

PUBLIC HEALTH STATISTICS IN NEW YORK CITY ON THE NINETIETH ANNIVERSARY OF THE BOARD OF HEALTH¹

CARL L. ERHARDT²

TONIGHT we mark the ninetieth anniversary of the first meeting, on March 5, 1866, of the Board of Health of the City of New York. It is not my intent to provide a lengthy discussion of vital statistics in 1866 and their comparison with the present day. Much literature on long-term trends in birth and death rates is already available and the phenomenal changes that have occurred are quite familiar. The occasion, rather, offers the opportunity to discuss the changes in vital statistics practices that New York City has introduced during recent years, and to outline briefly some of the other aspects of the Department of Health's statistical program.

A ninetieth anniversary is perhaps an appropriate time to take a look at ourselves. Even a little "pointing with pride" may be forgiven on a birthday. Some of you will be familiar with much that I am going to say; all of you, I hope, will get some insight into what the Department of Health is trying to do in its statistical program. Because of time restrictions, it will necessarily be a sketchy and limited view. Basic research, such as that conducted by the Public Health Research Institute, is not included in this discussion. As an operating agency, we place emphasis naturally on statistics needed for program planning, administration, and evaluation. Constant promotion of the use of modern statistical methods by the several bureaus of the Department has been part of the job. Most of the bureaus now prepare simple and routine statistical reports on the basis of established patterns. Experienced professional statistical time is hence largely reserved for assistance in designing

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² Director, Bureau of Records and Statistics, Department of Health, City of New York.

data collection and analytic procedures for new programs or for special studies.

A substantial portion of our present program still relates to births and deaths. These were almost the sole statistical source of the Department of Health's data ninety years ago. The number of births reported for the entire year 1866 was about 11,000, less than one-third of the 34,000 births estimated to have occurred in the City that year. (1) The Department concerned itself first with improvement of birth registration. Fewer than 400 births were being reported monthly to the Office of the City Inspector, the predecessor agency. By the end of 1866, nearly 1,200 births were being registered monthly, about three times the earlier number. With about 165,000 births occurring in New York City each year now, we know that few are unreported. Our aim lately, therefore, has been to improve the quality of the data and to utilize birth and death records for more than simple counts of events. We are trying to provide the medical profession with additional details regarding these events, details intended to provide the Department with more precise program guides and the profession with leads for clinical investigation, leads that are possible in unbiased fashion only from community-wide data. Some changes in registration practices may be of interest as they relate to improvement in accuracy of the data on the records and also as they reflect the development of social conscience with respect to the children whose births are recorded.

REGISTRATION PRACTICES

In New York City, contrary to the practices everywhere else in the country until a year ago, the superintendent of a hospital is responsible for preparing and filing records of birth for children born in his institution. (2) More than 99 per cent of the births occur in hospitals nowadays. In most hospitals the staff customarily prepares the record for the physician's signature, and the Board of Health recognized existing practice in the law. The control problem of insuring that all births are re-

ported was thus simplified for the Department, since it need only supervise some 100 hospitals rather than thousands of physicians. Moreover, the data needed for the birth record, both identifying and medical information, is on the hospital record or should be. In 1955, New Hampshire adopted this practice also (3) and other states may follow suit in future.

Another registration procedure, intended initially to encourage complete birth registration, is the transmittal to the mother of each newborn infant a certificate attesting that the birth record for the child has been filed. (4) In former days this certificate was a handwritten extract of selected information. In the 40's, however, it was realized that practically all births were being reported; this certificate was therefore redesigned by making it a complete copy of the entire face of the record. The present purpose is to induce the parents to report immediately any errors in order to insure the child a correct record when a copy is needed and to improve the statistical data derived from these records.

In the late 30's, the State Legislature provided for the filing of a completely new birth certificate whenever a child has been adopted or has been legitimized by marriage of its parents subsequent to its birth. (5) More recently, the Board of Health has allowed the filing of a completely new birth certificate for a child whose father acknowledges its paternity even though he is not married to the mother. (6) We are also notified whenever a court in the State has handed down a determination of parentage, and in these cases, too, a new birth certificate is prepared for the child. (5) These procedures allow the child to have a straightforward birth certificate indicating the facts as they have been legally established. Hence, the child will not have to make continuous explanations when he uses the record. From data on the birth certificates of adopted children a study of their characteristics has been made: age at adoption, sex, color, and the like. (7)

New York City remains the only community that provides for a confidential medical report on cause of death. It has

been difficult to demonstrate that better information is obtained by this mechanism, but it is the only means for avoiding the situations said to account for misstatements of the facts. Moreover, this form of report is an appropriate method of medical certification in view of the confidential relationship between physician and patient. (8)

For better service to the public, we have been able to prevail upon the Budget Director to provide about \$50,000 annually over several years to prepare new indexes to the birth records from 1880 to 1909. We are also considering the transfer of the old records of 1804 to 1865 to the Municipal Archives as documents essentially of historical and genealogical interest.

VITAL STATISTICS

On the medical statistics side of the picture, the New York City Department of Health was the first agency in this country which included with the birth certificate a confidential medical report of the facts regarding the mother's pregnancy and delivery. (9) The items in these reports have changed over the years: new ones are added as need for them is seen; changes in the questions are made in order to get more precise information; items are eliminated when they have served their purpose or when they do not provide the information expected of them initially. From the information contained in these medical reports some of the earliest community-wide studies of infant mortality by weight at birth, of the extent and influence of operative interventions, of complications of pregnancy, and of the extent of prenatal care have come out of New York City's Health Department. (10-14) To have a convenient method of measuring the effects of some of these factors on infant mortality, New York City developed the system of combining the data on infant deaths with information regarding the parents and medical history of the pregnancy and delivery as reported on the corresponding birth certificate.

Most of you are familiar with the use of small area statistics for localization of problems. During the Bureau's early history

much use of ward statistics was made and advantage was taken of census tract data as soon as the population facts were collected on such a basis. Vital statistics for health areas are continuously available for about thirty years. It is hoped that such small area data can be utilized to a greater extent in future for investigations of the influence of socio-economic status on health conditions. Another statistical maneuver early introduced was allocation of vital events according to residence, first done in 1905.

About 1938, the New York City Department of Health decided on an intensive campaign to encourage reporting of all fetal deaths regardless of period of gestation. It later abandoned the restrictive term "stillbirth" in favor of the inclusive and descriptive term "fetal death." (15) Each succeeding year has seen increases in the number of fetal death certificates filed, (16) but it is only in the past few years that we have felt the data sufficiently well reported to warrant some reasonably intensive analysis. (17) A more recent paper discusses the relative incidence of ectopic pregnancy by age, parity and race of the mother, and similar data for presumably spontaneous fetal deaths at less than twenty weeks gestation. (18) It is perhaps of some interest that the World Health Organization in 1950 recommended that all terminations of pregnancy, regardless of period of gestation, be reported to the health department, and adopted the term "fetal death" to describe any termination of pregnancy not producing a live born infant. (19)

A few years ago we were impressed by Dr. Sigismund Peller's thesis that late fetal deaths and neonatal deaths were subject to much the same influences and that, consequently, these two types of reproductive loss should be considered as an entity. (20) Moreover, we were disturbed, as most people are who work in this field, by the vagaries of stillbirth and infant mortality statistics that resulted from varying definitions of the term stillbirth. For the past six or seven years therefore perinatal mortality rates have been utilized to measure reproductive loss around the time of birth. (17) This concept is also being

used to assess differentials in such loss between hospitals. (21)

To increasing extents resort is had to vital statistics for medical research purposes outside of the Department of Health and the Department is anxious to cooperate in any way, within its limitations, in such studies. The Board of Health and the Commissioner, under authority granted by the Board, have approved our supplying data for nearly 100 such clinical and statistical investigations in recent years. Only a few can be mentioned.

It is now fairly routine to provide Committees of the County Medical Societies with copies of records needed for clinical investigation of maternal deaths, infant deaths, late fetal deaths, deaths associated with anaesthesia, and deaths associated with cesarean section. It is also fairly routine to provide data regarding date and cause of death to institutions following up patients whom they have treated for cancer or other diseases. (22-29) Similarly, information regarding date and cause of death is provided to other agencies doing medical research, such as the American Cancer Society and the National Cancer Institute in their investigations of the influence of tobacco and other factors on cancer and other conditions. (30) Such assistance was also given to a study made by the Metropolitan Life Insurance Company of the experience of men disabled by heart disease. (31) In like fashion follow-up information has been provided for such investigations as the evaluation of thoracolumbar splanchnicectomy on mortality and survival in hypertensive cardiovascular disease and essential hypertension (32, 33) and another of the prognostic significance of the anoxemia test in coronary heart disease. (34) Examples of epidemiologic type studies that have been aided include those looking into amaurotic family idiocy; the occurrence of neoplasms, especially those of the lymphatic and hematopoietic systems, among children; differential mortality among physicians and dentists; variations in the number of births by day of the week, including their association with outstanding daily events.

With the decline in mortality from infectious diseases and

the increasing proportions of deaths among older persons, it has become obvious that the single cause of death concept produces data of minimum usefulness. Moreover, significant facts may be concealed by adherence to this concept. Consequently, the Department has been investigating methods of preparing multiple cause tabulations. Although methodological problems have been of primary concern, the data produced from a small sample have been otherwise useful. One study demonstrated that a more meaningful classification of deaths from cardiovascular disease than that provided in the International Statistical Classification could be designed if all the diagnostic information reported on death certificates were fully used. (35) This study will be followed by other investigations on classification of cardiovascular mortality. Another analysis of multiple cause tabulations, restricted to deaths among persons sixty-five years old and over, showed, for example, that 17 per cent of such persons had suffered a cerebrovascular accident in contrast to the nine per cent as indicated by "underlying cause of death" tables as routinely prepared. (36)

Although the discussion so far has related largely to vital statistics, the major portion of professional statistical time in the Department is now spent on other statistical problems of the Department. A few selected investigations, some completed, some in progress, must serve to demonstrate the scope of the program.

OTHER PUBLIC HEALTH STATISTICS

Laboratory Problems. Question arose whether the laboratories of the Department of Health and the Department of Water Supply reached similar conclusions on coliform counts of potable water supplies. A comparative study of coliform findings on parallel water samples by both laboratories indicated that they were equally effective in determining coliform content. Such information is useful in the conduct of the sampling program of potable water by the Health Department, which acts as a control agency over the Department of Water Supply.

An earlier study of comparative laboratory findings for harbor waters revealed significant differences in bacteriologic results of the Departments of Health and Public Works. As a result, procedures in the laboratories were reviewed to determine the source of the difference. Again duplication of effort can be reduced if the reason for differences can be eliminated.

The usual method of checking laboratory performance has been by personal inspection. Analysis of frozen split samples of milk produced a direct and time-saving method whereby the milk bacteriology of several laboratories can be checked simultaneously without resorting to personal inspection. Design and method of analysis provide the means for evaluating the performance of the laboratories. (37)

In a study of certain blood constituents of newborn infants, it was observed by the statistician that untoward results occurred most frequently with mothers of blood type O when the blood of the infant is incompatible with that blood type; this was a significant hematological observation. (38) Isolation of the influential factors is now being attempted in a more detailed investigation.

A number of statistical studies were undertaken with the Bureau of Laboratories to evaluate new media proposed for standard plate counts of dairy products. As a result, new standard media was adopted. In the process of the evaluation a short and relatively simple method was designed for testing sample media or batches against standards. (39-41)

By statistical analysis of data already available it was possible to demonstrate to the satisfaction of the Bureau of Food and Drugs and the Bureau of Laboratories that four milk samples uniformly collected from each plant gave results as reliable as those of the six to ten samples routinely taken to determine average bacterial counts. The work in the laboratory was thereby reduced substantially without affecting efficiency.

Maternal and Child Health Problems. All children with cerebral palsy for whom financial assistance has been granted have been followed over several years. The data include type of

disease, financial payments, amount of hospitalization, and type of disability. Education of the child and degree of handicap is considered at three points in time: at the initial point when financial aid was first allowed, at the time when such financial aid ended, and the present situation. The purpose, of course, is to determine the extent to which the children were improved and how much it cost. (42)

In an evaluation of the reporting of birth injuries on the birth certificate, it was determined that there existed a considerable degree of both underreporting and overreporting. In other words, conditions noted at the time of delivery often turned out not to be birth injuries, while in many cases an actual birth injury was not manifested until after the birth certificate had been completed. (43, 44) As the result, serious consideration is being given to other methods of learning of birth injuries in order that the item may be eliminated from the birth certificate as not providing adequate information.

For all deaths under age 20 ascribed to congenital malformations, hospital and medical records relating to these young people were surveyed. The treatment and care are now being reviewed to determine whether the death could possibly have been prevented and whether the Department of Health, through its Bureau for Handicapped Children, could provide better service to children with congenital malformations.

A similar investigation was made of all deaths under age 20 ascribed to rheumatic fever and rheumatic heart disease. Its purpose was to determine the need for medical care of other members of the family and to evaluate the medical care that the decedent had received in order to see whether gaps in service exist. (45)

Mental health is the focus of a study of behavior problems (feeding, sleeping, etc.) encountered in children attending child health stations. This study will attempt to show the relationships, if any, between social and ethnic patterns and the type of problem encountered. The information obtained will be used as an aid in training the child health station physicians for

anticipatory instructions to parents. A companion study will look into such problems as seen in a group of children over a period of time. The purpose of this aspect of the investigation is to test the possibility of applying mental hygiene techniques into an ongoing program and will be conducted in cooperation with the Kips Bay Mental Hygiene Project.

Another study seeks the circumstances under which infants are withdrawn from the child health stations. Its purpose is mainly to determine the pattern of such withdrawals and the reasons, although some other pertinent information regarding the children leaving will be learned, such as the extent to which they have completed basic recommended immunizations.

Arrangements have been made in the department for nursing visits in all reported accidental poisonings among children under 16 years of age. A statistical program for compilation of data about such poisonings has been set up to cover the age of the patient, place and time of occurrence, the name of the poison, the signs and symptoms, the treatment and care given, preventable factors involved in the occurrence, and the outcome, as well as some questions on family background and home follow-up. Statistical analysis of the data compiled will hopefully provide information valuable in a preventive program directed toward poison hazards and also to confirm details of treatment given and the results. (46)

In view of the long term educational efforts that have been made to induce pregnant women to place themselves under medical care early in their pregnancies, the high proportion of women who do not receive adequate prenatal care in some areas of the City is disturbing. Plans have been prepared for a follow-back study, in one district of the City, of the prenatal supervision given to pregnant women in that district. This survey will serve incidentally to evaluate information regarding prenatal care given on vital statistics records. By interview of those women whose prenatal care was apparently inadequate, an attempt will furthermore be made to determine the reasons why they did not avail themselves of better care. It is expected

that this study will provide information useful for a program to improve the situation.

COMMUNICABLE DISEASES

Tuberculosis. In the mid-forties a punched card system was designed to provide measures of morbidity (prevalence and incidence) and mortality from the existing tuberculosis register. Information was thus made available in greater detail and with greater ease and accuracy than previously. The system since has been changed and adapted to meet new needs.

The introduction of antibacterial drugs for the treatment of tuberculosis led the Department to inaugurate ambulatory treatment of tuberculosis clinic patients by this new modality. A special statistical system was set up for evaluation of the results of such therapy. Identifying data and the characteristics of each patient at the start of treatment are recorded in such a manner that changes in his status can be readily determined at intervals. Reports have already been prepared on the outcome with respect to patients who have been treated in this program over a period of time. (47, 48)

The design for statistical analysis of the data from the South Bronx community-wide mass x-ray survey was planned by the Statistical Division of the Department in cooperation with its Bureau of Tuberculosis. In this instance the volume of tabulating work to be done indicated that this part of the job should be done on contract, outside of the Department, in order that the Department's tabulating facilities would not be overloaded and in order that reports could be planned for a specific interval after the close of the project. A novel part of this particular study will be the selection of several samples of the data in addition to the totals in order to demonstrate empirically, for the benefit of the administrators, the effectiveness of systematic samples of various sizes in this kind of an operation.

Another tuberculosis program requiring procedures for statistical evaluation is the tuberculosis screening program in the secondary schools. All students, upon admission, will be

screened for tuberculosis infection by means of patch tests. Positive reactors will be referred to the Department's tuberculosis clinics for follow-up chest x-rays each year during their school years. Negative reactors in selected schools will be given a new patch test each year, since it has been noted that the conversion rate in some areas of the City is high.

Social Hygiene. The Statistical Division is also responsible for reduction of detailed data no longer needed. An elaborate punched card system for reporting and controlling cases of, and contacts with, venereal disease was required fifteen years ago. With the growing use of penicillin therapy, such an extensive system was no longer necessary for control of clinic patients. This part of the system was therefore discontinued with due regard for continuation of morbidity reports, follow-up of contacts, and administrative needs.

Poliomyelitis. For a special study of the trend of the incidence of poliomyelitis tables were prepared showing mortality from this disease by age cohorts from 1916 to 1954. The purpose, obviously, is to measure the relative changes between each cohort after expiration of equal periods of time rather than to make the usual comparison between groups of similar age at different intervals of time. In addition, statistics are being routinely maintained on the attack rate among vaccinated and non-vaccinated children according to paralytic status for evaluation of the Salk vaccine administered in New York City. Analysis of the relationship between the site of a recent injection and site of paralysis in cases of poliomyelitis represents another one of the statistical studies in this field. (49)

OTHER AREAS OF INVESTIGATION

To determine the type of findings met in such a service, a plan was designed, integrated with the routine clinic recording, for the Cancer Prevention Detection Center. Again, the collection of these data was discontinued when the general patterns had been identified. (50) Only simplified counts of patients are now maintained for administrative purposes.

As with the cancer detection work, a temporary evaluative program to assess the results of the pilot diabetes detection clinic was installed. The data are now being analyzed and further collection halted, except for minimum administrative needs.

In cooperation with the Bureau of Nutrition an analysis of dietary factors among 100 underweight children selected in the Lower East Side clinic is in progress. Dietary histories of these children were recorded at annual intervals during which time the children were given nutritional education when they came for their monthly medical examinations. A report on the environmental factors relating to these 100 children has already been made (51), and the nutritional aspects are being evaluated.

The use and evaluation of data reported on certificates has already been mentioned. In 1955 the item on the birth and fetal death certificates relating to morbid conditions present during pregnancy was changed to follow the format inaugurated by the State of New York and recommended subsequently by the National Office of Vital Statistics. This format provides a check-off system in lieu of an open-ended question. It had been found in New York State that the check-off system yielded somewhat better results than the open-ended question. An evaluation study will determine the extent to which the reported information actually reflects the incidence of these specific conditions among the women delivered. At the same time, the data reported will be utilized to see whether measurable differences exist in the outcome of the pregnancies of women reported to have illnesses intercurrent with pregnancy as compared to those who do not.

Furthermore, a number of the bureaus in the Department have special interests in this particular project. For example, the Bureau of Tuberculosis will be interested in those pregnancies where tuberculosis was reported; the Bureau of Preventable Diseases will be interested in the influence of syphilis and viral infections on the outcome of pregnancy; the Bureau for Child Health will be interested in the influence of such condi-

tions as eclampsia, pre-eclampsia, hypertensive disease, pyelitis, and nephritis; while the Bureau of Adult Hygiene will be interested in the extent to which neoplasms or related conditions are reported and their influence on the outcome of pregnancy. All of these Bureaus have been asked to prepare study outlines so that the most widely useful information can be obtained from the records.

Plans have been made for statistical analysis of dental defects among a sample of school children. This survey is planned to provide baseline data against which may be measured the effects of fluoridation of New York City's water supply whenever such fluoridation is installed. Unfortunately, there is some question whether this survey can be undertaken at the present time since the Board of Education is reluctant to add to the surveys presently requiring cooperation of the schools.

Statistical assistance is also being furnished to a cooperative investigation with the Bureau of Preventable Diseases and several hospitals for a current study of the effectiveness of thymol turbidity as an indicator of hepatitis infectivity by way of blood transfusions.

The utilization of public health nursing time in schools was the subject of a survey to see whether nursing time is most effectively used. The kinds of activity required of the nurse were tabulated, as well as the average time and percentage of her total time spent in each activity. The influence of non-professional help (the public health assistant) on the expenditure of nursing time was also explored and consideration was given to the effect of special characteristics of particular schools and of the educational level of the schools or their auspices. (52)

General Morbidity Data. For a compilation of data about young people in New York City, the Department of Health was permitted to select a systematic sample of the medical records of enlistees and inductees rejected by the armed services during 1955. (53) Unfortunately a similar sample of all men examined could not be obtained to define the population specifically. Nevertheless, the fact that 294 per 1,000 are rejected,

182 for psychiatric, neurologic, or physical conditions, was considered useful information about general health status among these men.

A start in the direction of comprehensive morbidity information for the City has been made with the provision of budget funds for collection and analysis, on a routine basis, of data regarding patients discharged from municipal hospitals. This project has been discussed before this group by Dr. Fraenkel and me on two occasions. More recently the findings of our Pilot Project were published by Russell Sage Foundation. (54) The data presently collected are intended primarily to serve administrative needs of the Department of Hospitals, but expansion of the existing program in several directions is contemplated.

TABULATING SERVICE

The availability of a fair sized tabulating division has made possible much of the work that is being done. But in addition to responsibility for application of mechanical tabulating techniques to statistical processes, the tabulating division is also being increasingly used to fill administrative needs. Data regarding tuberculosis cases for follow-up in districts can be obtained from the punch cards of tuberculosis cases registered with the Department, for example. Lists of births and fetal deaths are sent monthly to each reporting hospital so that they may check to determine that all deliveries occurring in the institution have been recorded. This listing also provides our Records Division with the major portion of an index by place of occurrence and thus has eliminated need for clerical staff formerly engaged in preparing such an index. In the last year also we were able to provide by means of our tabulating equipment the basic facts which have now been published in the form of new house number guides for health areas, published by the City Planning Commission after an interval of about twenty years since the first edition was published by the Welfare and Health Council. (55) Permits issued by the Department, as well as

notices to permit holders when the time comes for renewal of such permits, are now prepared mechanically. Considerable clerical time is thus also saved by the Department. A system for expediting and controlling the inspection of wholesale food establishments is now being constituted, utilizing the established source punch cards already available for permit purposes. This short "by-the-way" is inserted to illustrate how we serve the Department administratively as well as statistically and that the administrative service is sometimes a by-product of the statistical, involving little additional expense.

These brief descriptions of some of the completed, ongoing, and planned statistical studies should suffice to create a general impression of the scope of our interests and investigations. They effectively contrast with the limited vital statistics interests of 1866. However, the promise for our future was just as well phrased ninety years ago as it could be today. It was then said, "Defects and wants in this department of the sanitary service will continue to be discovered, while progressive experience and the constantly increasing intelligence and demands of society will both require and render practicable new and enlarged inquiries, registries, studies, and useful applications in Vital Statistics and Hygiene. Therefore the governing purpose in all which the Bureau has undertaken has been to recognize this necessity for progress in the development and direct application of Sanitary Science." (1)

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