

# Selected Types of Poisoning as Causes of Accidental Death, United States, 1964

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THE National Center for Health Statistics undertook a study of selected accidental deaths by poisoning, using as a source of information the death certificates for the United States for 1964. The study was based on 283 certificates on which the cause of death was stated to be "Accidental poisoning by other and unspecified solid and liquid substances," category E888 of the International Statistical Classification of Diseases, Injuries, and Causes of Death (1).

As shown in table 1, the classifications E870-E887 provide for the identification of accidental poisonings from 18 specified types of solid and liquid substances (2). These classifications were designed to provide for assigning deaths from single substances to categories and to facilitate identifying deaths by accidental poisoning from a single substance. The residual category, E888, includes accidental deaths from combinations of substances and from substances either not separately identified elsewhere in the classification or of an undetermined type.

The purpose of this study was to ascertain the substances which caused the accidents assigned to category E888 in 1964. The death rate for "other" accidental poisonings (E888) was 0.1 deaths per 100,000 estimated midyear population for 1964. Some information on the age

and sex of decedents is given in this paper. However, because of the small number of deaths involved, no effort was made to relate the information to the population "at risk."

Comparison of deaths from accidental poisoning, category E888, using data for 1960 and 1964 shows that the greatest increases in these fatalities were associated with alcohol and pesticides.

Type of substance	Deaths	
	1964	1960
Total.....	283	200
Pesticides, weed killers, and other substances.....	90	65
Alcohol and barbituric acid and derivatives.....	54	22
Alcohol and other substances.....	29	7
Other specified substances.....	63	59
Not stated.....	47	47

## Pesticides

Pesticides and like substances accounted for 90 of the 283 deaths classified as E888 in 1964. This number, 90, does not include all accidental fatalities resulting from pesticides because such deaths are classified by compound, and some would be assigned elsewhere in the classification.

According to Hayes and Pirkle (3), about 65 percent of deaths from pesticides are assigned to category E888. The remaining 35 percent usually are assigned to the categories of poisoning by arsenic, antimony, and their compounds;

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fluorides; strychnine; and mercury and its compounds. In this paper the deaths from pesticides are those assigned to E888. Chief among the pesticides causing death is parathion, an organic phosphorus compound (table 2).

Children 1-4 years old are the persons most likely to ingest pesticides found in the home. More than one-third of the 90 reported deaths from pesticides occurred in preschool children (table 3).

The seven States which reported five or more deaths from pesticides in 1964 are in the South (table 4). Florida registered 15 deaths from pesticides assigned to category E888; most of these pesticides were parathion or other phosphorus compounds. The age distribution of these 15 decedents was characteristic of the pattern of fatalities from ingestion of most other toxic agents. Ten of these poisonings were in children from 1 to 5 years of age.

Deaths of two persons aged 79 and 83 occurred because the decedents drank a pesticide, one mistaking the liquid for cough medicine and the other believing it was whiskey. Two farm laborers died while at work—one from

**Table 1. Deaths from accidental poisoning by solid and liquid substances, by type of substance, United States, 1964**

Type of substance (Seventh Revision of International Lists)	Deaths
Total (E870-E888).....	2, 100
Morphine and other opium derivatives (E870).....	116
Barbituric acid and derivatives (E871)....	424
Aspirin and salicylates (E872).....	192
Bromides (E873).....	8
Other analgesic and soporific drugs (E874)...	381
Sulfonamides (E875).....	0
Strychnine (E876).....	8
Belladonna, hyoscine, and atropine (E877)...	0
Other and unspecified drugs (E878).....	209
Noxious foodstuffs (E879).....	4
Alcohol (E880).....	217
Petroleum products (E881).....	56
Industrial solvents (E882).....	52
Corrosive aromatics, acids, and caustic alkalies (E883).....	49
Mercury and its compounds (E884).....	7
Lead and its compounds (E885).....	54
Arsenic, antimony, and their compounds (E886).....	38
Fluorides (E887).....	2
Other and unspecified solid and liquid substances (E888).....	283

**Table 2. Deaths from pesticides assigned to category E888, accidental poisoning by other and unspecified solid and liquid substances, United States, 1964**

Type of substance	Deaths
Total.....	<sup>1</sup> 90
Cyanide and cyanide compounds.....	2
Chlorinated hydrocarbon compounds:	
Chlordane.....	3
Benzene hexachloride.....	2
DDT.....	7
Endrin.....	1
Lindane.....	1
Nicotine and nicotine compounds.....	2
Organic phosphorus compounds:	
Bidrin.....	1
Diazinon.....	1
Guthion.....	1
Malathion.....	3
Methyl parathion.....	1
Parathion.....	12
Phosdrin.....	1
Unspecified.....	5
Phosphorus poisoning.....	6
Weed killers (herbicides):	
Dinitro-O-secondary butyl phenol.....	1
Pentachlorophenol.....	2
Unspecified.....	4
Other substances:	
Di-weevil.....	1
Insect poisons.....	15
Moth balls.....	1
Rat poisons.....	5
Real Kill.....	1
Roach poisons.....	5
Thallium.....	3
Warfarin.....	1
Unidentified.....	2

<sup>1</sup> Does not include all deaths from pesticides—only those assigned to category E888.

phosdrin and the other from parathion. The 15th fatality occurred in a 14-year-old student who died after using DDT powder in his home.

#### Alcohol Combined With Barbiturates

Ingestion of alcohol and barbiturates, a combination which caused 22 reported deaths in 1960, resulted in 54 deaths in 1964. The number of deaths assigned to category E888 may be understated because proper medical certification of such deaths depends on toxicological investigation. Moreover, some of the fatalities listed as poisonings may result from other causes. If the results of such investigation are not available within the statutory time limit for filing a death certificate, the report of an autopsy may be presented as an amendment to the original record. However, an advanced processing schedule in

the National Center for Health Statistics precludes the use of all such amendments. Therefore these incomplete medical certifications may be classified with records of accidental deaths from poison of undetermined type or among those for ill-defined and unknown causes of mortality (category 795).

In 1964 barbiturates caused 478 deaths from accidental poisoning (table 5). Of these deaths, 54 resulted from alcohol and barbiturates (E888), and 424 were caused by barbiturates only (E871). The group accounting for the highest mortality in both categories was women 45-54 years old. As indicated previously, these frequencies are too small to relate to the popula-

tion "at risk." However, of the 26 women whose deaths were assigned to E888, 17 were housewives, seven had other occupations, and no occupation was shown for two.

Accidental ingestion of alcohol and substances other than barbiturates caused 29 deaths. About half of these other substances were analgesic or soporific drugs, such as paraldehyde, darvon, or meprobamate.

#### Other Specified Substances

Furniture polish was second only to pesticides in causing deaths among preschool children. Many furniture polishes have a distinct smell of lemon that makes them appealing to young-

**Table 3. Deaths from accidental poisoning by pesticides and all other solid and liquid substances, by age and sex of decedent, United States, 1964**

Type of substances	Total	Age (years)					
		Under 1	1-4	5-24	25-44	45-64	65 and over
Total.....	283	9	57	26	79	81	31
Male:							
Pesticides.....	67	0	21	5	15	16	10
All other substances.....	116	6	14	10	40	30	16
Female:							
Pesticides.....	23	2	12	3	3	2	1
All other substances.....	77	1	10	8	21	33	4

**Table 4. Deaths from accidental poisoning by pesticides and all other solid and liquid substances, by State of occurrence, 1964**

State	Total	Pesti- cides	All other substances	State	Total	Pesti- cides	All other substances
Total.....	283	90	193	Montana.....	2	1	1
Alabama.....	13	5	8	Nebraska.....	1	0	1
Arizona.....	7	0	7	Nevada.....	4	0	4
Arkansas.....	2	0	2	New Hampshire.....	1	0	1
California.....	44	1	43	New Jersey.....	6	2	4
Colorado.....	2	1	1	New Mexico.....	1	0	1
Florida.....	20	15	5	New York.....	12	2	10
Georgia.....	11	7	4	North Carolina.....	9	5	4
Hawaii.....	3	1	2	Ohio.....	7	1	6
Illinois.....	3	0	3	Oklahoma.....	1	0	1
Indiana.....	7	2	5	Oregon.....	1	0	1
Iowa.....	2	1	1	Pennsylvania.....	9	1	8
Kansas.....	4	2	2	Rhode Island.....	2	0	2
Kentucky.....	3	1	2	South Carolina.....	10	5	5
Louisiana.....	8	5	3	Tennessee.....	6	2	4
Maryland.....	7	0	7	Texas.....	26	17	9
Massachusetts.....	3	1	2	Utah.....	1	0	1
Michigan.....	7	3	4	Vermont.....	2	0	2
Minnesota.....	7	1	6	Virginia.....	6	1	5
Mississippi.....	11	4	7	Washington.....	2	0	2
Missouri.....	8	1	7	Wisconsin.....	1	1	0
				Wyoming.....	1	1	0

NOTE: States not listed reported no deaths in category E888.

**Table 5. Deaths from accidental poisoning by barbituric acid and derivatives (E871) and from barbiturates and alcohol (E888), by sex and age of decedent, United States, 1964**

Age (years)	Barbiturates only			Barbiturates and alcohol		
	Both sexes	Male	Female	Both sexes	Male	Female
Total.....	424	177	247	54	28	26
Under 15.....	5	2	3	0	0	0
15-24.....	23	10	13	4	2	2
25-34.....	54	15	39	5	2	3
35-44.....	93	41	52	14	10	4
45-54.....	131	55	76	17	7	10
55-64.....	66	30	36	9	3	6
65 and over.....	52	24	28	5	4	1

sters. Nine deaths from furniture polish were reported in 1964. On eight of these death certificates, chemical pneumonia—which is particularly difficult to treat—was given as the immediate cause of death. Eight deaths resulted from ingesting Clorox, Pinesol, hair tint, or gun blue. Two deaths were reported from the accidental substitution of salt for sugar in infants' formulas.

Another category of "other specified substances" consisted of alcohol or alcohol-like substances. Six deaths were reported from poisonings by antifreeze. Other substances reported were shaving lotion, pyrogallol, and similar preparations. The medical examiner or coroner certified these deaths as accidents; in no instance did the death record contain a statement that the decedent mistook the stated substance for any other.

On the other hand, when decedents 65 years and over had ingested "other substances" or pesticides, the medical certification usually indicated that one substance was mistaken for another or that the substance causing death was not in its usual container.

A publication of the World Health Organization contains several recommendations for control and prevention of poisonings (4). These recommendations are directed to the physician, the consumer, and the manufacturer.

1. Physicians should warn their patients that barbiturates and similar drugs have a greater potency when taken with or shortly after alcohol.

2. Persons should keep sleeping tablets in a room other than a bedroom, never on a bedside table. If the person must arise from bed and walk to another room to take a second pill, he

will probably awaken sufficiently to recall the first dose.

3. Soft drink bottles or other containers for beverages should never be used for storing toxic substances.

4. Medicine should be packaged in containers which children find difficult to open.

### Summary

In 1964 there were 1,817 deaths in the United States attributed to 18 separately identified solid and liquid substances, categories E870–E887 of the International Statistical Classification of Diseases, Injuries, and Causes of Death. In addition, 283 deaths were assigned to the residual category E888, which includes deaths from combinations of substances, substances not separately identified, and those of an undetermined type. The purpose of this study was to ascertain the substances that caused deaths included in E888.

Deaths from pesticides and like substances accounted for 90 of those deaths classified as E888. (Some of the deaths are assigned elsewhere in the classification.) More than one-third of the 90 reported deaths from pesticides occurred in preschool children.

Ingestion of alcohol and barbiturates, a combination which caused 22 reported deaths in 1960, resulted in 54 deaths in 1964. Housewives between the ages of 45–54 years old were most likely to die of this combination.

Accidental ingestion of alcohol and of substances other than barbiturates caused 29 deaths.

Among the "other specified substances," household preparations caused most deaths of children 1–4 years of age. For persons over 65

death usually resulted from a person mistaking one substance for another or from a substance not being in its usual container.

#### REFERENCES

- (1) World Health Organization: Manual of the international statistical classification of diseases, injuries, and causes of death. Geneva, 1957.
- (2) U.S. National Center for Health Statistics: Vital statistics of the United States, 1964, Vol. 2, pt. A. U.S. Government Printing Office, Washington, D.C., 1966, table 122, pp. 1-84.
- (3) Hayes, W. J., Jr., and Pirkle, C. I.: Mortality from pesticides in 1961. Arch Environ Health 12: 43-55, January 1966.
- (4) Backett, E. M.: Domestic accidents. Public Health Paper No. 26. World Health Organization, Geneva, 1965.

## Pipelines for Solid Waste Disposal

The University of Pennsylvania in Philadelphia is the recipient of a \$42,724 Public Health Service grant to explore the use of pipelines in the collection and transportation of garbage, trash, and other solid wastes from homes, industries, and farms to disposal sites.

The award was made by the Solid Wastes Program of the new National Center for Urban and Industrial Health in Cincinnati, Ohio. Improper disposal of solid wastes—causing pollution of the land, sea, and air—poses a serious health problem in the United States.

The university's research objective is to provide data on the feasibility of collecting and transporting solid wastes in pipeline systems similar to those used for moving slurries of pulverized coal and water. If such a system can be developed, it will reduce the costs of manually collecting solid wastes and transporting them by trucks. These costs now average more than 70 percent of total expenditures for disposal operations.

The research will be phased into studies which university scientists now are making on pipeline transportation theory and engineer-

ing practice. During their federally financed research, they will work in the following areas:

1. Experiment with different refuse mixtures at varying particle sizes and concentrations to obtain data to provide a basis for determining the extent to which characteristic movements of solid waste slurries in pipes may be similar to movements of other waterborne solids in pipelines.

2. Analyze variations in waste sources, composition, and quantities in terms of their significance for pipe system designs. Information will be gathered on such variables as number of households served per collection truck, quantities hauled in given areas, and relationships between neighborhood, geographic location, and seasons of the year, and variations in waste characteristics and volume. Also during this phase of the research, models will be built for analyzing effects on costs of changes in operating conditions.

3. Attempt to determine pipeline costs both in absolute terms and in comparison with alternative conventional collection and transportation systems.



**Scabies (The Itch).** *PHS Publication No. 79, Health Information Series No. 11; revised 1967; leaflet; 5 cents, \$2 per 100.* Presents, for the general public, information on the disease caused by the parasitic scabies mite. Describes how mites attack human beings and how infection should be treated.

**Malaria.** *PHS Publication No. 166, Health Information Series No. 41; revised 1967; 5 cents, \$2 per 100.* Gives a brief statement for the general public on malaria. Tells how it is spread, fought, and what to do in case of illness. Also relates what is being done internationally to eradicate it.

**Emergency Health Services. Definition of program content for Bureau of Health Operations.** *PHS Publication No. 1071-A-6; 1967; 230 pages.* Gives a brief statement of functions and activities in pre-attack period for the program categories of the Emergency Health Services of the Bureau of Health Operations. Presents charts showing the government responsibilities at all levels, Federal to community, for the in-and-out phasing of each program activity.

**A Skin Test Survey for the Prevalence of Schistosomiasis in Puerto Rico.** *PHS Publication No. 1525; 1966; 100 pages; 65 cents.* Presents the findings of a study to determine the prevalence of schistosomiasis in Puerto Rico. Discusses technique and sample of population. Publication should be of special interest to parasitologists, researchers in tropical medicine, physicians in Puerto Rico, and public health epidemiologists. The statistical method upon which this report was based may be of use to investigators planning similar extensive surveys.

**To the First Americans. A report on the Indian health program of the U.S. Public Health Service.** *PHS Publication No. 1580; 1967; 20 pages; 15 cents.* Summarizes the health services provided Alaskan Native and Indian populations since the

Public Health Service assumed responsibility for the program in 1955. Contains photographs and charts and lists Indian health facilities.

**Laboratory Aspects of Syphilis.** *PHS Publication No. 1602; May 1967; 21 pages; 25 cents.* Discusses laboratory procedures. Presents text in outline form which is designed to provide a basic understanding of syphilis serology and its interpretation.

**Systemic Lupus Erythematosus.** *PHS Publication No. 1616; 1967; leaflet; 5 cents.* Describes systemic lupus erythematosus. Tells what causes the disease, which persons are most frequently affected, and gives the symptoms. Discusses treatment methods presently used and the progress that is being made in research.

**Groups in Disaster.** *1967; 8 pages.* Presents a reprint of a report by Dr. Michael L. Connell on the reactions of refugees from Hurricane Betsy in the New Orleans area who were sheltered at Algiers Naval Base. The mental health of the occupants was observed during personal contacts with persons and in group discussion periods in which the refugees related their disaster experiences and reactions. Discusses some of the natural groupings which shelter occupants form and points out the psychological reactions of individual persons and groups to shelter living and to the disaster experience itself.

**Catalog and Guide for Distribution of Packaged Disaster Hospital Materials, Series 54000-57000.** *PHS Publication No. 1071-F-15-A; 1967; 171 pages; \$1.50.* Lists all items contained in the Packaged Disaster Hospital, Series 54000 and 57000, including Supply Additions Nos. 1 and 2 and the Laboratory Service Unit. Describes items and identifies them by Federal stock number, quantity in PDH and supply additions, unit of measurement, and case number in which packed. Includes information on initial delivery point for cases containing item and subsequent re-

distribution when identical items must go to more than one PDH section. Also contains cross-reference checklists on delivery of cases by number and by hospital section. Publication was prepared for persons concerned with storing, establishing, unpacking, setting up, and operating the 54000 through 57000 Series Packaged Disaster Hospital. It will also aid in locating urgently needed items in a disaster when only a portion of the PDH components are required.

**Coordinated Home Care Programs. 1964 survey.** *PHS Publication No. 1479; December 1966; 72 pages; 30 cents.* Contains a brief history of home care programs in the United States, based on a 1964 survey. Describes the types of services provided. The publication is designed to stimulate the development of home health services provided by home health agencies that can meet the standards for participation in the Medicare program.

**State Legislation and Regulations Involving Ionizing Radiation.** *PHS Publication No. 1574; January 1967; 47 pages.* Summarizes developments of the past decade in State legislation and regulations affecting radiation protection and control. Includes tabulations, by States, of enacted, proposed but not passed, and not completed legislation for the calendar year 1965. The not completed legislation is a valuable indicator of current trends.

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This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared with Federal support.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington, D.C. 20201.

The Public Health Service does not supply publications other than its own.

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**MCCULLOUGH, J. JEFFREY** (Minnesota Department of Health), **ROSSOW, GERALD**, and **HILLER, ROBERT**: *Leukemia deaths in Minnesota 1950-64. Trends and patterns. Public Health Reports, Vol. 82, November 1967, pp. 946-956.*

The distribution of leukemia deaths throughout Minnesota during the period 1950-64 was determined from death certificate information and analyzed. During these 15 years, leukemia death rates for the total population showed no significant increase. Death rates for persons 65 years of age and over, however, in-

creased significantly. A significant decrease in leukemia death rates in children under 15 years of age also occurred, caused primarily by a decreasing death rate in boys 0-4 years of age.

Our study supports previous suggestions that leukemia death rates are becoming constant in areas which

have had high leukemia death rates in the past and that they are actually declining in some younger age groups.

No portion of the State had persistently elevated leukemia death rates, although they appeared to be higher in the more populous southern portion. The rates in St. Paul were consistently and significantly higher than in Minneapolis, and both cities had rates higher than the rural portions of the counties in which they are located.

**LAESSIG, RONALD H.** (University of Wisconsin and State Laboratory of Hygiene), **BASTEYNS, BARBARA, J.**, **UNDERWOOD, CHESTER E.**, and **INHORN, STANLEY L.**: *Evaluation of cholesterol determinations among clinical laboratories in Wisconsin. Public Health Reports, Vol. 82, November 1967, pp. 957-964.*

The State of Wisconsin is conducting an external quality control program to evaluate cholesterol determinations among clinical laboratories. The laboratories are participating voluntarily, and they include a cross section of types—hospital, clinic,

group practice, individual physicians' offices, and independent laboratories.

The results obtained during the first 2 years of the program, 1964-66, by 69 laboratories were evaluated in two ways: (a) by their method of analysis (direct or extraction) and

(b) by laboratory groups, according to size of workload, use of commercial kits, directors' training, and other factors.

Laboratories using direct methods of analysis showed elevated results, while the results of those using extraction methods correlated more closely with actual cholesterol levels. Generally, by the criteria chosen for evaluation, one-half of the participants performed at acceptable levels, one-fourth at the middle level, and one-fourth at unacceptable levels.

**GORDON, TAVIA** (Public Health Service): *Further mortality experience among Japanese Americans. Public Health Reports, Vol. 82, November 1967, pp. 973-984.*

Around 1960, as in previous decades, the Japanese in the United States had lower death rates than the white population. Indeed, the differences were even greater than they had been a decade earlier. For Japanese men aged 25-64 years the reported rate in 1960 was half that for white men.

In 1950 there had been a low death rate for diseases of the heart and a high death rate for vascular lesions

affecting the central nervous system in Japanese Americans relative to white Americans. Similar but greater contrasts were evident between the Japanese of Japan and the white population of the United States. Around 1960 the Japanese American retained these differentials for diseases of the heart, mortality for that group of causes remaining intermediate between mortality for white

Americans and for Japanese of Japan. The differential in mortality for vascular lesions, however, became attenuated.

There was no difference between native- and Japan-born Japanese Americans in mortality for these causes in 1960. Differences in heart disease mortality between American Japanese resident in Hawaii and on the mainland were relatively minor when compared with their differences from white Americans, on the one hand, and the Japanese of Japan, on the other.

**HELD, JOE R.** (National Communicable Disease Center, Public Health Service), **TIERKEL, ERNEST S.**, and **STEELE, JAMES H.**: *Rabies in man and animals in the United States, 1946-65. An epidemiologic review. Public Health Reports, Vol. 82, November 1967, pp. 1009-1018.*

During the 20-year period 1946-65 the incidence of dog rabies in the United States declined markedly, with a concomitant decline in the number of persons who died of rabies. In the same period, however, there was an increase of cases of rabies in wildlife, principally in skunks, foxes, bats, and raccoons. Wildlife species are now responsible for half the cases in man. The presence of wildlife rabies makes it im-

perative to continue rabies control programs for dogs. More information on the epidemiology of wildlife rabies and better methods of controlling the disease among these species are needed.

Among human beings, although all ages of both sexes were affected, the majority of cases were in males and in children, presumably because of a greater chance of exposure and possibly greater susceptibility and likeli-

hood of more severe exposure among children.

There is evidence that postexposure immunoprophylactic therapy prevents some cases of the disease in man, particularly in persons for whom longer incubation periods would have been expected. There is no evidence that nervous tissue vaccine is more or less effective than duck embryo vaccine. Pre-exposure immunization of persons in situations where there is a high risk of exposure to rabies should be considered.

**HAY, SYLVIA (Public Health Service):** *Variables in under-reporting of clefts on birth certificates. Public Health Reports, Vol. 82, November 1967, pp. 985-993.*

The birth certificates of 1,039 babies reported by 26 State Crippled Children's Service agencies to have been born in 1963 with a cleft lip or cleft palate, or both, were examined for the completeness and accuracy of reporting of the malformation. The certificates showed that 77.8 percent of the children (808 patients) had some type of cleft; the overall rate of under-reporting was 22.2 percent. The rate of under-reporting was highest for isolated cleft palate and lowest for cleft lip and palate com-

combined. The completeness of reporting among States varied widely.

For the following variables no significant difference was found between the cases reported on birth certificates and those not reported: age of mother, age of father, birth weight, month of birth, and, with the exception of isolated cleft lip, sex of child.

The reported and nonreported cases differed significantly for the following variables: race of mother, with Negroes having the highest rate

of under-reporting; place of delivery, with nonhospital births having higher under-reporting rates than hospital births; sex—for cases of isolated cleft lip, with males less well reported; and the number of associated congenital malformations, with a higher rate of under-reporting for cases of multiple malformations than cases in which only a cleft occurred.

The results of the study indicate that despite general under-reporting of cleft lip and cleft palate on birth certificates, results based on analyses of clefts reported on birth certificates may be accepted as valid within certain limitations.

**MCCARTHY, MARY A. (National Center for Health Statistics):** *Selected types of poisoning as causes of accidental death, United States, 1964. Public Health Reports, Vol. 82, November 1967, pp. 1025-1029.*

In 1964 there were 1,817 deaths in the United States attributed to 18 separately identified solid and liquid substances, categories E870-E887 of the International Statistical Classification of Diseases, Injuries, and Causes of Death. In addition, 283 deaths were assigned to the residual category E888, which includes deaths from combinations of substances, substances not separately identified, and those of an undetermined type.

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**JOHNSTON, PHILIP W. (Massachusetts Department of Public Health):** *Factors associated with deafness in young children. An evaluation. Public Health Reports, Vol. 82, November 1967, pp. 1019-1024.*

The mothers of 118 deaf children were questioned intensively about the physical and mental disorders of members of their families, their families' dietary habits, exceptional events in their pregnancies, hereditary influences, and numerous other factors which might have contributed to their children's deafness. A control group of 54 mothers of hearing children also was interviewed in a parallel manner.

The results of this study pointed to certain factors which had not been given sufficient attention as probable causes of deafness in young children. These factors included absence of

fetal movement in the third or fourth month of pregnancy, maternal thyroid deficiency, breech delivery, and body blueness in the neonatal period. Other significant etiological elements in the pattern of deafness included maternal measles in the first trimester of pregnancy, bleeding in pregnancy, birth weight under 4 pounds 8 ounces, and administration of mycin drugs before the infant was 1 month old.

Hearing loss was not suspected in 50 percent of the deaf children until some time between 8 months and 48 months of age although most of the children probably were deaf within

2 months after birth. The importance of improving methods of early detection of hearing loss is thus emphasized.

Etiological classification of deafness in 118 children showed the causes were maternal rubella in the first trimester, 28 percent; hereditary factors, 12.7 percent; blood incompatibility, 4.2 percent; childhood meningitis, 3.4 percent; maternal influenza in the first trimester, 2.5 percent; and maternal chickenpox or scarlatina in the first trimester and child trauma, 0.8 percent each. In this group approximately 39 percent had histories of frank abnormalities, but the cause of their deafness was unknown. The remaining 7.6 percent had essentially normal histories.



**HOROWITZ, HERSCHEL S. (Public Health Service), MAIER, FRANZ J., and LAW, FRANK E.:** *Partial defluoridation of a community water supply and dental fluorosis. Public Health Reports, Vol. 82, November 1967, pp. 965-972.*

Since November 1948, excessive fluorides have been removed chemically from the community water supply of Britton, S. Dak. The water supply originally contained an average of 6.7 ppm fluoride. Hydroxy apatite was used as the defluoridating agent for the first 4 years of operation, but since January 1953 bone char has been used instead because it is more effective and efficient in reducing the fluoride content to the desired target level (1.5 ppm).

A baseline survey, using Dean's classification, was conducted in 1948, just prior to the initiation of partial defluoridation, to determine the prevalence and severity of fluorosis among school children who had used

the city's water supply since birth. Followup surveys were made in 1960 and 1965 to determine whether or not there had been any changes in the extent of fluorosis after partial defluoridation.

The findings showed less fluorosis among Britton children in 1960 than in 1948 and still greater improvement in 1965. The results in 1965 were particularly striking for those children less than 11 years old, essentially all of whom were born subsequent to the use of bone char as the defluoridating medium. Originally children in this age group had had a fluorosis index of 2.44; by 1960 the corresponding index had fallen to 0.90; and by 1965 it had reached 0.68, a 72 percent re-

duction compared with the baseline figure. Whereas all of these younger children had been classified as having fluorosis in 1948, only 29 percent were so classified in 1965, and nearly all of these demonstrated the milder forms of fluorosis.

Because more than 4 million persons live in communities served by water supplies containing excessive fluorides, dental fluorosis remains a serious dental public health problem. The successful removal of excessive fluorides in Britton with the use of bone char and in Bartlett, Tex., with activated alumina, plus the concomitant improved appearance of the teeth of children reared on the partially defluoridated water, should stimulate public health leaders in other communities with excessive fluorides to adopt similar measures to improve the appearance of their children's teeth.

**KING, BARRY G. (Public Health Service), and SOX, ELLIS D.:** *An emergency medical service system—analysis of workload: San Francisco area. Public Health Reports, Vol. 82, November 1967, pp. 995-1008.*

Determination of workload is an essential step in a systems analysis of the operation of an emergency medical service system. In a sample of 11,564 cases from four emergency hospitals in the San Francisco emergency medical service, approximately 33 percent of all emergencies were handled by the ambulance subsystem. The remaining emergency patients were admitted directly to the emergency hospitals. An average of 143 persons per day were admitted to the four hospitals—43 ambulance and 100 nonambulance.

The maximum difference in percentage distributions of the workload by day of week was 3 percent. The distribution of workload by time of day for ambulance emergencies increased about 14 percent from the low at 4 a.m. to 6 a.m. to the high at

10 p.m. to midnight; the increase for nonambulance emergencies from the low at 4 a.m. to 6 a.m. to the high at 6 p.m. to 8 p.m. was about 12 percent.

Provisional diagnoses at the hospitals showed that 64 percent of the emergencies resulted from accidental trauma and of these, about 12 percent were incurred in motor vehicle accidents. Illness, suicide, and assault were the causes of 34 percent of the emergencies.

Ambulances were available for dispatch without delay for 99 percent of the calls received. In 70 percent of the runs of 3 miles or less the ambulance reached the scene within 5 minutes, and in 99.5 percent within 15 minutes. Patients had left the scene of the emergency or refused service when the ambulance arrived in 10

percent of the calls. In 72 percent of the runs patients were transported to an emergency hospital; the remainder were treated at the scene, referred to a private physician, or released to the coroner. Ambulance crews remained at the scene for 15 minutes or more in 40 percent of the runs and for 5 minutes or less in the remaining 60 percent. The crews performed additional duties when not on emergency calls.

The majority of patients admitted to the emergency hospitals were referred for further care or sent home within 15 minutes, although some remained for periods up to 12 hours.

Accumulation of information on individual cases provides input data for developing and conducting computer simulation studies on the distribution of workload of an emergency hospital and of other parts of the emergency medical service at any given time.