Recent Trends for Pneumonia Mortality

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PNEUMONIA mortality, excluding pneumonia of the newborn (under 4 weeks) and influenza with pneumonia, demonstrated a spectacular decrease from 1937 to 1949, which was ascribed mainly to use of sulfa drugs and antibiotics. After little change over a 4-year period, a rate of 23.8 per 100,000 population was recorded in 1954. This was the lowest death rate ever reported for pneumonia in the United States, except for the South Atlantic, West South Central, and Mountain districts where pneumonia mortality was slightly lower in 1955. Whereas mortality rates for influenza have fluctuated widely, with recent outbreaks occurring in 1953, 1957–58, and 1960, pneumonia mortality rates have remained consistently higher since 1954 (fig. 1).

In Canada and England and Wales also, pneumonia mortality rates have been consistently higher since 1954. Sweden had its lowest recorded rate, 35.0 per 100,000 population in 1952, and for the period 1950–58 its highest rate, 48.0, was reported in 1958.

In the United States, annual death rates for pneumonia were higher from 1957 to 1960 than for any year since 1948 (fig. 1). The change in the method of selecting the underlying cause of death in the sixth revision of the International List is at least partly responsible for the abrupt drop in the mortality rate for pneumonia in 1949. With the fifth revision a fixed set of priorities was used to select the cause when more than one cause of death was reported. The rules of the sixth revision specify that the underlying cause of death indicated by the physician shall be the cause used for tabulation. Coding of a 10 percent sample of death certificates for 1950 according to the two methods of cause-of-death classification showed about 15 percent fewer deaths classified as pneumonia by the sixth revision. Moreover, reclassification of pneumonia among infants under 4 weeks old also resulted in fewer deaths ascribed to pneumonia, except pneumonia of newborn, than to the previous pneumonia category, which included newborn. Assignment of deaths according to the sixth and seventh revisions of the International List for a 10 percent sample of deaths in 1958 also showed a small decline reflected in the drop in the death rate from 1957 to 1958. However, these changes did not interrupt the trend.

The trends in pneumonia death rates for white and nonwhite males and females are similar, but the difference between rates is notable. In 1960 the mortality rate for nonwhite males was 65.7 per 100,000 population; nonwhite females, 43.0; white males, 35.1; and white females, 25.3. The low 1954 mortality rate with subsequent increases is most marked for those aged 25 years and over. No marked upward trend is evident for children and youth (fig. 2). The peak in mortality in the influenza epidemic year 1957 is most evident for the age groups under 35 years.

The death rate for lobar pneumonia increased slightly in 1955 and sharply in 1957, but the rates for 1958 (5.4), 1959 (5.0), and 1960 (5.6) were the lowest ever recorded. Deaths ascribed to pneumococcus pneumonia are coded as lobar pneumonia. The increase in the low rate for primary atypical pneumonia has been very slight. Bronchopneumonia showed the most marked increase in the recorded death rate in recent years, from 12.3 per 100,000 population in 1954 to 17.6 in 1959 and 19.2 in 1960. Pneu-

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monia recorded as other or unspecified also showed an increase of 89 percent in the rate for 1960 over the rate for 1954.

Military Personnel

The reported rates for selected diagnoses among Navy and Marine Corps personnel showed increased incidence rates per 100,000 average strength for both lobar pneumonia and bronchopneumonia since 1954, while rates for primary atypical pneumonia have been lower in recent years than in 1950–56, with a notable drop in 1953 after the close of the Korean War. Incidence rates per 1,000 average strength among active-duty Army personnel also increased almost without interruption for lobar pneumonia although incidence of bronchopneumonia showed relatively less change. The primary atypical pneumonia rate for Army personnel was 1.42 per 1,000 average strength in 1959 in contrast with 6.54 in 1951.

Bacterial Types

Unfortunately, few sources can provide data on bacterial type. Data from the Columbia-Presbyterian Medical Center, New York City,

Figure 1. Annual pneumonia mortality per 100,000 population, excluding pneumonia of newborn, by race and sex, United States, 1930–60

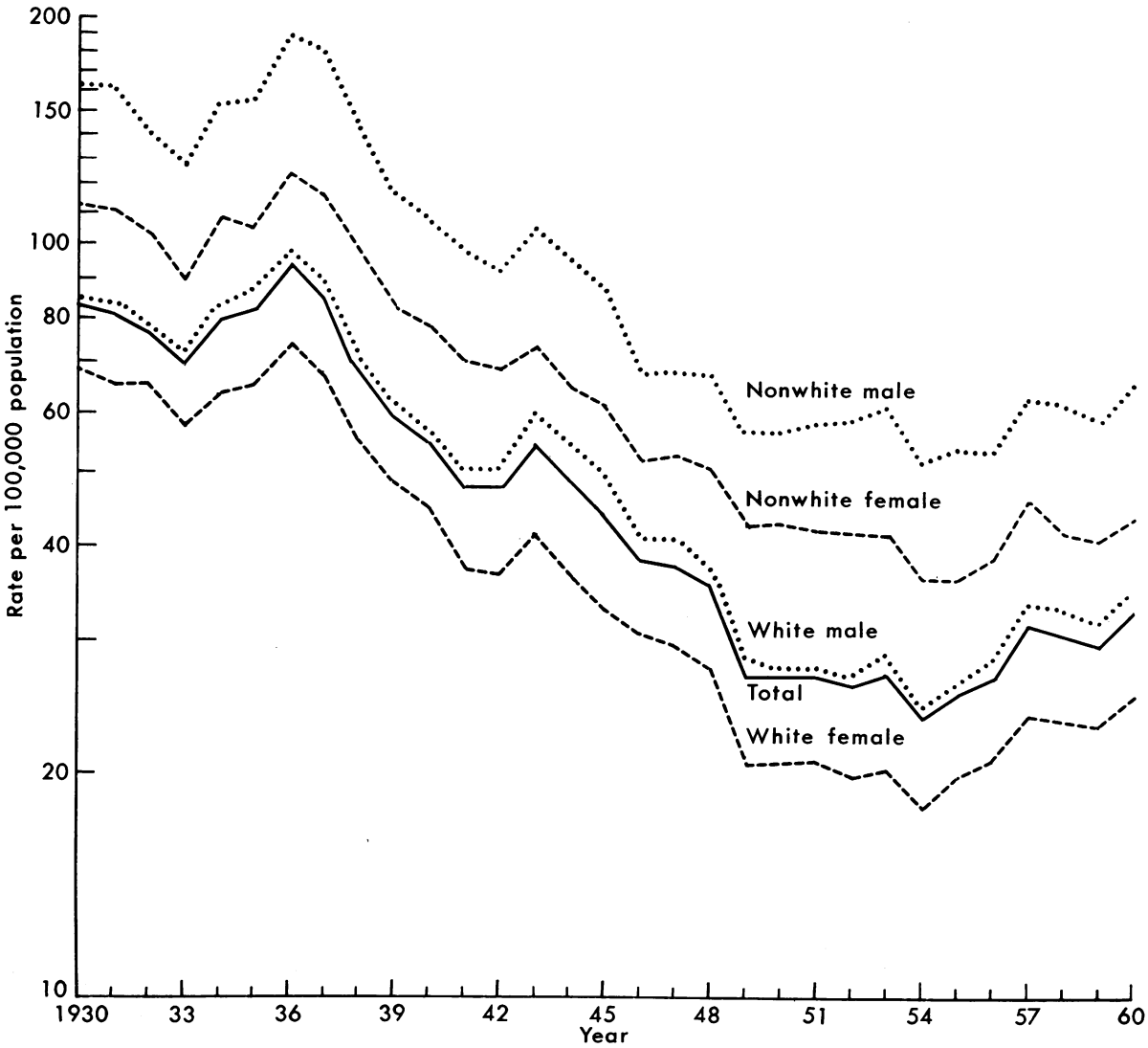
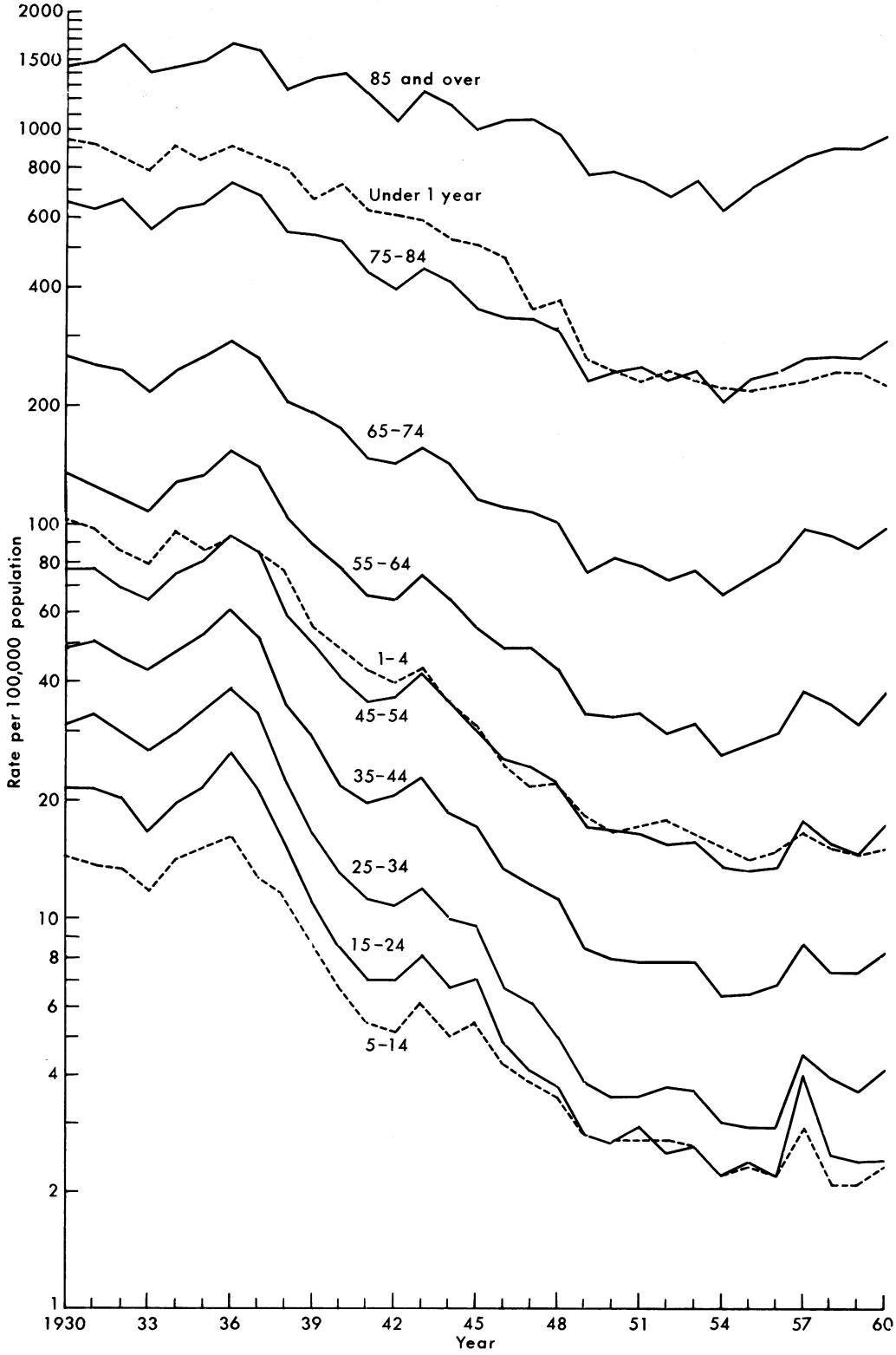


Figure 2. Annual pneumonia mortality per 100,000 population, excluding pneumonia of newborn, by age, United States, 1930–60



show the majority of cases with "other or unspecified" type (see table). The size of the sample and other possible variables may cause conclusions drawn from these data to be guarded. Perhaps the abrupt rise in 1957, when an Asian influenza epidemic occurred, and the continuing increased level in the number of staphylococcal pneumonia cases is noteworthy. Other evidence supports this change. Deaths from septicemia and pyemia due to staphylococcal infections have increased steadily since 1949, with an abrupt rise in 1954, while deaths from these causes with streptococcal and pneumococcal infections declined (*1*). The numbers of deaths from septicemia and pyemia have been relatively few, with a rate of 11 per million in 1960.

In a study of bacterial infections at Boston City Hospital for selected years from 1935 to 1957, Finland found that the pneumococcus, which was the most frequent invader of the bloodstream in 1935, showed a significant drop in 1955 and 1957 (*2*). A great increase occurred in the number of patients with bacteremia due to *Staphylococcus aureus*. In 1957 there were nearly four times as many cases as in 1935 and more than twice as many as in 1947. The number of deaths in patients with *S. aureus* increased nearly fourfold between 1947 and 1957. The proportion of autopsies yielding *S. aureus* in the total number of autopsies from which cultures were made also showed a notable increase. Finland concluded that there is a changing pattern of serious staphylococci and other specific bacterial infections in relation to the use of the antimicrobial agents. A related study based on the same data showed that whereas pneumococci and hemolytic streptococci formerly accounted for three-fourths of all deaths from such infections, they more recently accounted for less than one-eighth of the deaths (*3*). In each 10-year age group a sharp drop in mortality occurred from 1935 to 1941 and a slower one to 1947 followed by a definite increase, particularly in 1956 and 1957. These data indicate that the bacteria that were formerly the most important causes of severe infection and mortality and were also the most susceptible to antibiotics have now been reduced to a relatively minor role.

In a general medical ward of the Second Medical (Cornell) Division of Bellevue Hospital, New York City, where 294 patients were studied over a 6-month period, transmissibility of staphylococci was considerably increased among patients receiving tetracycline therapy (*4*). Other studies suggested that acquisition rates of new strains of staphylococci were higher among patients receiving chemotherapy and higher among those receiving tetracyclines than among these receiving only penicillin.

Finland and Haight reported that 500 strains of hemolytic coagulase-positive *S. aureus* were isolated from clinical material at the Boston Hospital from October 1951 to February 1952 and tested for sensitivity to nine antibiotics (*5*). The authors concluded that the data sug-

Hospital admissions for lobar pneumonia and bronchopneumonia, by bacterial type, Columbia-Presbyterian Medical Center, New York City, 1950–61

Year	Total	Number of admissions by bacterial type				
		Pneumococcus	Staphylococcus	Streptococcus	Friedlander's bacillus	Unspecified and other
1950	558	96	3	0	1	458
1951	443	82	5	2	1	353
1952	413	64	7	1	5	336
1953	394	41	4	0	0	349
1954	427	54	3	4	1	365
1955	465	68	6	2	2	387
1956	493	38	8	1	6	440
1957	585	62	20	1	2	500
1958	575	74	32	7	2	460
1959	529	50	11	0	5	463
1960	494	65	22	1	5	401
1961	557	47	22	1	10	477

gested that while previous antibiotic therapy of any given patient may be an important factor in the occurrence of strains resistant to that antibiotic, the widespread use of antibiotics may be of equal or greater importance in the increase in incidence of staphylococci which are resistant to those antibiotics.

Antibiotic Production

The increasingly widespread use of antibiotics is indicated by the striking rise in production. Production of antibiotics for human or animal use, except animal feed, has increased each year since 1950 except 1955 and 1959. Production in 1961 of 3,311,000 pounds increased 288 percent over the 853,000 pounds produced in 1950. Antibiotics produced for animal feed supplements, food preservation, and crop spraying rose from 236,000 pounds in 1951 to 1,819,000 pounds in 1961. The volume of penicillin salts increased from 138,103 billion international units produced in 1949 to 648,578 billion in 1961.

Hospital Admissions

A survey of 248 selected reports on the incidence of penicillin-resistant strains of staphylococci from 1942 through 1959 shows a peak in percentage of nonhospital cases in 1958, with 54.5 percent resistant strains, followed by a decrease in 1959 (*6*). In hospital cases a steady increase occurred in penicillin-resistant strains after 1948 with a decrease each year after the high point of 67.7 percent in 1956.

In a survey of 87 hospitals included in a professional activity survey of 1959, an average of one-third of all patients, exclusive of newborns, received antibiotics (*7*). Among 33 hospitals with fewer than 5,000 discharges per year, from 14.3 percent to 93.2 percent, with an average of 41.5 percent, of the patients had received antibiotics. Other hospitals grouped by size showed less variation and an average close to that for the total.

The number of patients admitted to U.S. hospitals which report to the American Hospital Association (6,923 in 1961) increased in short-term general and other special hospitals from about 14 million in 1946 to more than 23 million in 1961; the admission rate for short-term hospitals rose from 98 to 128 per 1,000 population (*8*). Part of this increase is ascribed to a larger number of reporting hospitals, but there has also been an increase in use of hospitals with the extension of surgical and medical insurance.

Conclusions

A theory of changing etiology is suggested, with pneumococci and hemolytic streptococci no longer the bacterial agents responsible for as large a proportion of pneumonia mortality. The evidence indicates that the higher level of pneumonia mortality in recent years may well be the result of the increasing prevalence of organisms resistant to antibiotics.

The mortality trend for pneumonia showed a marked decline from 1936 to 1948 followed by a leveling off and a higher rate since 1954 or 1955 in all divisions of the United States. The increase has occurred chiefly in deaths from bronchopneumonia and in older age groups. An increase in hospital admissions and deaths for pneumonia with *Staphylococcus aureus* is suggested.

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(*6*) Munch-Petersen, E., and Boundy, C.: Yearly incidence of penicillin resistant staphylococci in man since 1942. Bull. World Health Organ. 26: 233 (1962).

(*7*) Commission on Professional and Hospital Activities: Antibiotic usage. Professional Activity Study Report 35. Ann Arbor, Mich., Aug. 14, 1959.

(*8*) Hospitals 36: 403, Aug. 1, 1962, pt. 2.

Federal Publications

The Struggle for Clean Water. *PHS Publication No. 958; 1962; 21 pages; 15 cents.*

This booklet, developed jointly by the Division of Water Supply and Pollution Control, the Office of Education, and the Children's Bureau, is the first in a series designed to provide educators and students with information about recent developments in vital health and welfare fields.

Discussions deal with the need for clean water in our everyday lives, the causes and effects of polluted water, its hazards to health and economic growth, and treatment of wastes. The Federal programs for aiding in construction, law enforcement, research, and cooperative river basin planning to clean up the nation's waters are outlined.

Activities of the National Institutes of Health in the Field of Gerontology, January 1962. *PHS Publication No. 935; 1962; 47 pages; 35 cents.*

Extramural research and training projects active on January 31, 1962, and intramural research projects carried on during calendar year 1961 are listed.

Studies related to the basic biological processes of aging and to health-related problems of older persons are included.

Leptospirosis. Epidemiology, clinical manifestations in man and animals, and methods in laboratory diagnosis. *PHS Publication No. 951; 1962; by Mildred M. Galton, Robert W. Menges, Emmett B. Shotts, Jr., Andre J. Nahmias, and Clark W. Heath; 70 pages; 30 cents.*

The first section of this reference booklet describes the known distribution of leptospirosis in man and animals in the United States and current aspects of the epidemiology of the disease, including avenues of transmission, occupational hazards, age, sex, and seasonal prevalence, and control measures. It also discusses clinical features of leptospirosis in man and animals.

General methods in diagnosis and recommended procedures for isolation of leptospires by direct culture and animal inoculation are presented in the second section. Serologic tests for the detection of antibodies and identification of the organisms are outlined in detail.

Dental School Planning. *PHS Publication No. 940; 1962; 113 pages; 70 cents.*

Intended as a general guide for educators, architects, and others responsible for planning new dental schools, this publication discusses the changes occurring in content and teaching methods of dental education and their effect on school facilities. It considers in detail the steps in programing a school; offers general and specific suggestions for the arrangement and space allocation for laboratories, clinics, and administrative and other offices; and presents methods for estimating costs. Space tables for schools with entering classes ranging in size from 48 to 112 students are presented in an appendix.

Home Sanitation. *PHS Publication No. 231 (Health Information Series No. 39); revised 1962; 5 cents, $2.50 per 100.* Gives standards for food protection, water supply, sewage and refuse disposal, insect and rodent control, light and ventilation, and heating and plumbing.

Elements of Progressive Patient Care. *PHS Publication No. 930–C–1; September 1962; 65 pages; 45 cents.*

To aid hospitals planning to introduce progressive patient care, the concept and history of this type of organization are explained; its fundamental principles are discussed; and guidelines for organizing the patient care units are provided. Suggestions for hospital design and equipment are also included.

This publication is a revision and extension of material published under the same title as a tentative draft in 1959.

Resources for Medical Research. Federal expenditures for medical and health-related research, 1960–1963. Report No. 1. *PHS Publication No. 969; 1962; 15 pages; 20 cents.*

Recent trends in Federal expenditures for medical and health-related research are analyzed.

The report shows the relationship between these outlays and Federal support for research and development in all fields, distribution of support among Federal agencies, and distribution of the Federal medical and health-related research dollar by performer and by field of science.

Flies of Public Health Importance and Their Control. *PHS Publication No. 772, pt. V; 1962; by Harold G. Scott and Kent S. Littig; 40 pages; 30 cents.*

The public health importance and the biology, identification, survey, and control of flies associated with human diseases are discussed. Portraits, pictorial keys, equipment diagrams, and selected references are presented. The operation of communitywide fly control programs is described.

The Teacher and Mental Health. *PHS Publication No. 385; revised 1962; 27 pages; 20 cents.*

Designed to help the classroom teacher meet the emotional needs of each of his pupils, this pamphlet spells out basic principles of emotional growth and human relations and provides pointers as to how the teacher can implement them in classroom situations.

Also discussed are the teacher's attitudes, ways in which the teacher can help the child grow, resources to which the teacher can turn to learn more about mental health, and where the teacher can look for assistance in handling special problems.

A list of mental health publications and films, which present classroom problems in general terms or discuss specific developmental processes and behavioral problems, is included.

The National Institute of Allergy and Infectious Diseases. *PHS Publication No. 945; 1962; 25 cents.*

This illustrated brochure describes briefly the research program of each of the 10 intramural laboratories comprising the National Institute of Allergy and Infectious Diseases and outlines the institute's extramural programs.

A preface by the director gives a brief history of research milestones, with particular emphasis on scientific accomplishments in infectious disease research in the early days of the Public Health Service.

Hospital Equipment Checklist (Group I–Built-In). *PHS Publication No. 930–D–2; 1962; 24 pages; 25 cents.* Provides checklists for equipment as a guide to planning for hospital construction under the Hill-Burton Program. Includes cost data for built-in equipment frequently purchased on the open market.

Lighting for Hospital Patient Rooms. *PHS Publication No. 930–D–3; 37 pages; 35 cents.* Reports a two-part study to determine lighting requirements for hospital patient rooms, to develop lighting criteria, and to recommend methods of providing illumination in patient rooms that most economically and satisfactorily meet the needs of patients and the hospital staff. Includes a tentative code of lighting levels and brightness.

Hospital Equipment Planning Guide. *PHS Publication No. 930–D–4; 1962; 66 pages; 45 cents.* Provides suggested equipment lists for 50-, 100-, and 200-bed general hospitals and discusses planning and preparation of a list for a new general hospital. Includes charts on estimated equipment costs and sample forms for use in preparing equipment lists required of applicants for Hill-Burton assistance.

Hill-Burton State Plan Data: A national summary as of January 1, 1962. *PHS Publication No. 930–F–2; 1962; 90 pages; 50 cents.*

Data from the latest Hill-Burton State plans on general, mental, tuberculosis and long-term care beds, public health and diagnostic and treatment centers, and rehabilitation facilities are summarized. Included also are current estimates of additional needs and data on trends since the enactment of Hill-Burton legislation in August 1946.

Grants for Migrant Family Health Services. *PHS Publication No. 971; October 1962; leaflet.*

The purpose and requirements of new legislation which authorizes the Public Health Service to make project grants to improve health conditions and services for the nation's domestic migrant farmworkers and their families are explained. The leaflet outlines the types of activities sought, the criteria for reviewing applications, and how and where to apply for grants. It gives examples of public agencies and nonprofit organizations eligible to apply for grants.

Reported Tuberculosis Data, 1962 edition. *PHS Publication No. 638; revised 1962; 45 pages.* Presents statistics on tuberculosis morbidity, mortality, and casefinding.

Nurses in Public Health. *PHS Publication No. 785; revised 1962; 72 pages; 40 cents.*

Based on data collected by directors of public health nursing in State health departments, this publication shows the number and educational preparation of nurses employed in each State, Puerto Rico, and the Virgin Islands on January 1, 1962. The census covers professional nurses employed full or part time for public health work by State and local, official and nonofficial public health agencies, boards of education, and industry. Also included are practical nurses employed to supplement the work of public health nurses and data on primary and secondary areas of responsibility assigned to nursing consultants in State and local health agencies.

The report should be useful to health agencies, professional organizations, universities, and national groups concerned with health manpower resources.

Simple Goiter. *PHS Publication No. 100 (Health Information Series No. 56); revised 1962; pamphlet; 5 cents, $2 per 100.* Gives etiology, symptoms, and effects of goiter. Recommends use of iodized salt in low-iodine areas, emphasizes importance of diagnosis and treatment by a physician, warns against neglect and home treatment.

Smallpox. *PHS Publication No. 230 (Health Information Series No. 27); revised 1962; 5 cents, $2 per 100.* Emphasizes prevention by vaccination; discusses cause and spread; describes symptoms and warns against confusing smallpox with chickenpox.

Health Statistics From the U.S. National Health Survey

CHRONIC CONDITIONS CAUSING LIMITATION OF ACTIVITIES, United States, July 1959–June 1961. *PHS Publication No. 584–B36; 1962; 39 pages; 35 cents.*

PERSONS INJURED, by detailed type and class of accident, United States, July 1959–June 1961. *PHS Publication No. 584–B37; 1962; 51 pages; 40 cents.*

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 25, D.C. 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 25, D.C.

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