



For Tuberculosis Control Programs

TUBERCULOSIS control, despite notable progress in recent years, still demands a sizable share of public health attention in many communities, and the need for sound program statistics is as pressing as ever.

So much information is potentially available for studying the needs and achievements of tuberculosis control programs that great care must be taken to choose appropriate types and amount of data to be collected as service statistics. A health department will want to collect only data that are basic to its own program, in addition to those requested for State and national reports. The statistics selected should indicate the extent to which defined program objectives of tuberculosis control are being achieved. Progressive revisions of a program should of course be anticipated.

From tuberculosis service statistics it should be possible: (a) to indicate the size, composition, and location of the tuberculous population; (b) to determine whether or not the cases that require medical supervision are receiving supervision and the care they need; (c) to study the productiveness of casefinding techniques; and (d) to judge whether or not resources are being used effectively and efficiently.

The Indexes for Interpreting Data given in

this paper and the data items for developing these indexes, given under Statistical Information, are suggested as those which can be most helpful in planning, administering, and evaluating services in tuberculosis control. Neither the indexes nor the data items, however, can in themselves provide sufficient information for complete evaluation. The data must be related to one another and to other available information, and they must be grouped so that a clear picture results. Even then, appropriate decisions can be made only after careful consideration by persons who understand the significance of the findings and can identify pertinent highlights for action.

In some areas, procedures have not been established for collecting basic information, and consequently health agencies are unable to observe certain important local trends. The absence of such information is a deficiency, and health jurisdictions should make every effort to develop adequate records and procedures for the collection of pertinent service statistics.

Indexes for Interpreting Data

The principal quantitative indexes of the tuberculosis problem and selected indexes of the

Service Statistics Series

With this report, the Working Group on Service Programs of the Public Health Conference on Records and Statistics has completed five documents on the collection, analysis, and interpretation of service statistics. These documents are intended to aid in preparing data for planning, administering, and evaluating various public health services.

The first report, appearing in *Public Health Reports* in June 1956, page 519, introduced the series and set forth basic principles governing service statistics. Subsequent reports dealt with health supervision of infants and preschool children (July 1956, page 705), health services for children of school age (September 1956, page 917), and home accident prevention programs (June 1957, page 494).

In preparing this fifth report on statistics for tuberculosis control programs, the working group was assisted by several consultants with special experience in programs of tuberculosis control. The guide had almost reached its present form when the conference was reconstituted in March 1958 as a consultative and collaborative study program. Aided by the Tuberculosis Program, Public Health Service, a study group of the new conference completed the work. Their revisions were based on comments received after distribution of the mimeographed release (Document 438, reproduced by the National Office of Vital Statistics, Public Health Service, De-

partment of Health, Education, and Welfare, Washington 25, D.C.).

Under the title "A Guide for the Collection, Analysis, and Interpretation of Service Statistics in Tuberculosis Control Programs," the document has the endorsement of the following organizations: American Association for Vital Records and Public Health Statistics, the Committee on Public Health Administration and the Statistics Section of the American Public Health Association, and the Association of State and Territorial Directors of Local Health Services. It was endorsed by the president of the American Trudeau Society. The Association of State and Territorial Directors of Public Health Nursing recommends that the guide receive careful attention.

Dr. James E. Perkins, managing director of the National Tuberculosis Association, one of the agencies providing technical consultation in developing the guide, believes that it will be helpful to those responsible for the collection and analysis of meaningful statistical data on tuberculosis. The Committee on Tuberculosis Nursing of the National League for Nursing and the National Tuberculosis Association regards the guide as an important and worthwhile step forward in measuring progress in tuberculosis control.

scope and effectiveness of program operations are given in this section. These indexes can be constructed from the data items listed under Statistical Information, sometimes from only a pair of items and sometimes from several. For example, the first index under Program Operations, casefinding coverage, is in effect a summary obtained by analyzing items selected from Baseline Data, as well as from Data on Program Operations.

The validity of the indexes will depend on the completeness of the component statistical items and the reliability of the statistical procedures used in relating one item to another. If a valid comparison is to be made between indexes for different time periods or different areas, it is

essential that they be based on comparable data uniformly defined, collected, and analyzed.

For most of the indexes, the period of measurement is 1 year; however, in some localities another time interval may be preferred. For example, in areas where there are few cases of tuberculosis, or few deaths, it might be advisable to use 3- to 5-year averages in order to minimize the effects of random fluctuations.

Many of the indexes have been used in reports prepared by various health agencies, such as Reported Tuberculosis Data, released periodically by the Public Health Service. It is therefore possible for a health department to obtain data on other communities for comparison with its own performance.

Many health departments may not find it feasible to tabulate the data required for all the indexes, while others may need additional indexes. The list is intended to be a reasonable compromise.

Definition of Problem

Mortality: Annual rate of tuberculosis deaths per 100,000 population.

Incidence: Annual rate of newly reported active cases per 100,000 population. (The term "active case" in this paper refers to cases classified as active and probably active, as explained in reference 1.)

If casefinding and reporting are reasonably adequate (as indicated by the ratios under Casefinding, below, and in other ways), this rate provides an estimate of the rate at which new cases are actually developing in the population. Where casefinding and reporting are consistent from year to year, this rate reveals the trend of known incidence.

Prevalence of known cases: Rate of known active cases per 100,000 population as of a specified date.

This rate has limited meaning when the percentage of cases for which medical examination reports are overdue is high.

Rate of all known cases, regardless of clinical status, per 100,000 population as of a specified date.

These figures on known prevalence can serve as an estimate of the community's tuberculosis problem. Estimates of total prevalence of tuberculosis cases, including unknown as well as known cases, can be obtained only by special studies, not from service statistics.

Prevalence of infection, as measured by the tuberculin test (2): Percent reacting among all ninth grade students tuberculin tested (and read) during year.

This index can be used to observe long-term trends in the prevalence of infection in the community. It can also be used to identify areas of a city where infection rates tend to be the highest. Lower grades are not suggested because in many parts of the country it is necessary to test adolescents in order to obtain a rate high enough to fulfill these two functions. Higher grades are not recommended because these students are progressively less representative of the community population of similar age.

In some cities the prevalence of sensitivity among first grade children is still great enough to serve these purposes. In such localities it would be useful to test

first grade children as well as those in the ninth grade since the sensitivity level among the younger children is more likely to indicate recent conditions of exposure to infection.

The prevalence of infection among adults should be determined by special studies, and testing of this group should progressively become a part of the regular program of periodic assessment of the tuberculosis problem. In many areas today testing of adults is needed more than testing of school children.

Program Operations

CASEFINDING

Coverage: Of the population in specific high-risk groups or areas, percent screened during year.

Followup of screening program suspects: Of tuberculosis suspects, percent for whom followup was completed within 6 months after the screening program either by establishment of a diagnosis (tuberculosis, other chest disease, or essentially negative) or by other disposition.

Contact examination: Of contacts to new active cases reported during year, percent examined by end of year.

Effectiveness of casefinding programs: Of new active cases reported during year, percent discovered by organized casefinding efforts: chest X-ray surveys, tuberculin testing programs, or contact examination.

Of new active pulmonary cases reported during year with extent of disease specified, percent classified as minimal.

If extent of disease is not specified in a large proportion of cases, the meaning of this item is severely limited.

Of new active cases reported during year, percent first reported by death certificate or at time of death.

USE OF HOSPITALIZATION

Of new active cases reported during year, percent hospitalized for treatment of tuberculosis at any time during year.

Of all known active cases as of a specified date, percent in hospitals for treatment of tuberculosis on that date.

SUPERVISION OF UNHOSPITALIZED CASES

Prescribed treatment: Of unhospitalized active cases on a specified date, percent with no

known drug therapy or other specific treatment prescribed.

Of unhospitalized inactive cases, percent with no known drug therapy currently prescribed.

Medical supervision: Of total unhospitalized cases as of a specified date, percent for which medical examination report is overdue.

This index should also be constructed for active and activity undetermined cases.

Of unhospitalized active cases as of a specified date, percent with no bacteriological examination report within preceding 6 months.

Public health nursing supervision: Of total unhospitalized active and activity undetermined cases as of a specified date, percent with no public health nursing visit within preceding 6 months.

Of unhospitalized active cases with current positive bacteriological findings as of a specified date, percent with no public health nursing visit within preceding 6 months.

Of new active cases reported during year, percent visited by public health nurse within 1 month of report to health department.

A low rate may be caused by lack of prompt referral to the nursing division.

Of cases discharged from hospitals during year, percent visited by public health nurse within 1 month of date of discharge.

A low rate may be caused by the hospital's delay in notifying the health department.

Status on hospital discharge: Of active cases discharged from hospitals during year, percent with positive bacteriological findings at time of discharge.

Of active cases discharged during year, percent discharged against medical advice.

Medical social service: Of unhospitalized active cases referred to social service during a specified period, percent who have received social service during same period.

Vocational rehabilitation: Of cases referred for rehabilitation service during year, percent accepted for rehabilitation.

Terms, Data Sources, Tabulation

Standard terminology. Uniform application of standard terminology is essential in the collection of data. Unless all items that go to make up a total are chosen according to one

definition, the total will not be valid. If different definitions are used at different times or in different places, totals will not be comparable from one time to another or from one place to another.

Definitions for most of the basic terms used in tuberculosis control may be obtained from Diagnostic Standards and Classification of Tuberculosis (2) and from the Report and Recommendations of the Committee on Morbidity Reporting (1). The committee's recommendations are reprinted on the back of the Semiannual Tuberculosis Morbidity Report, a Public Health Service required report (PHS Form 1394, revised 1-52), and in the National Morbidity Reporting Manual of Procedures (3).

Sources of data. Most data in tuberculosis control come from basic records (clinic and hospital, laboratory, nursing, case register, for example), and these must be adequate, accurate and properly correlated if they are to supply the necessary information. Statistical analysis cannot produce results more accurate than the primary data. Public health agencies can do much to refine and improve their own source documents in tuberculosis control and to improve communications with other agencies and institutions. Joint planning can frequently reduce the number of record forms needed and make each more effective and serviceable.

Data on newly reported cases can be obtained from the official morbidity reports and summaries which are made once or twice a year by most local health departments.

The source of prevalence data is the tuberculosis case register, or equivalent records, for which information must be obtained routinely from places providing services to the patient, such as clinics, private physicians, laboratories, hospitals, and nursing offices. Keeping current information on each patient's status should be part of routine operating procedure in maintaining good case supervision. Techniques will vary for obtaining statistical reports reflecting the extent of supervision and current clinical status of known tuberculosis patients.

Mortality data are available from the analysis of death certificates filed with local registrars of vital statistics and forwarded to offices

of vital statistics in State departments of health. Counts by cause of death are made by the State vital statistics offices. Information regarding persons with tuberculosis who die of other causes, as well as tuberculosis cases reported for the first time by death certificate, must come from the cooperative efforts of the tuberculosis control and vital statistics offices.

Population figures which are more recent than those reported in the United States decennial census publications may be available from special local censuses or from population estimates periodically prepared by a State or local agency. Each year the May issue of *Sales Management* magazine contains current population estimates and pertinent information on economic status for all counties and major cities.

The hospital facilities office of the State health department can supply information on the number and kinds of hospitals within its jurisdiction, including bed capacity and other pertinent data. Similar information can be found each year in the August issue of *Hospitals* (Journal of the American Hospital Association) and the Public Health Service publication, *Tuberculosis Beds in Hospitals and Sanatoria*. State nursing and medical associations, as well as other professional organizations, and special surveys made by professional organizations provide information on numbers and specialties of medical and paramedical personnel.

Tabulating methods. Tabulating methods must be considered when record forms are designed since the two are related. In selecting the most appropriate method, volume is an important factor. Hand tabulations are not necessarily the least expensive or most accurate. For a moderate quantity of records the marginal punchcard system, with its many applications and flexibility, merits consideration. Machine tabulation is usually recommended for large volume because of its greater speed, accuracy, and flexibility.

Statistical Information

The items listed below provide the information necessary for program measurement as outlined in the section on indexes, plus supplemental information which will permit further

assessment of the tuberculosis problem and adequacy of program activities.

Baseline Data

HEALTH JURISDICTION

1. Total population as of specified date.
2. Population of specified high-risk groups (for example, special geographic areas; admissions to general hospitals; residents and employees of mental, penal, and other "resident" institutions; lower economic groups; and older age groups).
3. Population breakdown by age, sex, race, marital status, urban-rural, geographic location, occupation, and economic status.
4. Health facilities and resources, including (a) number of beds available to tuberculosis patients in general and tuberculosis hospitals; (b) number, location, and patient capacity of chest clinics; (c) number and type of medical and paramedical personnel.

MORTALITY

1. Number of tuberculosis deaths for the year.
2. Tuberculosis deaths by age, sex, race, marital status, geographic location of residence, occupation, and economic status.

INCIDENCE

1. Newly reported active cases for year, including active and probably active in both pulmonary and nonpulmonary classifications of disease (1), by source of report: (a) private physicians, (b) tuberculosis hospitals (public and private), (c) general hospitals, (d) chest clinics, (e) mental institutions, (f) death certificates, (g) transferred from other States, (h) transferred from other local health jurisdictions, (i) other.
2. Newly reported active cases for year by method of discovery (source of referral), such as chest X-ray surveys, tuberculin tests, contact examination, health examination, and self-referral.
3. Newly reported active cases for year by age, sex, race, marital status, geographic location of residence, occupation, and economic status.
4. Newly reported active cases for year by form and extent of disease.

PREVALENCE OF KNOWN CASES

Known tuberculosis cases as of a specified date classified by clinical status: (a) active or probably active (group A); (b) activity undetermined or not specified; (c) inactive or probably inactive but requiring public health supervision (open file only).

PREVALENCE OF INFECTION

1. Total number of persons tuberculin tested (and read), by method of test, by age or school grade, sex, and race, for each population group that warrants special investigation.

2. Number read, by size of induration (in millimeters), by the same classifications.

3. Number considered "positive," by the same classifications.

Data on Program Operations

CASEFINDING

Data should be collected for each population group that warrants special investigation, by age, race, and sex if possible, and for appropriate periods.

Chest X-ray Surveys

1. Number of persons screened.

2. Number of persons with screening films read as suspected: (a) tuberculosis, (b) cardiovascular disease, (c) tumor, (d) other non-tuberculous chest disease.

3. Followup of tuberculosis suspects.

(a) Number diagnosed as tuberculous and reported as new cases, by clinical status.

(b) Number diagnosed as essentially negative for tuberculosis.

(c) Number diagnosed as having nontuberculous disease, by type of disease.

(d) Number with followup incomplete or pending.

Tuberculin Testing

1. Number of persons tested and read.

2. Number of reactors.

3. Number of reactors X-rayed.

4. Number of persons found with suspected tuberculosis.

5. Number diagnosed and reported as new cases, by clinical status.

Contact Investigation

1. Number of close contacts (household and

any other with a history of close contact) to newly reported active and probably active cases.

2. Number of contacts examined by end of year by X-ray or tuberculin tests: (a) diagnosed as tuberculous and reported as new cases, by clinical status; (b) diagnosed as negative for tuberculosis; (c) with incomplete followup.

HOSPITALIZATION

Of new active cases reported during year, number hospitalized for treatment at any time during year.

Hospitalization for diagnosis or observation alone should not be included in this count.

CASE SUPERVISION: TUBERCULOSIS REGISTER

1. Total number of cases in tuberculosis register or its equivalent (current file only) as of specified date:

(a) Cases hospitalized for tuberculosis: (i) in tuberculosis hospitals (including tuberculosis wards of general and chronic disease hospitals); (ii) in mental and penal institutions (only active cases and inactive cases on anti-tuberculosis drug therapy).

(b) Cases hospitalized for other conditions.

Include cases not being treated for tuberculosis but presumably being given appropriate periodic examination by the institution; for example, inactive cases not on drug therapy in mental, penal, and chronic care institutions. If the hospitalization is of short duration—for an appendectomy, for instance—count in the following item.

(c) Cases not hospitalized.

Include those presumed to be outside institutions, plus tuberculosis patients residing in certain institutions, such as nursing homes, who are not being supervised for their tuberculosis by the institution. It is, of course, the responsibility of the health department to see that these patients receive necessary medical supervision and treatment.

2. Clinical status of cases not hospitalized.

(a) Active and probably active.

(b) Activity undetermined (or activity not stated), that is, only those cases which cannot be classified as probably active or probably inactive.

(c) Inactive and probably inactive with current drug prescription.

(d) Inactive and probably inactive without current drug prescription.

3. Medical followup of cases not hospitalized, by clinical status.

(a) Report of medical examination (X-ray or clinical) not overdue.

(b) Report of medical examination overdue:
(i) last examined less than 12 months ago;
(ii) last examined more than 12 months ago.

4. Bacteriological status of active and probably active cases not hospitalized.

(a) Positive at last report within past 6 months.

(b) Negative at last report within past 6 months.

(c) Status undetermined in past 6 months.

5. Unhospitalized cases with drug therapy currently prescribed, by clinical status.

CASE SUPERVISION: NURSING SERVICES

1. Of unhospitalized tuberculosis cases at a specified time, number not visited (home, office, or clinic) by public health nurse within preceding 6 months, by clinical and bacteriological status.

2. Of new active cases reported during year, number visited (home, office, or clinic) by public health nurse within 1 month of date of official morbidity report.

3. Of cases discharged from hospitals during year, number visited (home, office, or clinic) by public health nurse within 1 month of discharge, by clinical status (excluding deaths, transfers, nontuberculosis cases, and persons hospitalized only for diagnosis).

4. Total number of visits (home, office, or clinic) to all tuberculosis patients during year, by purpose of visit (guidance or instruction, therapeutic care, collateral service).

OTHER NURSING SERVICES

Total number of suspects, contacts, and associates of reactors who receive public health nursing service during year.

TUBERCULOSIS HOSPITAL DATA

1. Percentage of available tuberculosis beds occupied as of a specified date.

2. Average cost per patient day.

3. Average length of stay.

4. Number of patients discharged from tuberculosis hospitals during year (excluding transfers, nontuberculous cases, and persons hospitalized only for diagnosis) by

(a) Clinical status and type of discharge.

(b) Clinical status and bacteriological status.

(c) Recommended treatment: drug therapy only; rest only; both drug therapy and rest.

MEDICAL SOCIAL SERVICE

1. Number of active tuberculosis patients in current caseload referred to social service during a specified period.

2. Number of these patients served by medical social workers by end of specified period, either through direct service (casework or consultation) to the individual patient or indirectly through interagency activities.

VOCATIONAL REHABILITATION

Number of tuberculosis patients referred by health department for vocational rehabilitation to both official and voluntary agencies during year: (a) accepted for rehabilitation; (b) not accepted (either agency or patient nonacceptance); (c) acceptance pending.

SPECIFIC PREVENTION

1. Number of BCG vaccinations administered during year to (a) persons in families with tuberculosis, by age and race; (b) persons in other groups (nurses and medical students, for example), by age and race.

2. Number of persons receiving chemoprophylaxis as of a specified date, by age and race.

EDUCATION AND TRAINING

1. Types of inservice training for public health professional workers and others.

2. Types and number of training sessions for volunteer workers.

3. Number of contacts with and presentations to organized civic and service groups.

Special Studies

Where a sustained program is well developed and additional statistical information can be utilized, greater attention can be given to special phases of tuberculosis control activities. Studies can be undertaken to develop more definitive statistical information and to provide greater refinement in measurement. The following are suggested as special study topics:

1. Prevalence of tuberculin sensitivity among adults.

2. Analysis of tuberculosis casefinding through tuberculin testing, based on the number of reactors rather than on persons tested, showing yield by age, sex, and race; also by length of time from discovery of infection to emergence of disease.

3. Comparison of stage of disease of new active cases found in tuberculin testing programs with those found by chest X-ray surveys of similar groups of persons.

4. Comparative cost of finding active cases by tuberculin testing surveys and by chest X-ray surveys.

5. Nontuberculous disease found in tuberculosis casefinding programs.

6. Completeness of case reporting.

7. For deaths in a specified time period, time intervals between date of morbidity report and date of death.

8. Extent to which known active unhospitalized patients are following treatment recommended.

9. Disease reactivations.

10. Hospital admissions and discharges within a given time period:

(a) Average length of stay as related to diagnosis on discharge, age, and sex.

(b) Admission diagnosis compared with discharge diagnosis as related to length of stay and other factors.

(c) Length of time between hospital discharge date and receipt of referral by the health department.

11. Analysis of social factors which have contributed to nonacceptance of medical recommendations by patients with tuberculosis, and the extent to which resolution of social problems has led to an acceptance of treatment.

12. Extent to which patients who received social service had their problems resolved compared with those who did not receive social service, with analysis of reasons for nonresolution in both categories.

13. Analysis of other than social factors which have contributed to nonacceptance of medical recommendations.

REFERENCES

- (1) Report and recommendations of the Committee on Tuberculosis Morbidity Reporting, May 14, 1951. Pub. Health Rep. 66: 1293-1294, Oct. 5, 1951.
- (2) Diagnostic standards and classification of tuberculosis. 1955 edition. New York, National Tuberculosis Association, 1957.
- (3) U.S. National Office of Vital Statistics: National morbidity reporting manual of procedures. Section X. Morbidity reports of tuberculosis. Washington, D.C., U.S. Government Printing Office, January 1956, p. 24.

Training in Epidemiology

A course in applied epidemiology will be offered at the Communicable Disease Center, Public Health Service, Atlanta, Ga., May 4-8, 1959.

This course is designed primarily for physicians who investigate disease outbreaks or who have administrative responsibility for such investigations. It serves as a review for experienced health administrators and as a guide to physicians new to the public health field.

Emphasis is placed on developing an understanding of the use of epidemiological techniques to solve preventable disease problems. Lecture-discussion sessions and audiovisual aids are used in the presentations. Group participation is stressed through group solution of epidemiological problems, seminars, and panel discussions.

Further information and application forms may be obtained from: Chief, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga. Attention: Chief, Training Branch.