by type of infection are available, it cannot be determined whether the septicemic form is becoming relatively more frequent.

The number of deaths from meningococcal infection currently reported annually is about 800, which is far in excess of those from diphtheria, measles, streptococcal sore throat and scarlet fever, typhoid fever, or whooping cough. Since 1955 meningococcal infection has outranked poliomyelitis as a cause of death.

**Case fatality rates for meningococcal infections, United States, 1925–58.**




The fact that this acute infection causes 800 deaths a year and 1 fatality for every 4 cases reported suggests the need for the development of more effective methods for its control.—DR. CARL C. DAUER, *medical adviser, National Office of Vital Statistics, Public Health Service.*