

# The 25<sup>th</sup> Anniversary of the National Health Survey

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## The National Health Survey—in the Beginning

ALICE HAYWOOD

TWENTY-FIVE YEARS AGO, on July 3, 1956, President Eisenhower signed into law the National Health Survey Act of the 84th Congress, and thereby made possible continuing national surveys of health.

The act begat a family of statistical systems, for the founders of the National Health Survey planned not just a single survey but "a program of surveys, using different approaches and having changing end objectives as both the techniques and the needs for data evolve" (1). From those varied data systems have come much of the current knowledge about health in the United States, condensed in a series of more than 600 reports issued since 1958.

Accumulated year by year, the "bits and pieces" that are statistics slowly formed a picture. Some pieces of the picture are still missing but, because of the National Health Survey, the nation has a better basis than ever before for assessing health needs and planning action.

On this 25th anniversary of the

National Health Survey Act, it is appropriate to look back and to try to reconstruct what it was like in the beginning.

### Background

In the mid-1950s national health data sources included the reporting system for communicable diseases and the death registration system. Various health programs produced data related to their activities. Data that were both recent and representative of the general health status of the population were not so readily available. Statisticians in the Public Health Service (PHS) and elsewhere still relied primarily on the National Health Survey of 1935-36 as the basis for estimating the current level of illness and disability in the United States. That survey, part of a comprehensive National Health Inventory, had covered 700,000 urban families in a study of health under the depressed economic conditions of the time. Directed by George St. J. Perrott of the PHS, the survey had been financed by the Works Project Administration as a health promoting project that also would create jobs for some of the unemployed.

In the 20 years since the survey the country and its people had changed. Between 1936 and 1956 the country had gone from Depression to war to recovery; its population had grown from 128 million to 168 million, increasingly urbanized. Medical care had advanced, and so had health. The tuberculosis death rate had dropped from 71 per 1,000 population in 1936 to 9 per 1,000 in 1956, and the infant mortality rate from 57 per 1,000 live births to 26.

Over the 20-year period, too, the science of survey methodology and population sampling had advanced. The Census Bureau had experimented with questions on morbidity and disability in its monthly labor force survey. In the late 1940s and early 1950s came a series of health surveys. Among them were the California Department of Health's study of interviewing methodology, conducted in San Jose; the studies of handicapping conditions carried out by Community Studies, Inc., of Kansas City, Mo., and the Commission on Chronic Illness's "unique first attempt" to combine results of health interviews with comprehensive medical examinations of a repre-

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sentative population (1). The Census Bureau had done much to make a science of household sampling and, with the Public Health Service, had provided advice to those carrying out local surveys.

More than one proposal for a new national health survey had been made. The one that eventually became the basis for the National Health Survey Act was the report, "Recommendations for the Collection of Data on the Distribution and Effects of Illness, Injuries, and Impairments in the United States" (2), prepared by the Subcommittee on the National Morbidity Survey of the U.S. National Committee on Vital and Health Statistics. The subcommittee was chaired by Dr. W. Thurber Fales, and its members were Dr. George F. Badger, William G. Cochran, Dr. Edward Holmes, Dr. Morton I. Levin, Dr. Eli Marks, and Theodore D. Woolsey.

The subcommittee drew the blueprint for the National Health Survey—the types of data to be collected, the statistical standards to be met, and the types of studies needed. The report was submitted to Dr. Leonard A. Scheele, Surgeon General of the Public Health Service, in 1953.

A proposal for a national health survey in the President's 1956 legislative package was sparked by the need of the Department of Health, Education, and Welfare (DHEW) for information related to vocational rehabilitation—the number of people eligible for it each year, the number who could benefit—and by discussions between Charles Lawrence, Program Analysis Officer in the Office of the Secretary, who wanted the data, and Woolsey, a member of the subcommittee and a statistician in the Division of Public Health Methods, who recognized the need for the survey.

On January 26, 1956, the Presi-



*Specially designed mobile examination centers were equipped with X-ray and laboratory facilities, soundproof booth for hearing tests, and other special features needed to assure high quality data*

dent in his "Special Message on the Nation's Health Program" urged the Congress "to authorize the Public Health Service to secure periodically needed information on the incidence, duration, and effects of illness and disability in the Nation."

Once started, the proposal moved quickly. Legislation for a National Morbidity Survey was introduced, drew bipartisan support, and moved through hearings without memorable controversy. Along the way, the House of Representatives made three changes in the proposed legislation. It changed the title of the bill to National Health Survey Act, rendering its purpose understandable to the people who would be asked to provide information for it. The House also added a provision for the study of statistical methods and survey techniques, seeking continuing improvement, and it authorized the Surgeon General to make technical advice and assistance available on the application of statistical methods in health and medicine.

Six months after the health message, the National Health Survey

Act was law. A year later, on July 1, 1957, the act's "continuing survey" began, carried out by interviewing in 36,000 households selected to be a representative sample of the civilian, noninstitutionalized population of the United States.

The first formal report of findings appeared in February 1958. It gave preliminary estimates, based on 3 months of interviewing, of the volume of physician visits in the United States (3).

### **Creating the Survey**

Twenty-five years and some 900,000 household health interviews later, people who came early to the survey give great credit to their predecessors in the conduct of surveys and in population sampling. The National Health Survey staff were not a group starting from scratch. Much had been learned in the earlier surveys; much would be learned from the National Health Survey experience.

The new program was made a part of the Division of Public Health Methods. Forrest E. Linder was named director of the National



Dr. Carl Dauer, Survey medical officer, and the late Congressman John E. Fogarty of Rhode Island

Health Survey and Woolsey, assistant director. Walt R. Simmons, statistical advisor, Oswald K. Sagen, special studies, Philip S. Lawrence, household survey, and Alice M. Waterhouse, medical advisor, were senior program staff.

The act had authorized a three-part program: a continuing survey, special studies, and methodological studies. As the founders began to carry out the act, they defined their function and goals more precisely. The National Health Survey would not serve any single interest or meet needs for detailed local data. It would produce general data on the nation's health and show the various aspects in proportionate relationship to each other. Its unique responsibility would be the collection of the types of data which could be collected from a representative sample of the population or could be related to general population statistics (1).

Linder has written of the survey (4):

When the National Health Survey was set up as a continuing activity, we soon

decided that if we wanted to know about people's health, we would have to go to those people. Not even the most careful compiling and tabulating of data about people from physicians' or hospitals' case records would do. For one thing, such records have no standard content or level of detail. For another, any one person may seek care in the course of a year from a number of physicians, hospitals and clinics; their treatments of his conditions may overlap, and so will their records. Finally, even if all the technical difficulties could be corrected for, a major drawback would remain: medical records relate only to illness for which medical attention is sought, and there is a great deal of poor health that never comes to the attention of a physician or hospital.

Clearly the individual person is the only focus for all information about that person's life. It is only the individual himself who knows the total of his medical experiences: the illnesses, chronic conditions and injuries, the effect they have had on his life, and the places where he has sought treatment or preventive care.

The founders set other policies vital to a statistical program. They sought and received advice on needed data from inside and outside the Federal Government, particularly from the National Health Survey Advisory Committee. The staff strongly supported the study of statistical methods and survey techniques authorized by the act. Linder believed that criticism of your own data is the only way to make it better, and a substantial portion of the survey's budget went for methodological studies.

The act had authorized use of the Bureau of Census staff to conduct the household interviews for the survey, and a working relationship which continues was established soon after the act was passed.

Confidentiality was another immediate concern. Linder cites work toward the issuance of regulations by the Secretary of DHEW to protect the confidentiality of information reported in the survey as "the first thing I did." Legislation was later enacted to protect confidentiality.

For practical purposes, the household interview survey was the National Health Survey for several years. It began immediately, while the special studies authorized by the act were being developed.

Despite all their experience and the knowledge gained from earlier surveys, the National Health Survey's leaders still were not completely sure of what they would get. And believing that lay reporting of illness could not be translated to medical diagnosis, they chose to emphasize in the interview survey measurements of the effects of sickness and poor health on the individual as manifested in such ways as disability days and limitation of activity and mobility.

The National Health Survey's first questionnaire was modeled on the California health department questionnaire and ran to three 10½-by-16-inch pages. In addition to questions on acute and chronic conditions and impairments and their effects, it covered medical and dental care received, hospitalization, and the demographic characteristics of household members.

Robert Fuchsberg, one of the first statisticians with the survey and now director of the National Health Interview Survey, summed up the early attitude: "We put the best questionnaire we could come up with into the field in 1957, and then we set out to improve it. Data from those first years are not trends. We knew that there would be underreporting on some things and we were revising and rearranging the questions to improve reporting. It wasn't until the late 1960s that we felt we had a good core set of questions."

So the survey staff learned as they went along, through continuous appraisals of findings and methods. When estimates of hospitalization from the survey fell

short of estimates based on hospitals' reporting to the American Hospital Association, they set up a study to find out why. Another study matched reporting of illness in interviews with medical records of those interviewed and the researchers found that there were inadequacies in records, just as in interviews. The staff began to appreciate the importance of people's perceptions of their health; a lot of conditions were not reported in interviews because the respondents did not think of themselves as sick. Moreover, some people failed to report conditions which they considered embarrassing even when the condition was life threatening.

Almost immediately, in response to special needs, the survey began to cover new subjects with supplementary questions—in 1959, questions on needs for home nursing care and use of aids such as wheelchairs; in 1960, on health insurance coverage; in 1961, on X-rays. What evolved over time was a questionnaire comprising a core of standard questions, repeated annually, and single-time and recurring supplements (5).

In 1963, in accordance with a long-range plan set out at the beginning, the survey staff undertook a full-scale evaluation of what by then was called the Health Interview Survey and began to experiment with changes which the evaluation of the survey seemed to indicate.

### Reporting the Findings

The founders considered the entire health community, public and private, to be the survey's clientele, and publication of findings had high priority; several reports were issued based on 3 months of interviewing in the first year. To speed release and use of the data, those reports dealt with single topics. With a full year of data available,

a series of reports was begun that covered specific population groups, such as children and veterans.

The goal for each report was a scientific work. Statistical findings were to be presented fairly and impartially, and publication of each set of findings would be accompanied by descriptions of data collection methods, definitions of terms, and other information that would help the users assess the reliability of the data.

Occasionally, this approach was misunderstood. Lawrence remembers one meeting where he was introduced as the representative of the survey whose reports "present such wonderful information and then carefully explain why the information isn't very good."

The original publication series, "Health Statistics from the U.S. National Health Survey," had four parts: one for program descriptions, one for findings by topic, one for findings for population groups, and one for developmental and evaluation reports. Each part was distinguished by a cover of a different color. That series gave way in 1963 to the Vital and Health Statistics Series of the National Center for Health Statistics.

### The First Special Study

The National Health Survey Act authorized special studies as well as a continuing survey; the 1953 subcommittee report had called for special studies to complement the interview survey, including one "to obtain data on undiagnosed and nonmanifest disease."

There was no large-scale precedent for the Health Examination Survey that began in 1959 as a special study. In the early 1950s the Commission on Chronic Illness had examined a subsample of its interview sample in two locations, Baltimore, Md., and Hunterdon County, N.J. A national sample

would require examinations in rural areas, small towns, and cities across the United States. Valid data would require standardized examination procedures and staff trained to follow them precisely.

In addition to questions about the desired content of the examination, there were questions about feasible content. Could heart disease be diagnosed in a one-time cardiovascular examination? What should be the criteria on glucose tolerance when people could not be asked to fast before examination? In consultation with scientists from the National Institutes of Health and other institutions, examination standards were developed and tested.

In the end, the founders of the National Health Survey took the very bold step of employing a traveling staff and mobile examination units that would move to areas in the sample. In the end, costs and sampling requirements precluded linking the examination sample to the interview sample. As both surveys went on, it became clear that they measured different things and that both approaches were needed.

The decision to take the examination survey to the people opened up a nightmare of logistical complications: it meant establishing good relationships in 42 sample locations with medical and dental societies and public officials whose support was needed to get the persons selected for the sample to come in for examination; locating sites for the trailers which formed the examination center and for a field office; living arrangements for a staff who would stay in an area only a few weeks; contracts and permits for utility connections; laundry; cab service to transport examinees to and from examination; stocking an endless list of supplies required for the clinical

examinations. Getting it all together and then transporting the equipment, supplies, and personnel from area to area represented an infinite number of possibilities for things to go wrong.

The idea was so new and the problems seemed so difficult that contingency plans were made. The population sample was designed in subsets. If the survey had to be stopped after one subset, at least a representative sample of the population would have been covered.

In field reports from that time, the United States seems to consist of a series of flooded roads, inept plumbers, and a generation of older Americans who seemingly had never been to a physician and did not intend to start with the survey.

Generally, though, the survey teams' reception was good. In rural areas, particularly, the arrival of the trailers that formed the examination center and the field staff was an event to be noted and observed. From rural Wisconsin, where a site near a small-town city hall had been selected for the examination center, the field staff reported: "A prolonged rainy period prior to our arrival had made the location rather swampy so that a bulldozer was required to push the trailers into position; a veritable hurricane on the day of breakdown made this service necessary again to remove the trailers. On both occasions the whole town from the mayor to the village idiot was on hand to enjoy the show and offer advice. All officials were cooperative, however, and did much to make our stay both pleasant and successful."

In rural Alabama, the team reported, ". . . whether in church, stores, or restaurants, groups would approach our personnel with inquiries relating to the survey. The genuine interest expressed by these persons indicated that they thought

we were performing a real public service."

In urban and rural locations, headquarters and field staff together generated enough support and publicity to inform people of the survey's presence and purpose. Only a few newspaper stories carried such headlines as "Public Health Service Seeking 150 People to be Research Guinea Pigs." Survey representatives visited, and revisited, prospective examinees to persuade them to accept the examination, and rescheduled broken appointments and then rescheduled them again.

And it worked: between October 1959, when the first cycle of the Health Examination Survey opened in Philadelphia, and December 1962, when it closed in South Carolina, the field staff traveled to 42 sampling locations in 29 States. They examined 6,672 persons, 85 percent of the sample—a remarkable achievement. The survey was conducted with the same concern for the quality of the findings—from performance of replicate examinations of a portion of the sample to the design of a special harness for fastening down the electrocardiograph in the trailers during transit—that had been demonstrated in development of the interview survey.

### Moving On

A description of the National Health Survey program published in 1958 pointed the way to the future. It said that "other types of studies are also a part of the Special Surveys program. For example, the universe of hospitalized illness and injury may be studied from a sampling of hospitalized discharges . . . medically attended illness may be surveyed by appropriate samplings of doctors and their practices. Such surveys require extensive methodological study, however, before they

can be put into effective operation."

By 1960, when the National Health Survey and the National Vital Statistics Division were combined to form the National Center for Health Statistics, the National Health Survey had begun to move ahead in the development of surveys based on records of health facilities and providers. Work began with the basic step of developing a roster of all facilities for inpatient care in the United States. This Master Facility Inventory, as it was called, was used as a basis for sampling and as a source of statistics on resources.

By 1960, a philosophy of data collection and dissemination had been developed and proved to be both workable and worthwhile. The National Health Survey in 1981 encompasses many more data systems, as the accompanying list indicates, but the traditions set 25 years ago are still strong.

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## Major Data Systems of the National Center for Health Statistics

### Vital Statistics System

- Data on births, deaths, fetal deaths, induced abortions, marriages, and divorces
- Based on vital records filed in State vital statistics offices
- Produces annual data for the United States and for States, counties, and other local areas

### National Survey of Family Growth

- Data on family planning practices and attitudes, factors influencing trends and differentials in fertility, and aspects of maternal and child health
- Based on interviews with ever-married women ages 15-44
- Conducted in 1973 and 1976

### National Natality Survey

- Data on socioeconomic and demographic characteristics of mothers, prenatal care, pregnancy history, occupational background, health status of mother and infant, and types and sources of medical care received

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- Based on questionnaires mailed to a sample of mothers with live births during a given year and to physicians, hospitals, and other medical care providers associated with those births
- Conducted in 1963, 1964-66, 1968-69, 1972, and 1980. National Fetal Mortality Survey was done in conjunction with the 1980 natality survey

### National Health Interview Survey

- Data on the incidence of illness and accidental injuries, the prevalence of chronic diseases and impairments, the extent of disability, physician and dental visits, hospitalizations, and other health topics
- Focuses on health conditions and factors about their health that people are willing and able to relate and on the correlation between demographic and socioeconomic characteristics and health
- Based on household interviews conducted in about 42,000 households representative of the civilian noninstitutionalized population
- Conducted annually since 1957

### National Health and Nutrition Examination Survey

- Data on the prevalence of specific conditions or chronic diseases; norma-

tive data on such measurements as blood pressure, serum cholesterol, and visual acuity; and nutritional status and deficiencies

- Based on direct health examinations including laboratory procedures, medical history, and standardized tests administered to a sample of 30,000 people, ages 1-74
- Conducted in 2- to 4-year cycles in mobile examination centers
- Began in 1959 as the Health Examination Survey, expanded in 1970 when a nutritional component was added

### National Hospital Discharge Survey

- Data on the use of non-Federal short-stay hospitals; on diagnoses, surgical procedures, and characteristics of inpatients; and size, location, and ownership of hospitals
- Based on data abstracted from a sample of approximately 200,000 records from a sample of 500 hospitals
- Conducted annually since 1965

### National Ambulatory Medical Care Survey

- Data on visits to physicians, including patients' symptoms and physicians' diagnoses
- Based on a sample of 50,000 visits to

a sample of approximately 3,000 office-based, private physicians

- Conducted annually since 1974

#### National Nursing Home Survey

• Data on nursing homes, their services, and staff and on residents' personal and health characteristics

- Based on self-administered questionnaires and interviews with administrators and staff in a sample of 1,700 nursing homes

• Conducted periodically since 1963; latest survey was in 1977

#### National Medical Care Utilization and Expenditures Survey

• Data on use of and expenditures for health services during 1980

- Based on household interviews with a sample of civilian noninstitutionalized population. Respondents in 10,000 households provide data throughout the year in five interview sessions
- Began in 1980

#### National Master Facility Inventory

• A listing of inpatient health facilities in the United States, including hospitals, nursing homes, and other facilities, such as those for the mentally retarded or physically disabled. Data on services, location, staff, and other characteristics of the facilities

• Based on data collected in questionnaires sent to facilities or through associations or State agencies.

- Conducted periodically since 1967

#### National Mortality Survey

• Data on socioeconomic characteristics of decedents, use of and payment for hospital and institutional care during the patient's last year of life, and factors related to health status, such as smoking habits

• Based on questionnaire sent to the person who provided information for the death certificate. If death occurred in a hospital or institution, a questionnaire was also sent to those facilities

- Conducted annually from 1961 through 1968

#### Health Professions Surveys

• Data on the number, location, training, and specialization of a wide variety of primary and allied health occupations. Also for selected occupations, data on demographic and professional characteristics and on health services provided

- Based on data from professional societies, Federal and State agencies, inventories, and sample surveys
- Secondary data on health professions compiled biennially since 1965. In-

ventories maintained and surveys conducted periodically

#### National Reporting System for Family Planning Services

• Data on the characteristics of persons receiving medical family planning services and the type of services received at family planning clinics throughout the United States

• Based on clinic visit records completed for patients at federally supported family planning programs and those of other public and private organizations

- Conducted annually as a reporting system from 1968 through June 1977 and from July 1977 through 1980 as a sample survey covering approximately 2,000 service sites

#### National Inventory of Family Planning Service Sites

• A listing of all clinics that provide family planning services and information for each service site on location, ownership, funding sources, patients' characteristics, services offered, and staffing

- Based on data collected in questionnaires to facilities
- Conducted in 1974, 1975-76, and 1978



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## International Activities of the National Center for Health Statistics

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THE NATIONAL CENTER for Health Statistics (NCHS) engages in a variety of international activities that support its national mission and that reflect its worldwide reputation. Through its Office of International Health Statistics (OIS), the Center maintains programs of research (the Special Foreign Currency Research Program), analysis (the Comparative Health Statistics Program), and technical assistance (the Vital Statistics Improvement Program). In addition, the NCHS serves as the World Health Organization (WHO) Center for Classification of Diseases for North America and is closely involved with the work of other WHO Centers in France, Brazil, Russia, Venezuela, and England.

The foregoing programs are supplemented by informal work with visitors from other countries, many of whom visit the United States to learn directly about NCHS activities in the collection and dissemination of health statistics. Moreover, NCHS staff members have provided technical assistance to such countries as Saudi Arabia, Colombia, the Philippines, and Portugal.

### Background of NCHS International Activities

Programs in international statistics and assistance date back to the precursors of the Center, the Federal Division of Vital Statistics in the Bureau of the Census and the National Office of Vital Statistics (NOVS) of the

Public Health Service. In 1939-40, Dr. Forrest Linder, then in the Federal Division and later the first director of NCHS, was sent to Montivedeo, Uruguay, to assist in the development of that country's vital statistics system. During World War II, the Division briefly housed the Inter-American Statistical Institute. Somewhat later, a training program for Latin American statisticians was instituted under the Point Four Program, and resident consultants were sent to six South American countries. The training programs were continued in the Public Health Service by the NOVS and the NCHS until 1975.

Before the NCHS became a WHO reference center, its involvement with the International Classification of Diseases (ICD) was less formal, although important. Just after World War II, Dr. Iwao Moriyama of NOVS (later to become the Associate Director for International Statistics in NCHS) worked intensively, along with colleagues from Canada and the United Kingdom on the sixth revision of the ICD. This group made significant recommendations for the incorporation of the ICD as a permanent part of the activities of WHO when it was formed in the late 1940s. Subsequently, the staffs of NOVS and NCHS were instrumental in revising the seventh, eighth, and ninth editions.

The Center's interest in comparative analysis was also evident during the 1960s, when a number of cross-national comparisons of mortality were contracted to foreign statisticians in England and Wales, the Netherlands, Japan, Denmark, Norway, Scotland, and Chile.

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*Under Peru's improving vital registration system, birth and death records are permanently preserved on microfilm. Because of poorer quality paper, these recent records have deteriorated faster than older records*

### Special Foreign Currency Research Program

The Special Foreign Currency Research Program (SFCRP), also known as the Public Law 480 Program after the legislation that created it, draws upon surplus local currencies generated by the sale of U.S. commodities in foreign countries.

Since 1963, when NCHS involvement in the Program began, approximately 40 projects have been initiated; they have covered a wide range of health statistics topics. The following are only a few of the topics. Analytic studies of demographic indicators have been carried out in India, Egypt, and Yugoslavia. Variations in cause of death have been investigated in Israel and Yugoslavia. In Poland, a most successful study of chronic respiratory disease included two series of data collection and analysis before it was turned over to the National Heart, Lung, and Blood Institute for continuation. The data generated in this study will form part of the data base for a new project stressing the use of established data systems in the study of environment and health. Still another focus of study has been the physical growth and development of children, undertaken in Sri Lanka, Tunisia, Egypt, and India.

Since the supply of excess currencies has been ex-

hausted in many of these countries, SFCRP Projects continue only in India, Egypt, Tunisia, and Pakistan. In Tunisia and Pakistan, NCHS is collaborating with WHO to foster awareness and understanding in the development of health statistics among users and providers of those statistics—a task of signal importance where resources for health care and useful information as how to best employ them are scarce. In India, where a massive government program is underway to train and employ local personnel for the delivery of primary health care, a project to evaluate the role of village school teachers in State programs is nearing completion. Preliminary findings indicate that the special characteristics of elementary school teachers (education and prestige, for example) make them particularly suitable to deliver primary health care in rural areas. Also nearing completion is a project designed to establish physical and psychomotor growth standards for Indian children. The data have not been collected on a cross-sectional basis, as is usually done in such studies, but by following a birth cohort of children through the first 9 years of their lives.

The Health Profiles of Egypt Project, initiated in June 1977, is one of the Center's more recent collaborative efforts. This project grew out of the awareness by the Egyptian Ministry of Health that the development of a national data base is indispensable to the planning requirements for the country's pressing health problems. Three components, a Health Examination Survey (including a medical examination), a Health Interview Survey, and a Health Facilities Inventory form the core of the Project.

To date, approximately 180,000 people have been interviewed in the Egyptian Health Interview Survey (HIS), representing a response rate of more than 85 percent, and data are now being tabulated for major administrative units (governorates). An important feature of the Egyptian HIS sample design is that it makes possible national estimates for each year. Data to be used for making national estimates are already available on personal hygiene, reasons for visiting hospitals, physicians, and other health care sources, nurses, results of treatments, children's vaccination history, smoking habits, attitudes toward diseases, and dental care.

Pretests were completed, and the Egyptian Health Examination Survey (HES) began in February 1981. It will provide an extensive evaluation of the health status of the population by means of laboratory tests and body measurements as well as clinical assessments of the people examined. The prevalence of conditions such as the following will be measured: endemic diseases such as bilharzial infestation and malaria; nutri-

tional deficiencies such as nutritional marasmus and avitaminosis; anemias; malignant neoplasms; pulmonary tuberculosis; hypertension, heart disease, and diabetes; and dental diseases.

The Egyptian HES sample consists of a one-tenth subset of the HIS sample. Health examinations of the HES sample are performed as soon as possible after the health interviews. This "dual" sample procedure is of particular methodological interest to the NCHS because the samples for the two comparable U.S. surveys are independent of each other. Among other advantages, a single sample with a subset approach will enhance the information gained from both surveys.

Comparable progress has been made in the development of inventories of health facilities and data on manpower, equipment, and activities of health facilities. In view of the progress made so far, it is expected that within the next 2 years, national estimates of the health status of the Egyptian population as well as information concerning available health resources will enable the Egyptian Government to further refine plans for health programs and services.

### Comparative Health Statistics Program

Comparative data are essential to the evaluation of performance of the U.S. health services system, its success in improving the health of the population to levels attained elsewhere, and the amount of resources used to produce improvements. Other countries also can provide a wide range of new ideas about ways of dealing with problems in health and health care delivery, and much can be learned from their experiences with programs under consideration for implementation in the United States, such as national health insurance. Furthermore, international comparisons can reveal problems that persist in most countries despite a variety of approaches toward solving them, and they can help to generate an understanding of the interactions between health systems and social, cultural, and political conditions.

A basic requirement of comparative research is adequate data. In recognition of this requirement, the Office of International Statistics has undertaken a series of studies to investigate the availability, comparability, and quality of data produced by different countries. The initial studies have concerned data from other Western industrialized countries, since these countries, are most frequently compared with the United States. Detailed reports on the status of hospital use statistics have been completed, and work has begun on manpower data.

The reports on hospital statistics include "The Status of Hospital Discharge Data in Six Countries" (1),



*Water supply for an Egyptian village, one of the aspects of environmental health being surveyed in the Health Profiles of Egypt project*

which covered Australia, Canada, England and Wales, Finland, France, and Sweden, and "The Status of Hospital Discharge Data in Denmark, Scotland, West Germany, and the United States" (2). The reporting systems that collect abstracts of information on individual patients discharged from hospitals are the primary focus of these reports but other hospital statistical systems are also considered. A wealth of data is available on hospital use in most of the countries. All of the hospitals routinely prepare annual reports that contain aggregated data on use. There are also discharge reporting systems—covering part or all of each country—that collect information on the age, sex, and diagnosis of hospital patients. In addition, either continuous or recently completed household surveys supply some information about hospital use.

However, the data collected in the various countries are not completely comparable. Not all countries distinguish between long-term and short-term hospital patients. Unless adjustments are made to account for such differences, international comparisons of statistics such as average length of stay and bed-day rate per population are likely to be misleading. There are also important differences among countries in coverage of psychiatric, maternity, and other special categories of hospitals and patients. Definitions and procedures used to calculate use rates differ as well.

The quality of hospital data appears to differ from country to country, but little information is available on quality. Data on diagnoses and surgical procedures are usually checked for improbable or impossible com-



*Interviewers in the Egyptian countryside*

binations, (for example, male hysterectomies), but other types of errors are likely to exist in varying degrees. Different types of health personnel, from chief physicians to ward clerks, may report and code hospital data, and the types of personnel vary within as well as between countries.

Even after hospital statistics are adjusted for problems in comparability, differences in use rates persist. An analytic study is underway to see whether patterns in the organization of health statistics systems can help to explain the variations. The findings of this study are expected to complement previous studies of hospital use that have focused on factors such as the supply of hospital beds and hospital financing patterns. The effects of all of these factors must be understood before the international differences in hospital use can be explained fully.

#### **Vital Statistics Improvement Program**

Supported through an interagency agreement between NCHS and AID, the Vital Statistics Improvement (VISTIM) Program provides technical assistance for the improvement of vital registration in developing countries. Although this assistance takes various forms, in the main, it consists of development projects, regional meetings, regional and national level training courses, and the preparation of training materials and instruction manuals.

Initiated in 1977, the VISTIM Program, in addition to holding regional meetings in Latin America, Asia,

and Africa, has established projects in such varied cultures as those of Thailand, Jamaica, Peru, and Brazil. The Jamaican and Peruvian projects differ markedly in the type of assistance rendered and illustrate best the utility of the VISTIM Program under varying conditions.

The Jamaican vital registration system collects data that generally are of good quality and nearly complete in coverage. However, when the VISTIM Project was initiated in 1978, no natality or mortality annuals had been published for nearly 15 years. This serious bottleneck in the preparation of vital statistics was due to lack of data entry equipment. Under the VISTIM Project, keypunching equipment and facilities were purchased with excess currency funds. Technical assistance was also given to enhance the efficiency of the data entry process and to eliminate duplication in keypunching efforts. As a result, birth and death statistics for Jamaica are being prepared for publication for the first time since 1965.

In Peru the task was much more complicated, because this country does not enjoy the same quality of data or completeness of coverage as Jamaica. Because deficiencies in the Peruvian registration system are much more fundamental, a "model demonstration" approach was taken. Initiated in 1979 with the Peruvian National Office of Statistics, this project involves operations at a central office and in three demonstration areas. The goal is to develop a model vital registration system in three geographically and culturally distinct areas of Peru—the coast, the jungle, and the mountain regions—and ultimately, a plan for a totally new system that is feasible for implementation at the national level.

Significant results have been achieved in Peru's demonstration areas and at the national level. In the demonstration areas, the results include legal and administrative reforms, preparation of training manuals and provision of training for registrars, and implementation of the model system. At the national level, modernization of data entry equipment has been completed, and separate and detailed publications of birth and death statistics have been prepared for the first time in the country's history.

#### **Reference Center for Disease Classification**

One of the oldest activities in the international health statistics of the NCHS and its predecessor agencies is participation in the development, revision, and application of the International Classification of Diseases (ICD). The ICD, a statistical system that has been under development for more than 200 years (3), provides an invaluable tool for the study of the temporal

and spatial distribution of diseases; for estimation of the effects of disease on populations, particularly with respect to morbidity and mortality by age, sex, and other demographic characteristics; and for the investigation of other epidemiologic aspects of disease in human populations. Although the ICD's roots lie in the 18th century works of de Lacroix, Linnaeus, and Cullen—or even in Graunt's analyses of the London Bills of Mortality in the 17th century (3)—its modern form is the responsibility of the World Health Organization, which undertook the process of decennial revisions beginning with the Sixth Decennial Revision Conference in 1948.

In addition, over the years, WHO established reference centers in several countries to assist in the development and use of the ICD in various languages. In recognition of contributions made by the NCHS to earlier decennial revisions, and in view of the differences in terminology and usage among English-speaking countries around the world, WHO, in April 1976, designated the NCHS as the WHO Center for Classification of Diseases for North America. There are now six such Centers, located in Paris (for French-language users), São Paulo (for Portuguese), Moscow (for Russian), Caracas (for Spanish), and two Centers for English-language users, one in London and, for North America, one at the NCHS in the Washington, D.C., area.

The work of the North American Center includes not only general support and assistance to users of the current 9th revision of the ICD, but also the organization and planning for input into the 10th revision from a wide variety of users in the United States, Canada, and other English-speaking countries in the Western Hemisphere.

Some of the projects in which the Center is engaged include computerized access to the alphabetic index of the ICD; comparability or bridge-coding studies between revisions of the ICD; and devising and testing special ICD-related classifications such as for primary care, lay reporting of diseases, and environmental hazards of high interest to both developed and developing countries.

A special relationship exists between the WHO Center and Statistics Canada, the Canadian Government agency responsible for use of the ICD in that country. Close ties also exist among all six WHO reference centers. However, the North American Center has especially close contact, through the Pan American Health Organization (PAHO) with the Centers in Caracas and São Paulo, since these three Centers are within the Western Hemisphere responsibilities of PAHO, the WHO Regional Office for the Americas.



*Vital registration officials in Latin America call graves such as this "clandestine" because they often represent unreported vital events—perhaps both the birth and death of a baby or only a death*

### Future Activities

Future plans call for the continuation of research by use of remaining Public Law 480 funds. A health statistics project is being created in Egypt, and similar projects are being considered for India and Pakistan. The VISTIM Program has prepared training manuals for civil registration, and efforts are underway to test the procedures in Jamaica and perhaps in Indonesia. Finally, the Center's Comparative Health Statistics Program will be expanded to include such topics as health care financing, ambulatory care, manpower, long-term care, morbidity, and mortality.

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## New Ventures in Health Statistics

DOROTHY P. RICE, MA

FOUR YEARS AFTER ENACTMENT of the National Health Survey in 1956, the survey and the long-established vital statistics program were united in the National Center for Health Statistics. It was to be, in the words of the Surgeon General's Study Group on Mission and Organization of the Public Health Service, "a center for the collection, evaluation, analysis, and interpretation of data from many sources."

People and programs have changed since then, but that mission has not changed. Through the National Health Interview Survey (the original National Health Survey), the National Health and Nutrition Examination Survey, the vital statistics system, and a group of surveys of health care resources, the Center produces a wide range of national health data. Its reports present both descriptive findings and analyses of them. In special reports such as "Health, United States," we present the analyses of and commentary on interrelations among health variables that are required for meaningful use of the data in policy and program direction, implementation, and evaluation.

In many of the statistical systems we are continuing the work of the pioneers of the National Health Survey and their predecessors in health statistics. But just as they did, we also are moving in new directions and undertaking new programs that will supply needed data and aid in their use. Descriptions of some of these new ventures follow.

### NHANES I Epidemiologic Followup

Longitudinal data on the health of a representative sample of the U.S. population are greatly needed; in the 1980s the Center will be producing such data for

adults from the Epidemiologic Followup Survey to the first National Health and Nutrition Examination Survey (NHANES I) of 1971-75. Major funding for the followup is being provided by the National Institute on Aging.

More than 14,000 persons, a representative national sample of the population aged 25-74 years, received the detailed physical examination during the 1971-75 NHANES I period. The survey included a medical history and a dietary intake interview as well as various standardized tests and measurements—ECG, X-ray, pulmonary diffusion, and detailed biochemistries. This wealth of data for assessing health and nutritional status has not yet been fully exploited.

In late 1981, the Center will be going back to these people to ascertain their health history in the intervening years and their current health status. The followup survey will emphasize information needed to determine how factors measured in NHANES I relate to health conditions that have developed since then. With the two sets of data it will be possible, for example, to estimate the incidence of selected conditions and to study the slow-acting consequences of long-term and low-dosage exposure to a combination of environmental, dietary, social, and demographic factors.

The followup survey will not include a second physical examination, although measurements of weight and blood pressure will be taken by the interviewer in the home. Data will be collected in personal interviews. For those persons hospitalized since their examination, the interviewer will request permission to obtain diagnostic information from the hospitals. For those who have died, the Center will review the death certificates to obtain cause of death and occupational information and will attempt to interview the next of kin or another appropriate proxy respondent.

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Although the difficulties of tracing such a large sample after 8–10 years cannot be discounted, the feasibility has been demonstrated to our satisfaction. A recent trial included the 191 people in Baltimore, Md., who had received the detailed physical examination in NHANES I. Approximately two-thirds of these people had the same or another local address. Another 17 percent had died, and only 8 percent could not be traced. The Baltimore subjects generally were willing to be interviewed and to report on their health and hospitalization.

### **Hispanic Health Survey**

The Hispanic Health and Nutrition Examination Survey, which is scheduled to begin early in 1982, will be the first large-scale health examination survey of this rapidly growing segment of the U.S. population. Between 12,000 and 15,000 persons, ranging from 6 months to 79 years of age, will be examined in approximately 30 locations chosen systematically from U.S. areas having the largest Hispanic populations.

This special survey of an ethnic subgroup is a distinct departure from the National Health and Nutrition Examination Surveys of the 1970s, which involved representative samples of the population. The Hispanic survey is being undertaken because the national survey cannot, without prohibitive expense, produce detailed information for relatively small population groups—such as Hispanic Americans—or for small geographic areas—such as Appalachia. A survey of Hispanics was specifically recommended by a panel of the National Academy of Public Administration that was commissioned by NCHS in 1977 to evaluate the nutrition component of NHANES and recommend changes that would make it more useful in addressing health problems related to nutrition. The panel further recommended that such special surveys be conducted regularly between each national survey.

To provide data from examinations for Hispanic Americans comparable to the data available for the general population, the Hispanic survey will be similar in data collection procedures and in the content of the standardized health examination to the earlier surveys or those planned for the future.

The general health examination will be supplemented by medical history, laboratory tests, and dietary intake interviews. We also will be repeating the collection of data on the presence of lead, carbon monoxide, and selected pesticides in the body. A specially trained staff of physicians, nurses, dentists, nutritionists, and technicians will conduct the examinations in mobile examination centers.

In the detailed planning, the Center is being advised by national Hispanic organizations and others so that the survey will take account of cultural differences and of health problems suspected of being particularly prevalent among Hispanics.

A final important difference from earlier studies is that the Hispanic survey will not be a national sample of Hispanics. However, the sample is being designed to produce reliable estimates for a broad spectrum of the Hispanic population, including Puerto Rican, Mexican, and Cuban Americans.

### **Medical Care Utilization and Expenditures**

The National Medical Care Utilization and Expenditure Survey (NMCUES), initiated in 1980, is a joint project of the NCHS and the Health Care Financing Administration. It will produce detailed information on the amounts and types of health care received by the U.S. population during 1980, the costs of the services, and the sources that helped to pay the bills.

Unlike the National Health Interview Survey, in which respondents are usually interviewed only once, the NMCUES involves a panel of households interviewed 5 times over 15 months. Each household in a total sample of 10,000 was asked to provide information on all illnesses, injuries, and other health problems experienced during 1980, along with the health care received and expenses for the care. Additional information on disability, health insurance coverage, and other health-related items was also requested.

Another unusual feature of the survey is the inclusion in the population sample of 1,000 Medicaid families in each of 4 States—New York, California, Texas, and Michigan. This design makes it possible for the first time to produce data separately for the general population and for Medicare and Medicaid beneficiaries.

We anticipate periodic repetition of the survey. The information it produces is needed to measure and monitor the effects of existing health care financing programs on health status and costs.

### **CHSS State Agency Development**

The Cooperative Health Statistics System (CHSS), a national network of public and private organizations cooperating in data-generating activities, is not one of the Center's new ventures. Developmental work for the CHSS began in the early 1970s. But the program is changing in important ways that should be noted.

The Center, as the Federal focal point for CHSS, is now giving high priority to the development of State health statistics agencies. Through these agencies, a



Over 62,000 Americans have taken part in the National Health and Nutrition Examination Surveys. Upcoming, a special survey of Hispanics.

core of statistical competence can be maintained in each State to support a number of Federal and State programs as well as other users of health data.

Public Law 95-623 of 1978 required that each State participating in the CHSS designate one unit to administer or be responsible for CHSS activities. As of February 1981, 34 States had completed designation of their CHSS State agency. Although the law does not require that the State agency be an entity of the State government, most States thus far have designated the State health agency or a unit of that agency. One exception is the South Carolina State Budget and Control Board.

At a minimum, the CHSS State agencies will promote interest in and coordinate activities carried out in each State under the CHSS and assure access to CHSS data for all appropriate users. This function can include a wide range of program-related activities. For example, the agency may serve as a clearinghouse for health data, develop statistical standards, help to integrate emerging health data systems with existing systems, and promote agreements for sharing CHSS data among various collectors and users while maintaining confidentiality. Beyond this minimum level, the State agency may undertake a considerably broader function, including data collection, processing, analysis, and dissemination.

### National Death Index

Several years of planning and development came to fruition in spring 1981, when the Center began to accept applications for use of the National Death Index. Although the Index at present has limited coverage, including so far only the deaths that occurred in the United States in 1979, its establishment is significant for health and medical researchers conducting prospective studies. It will greatly facilitate their efforts to determine whether subjects in their research have died and if so, the State where the death record is filed.

To build the Index the Center has contracted with the States to receive certain identifying information from all death certificates. For each decedent, the information consists of name, date and State of birth, social security number, father's surname, sex, race, marital status, State of residence, age at death and date and State of death. Information for deaths occurring in 1980 and succeeding years will be added to the Index in annual increments.

The policies and procedures under which the Index is being operated were also established cooperatively with the States and reflect the concern of all parties for the confidentiality of information reported on vital certificates.



To use the Index, two principal criteria must be met: (a) the Index may be used only for statistical purposes in health and medical research and (b) the investigators must be able to provide sufficient information on their subjects for efficient use of the Index. At a minimum, the researchers must supply their subjects' names and either months and years of birth or social security numbers. When these criteria have been met, the researchers will be notified to submit computer-taped information on their subjects to the Center.

After matching the users' list against the Index, the Center will provide the death certificate number and the date and State of death for each probable match. Researchers may then contact the State registration office to obtain a copy of the death certificates and information on the cause of death.

Applications, a users' manual, and more detailed information on the National Death Index can be obtained from the Center's Division of Vital Statistics. We consider this first year of operation a period of testing and evaluation, looking toward smoother operations as the Index itself grows in coverage of annual deaths. We also expect that researchers will begin to collect the items of demographic description for their subjects that are found in the Index, enabling matches of high quality.

### National Telephone Health Interview System

When questions about the safety of liquid protein diets arose, no adequate data existed on how many people were using the substance or on their patterns of use. This is one illustration of the recurring need of health agencies for data on current issues and the concomitant need of statistical agencies for a mechanism that enables them to produce such data rapidly.

The Center's National Telephone Health Interview System (NTHIS) may prove to be the necessary rapid reporting system in future instances of this type. Other reasons for our development of a telephone survey capability besides rapid response are lower costs, in comparison with traditional household interviews, and the inherent flexibility and quality control of an in-house system.

So far, the Center has used its system in one survey, a longitudinal study of cigarette smoking prevalence and patterns for the Office on Smoking and Health. We also are conducting a telephone followup of non-respondents in some of the national surveys and administering an abbreviated version of the questionnaire used in these surveys; pretests of supplements to the annual National Health Interview Survey questionnaire are planned.

Research and evaluation of the NTHIS will con-



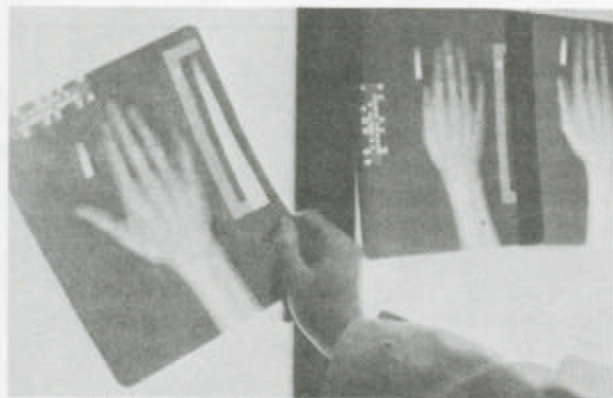
*Food portion models used in NHANES to aid examinees in reporting amounts and types of food consumed in the 24 hours before the interview*

tinue. The Center for Survey Research at the University of Michigan will shortly report to us on a major comparison of responses to the same set of questions as obtained through the National Health Interview Survey and the telephone interview system. This report, and other evaluations, should tell us a great deal about the strengths and weaknesses of the telephone survey system. In addition, a subcommittee of the Federal Committee on Statistical Methodology is studying the respective roles of telephone, mail, and personal interviews in the gathering of Federal statistics. The subcommittee's report will include a review of the state of the art and should aid all statistical agencies in the most appropriate use of each methodology.

### Experimentation with Network Sampling

The Center's staff devised network sampling to improve the reliability of estimates of uncommon events or diseases derived from sample surveys. In contrast to conventional sampling, network sampling allows each member of the target population to be reported at more than one sampling unit. For example, in a conventional household survey on diabetes, questions about the disease would be asked only for persons living in the household. In network sampling, each sample household would be asked about diabetes among close relatives living elsewhere as well as among household members. These relatives could include institutionalized persons, who are normally excluded from conventional household surveys. Network sampling reduces sampling errors because a larger portion of households are eligible to report diabetics in the survey, and it appears to reduce nonsampling error because relatives may be less reluctant to report diabetics than the diabetics themselves may be.

The Center is collaborating with the National In-



*Comparing the whiteness of bone and aluminum wedge gives a reading of bone density, information used to assess development of osteoporosis. The X-rays, from NHANES, also are read for cortical thickness.*

stitutes of Health in two large survey experiments with network sampling. One experiment is testing the quality of reports on cancer patients by their relatives in household surveys and the willingness of the relatives to identify the cancer patients so that followup interviews may be conducted with them to collect information on cancer care costs. If the experiment is successful, we will apply its methodology to the collection of cancer prevalence and cost data through the National Health Interview Survey in future years.

The other experiment is testing the feasibility of estimating the number of hospitalized persons with a disease from a sample survey of hospital discharges in which some persons may be discharged several times. If this pilot study is successful, it will demonstrate the feasibility of estimating the national incidence of disease from data collected in the National Hospital Discharge Survey.

### **Environmental Health Statistics**

The National Death Index, the NHANES I Epidemiologic Followup Survey, and the Hispanic Health and Nutrition Examination Survey are examples of activities that bear on relationships between environmental exposures and health. The 1980 National Natality and Fetal Mortality Surveys also are pertinent. In these surveys, the NCHS is gathering information on the occupational history of the mother and father, as well as the mother's receipt of X-ray, ultrasound, and nuclear medical procedures during the year before delivery.

In further fulfillment of our responsibility in the area of environmental health data, the current approach is to analyze existing Center data and to encourage wider and better use of available data. Staff of the recently established NCHS Division of Environ-

mental Epidemiology is reviewing and cataloging the Center's extensive data bases for data items potentially useful for studies in environmental health. This staff will be able to assist other agencies in using these data in their research.

Under Public Law 95-623 of 1978, the Center is responsible for preparing guidelines for the conduct of studies necessary for determining the effects of employment and environmental conditions on the public health. A draft of these guidelines, issued in 1980, dealt with observational data on human health.

Improvement of data was also the thrust of two reports submitted to Congress in the past year in compliance with Public Law 95-623. "Environmental Health: A plan for Collecting and Coordinating Statistical and Epidemiologic Data" reviews existing Federal data systems and makes recommendations for coordination and improvement. The second report, "Environmental Health: A Study of the Issues in Locating, Assessing, and Treating Individuals Exposed to Hazardous Substances" stresses particularly the need for "cause and effect" data on environmental exposures. A third study required by that law, of the costs of environmentally related diseases, was carried out under contract by the Institute of Medicine. In this study, a plan was drafted to identify environmental hazards and their sources, to identify and quantify the health effects and health costs associated with these hazards, and to estimate the extent to which reducing the hazards would affect costs.

Among other activities, the Center is planning to support the States in coding the occupational information reported on death certificates. Occupational differentials in mortality can be identified by use of information from the death certificates, in spite of many problems with the data. NCHS, the Bureau of the Census, and the National Institute of Occupational Safety and Health are creating uniform classification and coding procedures for use in processing and analyzing death certificate information that can be used by all States. This, too, is a step toward improving available data related to environmental health.

### **Conclusion**

In 1981, as in 1956, the demands for health data are greater than agencies' ability to produce data. Statistical agencies, like those that provide services, must make choices between research and data collection and between needed data sets. The activities outlined here and the longer-established statistical systems represent the Center's program for the immediate future. With them, we believe that we are on course to meet many of the health data needs of the 1980s.

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# Issues in Developing Routine Data Sources for Health Planning

SAM SHAPIRO, BS

PERSONS ENGAGED IN HEALTH PLANNING today are not being faced with a new set of conditions for which unanticipated demands for data are being made. Rather, they need to sort out from old demands those that could be met, in part or fully, by information from routine data sources and to examine under what conditions this might be accomplished. This is a repetitive process in which many in and out of government have struggled long before the current era of health planning and regulation, and the issues involved will never be fully resolved. We are unlikely ever to be satisfied that we have gone as far as possible with routine data sources to meet information needs for planning. This view of the future should not be interpreted as pessimistic, however—it simply recognizes several realities, including the complexity and uncertainties associated with many of the issues in health planning and the implausibility of achieving a state of sufficiency with available data.

In this paper, my approach is to proceed from a

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*This paper is adapted from one presented at the 18th national Public Health Conference on Records and Statistics, Washington, D.C., August 4, 1980.*

consideration of the nature of the demand for information to a discussion of routine data sources that have been identified as resources to meet the demand and, finally, to an assessment of the issues to be dealt with in effectively joining demand and capacity.

## Health Planning

It is now about 6 years since the enactment of Public Law 93-641, the National Health Planning and Development Act (1), which authorized the establishment through Federal funding of 205 local area health systems agencies (HSAs) and 57 State health planning and development agencies (SHPDAs). What distinguished this legislation from earlier mandates for national planning and from State and local planning efforts by official health agencies and other planning bodies that had been underway for many years were its comprehensiveness, its requirement for setting guidelines that direct the planning effort, and its provision of a defined structure for meeting the goals and objectives.

Klarman (2) captured the significance of Public Law 93-641 as:

The establishment of pervasive, elaborate, and intricately balanced structures of planning joined to regulation; a linkage among federal programs for planning, resource development, and purchase of health care services; a distribution of authority and responsibility between the federal government and the states, between the state governments and local areas, between public employees and advisory groups at the federal and state

levels, and between governmental auspices and voluntary, non-profit auspices at the local or areawide level.

It is worth reviewing some aims of the legislation and areas that were later identified for concentrated attention. The HSAs and SHPDAs were charged with responsibility to increase accessibility, acceptability, continuity, and quality of health services provided; improve health status; restrain increases in the cost of providing health services; and prevent unnecessary duplication of health resources. Priorities initially covered primary care services for the underserved, multi-institutional arrangements, developing group practices and HMOs, increasing the supply of physician assistants, advancing health promotion and disease prevention programs, and improving the quality of care. Supply, distribution, organization of health resources, and certificate of need determinations are key elements (3).

Imbedded in all of these objectives is the requirement that the local agency knows what and where the current needs and deficits are and how effective the actions taken are in producing change. A quantitative base is required for making these assessments, and for this purpose, at the local level the dependency is primarily on available sources of data. The expectation is that new attention will be given by others to the production of data and the resolution of problems of content, quality, measurement, and timely availability. The resulting descriptive information is expected to be adequate for many planning and assessment purposes. However, there

is often a gap in knowledge about the relationship between structural and process changes being advanced and effects being sought. And, if the stakes are high, nothing short of special research will meet the need for information.

To further the development of available sources, the National Center for Health Statistics (NCHS) was authorized legislatively to develop a Cooperative Health Statistics System, which in 1978 was recognized in statutory form as the CHSS. Other provisions of legislation were designed to strengthen the capacity of the National Center for Health Services Research (NCHSR) in advancing the conduct of research useful for policy and planning purposes and to create a new locus for technology research through the establishment of a National Center for Health Technology. An additional factor is the emergence of the Health Care Financing Administration (HCFA), which has fiscal responsibilities for cost-effective delivery of publicly funded health services, as a strong force in developing available sources of related data and in furthering research. Other Federal agencies, notably the Bureau of Health Professions and the National Institute of Mental Health, as well as voluntary agencies, for example, American Hospital Association, American Medical Association, and American Nurses Association, have been important sources for relevant data.

From the standpoint of health planning agencies some of the potential for contributing to the planning

process is being realized; much of it is still a promise. The March 1980 report of a committee of the Institute of Medicine on "Health Planning in the United States, Issues in Guideline Development," makes the following sharp criticisms of the current situation (4):

While the proper development of health planning guidelines is dependent on a firm empirical base, the committee is concerned about the absence of sufficient quantitative information and sound analyses for health planning. Health planning and regulation have been hampered by (a) an inadequate data base (for example, virtually no small area morbidity data or data on hospital discharges); (b) limitations in the applicability of analytic techniques and appropriate research methods (for example, functional classifications for long term care patient placement assessment, and the concept of medical need for individual health problems to estimate the need for services or equipment on an area-wide basis); (c) insufficient knowledge of the efficacy of services or appropriate conditions or circumstances under which services are useful (for example, electronic fetal monitoring, coronary by-pass surgery).

The report also comments that:

The base of data and knowledge about the collection and use of statistics could be expanded in several ways: existing data systems could be sources of data which are routinely shared with planning agencies. This is already occurring with some data from the NCHS, HCFA's Medicare files and the Bureau of Health Manpower's Area Resource File. While this is a step forward, such data are not current and are most useful as benchmarks. Analysis of such data would help to identify problems that would require special studies. Because they are part of national data sets, they produce data on the local area that can be compared with regional, state, and national figures to identify how an area stands in relation to other areas.

These statements appear toward the end of a critical appraisal of past performance and future requirements for the "process of national guidelines development (from agenda development through evaluation and revisions)." They are not elaborated upon to define the issues in planning for which routine data sources by themselves would be relevant and where they would have to be linked to products of special studies or other sources of information. It is not my intention to perform this function but to probe somewhat more fully into the nature of routine data sources and the potential for enhancing their utility in the planning process, avoiding too many overstatements.

### **Routine Data Sources**

There are, of course, guideposts for approaching the contribution of routine data sources. Of great importance is the content, past experience, and possible future direction of the CHSS, which also has been critically reviewed by an independent panel. Another guidepost consists of several developments in recent years that increase the likelihood of routine data sources contributing to planning. To be clear about our frame of reference, routine data sources in the health field are defined

as information systems in which data are recorded or collected continuously or periodically for program, legal, operational, or reimbursement reasons. The CHSS designated six components for a broad-based health data system that meet this definition—vital statistics, health facilities, health manpower, hospital care, long-term care, and ambulatory care statistics. A seventh component, the National Health Interview Survey, would be classifiable as "routine" under an extended definition that places heavy emphasis on reasonable assurance of periodic data collection. Potential or realized applications from these data sets cover a variety of interests—direct application to health planning under Public Law 93-641 is only one, and that, in many instances, is a relatively recent addition.

The components identify subject areas of prime concern to health planners at all three levels of jurisdiction—Federal, State, and local. Vital statistics represent the single source of information on health status that can be examined over a long period, geographically disaggregated to the county and city levels and down to sub-areas within a city or aggregated across civil subdivisions for medical market analysis. The vital statistics source in no way detracts from the importance of seeking ways to develop morbidity data and other measures of health status for local areas, as pointed out by the Institute of Medicine Committee.

However, we do not have such information and, in any event, vital statistics are not quite the insensitive measures we often make them out to be. Birth statistics tell us a great deal about adolescent pregnancies; what segments of the population are receiving poorly timed prenatal care; and many of the circumstances related to prematurity. Measures of infant mortality, particularly when derived from matched birth and death records, are still usable, even in our society, as indicators of broad health status, health behavior, and resource problems; this is in addition to what they tell us about the intensity and characteristics of a specific problem. Further, the effects of actions to change the situation can be rapidly determined, a possibility that is not realizable for many other health conditions whether the measure is mortality, morbidity, or functional status.

The ability to examine trends and conduct inter-area comparisons for mortality in childhood and causes of death among adults adds great power to any assessment of where and what type of new resources may be needed. Since mortality from ischemic heart disease and cerebrovascular diseases can be reduced, as evidenced by the downward trends in the past 10 years, the situation in an HSA or subarea where such reductions are not occurring leads to questioning the role of available or new resources. This application can be broadened to

other causes of death that are indicators of adverse health conditions in specific geographic areas. It requires the resolution of technical problems in the production of information that identifies "hot spots," an issue that is currently being dealt with through a contract from NCHS to a group of investigators at Johns Hopkins School of Hygiene and Public Health, headed by Alan Gittelsohn (5). Among the objectives is the development of efficient computer systems for the surveillance of variations in mortality rates over time and space to identify patterns indicative of emerging health problems. While the original intent was to make available a procedure for national use by NCHS, this methodology and an alternative approach developed by Lerner (6), also at Johns Hopkins, are being applied to the Central Maryland HSA's planning areas and the city of Baltimore's health districts with promising results.

The new set of interests in routine mortality statistics has also led to publication of Statistical Notes for Health Planners by the NCHS (7) and to work aimed at new uses for mortality data bearing directly on planning agencies' responsibilities in the prevention area. The Working Group on Preventable and Manageable Diseases, chaired by Rutstein, has proposed the use of "sentinel events," that is, unusual events—principally causes of deaths that are preventable—as an alert to conditions in a particular area requiring action (8). The methodology being developed by Gittelsohn really represents a next phase, that is, solving practical problems in implementing this concept. In a forthcoming paper, "Towards an Index of Preventable Mortality," Woolsey (9) has some interesting, new approaches to the use of mortality statistics in identifying achievable levels of improvement and a consideration of statistical issues involved that will certainly attract a great deal of attention.

Hospital care statistics, when aggregated for total discharges or on a large sample and when available for analysis by patient origin, represent another highly relevant data source for planning purposes despite the problems in accuracy of reported diagnostic information that have been identified by investigations by the Institute of Medicine (10). The major advances being made in classifying discharges into homogeneous diagnostic categories are providing an assortment of approaches to case mix that are being used with increasing effectiveness by cost review commissions. They also offer a useful tool to planning agencies in assessing variations in utilization and examining alternative ways of meeting need in potentially less costly settings.

There is justifiable impatience with the slow progress in the development of such data for local areas on a nationwide basis. HCFA now has the responsibility for ex-

panding coverage of hospital statistics, but such expansion is not likely to be accomplished quickly. In the meantime, the hospital experience of Medicare beneficiaries, which is part of the ongoing data collection system in HCFA, may possibly provide valid indicators of the use of hospitals by the total population in the community. This routine data source cannot replace a system that covers all age groups when the need is for rates of hospitalization for such procedures as tonsillectomy and adenoidectomy and hysterectomy. But the aim would be to overcome the present inadequate supply of data through broad measures of hospital use by patient origin. The results of exploratory studies of Wennberg and Gittelsohn in relatively small States encourage further examination of possible use of Medicare data on a wider scale (11).

The importance of planning for health facilities and for gathering statistics on health manpower needs no elaboration. The mandate to improve the supply and distribution of health resources and the decision-making authorities given to planning agencies depend on detailed information on facilities and manpower—this extends beyond the institutional sector to ambulatory care. An example of the saliency of this issue is the requirement that HSAs include in their 5-year Health Systems Plans, now in preparation, a detailed examination of the number (and rates per unit population) of primary care physicians required to meet health care demands in their areas. Manpower data generated from routine sources such as licensure systems or periodic surveys suffer from limitations that justify supplementation through special studies; for example, in the case of primary care physicians the lack of data on the movement of users of services across geographic boundaries. But, these restrictions do not obviate the applicability of what is derivable from routine sources for planning purposes.

Interest exists in other types of information that, in the long run, could emerge as important resources for a wide range of health planning and program development functions at the State and local levels. Long-term care and ambulatory health care statistics fall into this category.

With the recent appearance of the first recommendations for a "Long Term Health Care Minimum Data Set," the ground is being laid for creating a new "routine data source" (12). The primary focus of the data set is "on people in the health care system, their problems, and their use of services." Prominent among the general functions or purposes are "public monitoring and regulation of services" and "health planning and policy making." There are compelling reasons for paying a great deal of attention to this area. The sector of

the population and the health services system affected has reached substantial proportions and will continue to increase. Alternatives to nursing home care are being tested for their cost effectiveness, and the outlook is that planning agencies increasingly will be faced with the need to make difficult decisions regarding community resources for long-term care. The minimum data set includes a more extensive set of items on health status than the corresponding data sets for hospital and ambulatory care. These items cover measures of physical, social, and psychological function, as well as diagnoses, representing a scope that many of us would not have contemplated as feasible. The arguments for moving this way are strong, but some uncertainties will require examination over several years by the kinds of studies on quality, feasibility, costs, and utility recommended by the panel that prepared the minimum data set.

Ambulatory care statistics have been on the agenda longer than long-term care. The first minimum data set is now about 8 years old, and a new set of recommendations is under review. Many reporting systems are in effect to meet requirements for utilization and cost information in publicly funded programs. However, what is generally contemplated as a need for health planning and program development on a community level goes beyond the capacity of such data sources. Whether this need can or should be satisfied through a repetitive information system that has national coverage will remain debatable until a more compelling reason appears. The recent report of the National Committee on Vital and Health Statistics on Information Needs for National Health Insurance advances 10 principles that provide the rationale and requirements for a routine data system (13). But, we are far from national health insurance, and the need for some data on use of ambulatory care is a pressing matter for planning agencies.

The Public Health Conference on Records and Statistics in 1978 directed attention to the role of health interview surveys in filling the data gap, and several areas have moved in this direction (14). An idea now being explored centers on the derivation of synthetic estimates for small areas from the National HIS. Early results reported at the annual meeting of the American Statistical Association suggest that these estimates are likely to be crude and subject to fairly high relative errors (15). This conclusion comes partly from comparisons with data from a telephone survey of a sample of 2,500 families in Baltimore City and surrounding counties. The survey was modeled on the NHIS questionnaire. A more encouraging result is the demonstration of the feasibility of a relatively low-cost telephone methodology for obtaining information on accessibility, utilization, and health status.

## Issues

Clearly, the issue of data needs for health planning and the capacity of the various routine data sources just discussed requires far greater detail at both ends, that is, a more explicit identification of the policy and planning questions faced by planning and regulatory bodies and a more specific assessment of how these questions translate into data requirements. The guides for data usage and sources issued periodically by the Health Resources Administration are designed to perform this function, in part. The Statistical Notes for Health Planners and reports from those close to the scene at the State and local levels also have made important contributions. But, the reality is that we are still fairly early in the development of targets and the application of enforcement tools.

Two complimentary approaches would help the move to a different level. One approach is exemplified by the present Public Health Conference on Records and Statistics and other meetings where those responsible for health policy, planning, regulation, and programs join with methodologists and producers of data. The second approach consists of demonstration, research, and evaluation supported by special funding to advance the state of the art in health planning, including identification of issues and effective application of data. These approaches are not new, but there is an urgent need for a comprehensive reassessment of what, in light of experience, we know about planning needs, the effectiveness of available routine sources of data, and the technical and analytic issues in bringing together the data elements from several sources of information. Working material could include the HRA's Area Resource File, which has easily accessible user tapes (16). The timing of such an activity for the near future is particularly appropriate because of the availability within the next 6-12 months of population statistics for small areas from the 1980 decennial census. From a longer term standpoint, it is disappointing that the efforts by many interest groups, including those in the health sector, to assure a mid-decade census face defeat because of a congressional decision to not provide funds for planning a 1985 mid-decade census.

Despite the importance of the process of reassessment and resulting guidelines, it will be effective only to the extent that it is linked to resources (personnel and funds) and mechanisms within the States and at the national level directed at multiple functions of health statistics. The dominant factor here is the Cooperative Health Statistics System, which is reinforced by the recent report of a panel, established by the Assistant Secretary for Health, to evaluate the CHSS in light of experience over the past 10 years and to assess changes

directed by the health planning, professional standards review organization, and manpower legislation of the 1970s (17).

The observations and recommendations of the panel are both broad and specific. They cover the uneven development of key components in the CHSS, except vital statistics; the problems of quality and lags in availability of data; the shifts in location within the Department of Health and Human Services of responsibility for several components; and the decision criteria that should guide priority setting for selecting components to be included in a joint Federal-State collection system. For present purposes, the following broad conclusions of the panel are most relevant:

The CHSS should be perceived as a nationwide cooperative network of public and private agencies linked together to meet their respective needs for health statistics. The network has a central coordinating agency in each State (the State CHSS Agency) and at the National level (NCHS), but many agencies at every level are active or potential members of the network, either contributing to the production of certain health data or in using these data, or both.

A distinction is made between CHSS—a mixture of public and private interests having largely a State-level orientation—and a Federal program—the Cooperative Health Statistics Program—in which the States participate and the CHSP is the vector for support to the States:

The CHSP coordinates the flow of national data into and out of the system; provides Federal support for State CHSS agencies; takes the lead in developing and updating minimum data sets; and provides professional and technical assistance in statistical methods, data handling, and data use. Management of Federal participation is delegated to NCHS with collaboration of other Federal agencies.

A major conclusion of the panel's report is that because many Federal programs as well as State health programs increasingly require a strong State capacity, a first priority of the CHSP is to strengthen the ability of the States to identify health data needs, to develop appropriate collection mechanisms, and to build the capacity for analysis and use of health data. No activity for which the call for building State capability in health statistics is more pertinent than health planning under Public Law 93-641.

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# National Survey of Personal Health Practices and Consequences: Background, Conceptual Issues, and Selected Findings

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IN 1965, HEALTH QUESTIONNAIRES were completed by nearly 7,000 people constituting a probability-based sample of the adult residents of Alameda County, Calif. An analysis of the questionnaire data on the relationship of physical health status and health practices was reported by Belloc and Breslow in *Preventive Medicine*, August 1972 (1). The findings were described as follows: "A striking examination that demonstrates the relationship between the whole spectrum of physical health and actual day-to-day practices."

Since the publication of the Belloc and Breslow article, a number of other papers have appeared, based on analyses of the Alameda data. Among these was Belloc's ground-breaking 1973 report, "Relationship of Health Practices and Mortality," which was headlined by *Preventive Medicine* in these words: "A number of personal health practices show a striking inverse relationship with mortality rates, especially for men" (2). Her paper was based on a 5½-year mortality experience of the persons queried in Alameda County in 1965. A subsequent working paper, also by Belloc, reported on 9 years of mortality experience with substantially similar results ("Health Practices and Mortality—a 9-Year

Follow-up," a preliminary working paper supported by research grant No. 14500368, April 1976, from the National Center for Health Services Research). Further analysis of the 9 years of mortality experience and, in addition, of the persistence of health habits of the Alameda sample, was reported by Breslow and Enstrom in 1980 (3).

The articles cited are the principal reports, based on the Alameda County sample survey, that document the relationships between health practices and physical health status and between health practices and mortality. Other investigators who have analyzed the Alameda data have shown other relationships: between social networks and mortality (4,5) and between indulgence in the sick role and survival (6). A report by Wiley and Camacho assessed the relative value of the selected health practices examined in the Alameda study in predicting health status (7).

The reports on health practices of the Alameda group and the popular interpretations (8-10) have provided support to proponents of the notion that, in the face of seemingly diminishing returns from further expenditures for medical care (11,12), more attention should be paid to influencing individual health maintenance behavior and lifestyles (13-16).

The Secretary of the Department of Health, Education, and Welfare in 1977 established a Prevention Initiative. An impressive array of activities was carried out, sponsored, or coordinated by the Office of Disease Prevention and Health Promotion under the general direction of J. Michael McGinnis, Deputy Assistant Secre-

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tary for Health and Assistant Surgeon General. Many of these activities were addressed to the potential health consequences of modifying individual behavior.

Earlier, in 1974, the Canadian Government had issued a report, "A New Perspective on the Health of Canadians" (13), which brought into focus, by reference to four health fields (human biology, environment, lifestyle, and health care organization), the modest gains in health status attributable to medical care compared to the potential gains from changes in environmental or lifestyle influences on health. In 1975 the Fogarty International Center of the National Institutes of Health and the American College of Preventive Medicine co-sponsored a National Conference on Prevention and subsequently published a conference report, "Preventive Medicine, USA" (17). The Institute of Medicine of the National Academy of Sciences, under contract with the Public Health Service, convened a Conference on Prevention (February 16-18, 1978); for it, groups of experts prepared working papers on three basic areas—human environment, human lifestyles, and human services. These papers were presented in "Perspective on Health Promotion and Disease Prevention in the United States" (18). In 1977 DHEW organized a Departmental Task Force on Prevention; its work culminated in three major documents (19-21). One of these, "Healthy People" (19), set forth the strategy and goals for achieving improvements in the health of the nation. These goals were further developed into a number of specific and measurable objectives for 15 priority areas in "Promoting Health/Preventing Disease—Objectives for the Nation" (22).

As a part of these efforts, the Deputy Assistant Secretary for Health requested that the National Center for Health Statistics (NCHS) collect data on the extent and distribution in the population of positive personal health practices, their stability over time, and their relationship to morbidity and mortality. The design, selected preliminary findings, conceptual issues, and future plans for analysis of this study, the National Survey of Personal Health Practices and Consequences (NSPHPC), are presented in this paper.

The National Center for Health Statistics has collected data on various health practices in a number of its surveys over the past 15 years. Information on smoking has been collected as a part of the National Health Interview Survey (NHIS) since 1965, although not every year (23,24). Smoking data have also been collected in the National Health Examination and Nutrition Surveys—NHANES I (25) and NHANES II (26). The current National Natality and Fetal Death Follow-back Survey is obtaining smoking information on women both before and during pregnancy.

While the Center has not done a major study of drinking behavior, several surveys have collected limited data on consumption of alcohol, including the NHANES I, the 1977 NHIS, and the National Natality and Fetal Death Follow-back Surveys. Efforts are now underway to develop a more comprehensive set of questions about consumption of alcohol to be used in Center surveys. The 1975 NHIS included a supplement on exercise and participation in sports activities (27). More general questions on exercise and daily physical activity levels were asked in the NHANES I and II.

Before the National Survey of Personal Health Practices and Consequences, the major related study was conducted in 1977 when the National Health Interview Survey asked questions of approximately 23,000 adults covering the Alameda health habits (28). A report by Schoenborn and Danchik was issued on the prevalence of the Alameda health practices in the civilian noninstitutionalized U.S. population 20 years and over (29). The practices covered were hours of sleep, eating breakfast, snacking, physical activity, drinking alcoholic beverages, smoking cigarettes, and "desirable" body weight. Data were presented by sex, race, age, income, and education. A more detailed NCHS Series 10 report on these behaviors is forthcoming.

Each of these data bases provides a potential for further analysis of the relationship between the specific health behaviors and the health characteristics collected on the surveys. For example, the exercise and physical activity items on the NHANES I have been used to explain some of the findings on caloric intake and obesity. The greatest potential, because of the large sample size, lies with the 1977 NHIS data and the Alameda County items and the wide range of health data also collected on that survey. All of these data bases are now or will be available in the form of public use data tapes.

### Study Design

The data for the National Survey of Personal Health Practices and Consequences were collected in the spring of 1979 by Chilton Research Services, under contract with the National Center for Health Statistics. The target population was all persons aged 20-64 years residing in households with telephones in the coterminous United States. The survey was administered over the telephone through interviews lasting an average of about one-half hour. The questionnaire covered a wide range of health practices and attitudes, including six of the Alameda County items, questions on health status and use of health services, and items on social support, critical life events, and standard demographic variables.

The sampling plan of the survey was a three-stage stratified cluster design incorporating a random digit

dialing method. One sample respondent from each eligible household was selected by a random selection procedure. Self-reporting was required for all questions. For the purposes of estimation, respondents were weighted by the inverse of their overall probability of selection within the household. A response rate of approximately 81 percent was achieved, with 3,025 completed interviews.

Telephone surveys have two distinct advantages over face-to-face interviewing; they result in more rapid and more efficient data collection, and they reduce interviewer variance by allowing continuous monitoring of the quality of interviews. The principal disadvantage of the telephone method is under coverage; about 7 percent of U.S. households did not have telephones in 1979. Detailed analysis of 1976 National Health Interview Survey data revealed that, while persons residing in nontelephone households have disproportionately low income, differences in sociodemographic and health characteristics between the telephone population and the total population are, on the whole, small (30). According to investigators of the University of Michigan's Survey Research Center, who are currently conducting a study for the National Center for Health Statistics, the quality of data obtained using the telephone method and the personal interview method generally appears to be comparable ("Differences Between Telephone and Personal Interview Data. First Report of Findings HIS/SRC Telephone Experiment," by C. F. Cannell and R. M. Groves. 1980, unpublished report).

The respondents in the NSPHPC were reinterviewed 1 year later with essentially the same questionnaire. The findings we report are from the first wave of interviews in 1979. A more detailed description of the methods used in this survey is available upon request from the National Center for Health Statistics.

The completed sample in the NSPHPC was composed of 40 percent men and 60 percent women. This ratio differs from National Health Interview Survey estimates of the proportion of adult men and women (ages 20-64 years) in the telephone households (approximately 47 to 53). For this reason, data are not shown for both sexes combined. To assess the potential bias resulting from this imbalance, the demographic characteristics of NSPHPC respondents were compared with the characteristics of persons sampled in the NHIS. The overall sex composition in the NSPHPC was found to produce no appreciable bias among males and females with respect to race, marital status, and employment status. Modest differences were found regarding the respondents' education and income. NSPHPC respondents appeared somewhat better educated and with slightly lower incomes than the NHIS respondents.

## Findings

Each of the six Alameda health practices (1) asked about in the NSPHPC were categorized into favorable or unfavorable behavior to approximate the original Alameda analysis. The favorable practices are as follows:

1. Sleeping an average of 7-8 hours a night.
2. Controlling one's weight—(based on the 1960 Metropolitan Life height-weight standards) weighing between 5 percent under and 19.9 percent over the desirable weight if male, or weighing not more than 9.9 percent over the standard if female.
3. (a) Sometimes or often swimming in summer, taking long walks, jogging, or riding a bicycle or (b) often engaging in a physically active hobby, doing calisthenics, or participating in other active sports.
4. Limiting alcohol consumption to less than five drinks per day.
5. Never having smoked cigarettes.
6. Eating breakfast almost every day.

The Alameda study included a seventh health practice—not snacking between meals—that was not included in the NSPHPC. Some analyses of the Alameda data have failed to substantiate the value of not snacking between meals in predicting health status.

The distribution of persons with favorable health practices, by age, sex, and education is shown in table 1. Following are highlights of these data:

- In general, with respect to most age and education categories, there were no consistently large differences between men and women in the proportion with favorable health practices, with the exception of never having smoked cigarettes and not drinking heavily.

- Where differences existed by educational level, a greater proportion of those with higher education reported favorable practices. The largest differences were among males for the smoking variable.

- Age differences in favorable health practices existed, but with no consistent pattern, except for the variable "eats breakfast almost every day." There is a marked increase with age for this practice.

A health habit score based on the six Alameda County items was computed, and the distribution of the proportion with 0 to 3, 4, or 5 or 6 favorable practices is shown in table 2 by sex, age, and education. Clearer patterns emerge with the composite score than when each behavior is looked at separately.

- More women than men reported five or six "good" practices, and this pattern is found in all age-education categories.

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Table 1. Proportion of persons 20-64 years reporting selected favorable health practices, by sex, age, and education: National Survey of Personal Health Practices and Consequences, Wave I, 1979

Health practice and education	Men				Women			
	20-64 years	20-34 years	35-49 years	50-64 years	20-64 years	20-34 years	35-49 years	50-64 years
<i>Average 7-8 hours of sleep a night</i>								
Education:								
All levels	67.4	68.6	67.1	65.5	68.6	66.4	73.7	66.3
Less than 12 years	59.1	63.5	53.6	61.5	61.2	54.4	69.1	60.1
12 years	68.1	65.6	72.4	66.5	67.8	64.2	72.2	68.8
More than 12 years	70.3	71.4	69.7	68.5	73.3	72.1	77.8	69.8
<i>Weight within desirable range for height</i>								
Education:								
All levels	63.6	64.1	62.5	64.2	61.7	73.7	58.8	44.9
Less than 12 years	56.7	61.7	53.0	57.0	45.9	64.1	45.4	34.1
12 years	63.8	64.1	60.4	68.2	58.3	68.4	57.0	40.3
More than 12 years	66.3	64.7	68.5	67.4	73.8	81.7	68.0	62.6
<i>Never smoked cigarettes</i>								
Education:								
All levels	33.7	43.7	24.0	28.5	50.6	53.9	46.9	49.4
Less than 12 years	16.3	10.4	10.8	25.1	43.6	35.9	47.3	46.1
12 years	32.4	38.1	27.6	28.8	52.8	55.5	49.1	52.4
More than 12 years	41.8	53.6	27.7	31.5	52.0	57.6	44.2	49.4
<i>Fewer than 5 drinks per day</i>								
Education:								
All levels	85.1	80.6	88.5	88.7	96.6	94.6	98.7	97.7
Less than 12 years	76.3	68.7	77.7	79.9	94.7	86.2	99.0	97.3
12 years	85.3	79.1	91.2	88.2	96.4	94.5	98.5	97.4
More than 12 years	88.6	83.8	91.6	97.8	97.9	97.1	98.7	98.5
<i>Engages in physical activities</i>								
Education:								
All levels	92.6	94.7	91.3	90.4	91.4	96.6	90.7	83.4
Less than 12 years	86.5	92.2	87.3	82.1	81.4	96.4	84.5	69.3
12 years	93.0	92.5	92.8	94.1	93.0	95.0	93.4	88.5
More than 12 years	94.9	96.5	92.2	95.1	94.9	98.2	91.0	92.5
<i>Eats breakfast almost every day</i>								
Education:								
All levels	53.3	44.7	53.1	69.6	55.9	47.1	55.3	71.5
Less than 12 years	52.8	35.7	50.0	66.5	49.8	34.4	44.4	63.8
12 years	53.1	44.1	53.6	69.4	53.2	41.3	55.9	72.4
More than 12 years	53.6	46.9	54.3	72.8	62.3	56.7	60.5	78.9

• Persons with more than 12 years of education reported 5 or 6 favorable practices more frequently than those with less than 12 years of education. The differences were more than twofold among men in each age group.

Table 3 illustrates the type of attitudinal and other health practices questions asked in the survey and shows the response distribution by sex. Half of the respondents felt that they had a great deal of control over their own health. It is the prevalence of this feeling of control

over one's health that is one basis for any program promoting good health practices. About half of the respondents reported they are doing a good job of taking care of their health, but only about 15 percent felt they are doing an excellent job. However, to the extent that wearing seat belts when riding in a car reflects a positive health practice, only 20 percent of the study respondents reported "always or nearly always" wearing seat belts, while another 15 percent said "sometimes." There is little difference by sex in use of seat belts, although the respondents with more than a high school

Table 2. Proportion of persons 20-64 years reporting 0 to 3, 4, or 5 or 6 favorable health practices according to sex, age, and education: National Survey of Personal Health Practices and Consequences, Wave I, 1979

Health practice score and education	Men				Women			
	20-64 years	20-34 years	35-49 years	50-64 years	20-64 years	20-34 years	35-49 years	50-64 years
<i>0 to 3 favorable practices</i>								
Education:								
All levels	34.9	35.1	40.2	27.2	23.4	21.1	23.8	26.9
Less than 12 years	52.6	56.5	62.0	41.3	39.3	40.0	33.3	43.0
12 years	34.7	41.3	35.2	21.8	23.8	24.8	23.6	22.1
More than 12 years	27.7	27.2	33.2	18.5	14.6	11.8	18.9	15.5
<i>4 favorable practices</i>								
Education:								
All levels	31.8	31.9	27.4	37.9	34.0	33.6	34.4	34.3
Less than 12 years	31.1	28.7	24.7	38.5	36.0	35.4	39.6	33.8
12 years	31.1	25.9	30.8	41.2	34.3	33.7	31.9	38.5
More than 12 years	32.6	35.9	26.3	34.2	32.7	32.9	34.6	29.4
<i>5 or 6 favorable practices</i>								
Education:								
All levels	33.3	33.1	32.4	34.9	42.6	45.3	41.8	38.8
Less than 12 years	16.3	14.8	13.3	20.1	24.7	24.6	27.1	23.2
12 years	34.2	32.8	34.0	37.1	41.9	41.5	44.5	39.4
More than 12 years	39.8	36.9	40.5	47.3	52.7	55.3	46.5	55.1

education were much more likely to use seat belts than were those with less than a high school education. Another practice that is anticipated to be a predictor of other positive health behavior is the use of dental floss or a waterpick. Table 3 shows that two-thirds of the men and one-half of the women in the sample flossed or waterpicked less than once a week, and the majority of these never did.

A composite physical health status variable was developed to provide an approximation of a similar variable in the Alameda study. It is based on four variables: limitation of activity level (similar to the NHIS limitation of activity questions); questions on ability to perform routine activities of daily living (ADL), such as walking, using stairs, sitting or standing for long periods, using fingers to grasp or handle, and lifting or carrying a 10-pound object; number of days spent in bed in the past year because of illness or injury; and energy level. Responses to these items were combined into a 5-point scale of health status:

1. unable to perform major activity (work, housework) or report a "great deal of trouble" in at least one activity of daily living.
2. limited in kind or amount of major activity or limited in other than major activities or report "some trouble" in at least one activity of daily living.
3. no limitation of activity and no difficulty in ADL and eight or more bed days in the past year.

Table 3. Other selected health practices and attitudes by sex in percentages: National Survey of Personal Health Practices and Consequences, Wave I, 1979

Questionnaire Item and response	Men	Women
Total <sup>1</sup>	100.0	100.0
How much control do you think you have over your future health?		
None at all	4.1	3.1
Very little	6.3	4.7
Some	34.9	39.6
A great deal	51.9	50.2
How good a job do you feel you are doing in taking care of your health?		
Excellent	14.0	14.6
Good	51.1	53.6
Fair	27.5	27.2
Poor	6.2	4.0
How often do you use seat belts when you ride in a car?		
Always or nearly always	19.8	19.5
Sometimes	13.6	15.3
Seldom	18.1	17.6
Never	48.5	47.5
How often, if ever, do you use dental floss or a waterpick?		
Every day	16.0	28.3
3 to 6 times a week	6.1	7.9
1 or 2 times a week	12.2	14.9
Less than once a week	13.5	10.9
Never	52.1	37.8

<sup>1</sup> Total includes unknowns.

<sup>2</sup> Asked of persons who have at least some natural teeth; percentages represent percent of persons with natural teeth.

- 4. no limitation of activity *and* no difficulty in ADL *and* fewer than eight bed days in past year *and* report "less energy than other people your age."
- 5. no limitation of activity *and* no difficulty in ADL *and* fewer than eight bed days *and* report "more energy than other people your age."

The analyses in this paper combine scale categories 1 to 3 into a single category of relatively poor physical health status based on some level of limitation of activity, difficulty with ADL, or eight or more bed days. Overall, 23.6 percent of the men and 35.4 percent of the women were classified as having relatively poor physical health status (table 4).

Some preliminary findings regarding physical health status and health practices are shown in tables 4-6.

- As in the Alameda survey, the more health habits people practiced, the less likely were they to report concurrent physical health problems. This was true for both men and women, for the younger as well as the older adults, and for those who had gone to college as well as those who had not (tables 4 and 6).

- Persons reporting themselves as physically active were less likely to report having had physical health problems. Physical activity had the highest correlation with physical health status of any of the six Alameda health practices examined. There is, of course, some redundancy in this observation: degree of physical activity can be taken as part of a measure of concurrent physical health status (table 5).

- Also correlated positively with reported concurrent physical health status were these two Alameda health habits: controlling one's weight and sleeping 7-8 hours a night (table 5).

- The other three Alameda health practices examined were relatively uncorrelated with reported concurrent physical health status: never having been a cigarette smoker, moderate alcohol drinking or abstinence, and eating breakfast regularly (table 5).

- Indeed, what has been regarded as heavier drink-

ing of alcoholic beverages (that is, an average of five drinks or more on drinking days) was consistently associated, albeit only slightly, with reports of better physical health status for men and women, younger and older adults, and for better and less well-educated persons.

Table 4. Percentage of persons 20-64 years with physical health status scores 1 to 3, by sex and health practice score: National Survey of Personal Health Practices and Consequences, Wave 1, 1979

Health practice score	Men	Women
All scores	23.6	35.4
0 to 3	27.8	47.0
4	21.6	33.9
5 or 6	21.2	30.3

Table 5. Percentage of persons 20-64 years with physical health status scores 1 to 3 by selected favorable and unfavorable practices and sex: National Survey of Personal Health Practices and Consequences, Wave 1, 1979

Selected health practice	Men	Women
Sleep:		
Unfavorable	26.4	38.7
Favorable	22.3	33.9
Weight:		
Unfavorable	28.9	43.4
Favorable	20.6	30.5
Smoking:		
Unfavorable	24.8	37.0
Favorable	21.3	33.9
Alcohol:		
Unfavorable	20.6	30.0
Favorable	23.8	35.4
Physical activities:		
Unfavorable	37.6	61.7
Favorable	22.5	33.0
Breakfast:		
Unfavorable	22.8	35.3
Favorable	24.3	35.6

Table 6. Percentage of persons 20-64 years with physical health status scores 1 to 3 by health practice score, sex, age, and education: National Survey of Personal Health Practices and Consequences, Wave 1, 1979

Health practice score	Men				Women			
	20-44 years		45-64 years		20-44 years		45-64 years	
	High school <sup>1</sup>	College <sup>2</sup>	High school <sup>1</sup>	College <sup>2</sup>	High school <sup>1</sup>	College <sup>2</sup>	High school <sup>1</sup>	College <sup>2</sup>
0 to 3	23.8	21.5	46.2	27.4	36.8	42.3	62.3	53.2
4	20.5	14.9	34.3	18.9	28.8	27.2	46.1	39.2
5 or 6	18.1	11.2	45.2	21.6	26.9	23.9	39.0	42.0

<sup>1</sup> High school—high school graduate or less. <sup>2</sup> College—more than high school graduate.

- At all three Alameda health habit levels, generally people whose formal education did not go beyond high school were more likely to report poorer physical health status than persons who had some college education (table 6).

- For both men and women, the relation between number of Alameda health practices and concurrent physical health status obtains (table 6).

- The relationship between number of Alameda health practices and concurrent physical health status holds for younger (ages 20-44) and to a lesser extent also for older adults (ages 45-64) (table 6).

The national survey has verified the relationship found between certain Alameda health practices and concurrent physical health status, as originally reported by Belloc and Breslow (1). On the other hand, the relationship between other of the Alameda health practices and concurrent physical health status was not verified on the national survey.

### Conceptual Issues

Several conceptual issues complicate the analysis of the relationship between health practices and health status. The major issue is the potential for circularity between certain practices and health status measures. For example, one of the Alameda health practices concerns physical activity levels, and the physical health status variable also includes the ability to perform certain activities. This issue was recognized by Breslow and Enstrom in their most recent analysis of the Alameda data (3).

A closely related issue is the assumption that good health practices should lead to better health status. However, in investigations of the relationship between the two, there is the problem that health status can also affect health practices, that is, persons in poor health may be unable to perform many of the practices. Certain health conditions or their management may cause a person to lose weight or may restrict their smoking, drinking, exercise, or sports activity. The temporal relationship between practices and health is difficult to obtain in cross-sectional studies, although questions about past practices and past health status can be asked. In fact, in the NSPHPC, respondents were asked if certain of their health practices had changed in the last 2 years and, if so, was the change because of a health condition. The fact that the respondents were interviewed at two points in time will permit additional analysis of this temporal factor.

Another issue in any interview survey is the self-reporting of practices and appraisal of health status, an issue infrequently raised in the analysis and interpretation of survey data. In addition to the problem of accuracy of reporting health practices, such as the number of

hours slept, to what extent are self-reports of health status variables influenced by respondents' perception of both their health status and health behavior? People who perceive themselves as healthy might overlook and not report certain health characteristics that otherwise might be reported if they perceived their general health status differently. For example, are people who perceive their health as excellent as likely to report the bed days due to influenza that occurred several months ago as are people who have a poor self-concept of their general health status? This methodological issue has not been fully addressed in health interview surveys.

### Future Analysis

Several reports on this survey will be forthcoming later in 1981. One presents data on about 50 selected health practices by sex, age, and education, similar to those shown in table 1. This report also contains a copy of the survey questionnaire (31). The second report shows the percentage distribution of responses to most questionnaire items by sex, similar to the format of table 3 (32). There will be analyses similar to the Alameda study of the relationship of the six practices with the physical health status variable. One of the main purposes of the survey was to determine the distribution and predictive power of a wider range of health practices than were reported in the Alameda study. The 1-year reinterview of the respondents will permit analysis of the relative stability of these practices over time. Data will be presented both in terms of aggregate changes in the behaviors of subgroups of the population and in terms of individual changes.

Much of the initial analysis will be an examination of the relationship between the selected health practices identified in the survey to determine whether certain positive practices tend to cluster. In addition, there will be an effort to determine whether selected health practices can be used as indicators of more general positive health behavior. For example, do people who regularly wear seat belts or floss their teeth tend to follow a number of other "good" practices?

Additional analysis will be done on the impact of health practices on health status, although the health status measures in this study are rather general. Two types of analyses are possible with the data. The relationship between health practices and concurrent health status can be analyzed for both the first and second wave of data. The followup design will permit the analysis of the relationship between health practices at the first wave and health status at the second wave. In addition, several retrospective questions on the first wave will permit analysis of whether current health behaviors are influenced by previous health status.

A significant feature of this national study is the ability to follow the mortality experience of the sample, as was done in the Alameda County study. Data were obtained from the respondents that will permit matching them with the new National Death Index developed by the National Center for Health Statistics. Each year, the sample will be checked against a list of all deaths that have occurred in the country so that, as the data are accumulated over the years, estimates can be made of the life expectancy based on previous health behaviors. This, of course, is a long-term analysis plan, with the first major analysis at least 5 years in the future.

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## Health Data Quiz

Questions Featuring Data From the National Center for Health Statistics—  
Test Your Knowledge of Current Vital and Health Statistics

- The chronic condition most frequently associated with activity limitation as reported in the National Interview Survey is \_\_\_\_\_.
  - arthritis and rheumatism
  - diabetes
  - heart disease
  - hypertension
- \_\_\_\_\_ is the acute condition most frequently reported in household interviews.
  - upper respiratory conditions (including colds)
  - headaches
  - digestive disorders
- Life expectancy at birth is highest for \_\_\_\_\_.
  - white males
  - all other males
  - white females
  - all other females
- Infant mortality rates are lowest in the \_\_\_\_\_ Region.
  - Southern
  - Western
  - Northeastern
  - North Central
- June is still the most popular month for marriages, but \_\_\_\_\_ is a close second.
  - August
  - May
  - July
  - September
- \_\_\_\_\_ is the nonsurgical family planning method most used by married couples according to the National Survey of Family Growth.
  - diaphragm
  - oral contraceptive
  - IUD
  - condom
- \_\_\_\_\_ continues to be the leading cause of death.
  - cancer
  - accidents
  - stroke
  - heart disease
- Most women whose marriage ends in divorce (a) are \_\_\_\_ (b) are not \_\_\_\_ likely to remarry, according to the National Survey of Family Growth data on women ages 15-44.
- Most Americans rely on \_\_\_\_\_ to pay their hospital bills.
  - Medicare
  - Medicaid
  - self or family
  - private insurance
- Most Americans think that compared to other persons their age, their health is (a) excellent \_\_\_\_ (b) good \_\_\_\_ (c) fair \_\_\_\_ (d) poor \_\_\_\_, according to information collected in the National Health Interview Survey.
- Although more deaths are caused by motor vehicle accidents, \_\_\_\_\_ accidents are more frequent.
  - work
  - home
  - sports
- Most American mothers (a) do \_\_\_\_ (b) do not \_\_\_\_ nurse their babies, according to the National Survey of Family Growth.
- According to the National Ambulatory Medical Care Survey, the physician most frequently visited by patients is the \_\_\_\_\_.
  - surgeon
  - medical specialist, including pediatrician
  - general practitioner or family physician
- Excluding biopsies and diagnostic dilation and curettage of uterus, \_\_\_\_\_ is the most frequently

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performed operation recorded in the National Hospital Discharge Survey.

- a. tonsillectomy and adenoidectomy
- b. hysterectomy
- c. appendectomy

15. The ownership of the majority of hospitals in this country is \_\_\_\_\_, according to the National Master Facility Inventory Survey.

- a. Federal Government
- b. proprietary (operated for profit)
- c. State or local government
- d. nonprofit

16. Most Americans (a) are \_\_\_\_\_ (b) are not \_\_\_\_\_ overweight, according to skinfold measurements taken during the National Health and Nutrition Examination Survey.

17. There are more \_\_\_\_\_ than any other single occupational group in the health field.

- a. physicians
- b. registered nurses
- c. health technologists and technicians
- d. nursing aides, orderlies, and attendants

18. \_\_\_\_\_ is the most common form of exercise among persons 20 years of age or over.

- a. bicycling
- b. jogging
- c. walking
- d. swimming

19. The median age of brides at first marriage is now a little over \_\_\_\_\_.

- a. 21 years
- b. 20 years
- c. 19 years
- d. 22 years

20. Each year there are more (a) \_\_\_\_\_ male births (b) \_\_\_\_\_ female births.

21. For young Americans under 25 years of age \_\_\_\_\_ is the leading cause of death.

- a. congenital anomalies
- b. accidents
- c. homicide
- d. suicide

22. The average weight for women aged 18-74 is approximately \_\_\_\_\_ as measured in the National Health and Nutrition Examination Survey.

- a. 130 pounds
- b. 145 pounds
- c. 155 pounds
- d. 120 pounds

23. The average weight for adult men is about \_\_\_\_\_ as determined in the National Health and Nutrition Examination Survey.

- a. 150 pounds
- b. 160 pounds
- c. 170 pounds
- d. 180 pounds

24. Most Americans (a) need \_\_\_\_\_ (b) do not need \_\_\_\_\_ some type of dental treatment.

25. The major expense in providing care to residents in nursing homes is \_\_\_\_\_, according to the 1977 National Nursing Home Survey.

- a. operating costs, including food, drugs, and supplies
- b. labor costs, including wages, salaries, and benefits
- c. fixed costs, including equipment, rent, insurance, and taxes

26. The most common diagnosis among residents of nursing homes is \_\_\_\_\_.

- a. diseases of the circulatory system
- b. mental disorders and senility
- c. diseases of the musculoskeletal system
- d. diseases of the respiratory system

27. According to the National Ambulatory Medical Care Survey, \_\_\_\_\_ is the symptom most frequently reported as the reason for a physician visit.

- a. cough
- b. back symptoms
- c. sore throat
- d. colds

See page 236 for answers to the Health Data Quiz

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## The Varied Uses of Health Statistics

ROBERT H. MUGGE, PhD

THE DATA COLLECTED and disseminated by the National Center for Health Statistics (NCHS) are widely used. Newspapers, radio, and television frequently carry interesting and important new findings reported by the NCHS. These findings, for example, may be about trends in the rates of births, marriages, divorces, and deaths; infant mortality; changes in causes of death; growth in the numbers of physicians, dentists, or nurses; how many people are being hospitalized and for what ailments; time lost from work due to accidents; how long people live in nursing homes or the services they get in them; the adequacy of people's diets; the extent of under-

weight and overweight; changes in family planning practices; or trends in cigarette smoking. The Center releases a vast array of information about health conditions, health problems, health services, health service resources, and costs of health care.

In addition to informing the people about things they urgently need to know, all the data have specific and important uses for the nation. The data are used for planning and evaluating health programs, resources, and services; for developing and legislating public health programs to meet health needs; for budgeting for health programs; for determining needs for health practitioners; and for planning activities in health education.

The extent of data usage is indicated by some 10,000 direct requests for data received in the Center each month and some 400,000 copies of publications sent

annually to people who request them. In addition to publications, the Center has issued for public use more than 150 computer tapes containing detailed nonconfidential data from nearly all the surveys and data systems operated in the past 10 years. Several hundred tapes are sold annually, mostly to scientists who wish to make additional analyses of the data. Within the limits of staff and equipment, special tabulations of data are prepared; the costs are borne by the requestors.

Most of the specific uses of health data never come to the attention of the Center staff. The handful of specific uses that follow are examples of the mix of uses from the traditional program evaluation and health education to the more recent epidemiologic studies of environmental hazards.

—Growth charts for children, formulated from body measure-

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ments obtained in the National Health and Nutrition Examination Surveys, are used in medical practices throughout the world. More than 25 million copies of the charts have been distributed. They are now the "World Health Organization's Standard Reference" for physical growth of children 2-18 years of age.

—Twenty years of cancer mortality data, from the vital registration system, were used by the National Cancer Institute to produce the first U.S. "Atlas of Cancer Mortality for U.S. Counties: 1950-1969." The geographic concentration and dispersion patterns of various types of cancer shown in the atlas, such as consistently high rates of lung cancer along the Gulf Coast, provided clues that are being followed up in studies related to environmental and other exposures.

—Infant mortality and natality data, from the vital registration

system, were used by the Mayor's Blue Ribbon Committee on Infant Mortality in the District of Columbia and the Public Health Service Task Force on Health in the District in a year-long effort to analyze causes and seek solutions to the District's excessively high infant mortality. Investigation revealed that an unusually high percentage of babies born in the District were of critically low birth weight, which probably accounts for at least some of the excess infant mortality.

—Characteristics of nursing homes, the services they provide, and their patients, from the National Nursing Home Survey, are used by the Health Care Financing Administration in drafting proposals for conditions for participation of skilled nursing facilities and intermediate care facilities in the Medicare and Medicaid programs and in determining the cost impact of implementing the regulations.

—Data on anemia and iodine excretion, from the National Health and Nutrition Examination Survey, are used by the Food and Drug Administration as a basis for decisions concerning iron supplementation or limitation for basic foodstuffs.

—Variations in blood pressure, from the National Health and Nutrition Examination Survey, are used by the National Heart, Lung, and Blood Institute to create models for funding high blood pressure control programs across the country.

—Data on pesticide residues and metabolites in blood and urine, from the National Health and Nutrition Examination Survey, are used by the Environmental Protection Administration to identify and assign priorities for research on the health effects of pesticides shown to have widespread exposure in the U.S. population.

—Data on prevalence of skin disorders among people living at various longitudes and latitudes, from the National Health and Nutrition Examination Survey, were used by the University of California under an Environmental Protection Administration grant as part of the study of ozone layer damage and its health effects.

—Heart disease mortality data, from the vital registration system, and serum cholesterol data, from the National Health and Nutrition Examination Survey, were used by the Conference on the Decline in Coronary Heart Disease in examination of the decline in deaths from this cause.

—Trends in cesarean deliveries, from the National Hospital Discharge Survey, were used by the Consensus Development Conference on Cesarean Childbirth, to review the upward trend and its incidence across the United States.

—Data on nurse supply, from the "RN Inventory," are used by the Health Resources Administration to formulate and update criteria for designating nurse shortage areas.

—Health characteristics of persons with diabetes, from the National Health Interview Survey, are used by the National Commission on Diabetes, National Diabetes Advisory Board, National Institute of Arthritis, Metabolic and Digestive Diseases, and Centers for Disease Control to guide administrative planning of diabetes programs, to evaluate the screening programs for diabetic retinopathy, to evaluate health services for diabetics, and to identify educational needs of diabetics and their families.

—Data on exposure of the population to medical and dental X-rays, from the National Health Interview Survey and a mail follow-up survey, were used by the Bureau

of Radiological Health and the Food and Drug Administration to estimate the effect of such exposures and then to initiate a national program to evaluate X-ray trends and promote the safe and efficient use of X-ray equipment.

—Data on prevalence of cigarette smoking among various population groups, from the National Health Interview Survey, are used by the Office on Smoking and Health in its mandated reports to Congress, in public service messages, and in health education campaigns.

—Data on health of children, from the vital registration system and surveys, were used by the Secretary's Select Panel for the Promotion of Child Health in preparing a congressionally mandated report. The panel recommended that highest priority be given to meeting three areas of need: comprehensive prenatal care, care to children under age 5, and family planning services.

—Data on health of the aged, from multiple data systems, are used by the White House Conference on Aging to prepare fact books. These fact books are to be sent to all delegates well in advance of the conference to be used as background for study and deliberations on problems and needs of the aged.

—Data on trends in surgery, from the National Hospital Discharge Survey, are used by the American College of Surgeons in the annual "Socio-Economic Factbook for Surgery." These data are presented to and used by the congressional subcommittees on health, fellows of the American College of Surgeons, deans of medical schools, and others to evaluate the needs for surgery and surgeons of various types.

—Data from the 1977 National

Nursing Home Survey were first used by the National Institute of Mental Health to describe the mentally ill in institutions and then to create the Department's National Plan for the Chronically Mentally Ill.

—Data on use of family planning and infertility services, from the National Survey of Family Growth, are used by public and private agencies to evaluate the success of their programs in providing services and to plan future programs.

—The use-effectiveness rate of contraceptive methods, from the National Survey of Family Growth, is used by clinicians and family planning programs to guide clinic patients in the selection of methods and to identify subgroups of women in need of family planning services.

The preceding are just a few examples—perhaps some of the more dramatic ones—of the general uses of NCHS data; many more could be cited. In anticipation of such important uses, Congress directed the Center (in 42 U.S.C. 242k) to collect statistics on the extent and nature of illness and disability of the U.S. population; the impact of illness and disability; environmental, social, and other health hazards; determinants of health; health resources; use of health care; health care costs and financing; and family formation, growth, and dissolution.

The Center gathers and makes available a large and varied body of highly reliable and useful data in these areas. Although many important uses of the data are known, the Center staff is keenly aware that its data product continues to be seriously underused. It is hoped that more and more individuals and organizations will be looking to the Center's growing store of information on health problems and concerns.

## The Challenge to Health Statistics in the Eighties

LESTER BRESLOW, MD, MPH

THE CHALLENGE TO HEALTH STATISTICS in the United States during the 1980s will be at least fourfold: (a) to delineate clearly the changing health problems in the nation, (b) to reveal information about health that people want to know and important information they might not know to ask for, (c) to help discern and measure the factors that endanger and that promote health, and (d) to develop and apply the methods and technology that will enable health statistics to meet these major challenges.

### Changing Health Problems

As recently as 15 years ago our nation's health problems, and particularly their trends, appeared different from what they are today. For example, into the mid-1960s coronary heart disease had been rising steadily as a cause of death. This disease, first described in the early part of this century, was accounting by 1965 for 35 percent of all deaths. Then the peak was passed, and since 1965 there has been a decline of more than one-fourth in the mortality rate from coronary heart disease. For many years regarded as a so-called degenerative disease, coronary heart disease has now been shown by health statistics to be a modern epi-

demio. Rather than being measured in a few weeks or months like the epidemics of most acute communicable diseases, the epidemic of coronary heart disease has extended over several decades but since the mid-sixties has been turning downward. Also, during the most recent 15 years, health statistics has tracked the rise and decline of another modern epidemic, cancer of the body of the uterus, as well as the extension of the lung cancer epidemic to women.

Again focusing on recent years, health statistics during the period 1955-65 demonstrated America's failure to keep pace with other advanced nations in respect to infant mortality. Whereas the death rate for infants in Scandinavian and other northern European countries was dropping well below 20 per 1,000 live births, the rate in the United States was 26 in 1955 and 25 in 1965. During the past 15 years, however, our infant death rate has been cut in half, and it is still going down steadily—a fact not yet sufficiently appreciated.

These examples indicate the relatively rapid shifts that have taken place in the trend of important health problems, shifts that through health statistics can easily be observed well within a decennial period.

What changes will the 1980s bring? Will we be able to catch up with the Scandinavian countries and others whose death rates have kept on declining below ours? Will infant death rates and death rates among males under 65 years of age from coronary heart disease continue to be substantially higher among blacks than whites? Will we recover from recent reversals in health,

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such as the increase in mortality among young people in the late 1970s? What new epidemics will arise?

To delineate clearly the nation's changing health problems, of course, requires more than the keeping of mortality statistics and the publication of annual reports presenting them. It is necessary to go beyond deaths—infant deaths and deaths from cancer and heart disease—as the measure of health. Avoiding the premature end of life and its specific causes no longer expresses the goal of health for Americans. The words "adding life to years, not merely years to life" take on meaning when one considers that life expectancy at birth has increased from 47 years in 1900 to 74 years at present; it increased about 2½ years just during the 1970s. Does this addition constitute years of healthful life or merely years of existence? How healthy are those extra years, and how healthy can they be? These questions will no doubt increasingly be raised in the eighties.

Leaders in health statistics recognize and are responding to this changing emphasis. Our measures of health, as distinguished from those of life and death, are still fairly crude, but at least there is substantial agreement on the direction we must go. Those who struggled to initiate morbidity surveys in the 1930s and 1950s can see the progress. We must move faster, however, to complete the mission of devising and using more acceptable measures of health that reflect the realities, concerns, and goals about health in our time. That matter will be important for health statistics in the 1980s. I will resume that theme later in this paper.

Another aspect of delineating the health problems of our time is to present clearly, in a fashion that will attract appropriate attention and achieve comprehension, the data about health. Publication of the annual volumes of "Health United States" is a major step in that direction. Similar activities are underway in several States. Thus far, however, we have by no means conveyed the understanding of America's health problems that is possible even with existing data. We have not adequately brought that understanding to the general public, nor to the important special groups that particularly need to comprehend our health problems—legislators; health officials; health professionals of all kinds; leaders of business, labor, and the ethnic minorities; and other social leaders. Public health leaders in the past, who were often health statisticians, used the data of their times effectively to capture attention and arouse action on the major health problems of the day. We must do the same. One challenge in the eighties then is to delineate fully and carefully what the health problems are, not just for the experts but for all who should know.

## What People Want to Know About Health

Closely related is a second challenge, namely, to find out what people want to know about health and also what they might not know to ask for. Developing and reporting health statistics is essentially a service, a service to many groups in our society. Hispanics want to know about their health, just as blacks are beginning to know about theirs. Both groups want to know how they compare with the majority white population of the country and what progress is occurring in their group. What neither group yet knows to ask—and neither do the majority whites—is how they compare with those enjoying the best health record of any ethnic group in the United States—the Japanese (1).

Let us turn to some more statistically sophisticated groups, those who plan and administer hospital and medical services and the government officials who deal with these planners and administrators. These people want to know in some standardized and sensible format the nature, extent, and cost of the services that are provided by the hospitals, physicians, dentists, pharmacists, and other elements of the health care delivery system with which they are concerned. Health statisticians are beginning to supply such data, stimulated by national slogans such as cost containment and sometimes by stronger pressures closer to home. But again, providing what these users of health statistics want does not fulfill the responsibility of the health statisticians. These statisticians also have the duty of directing attention to the need for population-based statistics that afford a more rational basis for planning and administering hospital and medical care services than the institution-based statistics that are commonly used. Data on the average length of stay and the percentage occupancy of hospitals indicate what is happening in individual hospitals, but they do not delineate what is happening to the people who presumably are to be served by the hospitals. Such institution-based statistics do not adequately reveal even the cost implications. Wennberg and colleagues are showing, in some elegant studies of New England experience (2), that nearly identical percentage occupancy and average length of hospital stay can exist despite large differences in the parameters that are much more significant for hospital planning, for example, a difference of more than 50 percent both in patient days of care per 1,000 persons and in allocated per capita expenditures. Computing such statistics on a proper area-population basis yields the data that we really want to have for planning, giving a picture that is concealed when we stick to institution-based statistics. Furthermore, focusing as much attention as we do on

the average price per day of care and per medical service in different institutions as the targets for cost containment is a serious mistake. In fact, it is the frequency of the service per population unit—not the price per service—that often accounts for the extreme variation in medical service expenditures among different population groups.

Thus, although health statisticians must continue to respond to people's particular desires for information, that is not sufficient. Their mission, especially for the 1980s, includes acquiring, through statistical expertise and the production and analysis of data, the knowledge that bears most significantly on the problems at hand. Even though the existence of that knowledge and how to use it are not yet understood by non-statisticians, a challenge to health statistics is to create and convey that understanding.

### Factors Endangering and Promoting Health

From the standpoint of throwing light on current health problems and what to do about them, I believe our health statistics plans and reports throughout the 1970s were grossly out of focus. To correct this major imbalance in our statistics efforts, in the United States and in the industrialized world generally, is probably the most important challenge to the health statistics field for the 1980s.

In recent years, documents with such titles as "Health Statistics Plan," "Planning for Health," and "Priority Health Problems" have reflected much of the significant new health statistics work. A glance through such documents is revealing. Typically they focus on just two aspects of health. One is health status in the traditional sense: measures of infant mortality, the communicable diseases, and the chronic diseases such as cardiovascular diseases, cancer, and mental illness. Attention is often given to the distribution of these health problems among various segments of the population—people of different ages, sex, race or ethnicity, income, and residence. The second aspect, and the one that has been receiving the lion's share of attention, is medical and hospital care. Coverage of this aspect usually includes health care resources, that is, numbers of hospital beds, physicians, dentists, and the like; use of health care services, for example, hospital admissions and physician visits; and financial aspects of health care services, such as the price of a day in the hospital and the distribution of expenditures among the private and public sectors of the economy. To indicate access, measures of health care resources and use of health care services by various geographic, racial, and income groups have commonly been included in health statistics.

This concentration of effort on health care services is understandable. In the mid-1960s our nation made a policy decision to achieve equity in the use of health care services as a major approach to health, particularly to enhance the access to health care services of previously disadvantaged groups. The twin aims of that policy were to improve the health of the nation and to advance social equity. Health statistics, albeit with many serious imperfections, has served to monitor what happened after that decision. Several significant things have happened. The increasing proportion of the gross national product devoted to health care services has accelerated: the percentage was 4.0 in 1940, 4.5 in 1950, 5.3 in 1960, 6.2 in 1965, 7.6 in 1970, 8.5 in 1975, and probably more than 10 in 1980. Black people have received more physician visits than before and old people, more nursing home care. Also, overall, health status as commonly measured has improved.

In recording all of this information and displaying some of the health problems, however, health statistics has accepted health care services as its principal focus. It has perpetuated the basic assumption that these services constitute essentially the only factor in health about which modern society can do anything. That assumption is false, and the fallacy is becoming ever more obvious. Take one specific, well-known example. Cancer is a much feared health problem and the second leading cause of death. Lung cancer is becoming its major component, causing at present one-fourth of all deaths from cancer. Health care services, both existing and foreseeable, can provide little help for this component of the problem. Cigarette smoking is the overwhelming factor, and it has been known as such for many years. At this point some may protest: But health statistics found that out! True. The point is, however, that health statisticians have not provided in their central plans and reports for the systematic collection and presentation of data about cigarette smoking. Such work has been a peripheral matter.

The same relative neglect during the 1970s characterized the treatment in health statistics of other behavioral factors in health, such as excessive caloric intake in relation to bodily energy needs, excessive intake of sugar and salt, and excessive use of alcohol. It is becoming generally understood that the cigarettes, calories, alcohol, sugar, and salt that people consume have more impact on their health than the various types of health care services. Some U.S. government leaders, voluntary health agencies, and professional bodies, influenced by a few epidemiologists and health statisticians, have begun to highlight various behavioral factors in health. Health statistics reports,



biles, to build more nursing homes beds in an area, or to curtail obesity. Even within the problem of the attack on one disease—coronary heart disease, for example—data of the sort envisaged here would help decide how much emphasis should go to coronary care units, emergency medical services, finding and treating high blood pressure, curtailment of cigarette smoking and obesity, and reducing the animal fat content of food.

For health statisticians, the quest of the 1980s, in respect to the factors that endanger health and those factors that promote it, will be to develop and exploit information systems which will support a more rational data-based health policy that makes systematic use of behavioral influences, environmental control measures, and health care services to improve health.

### Methods and Technology

Technological advances during recent years, such as in computers, and improved methods, such as in sampling, have greatly expanded the potential of health statistics. For example, the feasibility of linking computerized records of the health-related data from a substantial sample of the 1980 census with the national registry of deaths, which was initiated in 1979, opens tremendous possibilities. That record linkage will permit study of the factors associated with mortality on a magnitude never before possible in the United States.

It is reasonable to anticipate that the methodology and technology for health statistics will continue to improve through the 1980s, and health statisticians will no doubt be participating in these developments. Health statisticians face a continuing demand to devise methods and techniques to solve problems and advance their field.

### International Aspects

After peace among nations and human freedom, one of the most fundamental searches of our time is for ways to achieve health. Of special interest here are the definition and measurement of health. The World Health Organization advanced the notion that health is "physical, mental and social well-being, not merely the absence of disease and infirmity." Yet in the three decades since that WHO pronouncement, relatively few serious attempts have been made to make the concept operational, to reduce it to quantifiable terms. Some say that is impossible. I disagree and suggest that it is time to start.

The increasing popularity of such terms as "wellness" and "holistic" reflects the striving for a concept of health beyond the one that has guided us heretofore. Measurement of health should soon begin to reflect something positive, something to be maintained and

promoted, as well as something whose loss we fear. We must learn how to measure the entire health spectrum, not merely its negative end—deterioration.

An interesting point is that both the countries of the West and the countries of Eastern Europe have proposed a set of social indicators, as distinguished from indicators of national economic status and progress. Moreover, the sets of social indicators that the two groups have devised are very similar, and in both, health appears prominently.

Although the leading and competing industrialized nations of the world have joined and participate with others in the World Health Organization, what is not so well known is that within the framework of their continuing intense rivalries, both the Western and the East European nations have recognized the necessity of measuring social as well as economic and military status and trends. Of great significance, it seems to me, is that they propose to develop and use similar social indicators, among which health is an important component. The United Nations itself has also issued a report of a similar venture (6). Measurement of social status, including health, for the purpose of discerning national trends and international comparisons appears to be a potentially significant step for society. This little known and unheralded development opens the possibility of international competition of a new sort—competition in social, and especially health, status.

The 1980s could be the time when social advance will become a significant, even the most significant, focus of competition among nations. Such a view of the current international scene may seem overly optimistic. However, whether or not it is justified, the two major groups of industrialized nations have agreed on the World Health Organization definition of health. They have also agreed in effect (in separate documents of a similar nature) that we should explore the development and use of social indicators, among which health is an important component.

That agreement does seem to provide a basis on which health statisticians throughout the world, in the developing as well as the industrialized nations, should now construct and apply more appropriate measures of health than those of the past. Such measures would contribute, for the rest of this century and into the next, to international as well as national progress in health.

### Summary and Conclusion

The 1980s may well be the most challenging decade ever for health statistics. In the past decade we have observed the extension of longevity; it has increased more than 50 percent since 1900. In the coming decade

we must find ways to delineate the new and rapidly changing health problems of advanced industrial society so clearly that all may understand them.

Also, we face the task of making health statistics a responsive service that reveals what people should know about health as well as what they want to know. This task calls for the health statistician to become an educator and leader, to go beyond simply serving as the source of desired information.

Moreover in the 1980s we must develop a well-rounded system of health statistics covering all the major factors that promote or endanger health. In particular this means expanding data concerning environmental and behavioral influences on health and bringing knowledge of these factors at least up to the level of current data about health care services. For maximum usefulness, we also will have to focus on all three sets of factors as they exist among populations in geographically defined areas. Only in this way can the potential for improving health be understood and guidance be provided to action for improvement. We need to develop further the methods and techniques that will elucidate the major issues in the field, taking into account global as well as micro-problems and opportunities.

Finally, it should be noted that our country has made a tremendous and increasing budgetary commitment to health. It troubles me greatly (and many others as well) to realize that the investment is probably not being well made. Yet the very means of guiding that investment and directing it into channels for the greatest return are being squeezed down to dangerously low levels in the budgetary process.

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## Answers to the Health Data Quiz

on pages 226-227

1. c. Heart disease is the most frequent cause of disability or activity limitation. Arthritis and rheumatism is the second.
2. a. Upper respiratory conditions (including colds) is the most frequently reported acute condition in household interviews, with some 130 million conditions in 1979. Other respiratory conditions, such as influenza, also ranked high. Only about 4 million headaches were reported.
3. c. Life expectancy at birth is highest for white women at 77.8 years, followed by all other women, 73.6; white men, 70.2; and all other men, 65.0, according to the 1978 data.
4. b. Infant mortality rates are lowest in the Western Region of the United States, with a 1978 rate of 12.1 deaths under 1 year per 1,000 live births. Rates for the other regions were Northeast, 13.1; North Central, 13.6; and Southern, 15.3.
5. a. August is a close second to June in the number of marriages performed each year. January is the least popular month.
6. b. The oral contraceptive is the nonsurgical family planning method most used by married couples; 22 percent use this method, compared to 7 percent for the condom, 6 percent for the IUD, and 3 percent for foam.
7. d. Since 1950, heart disease has been the leading cause of death, accounting for 38 percent of all deaths in 1978. Cancer accounted for 21 percent.
8. a. Most women ages 15-44 whose marriage ends in divorce remarry within 5 years; 20 percent within the first year after divorce.
9. d. Private health insurance, consisting of Blue Cross and other private or commercial insurance, was the principal expected source of payment for 54 percent of all discharges from non-Federal short-stay hospitals in 1977. Medicare was second with 25 percent, and Medicaid accounted for another 8 percent, according to data from the National Hospital Discharge Survey.
10. a. About 50 percent of the population selected

excellent when comparing their health to that of other people their age. Another 30 percent thought their own health was good, according to a recent National Health Interview Survey.

11. b. Home accidents are about 5 times as frequent as motor vehicle accidents; however, motor vehicle accidents account for more than half of all accident deaths.

12. b. Most American mothers do not nurse their babies, but the number who do is growing, up 30 percent during the first half of the 1970s, reports the National Survey of Family Growth.

13. c. Office visits to general and family practice physicians accounted for 36 percent of all visits recorded in the 1978 National Ambulatory Medical Care Survey. However, obstetricians and gynecologists and other surgical specialists accounted for almost 31 percent of visits.

14. b. Excluding biopsies and diagnostic dilation and curettage of the uterus, hysterectomy was the most frequently performed operation recorded in the 1978 National Hospital Discharge Survey. Next in order were ligation and division of fallopian tubes, tonsillectomy with or without adenoidectomy, repair of inguinal hernia, and cesarean section.

15. d. Almost half of the nation's general medical and speciality hospitals are operated by nonprofit organizations such as churches, fraternal associations, and other institutions.

16. b. Most Americans are not overweight, according to skinfold measurements taken during the National Health and Nutrition Examination Survey. Some 14 percent of men and 24 percent of women were measured as 20 percent or more above desirable weight.

17. b. Data for 1979 show 1,223,000 registered nurses. Nursing aides, orderlies, and attendants was the next largest category, another 1 million. There were about 430,000 physicians and 130,000 dentists.

18. c. Walking was the most common form of exercise among persons 20 years of age and over. Some

34 percent favored walking, compared to calisthenics, second with 14 percent, swimming (12 percent), bicycling (11 percent) and jogging (almost 5 percent).

19. a. The median age of brides at first marriage was recorded as 21.4 years for 1978. In 1970 the average bride was about a year younger.

20. a. The sex ratio in 1978 was 1,053 male births per 1,000 female births, unchanged from 1977. This ratio varies very little from year to year.

21. b. Accidents are the leading cause of death for all age groups under 25.

22. b. The mean weight for women ages 18-74 is 143 pounds. Average weight ranged from 132 pounds for women 18-24 to 149 in the 45-54 and 55-64 age groups.

23. c. The mean weight of men aged 18-74 is 172 pounds. Average weight was lowest (165 pounds) for young men 18-24 and highest (178 pounds) for men 35-44 years old.

24. a. Approximately 64 percent of the population needs dental treatment of one type or another based on data collected in the National Health and Nutrition Examination Survey. Dental care needs include cleaning, periodontal treatment, filling, and extraction.

25. b. Labor costs amount to about 60 percent of the expenses of providing care to residents in nursing homes. Operating expenses accounted for about 22 percent, fixed costs for another 14 percent. Miscellaneous costs accounted for the remainder.

26. a. For 40 percent of residents in nursing homes, diseases of the circulatory system was the primary diagnosis at the last physical examination. This compares to 20 percent for mental disorders and senility.

27. c. In the 1978 National Ambulatory Medical Care Survey of office-based private physicians, sore throat was the most frequent reason for a physician visit, followed by cough, back symptoms, skin rash, and colds. Sore throat was the cause of more than 17 million visits to physicians.