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INTRODUCTORY STATEMENT ON THE TOPIC

"THE PREVENTION OF ACCIDENTS IN CHILDHOOD"

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THE PREVENTION OF ACCIDENTS IN CHILDHOOD

By James L. Goddard, M.D., M.P.H.
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I. Introduction

The concern of the national health administrations of the Americas with the problem of accidents in childhood reflects the range and variety of Western Hemisphere cultures. Both the relative magnitude and specific nature of the problem change constantly as national or regional boundaries are crossed in this part of the world. Indeed, even within the boundaries of a single nation the dimensions and characteristics of the problem exhibit remarkable diversities.

Hand-in-hand with the growing concern over the problem created by accidents there is the full realization that a proper balance must be maintained between the search for solutions to the traditional, and in many countries the continuing, child health problem such as the contagious diseases, and the development of new knowledge and skills that will contribute to the reduction of deaths, injuries, and disabilities caused by accidents in childhood.

There is little need to justify the added emphasis on accident prevention, when we consider that accidents are already the leading cause of death in 13 countries in this Hemisphere in the age groups of 5-14 years, and that if the 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.

Fatal accidents in these age groups cause immeasurable loss of human resources, and even the nonfatal accident is a far greater source of human loss than the nonfatal case of a contagious disease. In the latter instance recovery is usually complete (with notable exceptions such as in polio). The prolonged and often permanent disability that may well be the sequel to a nonfatal childhood accident (loss of limbs, sight, etc.) is an enduring economic handicap to the individual, the family, the community, and the nation. Added to this important consideration is the financial factor of longer and usually more expensive (more specialized) hospitalization required by accident patients as contrasted with contagious disease patients.

Granted, then, the urgency (and, indeed, economic necessity) of organizing a broad attack on the childhood accident problems, how shall we proceed?

No large-scale health effort can be launched without the efficient assembly of adequate data. Specific plans must be based on the results of specific surveys, studies, analyses, and related procedures.

Fortunately, the same methods that have contributed to health problems in the past are adaptable to this new undertaking. The epidemiologic approach is an invaluable tool that is already in our hands and need only be applied to the accident problem to serve our needs.

Once the established techniques of fact-finding and case-finding have defined the childhood accident prevention problem in any given area or community and have thereby identified the types and causes of accidents with which we must deal, the general problem inevitably appears in its true light as a combination or pattern of specific problems.

Each specific accident hazard requires specific methods of prevention. Safety principles must be adapted to each hazard; they are not susceptible of universal inculcation.

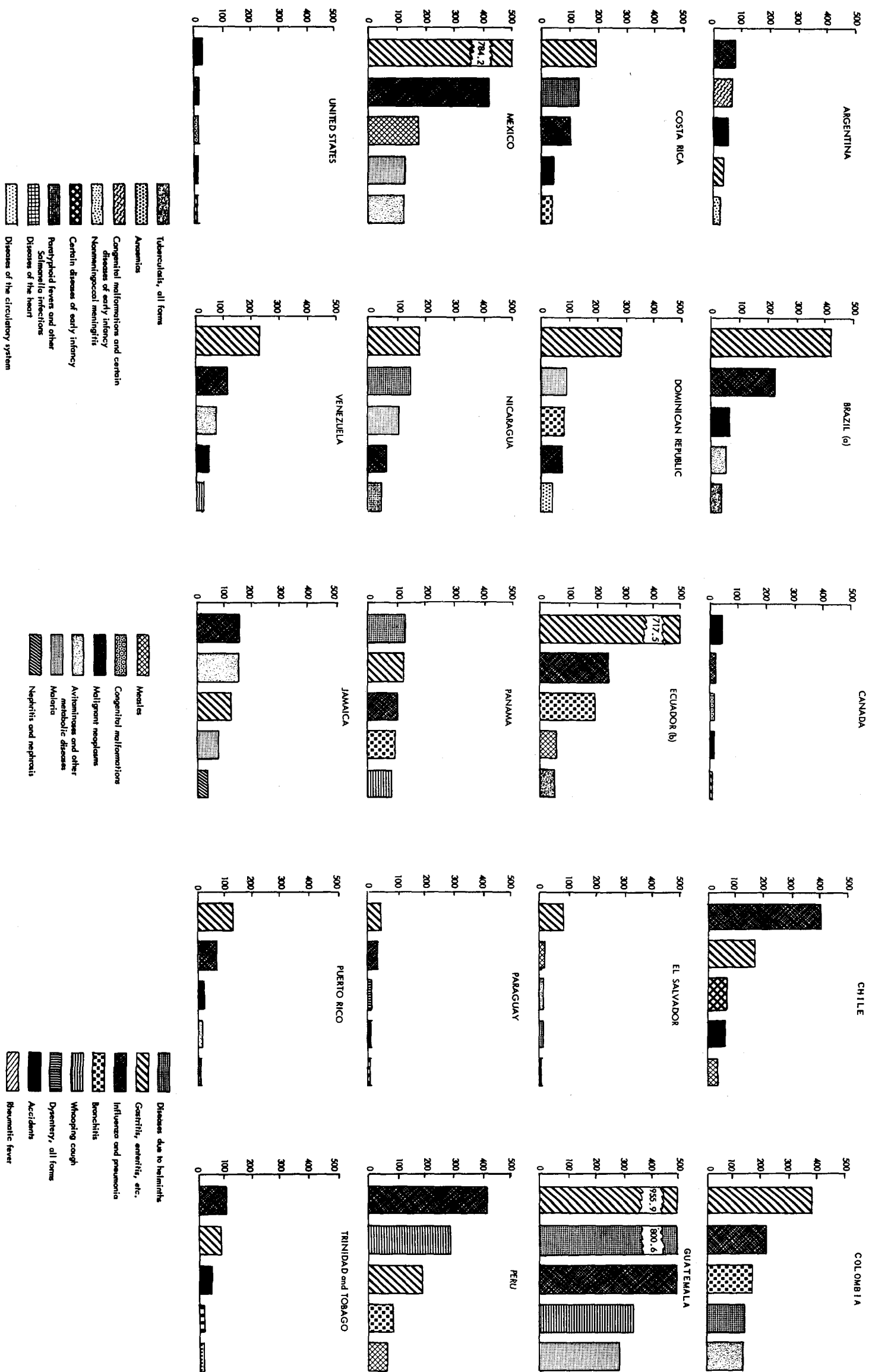
The traffic-filled street in New York or Río de Janeiro, the Texas ranch, the Peruvian mountain village --each type of environment, each type of culture-- produces a unique group of accident hazards and calls for a unique program of accident prevention.

II. Comparative Analysis of Mortality and Morbidity in Childhood

Nothing illustrates more clearly the geographical variation in the relative significance of accidents as a child health problem than an analysis of mortality tables. Charts 1 and 2 (1) present data for 17 countries of the Americas, and Puerto Rico, Jamaica, and Trinidad 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. 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 when mortality in children continues to be excessive in many countries.

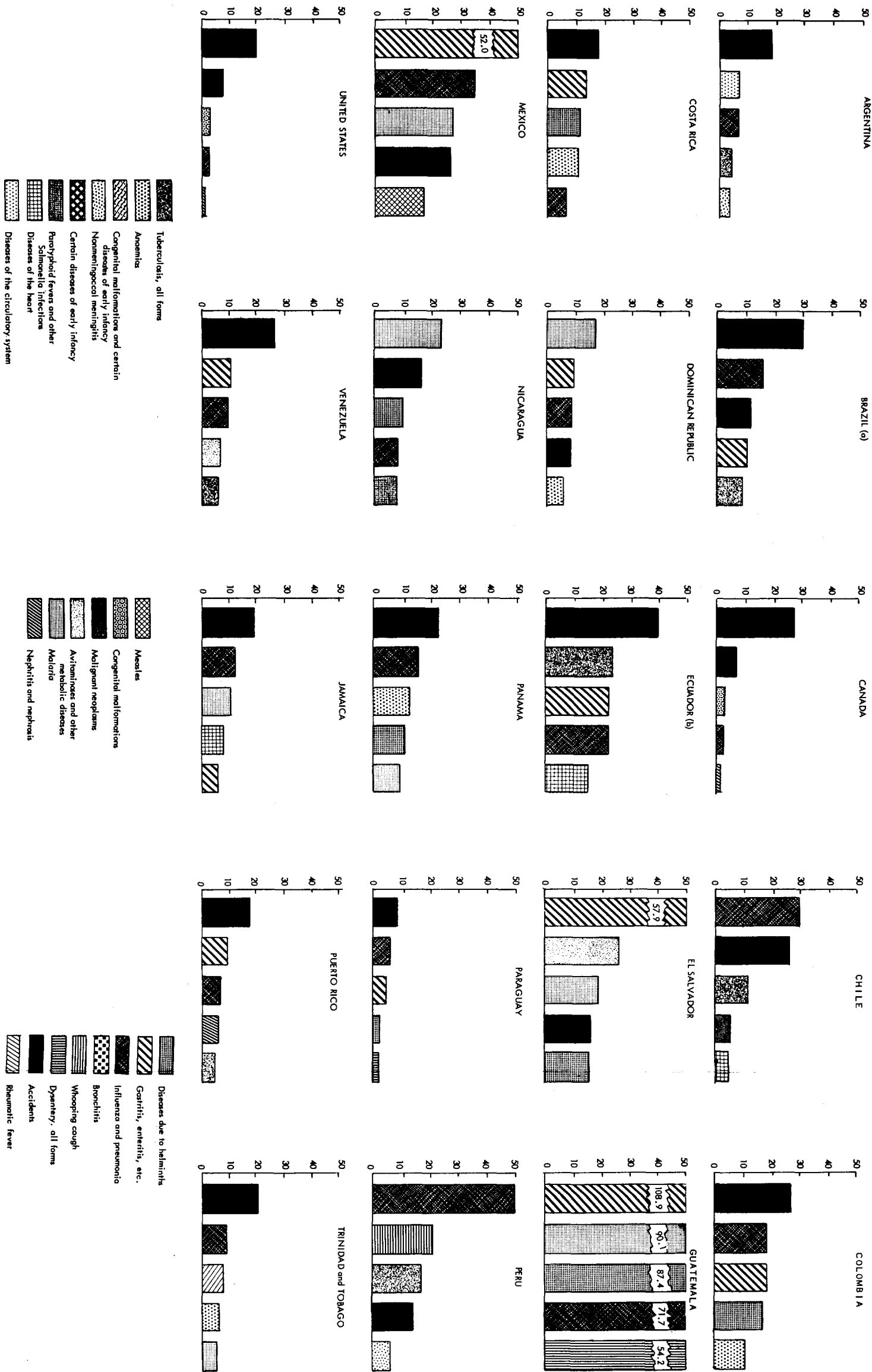
(1) Summary of Four-Year Reports on Health Conditions in the Americas, Pan American Sanitary Bureau, 1958.

Chart 1 PRINCIPAL CAUSES OF DEATH AMONG CHILDREN AGES 1 THROUGH 4 - AMERICAS 1956
(Rates per 100,000 population)



Note: (a) Includes only Federal District and 7 State capitals
(b) Includes only capital cities of provinces

Chart 2 PRINCIPAL CAUSES OF DEATH AMONG CHILDREN AGES 5 THROUGH 14 - AMERICAS 1956
(Rates per 100,000 population)

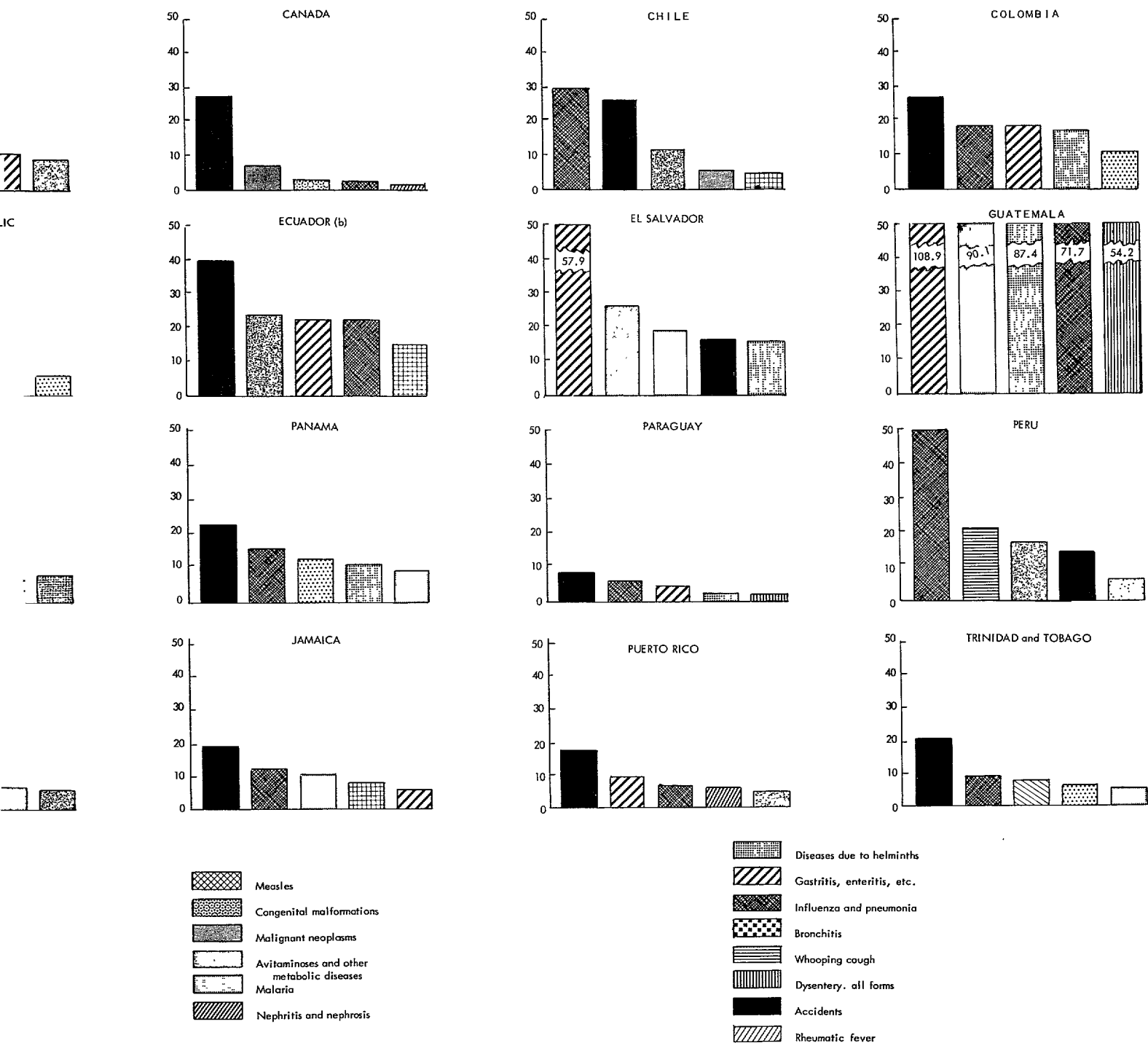


Note: (a) Includes only Federal District and 7 State capitals
(b) Includes only capital cities of provinces

Source: Summary of 4 year reports on health conditions in the Americas - 1958 - PASB

Part 2 PRINCIPAL CAUSES OF DEATH AMONG CHILDREN AGES 5 THROUGH 14 - AMERICAS 1956

(Rates per 100,000 population)



The contrast between the northern and southern sections of the Hemisphere is immediately apparent when it is noted that 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.

Gastritis, enteritis, etc., on the other hand, remain the leading cause of death in 12 of the countries and are among the five leading causes in all countries, although they rank fifth in both Canada and the United States.

Even allowing for a complete lack of uniformity in reporting procedures, these contrasts document the striking variations in the relative status of accidents as a child health problem in the Americas.

When we consider the 5-14 age group, however, we find that accidents are the leading cause of death for this group in two thirds of the countries reporting and that only in Guatemala are accidents missing from the five chief causes of death. The highest rate given is for Ecuador (capital cities of provinces), where the figure (39.7) is almost double the United States rate of 20.0.

Comprehensive morbidity data on childhood accidents in the Americas are not available, but the indications from several sources are that accident morbidity rivals the more common nonfatal diseases.

The following table from the California Health Survey of 1954-1955 illustrates this point and reveals that incidence of illness from accidents ranks second only to diseases of the respiratory system for persons under 15 years of age.

TABLE 1

SELECTED MEASURES OF ILLNESS BY DIAGNOSIS
FOR PERSONS UNDER 15 YEARS OF AGE
RATES PER 1,000 PERSONS PER YEAR

<u>DIAGNOSTIC GROUP</u>	<u>INCIDENCE OF ILLNESS</u>	<u>DAYS OF DISABILITY</u>	<u>HOSPITAL ADMISSIONS</u>	<u>HOSPITAL DAYS</u>
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: "Health in California," California Health Survey, State of California, Department of Public Health, September 1957.

In assaying the magnitude of a health problem such as this, the conclusions drawn from morbidity data serve to complement the evidence of mortality data in creating the total picture of the human, social, and economic significance of the problem in question. The amount of professional and skilled service any community must supply to cope with accident consequences is a vital factor to be studied, and morbidity data reflect such expenditures by communities.

It is highly significant, for example, that in November 1956 8 per cent of all hospital beds in the United States were occupied by accidents victims (as reported in the A.M.A. Hospital Survey).

Equally significant is the record of the La Posta Infantil Hospital in Valparaiso, Chile, where 10 per cent of the 31,510 visits to this children's facility in 1957 were made necessary by accidents (fractures, bites, poisonings, burns, wounds, and the like).

III. Mortality and Morbidity of Accidents in Childhood

For those who survive the common diseases of infancy and childhood, there is the ever-present threat of death or injury from accidents. This threat is both widespread and complex. The complexity of the accident problem is revealed by the differences which are indicated country by country, as well as by age, sex, race, agent involved, type of injury, season of the year, day of week, time of day, place of residence, and many other factors.

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

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

TABLE 2

Number of Deaths from Accident in Children 1-4 Years and 5-14 Years
with Rates per 100,000 Population in the Americas, 1956

Area	1-4 Yrs.		5-14 Yrs.		Area	1-4 Yrs.		5-14 Yrs.	
	Number	Rate	Number	Rate		Number	Rate	Number	Rate
Argentina (a,b)	690	42.9	(b)670	18.6	Mexico (e)	2,056	56.5	2,091	26.7
Brazil (c)	324	61.8	309	30.1	Nicaragua	40	25.6	59	16.8
Canada (d)	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 (a)	289	30.3	310	14.6
Costa Rica	47	37.2	47	18.1	United States(e)	4,791	32.6	6,099	20.0
Dominican Rep.(e)	76	21.7	56	8.3	Venezuela	329	43.2	369	25.6
Ecuador (e,f,g)	56	49.7	89	39.7	- - - - -				
El Salvador (e)	61	23.5	93	16.6	Jamaica (h)	46	29.9	67	18.4
Guatemala (e)	61	14.2	145	17.5	Puerto Rico (e)	61	20.2	102	16.9
					Trinidad & Tobago	38	44.3	34	20.9

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

- (a) Year 1953.
- (b) Detailed list numbers E800-E999.
- (c) Federal District and seven State Capitals.
- (d) Excluding Yukon and Northwest Territories.
- (e) Year 1955.
- (f) Capital cities of provinces.
- (g) Rates based on population estimated by the Pan American Sanitary Bureau.
- (h) Year 1954.

The distribution by age and sex for the five principal causes of accidental death for these age groups is presented for the United States and Venezuela in Tables 3 and 4.

TABLE 3

Principal Types of Accidental Deaths in Children Ages 1-4 Years and 5-14 Years, Continental United States, 1956

1-4 Years		
Type of Accident	Males	Females
Motor Vehicle	800	638
Fire and Explosion of Combustible Material	443	472
Drowning	463	191
Poisoning--Solid or Liquid	196	140
Falls	155	99
5-14 Years		
Type of Accident	Males	Females
Motor Vehicle	1,785	855
Drowning	981	204
Fire and Explosion of Combustible Material	263	404
Firearms	357	72
Falls	138	50

Source: National Office of Vital Statistics - Vital Statistics of the United States, 1956.

TABLE 4

Principal Types of Accidental Deaths in Children Ages 1-4 Years
and 5-14 Years, Venezuela - 1954

1-4 Years			
Males		Females	
Type of Accident	Deaths	Type of Accident	Deaths
Drowning	47	Drowning	38
Motor Vehicle	28	Burns	27
Poisonings	28	Motor Vehicle	22
Burns	26	Poisonings	19
Poisonous bites by venomous animals	6	Falls	7
5-14 Years			
Males		Females	
Type of Accident	Deaths	Type of Accident	Deaths
Drowning	55	Burns	31
Motor Vehicle	44	Motor Vehicle	28
Poisonous bites by venomous animals	39	Drowning	15
Falls	19	Poisonous bites by venomous animals	6
Burns	15	Falls	4

Source: Unpublished data from "División de Epidemiología y Estadística Vital, Dirección de Salud Pública, Ministerio de Sanidad y Asistencia Social, República de Venezuela."

Many authors have commented on the greater number of fatal and nonfatal injuries among young males, and the data in Tables 3 and 4 tend to support such observations. It is generally assumed that the growing boy is more active and more apt to take risks than a girl of the same age. Analysis of specific causes of mortality for the United States and Venezuela reveals other striking differences. In the 5-14-year-old females 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 home at this age learning how to cook, and, of special importance, wear clothing (dresses) more susceptible to fire hazards.

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

An interesting problem has been encountered in Mexico, where deaths from tetanus are frequent in the age group 5-14. Since most cases of tetanus are preceded by an untreated injury, usually a laceration or puncture wound of the foot, it is not at all improper to consider these deaths as being caused by accidents.

Accidental poisoning has been highlighted in recent years as a special part of the accident problem. In most of the Americas the majority of such cases involve children under two years of age. The common agents responsible for fatalities in the United States are petroleum products, aspirin and salicylates, arsenical compounds, and lead and its compounds (Table 5).

TABLE 5

Number of deaths due to accidental poisoning
by type of solid and liquid substances
for children under 15 years of age.
Continental United States 1952 - 1956
(excludes armed forces overseas)

Type of Substances	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
Flourides	-	-	-	1	-
Other and unspecified solid and liquid substances	60	71	72	68	96
Total	462	468	418	389	426

Source: National Office of Vital Statistics
Unpublished Data

Central and South American countries also report that petroleum products, insecticides and pesticides are frequently involved in fatal poisoning. Rat paste, for example, causes many deaths in Venezuela.

Better definition of the problem of accidental poisoning is possible when hospitals and emergency centers keep simple but accurate records of the agents involved. Table 6 summarizes, by type of substance, the experience of 23 poison control centers in the United States.

TABLE 6

Accidental poisoning cases
by type of substance ingested
reported by poison control centers in 23 areas
of the United States*

Type of Substance	Treated Cases		Telephone Inquiries	
	Number	Per cent	Number	Per cent
Medicines	3354	52.3	449	28.2
Internal	(3063)	(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	0.1	10	0.6
Plants	59	0.9	61	3.8
Paints, solvents, etc.	159	2.5	83	5.2
Other	739	11.5	151	9.5
Not stated	51	0.8	4	0.3
Total	6407	100.0	1594	100.0

*For 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.

CASE NO. _____

ACCIDENTAL INJURY REPORT

INJURED PERSON	1. NAME (Last, First, Middle Initial)		2. AGE <input type="checkbox"/> Mos. <input type="checkbox"/> Yrs.	3. ADDRESS (Number, Street, Town, County, State)	
	4. SEX <input type="checkbox"/> Male <input type="checkbox"/> Female	5. COLOR <input type="checkbox"/> White <input type="checkbox"/> Other	6. MARITAL STATUS Single <input type="checkbox"/> Married <input type="checkbox"/> Widowed <input type="checkbox"/> Separated <input type="checkbox"/> Divorced <input type="checkbox"/>		

ACCIDENT DATA	8. HOUR, DAY AND DATE OF OCCURRENCE		9. ACTIVITY (e.g. Driving auto, ascending stairs, asleep in bed)		
	10. PLACE OF OCCURRENCE <input type="checkbox"/> Home <input type="checkbox"/> Farm <input type="checkbox"/> Mine or quarry <input type="checkbox"/> Street or highway (Include sidewalk) <input type="checkbox"/> Public building <input type="checkbox"/> Industrial place or premise <input type="checkbox"/> Place for recreation or sport <input type="checkbox"/> Resident institution <input type="checkbox"/> Other, specify _____		11. IF "Home" in 10., SPECIFY <input type="checkbox"/> Kitchen <input type="checkbox"/> Bedroom <input type="checkbox"/> Livingroom <input type="checkbox"/> Diningroom <input type="checkbox"/> Bathroom <input type="checkbox"/> Basement <input type="checkbox"/> Hall <input type="checkbox"/> Stairs <input type="checkbox"/> Other indoors, specify _____ <input type="checkbox"/> Yard <input type="checkbox"/> Porch <input type="checkbox"/> Driveway <input type="checkbox"/> Roof <input type="checkbox"/> Garage <input type="checkbox"/> Steps <input type="checkbox"/> Walk <input type="checkbox"/> Other outdoors, specify _____		

ACCIDENT DATA	12. TYPE OF ACCIDENT		
	<input type="checkbox"/> Railway <input type="checkbox"/> Motor vehicle, traffic <input type="checkbox"/> Motor vehicle, non-traffic <input type="checkbox"/> Bicycle <input type="checkbox"/> Other road vehicle <input type="checkbox"/> Water transport <input type="checkbox"/> Aircraft <input type="checkbox"/> Machinery <input type="checkbox"/> Electric current <input type="checkbox"/> Firearm <input type="checkbox"/> Animal <input type="checkbox"/> Insect	<input type="checkbox"/> Mechanical suffocation <input type="checkbox"/> Drowning or submersion <input type="checkbox"/> Poisoning by solid or liquid substance <input type="checkbox"/> Poisoning by gas or vapor <input type="checkbox"/> Fall from one level to another <input type="checkbox"/> Fall on same level <input type="checkbox"/> Blow from falling or projected object <input type="checkbox"/> Collision with fixed object <input type="checkbox"/> Struck by person <input type="checkbox"/> Explosion of pressure vessel <input type="checkbox"/> Cutting or piercing instrument <input type="checkbox"/> Cut by other object	<input type="checkbox"/> Fire or explosion of combustible material <input type="checkbox"/> Hot substance, corrosive liquid or steam <input type="checkbox"/> Foreign body entering eye or adnexa <input type="checkbox"/> Inhalation or ingestion of food or object causing obstruction or suffocation <input type="checkbox"/> Foreign body entering other body orifice <input type="checkbox"/> Other foreign body - slivers, etc. <input type="checkbox"/> Excessive heat or insulation <input type="checkbox"/> Excessive cold <input type="checkbox"/> Torsion <input type="checkbox"/> Complication of medical or surgical procedure <input type="checkbox"/> Other, specify _____

INJURY DATA	13. NATURE OF INJURY (For multiple injuries, see instructions on reverse side)		
	<input type="checkbox"/> Fracture <input type="checkbox"/> Dislocation <input type="checkbox"/> Sprain or strain <input type="checkbox"/> Laceration or avulsion <input type="checkbox"/> Contusion or hematoma <input type="checkbox"/> Concussion <input type="checkbox"/> Amputation <input type="checkbox"/> Crushing <input type="checkbox"/> Perforation or puncture <input type="checkbox"/> Broken tooth or teeth	<input type="checkbox"/> Rupture or hernia <input type="checkbox"/> Burn or scald <input type="checkbox"/> Effect of poison <input type="checkbox"/> Drowning or submersion <input type="checkbox"/> Asphyxia or strangulation <input type="checkbox"/> Superficial injury <input type="checkbox"/> Internal injury <input type="checkbox"/> Nerve injury <input type="checkbox"/> Foreign body retained <input type="checkbox"/> Effect of electricity	<input type="checkbox"/> Shock <input type="checkbox"/> Sunburn <input type="checkbox"/> Sunstroke <input type="checkbox"/> Heat exhaustion <input type="checkbox"/> Frostbite <input type="checkbox"/> Reaction to medical or surgical procedure <input type="checkbox"/> No apparent injury <input type="checkbox"/> Other, specify _____

INJURY DATA	14. PART OF BODY INJURED (For multiple injuries, see instructions on reverse side)		15. CONDITION OF PATIENT
	<input type="checkbox"/> Generalized <input type="checkbox"/> Skull or scalp <input type="checkbox"/> Eye <input type="checkbox"/> Nose <input type="checkbox"/> Mouth <input type="checkbox"/> Jaw <input type="checkbox"/> Other head	<input type="checkbox"/> Neck <input type="checkbox"/> Spine <input type="checkbox"/> Chest <input type="checkbox"/> Abdomen <input type="checkbox"/> Back <input type="checkbox"/> Pelvis <input type="checkbox"/> Other trunk	<input type="checkbox"/> Shoulder <input type="checkbox"/> Upper arm <input type="checkbox"/> Elbow <input type="checkbox"/> Forearm <input type="checkbox"/> Wrist <input type="checkbox"/> Hand <input type="checkbox"/> Finger <input type="checkbox"/> Other, specify _____

TREATMENT	16. HOSPITAL STATUS <input type="checkbox"/> Emergency Room only <input type="checkbox"/> Outpatient <input type="checkbox"/> Inpatient <input type="checkbox"/> Not treated at hospital	17. NAME AND ADDRESS OF HOSPITAL
		18. NAME AND ADDRESS OF ATTENDING PHYSICIAN

19. REPORT SUBMITTED BY	20. TITLE OF REPORTER	21. DATE REPORT PREPARED
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INSTRUCTIONS FOR COMPLETING FORM PHS-2916 ACCIDENTAL INJURY REPORT

CASE NO. - For statistical use only; make no entry.

Item 2. AGE - Enter age at last birthday; use months if under one year of age.

Item 7. OCCUPATION - Enter the major occupation of the injured person; e.g. for a student who works part-time, enter "student"; for a housewife who works full-time as a stenographer, enter "Stenographer".

Item 9. ACTIVITY - Enter enough detail to indicate what the injured person was doing at the time of the accident. Avoid the use of nonspecific words such as "working", "playing", etc.

Item 10. PLACE OF OCCURRENCE - For definition of each category, refer to the International Classification of Diseases, 1955 Revision, Volume 1, World Health Organization, pp. 264-266.

Item 12. TYPE OF ACCIDENT - For definition of each category refer to the International Classification of Diseases, 1955 Revision, Volume 1, World Health Organization, pp. 243-284 ("E" Code).

Item 13. NATURE OF INJURY - In the case of multiple injuries, indicate each injury in the order of its relative severity to the other injuries by numbering the most severe as 1, the next most severe as 2, etc.

Item 14. PART OF BODY INJURED - In the case of multiple injuries, use the same numbering system as in Item 13, to relate the nature of each injury to the part of the body injured.

Item 15. CONDITION OF PATIENT - Indicate the condition of the injured person at the time first seen for treatment.

Item 17. NAME AND ADDRESS OF HOSPITAL - Make entry only if the injured person was treated at a hospital.

Item 18. NAME AND ADDRESS OF ATTENDING PHYSICIAN - Make entry only if the injured person was not treated at a hospital.

EXPLANATION OF ENTRIES (Use this space for additional information. Identify each by numbering according to the item being explained).

In approximately 25 per cent of those cases involving medicines, aspirin or other salicylates were the agents ingested. By contrast, aspirin is seldom the agent of poisoning in Latin America. In 230 cases seen in one year at a children's hospital in South America, only 2 cases involved aspirin or salicylates. Petroleum products and clorox were the two most frequent offenders reported by this institution.

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 the male than in the female. Of females under 15 years of age, one child in three is injured each year, the majority in or around the home. 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 per cent of all accidental injuries occur in the home, 10 per cent on the highway, 30 per cent in public places, and 14 per cent at work. A study on accident cases treated in the emergency room of the municipal hospital in San Juan, Puerto Rico, had a somewhat similar pattern of results: 56 per cent of all injuries were caused by home accidents, 34.5 per cent were accidents in public places, 6 per cent were motor vehicle accidents, and 3.5 per cent were work accidents.

The use of a uniform accidental injury report, such as the one opposite this page, can provide a wealth of data in a short period of time, especially if treatment agencies such as hospitals and emergency rooms, which care for a large number of injury patients, agree to cooperate. Such a system can easily be instituted and can provide quick results. On the basis of data thus gathered, preventive measures can be designed to meet the specific accidental injury problems of the community.

IV. Causative Factors in Childhood Accidents

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

Viewing the child himself as the "host", we clearly 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--all this type of knowledge will help to define the child as an "accident host."

The "agent" in childhood accidents can be almost everything he comes in contact with, 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 poisonings offer a similarly delimited field for study.

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

The child's "environment"-- the third element in the epidemiologic 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 moulding 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 suggestive and thoughtful presentation of the problem in graphic terms.

The graphic "flow-chart" facing this page is taken from Uniform Definitions of Home Accidents⁽¹⁾ and was developed by a group of specialists concerned with causative factors in accidents, brought together by the Public Health Service, the National Safety Council, and the American Public Health Association.

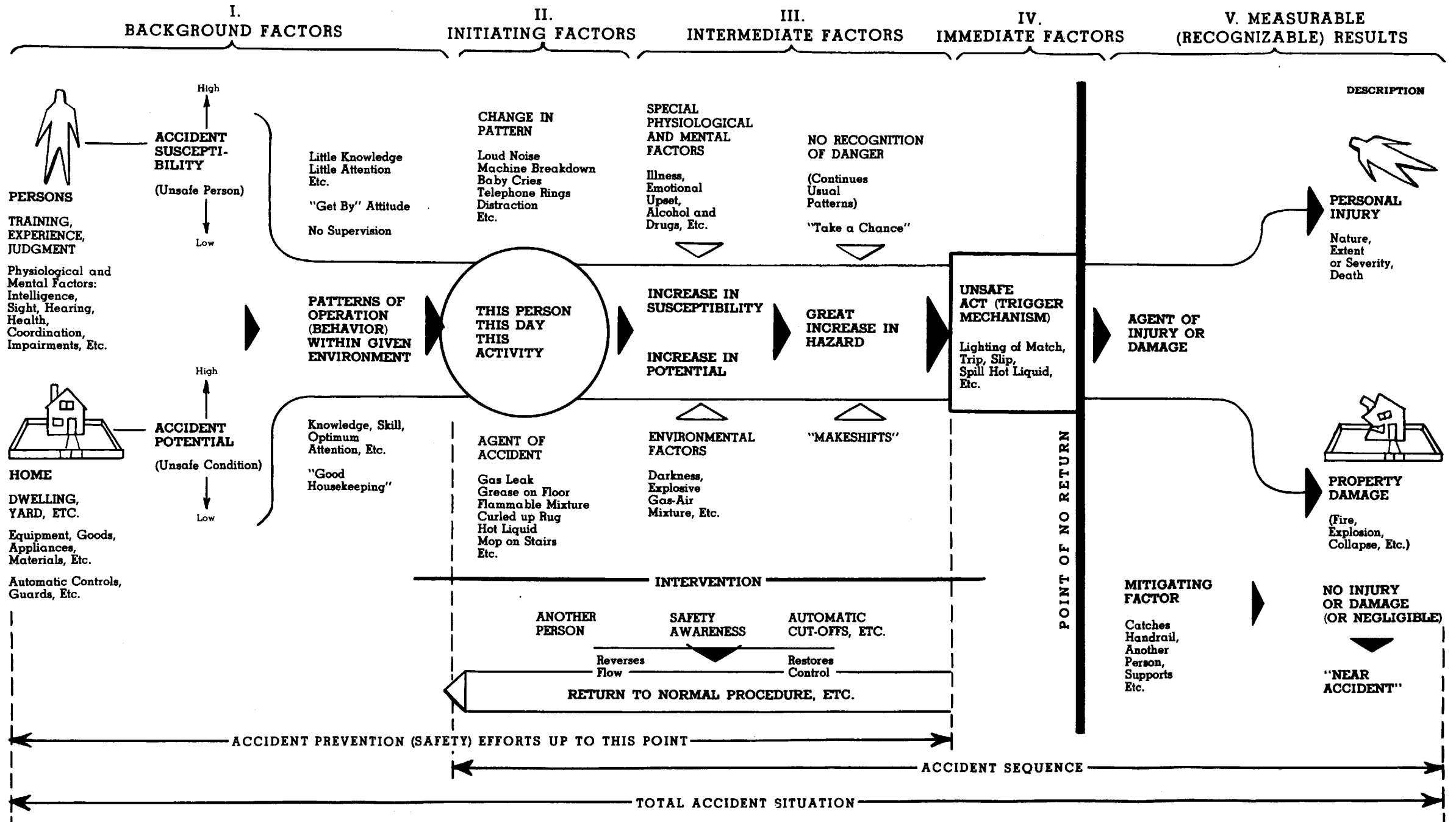
Although the type of accident situation illustrated by this chart is that occurring in the home, the dynamic principles involved are common to all accidents. Furthermore, even a cursory study of the upper half of the chart (the "Persons" section) shows immediately how applicable these principles are to all types of childhood accidents.

"Accident susceptibility" is obviously high in the child because, as the chart indicates, this factor is conditioned by training, experience, and judgment, in all three of which respects the child is less well-prepared than the adult.

Moving on to the "Intermediate factors" section of the chart, such special physiological and mental factors as illness, emotional upsets, and the like may be expected to affect children even more drastically than adults.

(1) U. S. Department of Health, Education, and Welfare, Washington, D.C., 1958.

The Dynamics of Home Accidents



Finally, the "Unsafe act or trigger mechanism" is never more clearly illustrated than when a child starts a fire while playing with matches or swallows poison while in search of candy.

In short, this graphic presentation of accident dynamics, summarizing as it does entire textbooks of discussion of the problem, will well repay close study by all who are professionally or personally concerned with improved accident prevention techniques based on better understanding of the causative factors.

V. Prevention

Effective programs for the prevention, control, and amelioration of effects of childhood accidents will be achieved only through use of the scientific method. This, as in all health problems, implies adequate definition of the problem, formulation of specific hypotheses, testing and validation of the hypotheses, and translation of findings into action programs.

Since a multiplicity of causative factors are involved in accidents, no single solution can logically be expected. Diversities which exist in terms of cultural patterns, environmental conditions, and host factors necessitate careful selection of preventive activities in a given area.

Examples of successful preventive activities will be found in the "Principles of Primary Prevention" section of this report (pages 13-20).

Recommended activities are presented under the general headings of Principles of Primary Prevention and Secondary Preventive Activities (many principles are, of course, equally applicable to both types of prevention).

A. Principles of Primary Prevention

1. Better Definition of the Problem

One of the major handicaps to be overcome is the lack of sufficient data concerning accidents in childhood, but mortality and morbidity data, supplemented by special epidemiologic studies, are the conventional sources of such information. In those Latin American Countries where hospital and emergency services are provided by the Government, the opportunity to obtain data on accidental injuries is unique as contrasted with the situation that exists in Canada and the United States. This method helps to identify problem areas that require further investigation and can single out the cases to be included in an epidemiologic study. A reporting system can also provide the data necessary to evaluate the effectiveness of a prevention program by comparing

the incidence during the reporting period prior to the program with that after the program.

The minimum requirements of such a reporting system include the following items on which information should be obtained for each accidental injury 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 hospital and/or attending physician; and identification of the reporter.

Such data, when supplemented by analysis of death certificates (even though there is great variation in completeness of reporting of deaths), provide an excellent basis for the selection of specific accident problems for detailed epidemiologic studies and for evaluation of preventive activities. As programs are developed it will, therefore be necessary to specify routinely on the death certificate the type of a fatal accident.

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

The following examples will illustrate the positive action that can result from competent analysis of accurate records and other data.

The redesign of refrigerators by American manufacturers has been undertaken as a consequence of studies which revealed the extent of the danger of death by suffocation for children who, while playing, crawled into discarded ice boxes and closed the doors.

The Cornell University Automotive Crash Injury Project has, in a few short years, profoundly influenced the design of the U.S. passenger cars in the direction of significant new safety features. The safety belt alone--the importance of which was validated by the Cornell studies--has altered the thinking of automotive safety engineers.

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

A Latin American analogy to this situation may be found in the widespread occurrence of burns among young children in Chile, where the brazier, placed on the floor or the ground, is the traditional equipment for cooking in rural districts. Protective devices for limiting the hazards of the brazier, coupled with public health educational campaigns, could greatly diminish this particular threat to childhood safety.

Knowledge of the relationship between childhood growth and development and accident patterns at different ages is necessary for education through 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 is also of proven value in identifying special problems.

Retrospective study of deaths from accidents using supplemental death certificate forms has been made for many years in different parts of the United States. Where such studies have been carried out, the data have been useful in public education and in alerting health workers to hazards which can be routinely identified in their work with families.

2. Education

Education is the key to accident prevention.

As in all fields, education in accident prevention will succeed only if it moves from the general to the specific, and only if it exemplifies the difference between teaching and mere distribution of information.

Public health agencies that are not equipped or motivated to accept the educational responsibility in this field should not attempt an accident prevention program. It is a wide responsibility.

First, the staff of a health agency must be educated, both in order to function directly and in order to function in a teaching capacity. Next, the staff must be utilized to educate other groups in the community and the citizens of the community themselves.

The physicians represent one of the essential groups that should receive education in accident prevention because they become excellent teachers themselves once they have been oriented to inculcate among their patients the basic facts of accident prevention. Needless to say, the physician has an unparalleled opportunity to engage in this type of teaching, and he is normally listened to carefully when discussing subjects of health importance.

No medical practitioner can speak more authoritatively in this area than the pediatrician. Dr. Harry F. Dietrich's definition of the pediatrician's role in accident prevention is an excellent example of the opportunity for teaching afforded by the situation.

Dietrich in the October 1950 "Transactions" of the National Safety Congress outlines the pediatrician's role as:

- "(1) He must gain an enlightened awareness of the problem;
- (2) 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;
- (3) He must alert the entire medical profession to the gravity and needs of the problem;
- (4) He must enlist the aid of all available organizations in a continuous community and national child accident prevention campaign."

To this, perhaps should be added:

- (5) He can keep us alerted to new hazards;
- (6) He can, by virtue of his detailed knowledge of the patterns of growth and development (both mental and physical) advise as to the appropriateness and acceptability of preventive measures.

The school teacher is also an important and influential figure in accident prevention education; health agency staffs should work closely with professional educators in the community.

All interested local groups can play a part in this educational undertaking. It is the job of the health agency to organize, stimulate, coordinate, inspire, and--sometimes-- to finance these cooperative efforts.

3. Coordination of Activities with Other Agencies

The prevention of childhood accidents is of concern to many governmental agencies, and a multiplicity of preventive activities have been developed in the past two decades. Today traffic departments and departments of education, health, social security, and labor are involved in various aspects of this problem. There is little to be gained in attempting to analyze the advantages or disadvantages of the current situation. Instead, it is our responsibility in the health field to make certain that our efforts do not duplicate the work of others. There is clearly a need for closer coordination between agencies engaged in this common effort. The role of the health agency in some instances may actually be limited to coordination; in other situations the health department may play a direct role, as well as effecting needed coordination.

The coordination of health agency activities with educational departments is of utmost importance. The teaching of principles of safe living as a part of the curriculum has long been accepted as a responsibility of the schools in the Americas. It is essential that such teaching continues. As new principles develop, this effective channel of communication will permit adjustment through revision of principles and methods. In this case, health agencies should be willing to 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. One example of such an activity would be the promotion of swimming classes for preschool children as well as school children.

The frequency of traffic accidents involving children, both as pedestrians and passengers, makes it important for coordination between several agencies. In countries such as the United States, Canada, and Mexico, where schoolboy patrol activities have been initiated, liaison already exists between the education and the traffic departments. Further extension and improvement of such existing programs is a worthwhile goal of the health agency.

Another activity that merits consideration is the development of adequate recreational facilities for children. In fact, a well-planned community recreational program has a tremendous potential for reducing child pedestrian traffic accidents. Again, such a program is not the direct responsibility of the health agency, but the demonstration of the need and recommendations for action are not beyond their scope of responsibility.

4. Legislation

In several 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 a constant hazard until they 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. Enforcement has been good in both cases and, as a result, the hazards to children have been greatly lessened.

There are similar problems throughout the Americas, and, as the reporting of injuries is improved, new hazards will be exposed which, in some cases, will come within legislative control.

5. Research

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

As has been mentioned, the epidemiologic 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 has already led to reductions on a limited scale in certain types of injuries and deaths. In the past, these have usually been related to environmental factors or agent factors immediately associated with accidents. Further research along these lines will continue to be valuable, for, as our technology changes, new factors are inevitably introduced into the environment.

One value of the epidemiologic approach that is often overlooked is that it facilitates appraisal of the entire data-collection process. Epidemiologic studies provide the basis for determining the value of data currently being collected, as well as pointing out the need for collection of additional data on a routine basis.

A second type of research considered to be of major importance is that related to improving our techniques of propaganda and education. Though it is almost universally agreed that the most important element in the prevention of accidents is education, practically nothing has yet been done to increase our understanding of why people accept or reject safety propaganda, or how to induce people to adopt principles of safe living. Research along these lines is admittedly expensive and time-consuming, but in the long run it will more than justify the effort and cost. One example of the type of research which may be productive would be the study of how population groups at varying levels of cultural development are influenced in their acceptance or rejection of specific practices.

The third type of essential research in this field is that relating to improvement in the treatment of injuries. Little more needs to be added about this line of endeavor, which is most familiar to the clinician, but it should be emphasized again that the planned cooperative study involving several hospitals or treatment centers is often indicated. One example of this 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 U. S. 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 different treatments for serious burns.

The clinical study or case study approach 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 cases seen day by day.

B. Secondary Prevention

Accidents to children are apparently inevitable, and thus our efforts must be directed not only towards a reduction of fatal accidents, but also towards amelioration of the effects of accidents. Prevention of deaths from secondary causes, and prevention or modification of disabilities are, therefore, aspects of the accident problem that cannot be neglected.

1. 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 surgical 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 and amount of equipment, and distribution of the 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 problems throughout the Americas. Curry and Lyttle, in their excellent description (1) of how one community was successful in overcoming these difficulties, provides 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 demonstrate 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 which is involved. This cannot be done in a haphazard manner. It is of as much concern to the physician in Buenos Aires, confronted with a child who has swallowed an unknown quantity of a deodorant, as it is to the physician in Montreal who is treating an infant who has swallowed an unknown quantity of a liquid detergent.

The prevention of secondary complications is not limited to proper treatment for poisoning. Lack of treatment or inadequate treatment may introduce new elements. 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. Since a puncture wound or laceration is the probable precursor, the implications for secondary preventive activities are obvious.

(1) Am. Jour. of Surgery, Vol. 95, April, 1958

2. Rehabilitation Services

Applied early, rehabilitation services contribute to reduction in the degree of disability following severe injury. Indeed, the case load of rehabilitation centers in the Americas is largely comprised 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. When the expense of rehabilitation is considered, however, the prevention of serious injury to children assumes even greater significance.

VI. 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 in many nations of the Americas. The great variety of the accident prevention problems results from the variety of Western Hemisphere cultures. Each specific hazard must be identified and prevented on an individual basis, but traditional public health principles, such as epidemiology, provide tested methods of procedure. Although "gastritis, enteritis, etc." 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 5-14 age group. Nonfatal accidents are found to cause great economic loss because of resultant disabilities, longer and more expensive hospitalization, etc. Motor vehicle accidents, drowning, burns, poisoning, falls, and insect and snake bites are leading causes of accidental death. With significant exceptions, boys have more accidents than girls. Over half the accidental poisoning cases occur under 2 years of age; the substances involved vary 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 per cent of all accidental injuries occur in the home. Accident survey data helps to define epidemiologic study areas and aids evaluation of programs. Accident causation, the subject of increasing study, is extremely complicated and awaits the application of a multi-disciplined approach. The host-agent-environment triad of the epidemiologic method is relevant. Accurate record systems are essential to accident studies. Analysis of accurate records has made possible specific successful prevention activities in 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 are equally

benefitted by education activities. Education is the key to accident prevention and the first duty of a public health agency. Physicians can perform valuable education work in this field. Health departments should establish leadership in accident prevention and can coordinate the work of other community groups. Research is needed in (1) epidemiology, (2) education techniques, and (3) emergency treatment and first aid. Emergency treatment services should be greatly strengthened as a secondary prevention technique. Rehabilitation centers in the Americas report case loads are largely comprised of accident victims.

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XV Pan American Sanitary Conference

San Juan, Puerto Rico
September-October, 1958

X Meeting Regional Committee



TECHNICAL DISCUSSIONS

CSP15/4 (Eng.)
ADDENDUM I
15 September 1958
ORIGINAL: ENGLISH

SUGGESTIONS FOR THE TECHNICAL DISCUSSIONS ON

"PREVENTION OF ACCIDENTS IN CHILDHOOD"

(Tuesday, 30 September 1958)

Suggested Guide for the Discussions

1. At what stage of development of health programs should an accident prevention program be initiated?
2. What methods should be employed for measuring the magnitude and nature of a national childhood accident problem?
3. What are the steps to be taken in planning a childhood accident prevention program?
4. What agencies should be involved in such a program?
5. Should such a program be separately administered or integrated with other health department activities (at the national, regional, and local levels)?
6. What other accident prevention programs (such as industrial) have been successful, and has evaluation clarified the reasons for this success?

Participants at the Conference are invited to study the above points to be discussed at the meeting and to suggest additions or changes to this guide. It is requested that the comments deemed pertinent be given to the Secretariat.