Problems in Improving Reported Morbidity Data as a Tool for Epidemiological Research

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The dual objectives of the morbidity reporting system, (1) immediate recognition of communicable disease as it occurs in the population and, (2) compilation of data for administrative planning and epidemiological analysis, although well known, often fail to be adequately considered in discussions of morbidity reporting problems among epidemiologists, statisticians, administrative health officers, and others who use the data for one purpose or another. The public health nurse has the individual case as her primary interest, the statistician and public health administrator give first attention to population differences in incidence, and the epidemiologist, although vitally interested in all aspects of reporting, often cannot give the long range functions of reporting the attention they deserve.

Although the reporting system in its present form, despite many inadequacies, appears to be successful in providing sufficient notifications to assure the health officer that he can reliably appraise the current communicable disease situation in his community, these same data have limited usefulness for measurement of variation in trends, geographic and seasonal distribution, and other factors involved in the epidemiological analysis of communicable disease. The data now obtained serve as effectively as they do because the local health officer and state epidemiologist can supplement the reported figures in various ways by means of informal reports of field workers, conversations with physicians, and other bits of miscellaneous information. For analysis of data, however, only the reported figures are left; the intangibles which the health officer or epidemiologist used to supplement the morbidity reports in meeting daily program needs are no longer available, and even if they were, would not be suitable for quantitative studies.

DETECTION OF SINGLE CASES AND OUTBREAKS

In examination of factors which explain the general acceptance of the present reporting system as adequate in detection of single cases and outbreaks, three come immediately to attention.

First, the sense of adequacy actually extends only to certain of the more severe diseases for which (a) there is an accepted public health action to be taken, or (b) there is a high degree of public health, medical, or popular interest. Diphtheria, poliomyelitis, syphilis, and Rocky Mountain spotted fever are examples of such diseases.

A second reason for reassurance results from the fact that in practice the reporting system is supplemented by many other sources of information, e.g., leads obtained from public health and school nurses, hospitals, informal conversations with physicians, laboratory reports, and even newspaper clippings.

In the third place, death certifications afford confirmatory evidence that no severe outbreaks pass unrecognized. The continuing decline in the annual death rate for many communicable diseases indicates that even though all cases may not be recognized, a sufficient number of them come to the attention of health authorities to enable maintenance of a moderate to low incidence level. Again such confirmation is restricted to certain diseases.

MEASUREMENT OF CHANGES IN INCIDENCE

The sense of adequacy which results from the reasonably good performance of the morbidity reporting system with respect to detection of cases and outbreaks cannot be extended to the use of reported morbidity in measurement of geographic differences in incidence; in time trends; and in changing incidence by sex, age, and race.

The weaknesses of our present system become immediately evident when comparative measurements of incidence are attempted. For this purpose, the incomplete reporting, varying from disease to disease, from time to time, and from place to place, cannot be supplemented by the diverse tips, leads, and clues which enable the reporting system to function as a detection mechanism. For a few notifiable diseases, the reported

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data serve as a reasonably acceptable index over periods of time during which concomitant factors have not caused a marked change in the reporting system itself. Thus smallpox, typhoid fever, and diphtheria have a long history of severity; the set of symptoms which give rise to clinical diagnosis have remained essentially the same for a long period of time; and public health action in case-finding has been intensive for many years. As a result of the relative stability of these factors, the time trends of morbidity rates for these diseases reflect changes in incidence in a manner that appears in accord with related information.

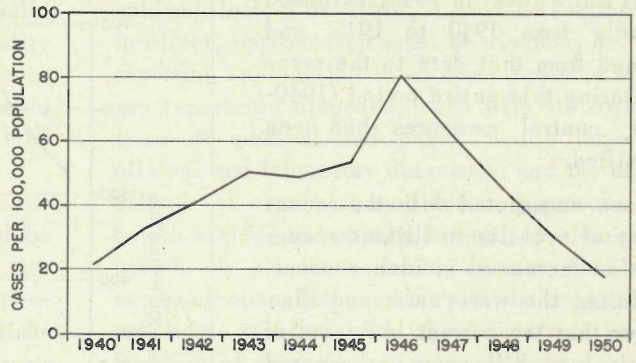
In other reportable diseases, great variation in reported incidence may result from such factors as: (1) the attitude of the private physician toward reporting; (2) incomplete etiological definition of reportable disease entities; (3) variation in clinical diagnosis according to local experience with infectious disease; (4) variation in follow-up and verification of physicians' reports; (5) variation in use and verification of supplementary reports, e.g., school and public health nurses' reports, laboratory reports, and others; (6) variations in laboratory procedures and in the criteria selected for querying physicians for case reports as a result of laboratory findings.

In some cases, the effect of external factors in the reporting system is readily apparent. In others, the influences may be detected only indirectly or through collateral information. Some examples of the effects of various influences on morbidity reports are shown in figures 1-3.

Syphilis Rates in Illinois. In Illinois, as in other States, the venereal disease control program developed during the late thirties was given a great deal of attention during the war years. Recent morbidity rates for

Figure 1

REPORTED CASES OF PRIMARY AND SECONDARY SYPHILIS
ILLINOIS, 1940-1950

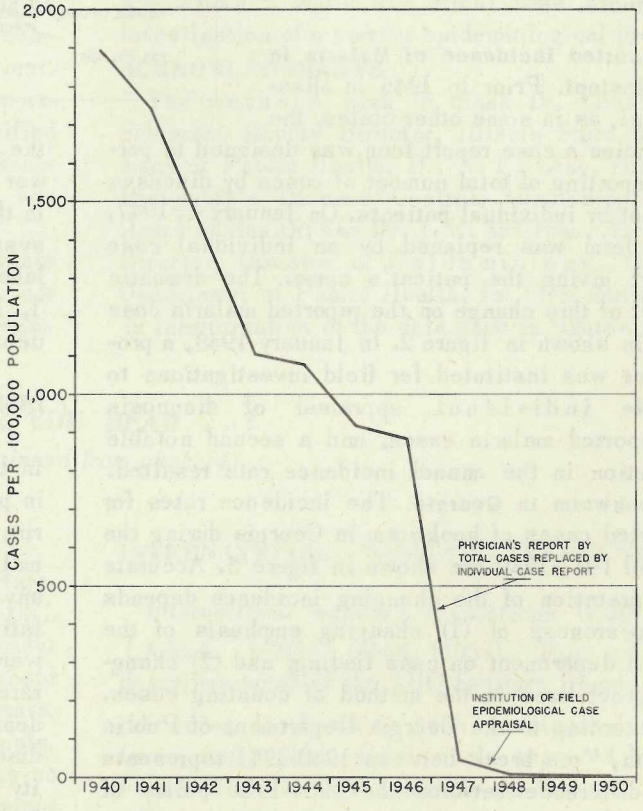


SOURCE OF DATA: CASES - ILLINOIS DEPARTMENT OF PUBLIC HEALTH
POPULATION - U.S. BUREAU OF THE CENSUS

FSA PHS CDC ATLANTA, GA. SEPT. 1951

Figure 2

ANNUAL REPORTED INCIDENCE OF MALARIA
MISSISSIPPI, 1940-1950



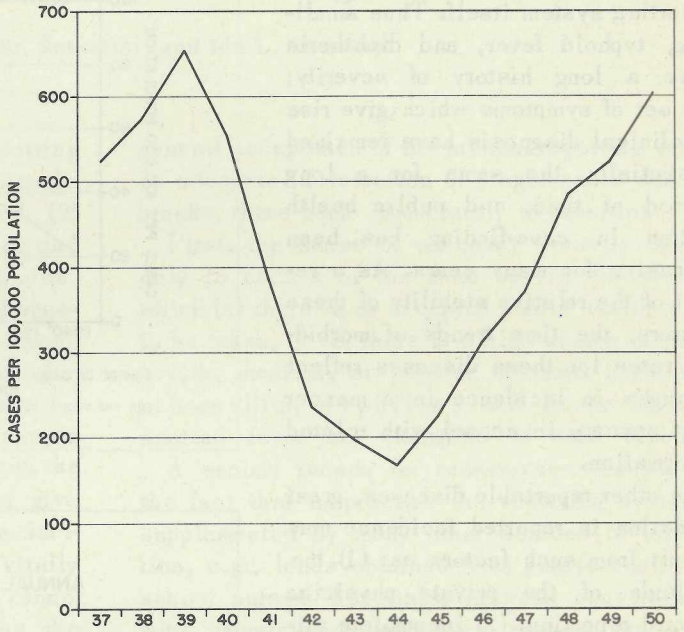
SOURCE OF DATA: CASES-MISSISSIPPI STATE BOARD OF HEALTH
POPULATION-U.S. BUREAU OF THE CENSUS

FSA PHS CDC ATLANTA, GA. SEPT. 1951

primary and secondary syphilis are shown in figure 1. From these rates it appears that infectious syphilis was at a low level in 1940, increased markedly from 1940 to 1946, and declined from that date to the present. During this entire period (1940-1950) control measures had been intensified.

Those acquainted with the recent history of syphilis in Illinois recognize that increased incidence occurred during the war years, and also believe that the current low level of infectious syphilis may be accepted as approaching the true incidence. The low level in 1940 is attributed to under-reporting which diminished during the intensive control program period of subsequent years, and thus induced a change in reporting practices which prevents a precise appraisal of the effect of the program in Illinois.

Figure 3
REPORTED INCIDENCE OF HOOKWORM
GEORGIA, 1937-1950



SOURCE OF DATA: CASES - GEORGIA DEPARTMENT OF PUBLIC HEALTH
POPULATION - U.S. BUREAU OF THE CENSUS

FSA PHS CDC ATLANTA, GA. SEPT. 1951

Reported Incidence of Malaria in Mississippi. Prior to 1946 in Mississippi, as in some other States, the physician's case report form was designed to permit reporting of total number of cases by diseases but not by individual patients. On January 1, 1947, this form was replaced by an individual case report giving the patient's name. The dramatic effect of this change on the reported malaria case rate is shown in figure 2. In January 1948, a procedure was instituted for field investigations to enable individual appraisal of diagnosis of reported malaria cases, and a second notable reduction in the annual incidence rate resulted.

Hookworm in Georgia. The incidence rates for reported cases of hookworm in Georgia during the period 1937-1950 are shown in figure 3. Accurate interpretation of the changing incidence depends on awareness of (1) changing emphasis of the health department on case finding, and (2) changing procedures in the method of counting cases.

According to the Georgia Department of Public Health, "the break between 1940-1941 represents the difference between the 1934-1940 policy of counting reports from all sources and the policy adopted in 1947, and now projected backward to 1941, of counting only positives reported by State laboratories. Fluctuations since 1941 reflect the decrease of case finding activities during the war years and a subsequent return to normal levels in the post-war period. A completely new reporting system, based entirely on direct tabulations from laboratory reports was placed in effect on January 1, 1951 and reporting of hookworm by health departments and physicians was discontinued."

DISCUSSION

The foregoing examples illustrate some artifacts in the notifiable disease data caused by changes in programs, diagnostic concepts, laboratory criteria, and reporting procedures. In the case of the malaria or hookworm reports, it is unlikely that anyone acquainted with the problems of interpretation of reported disease data would miss the warning given by the abrupt annual change in rates. The inherent danger signal is not so evident in the reported case data for many other diseases, and those familiar with reported morbidity data know that snares, traps, and hidden pitfalls lurk in all the reportable disease records to entangle the unwary and to frustrate the informed. This large body of data is, consequently, of limited usefulness, even in pin-point studies of

situations with which individual epidemiologists are familiar.

In improvement of death registration, the introduction of uniformity of reports and reporting procedures served as a foundation on which to build toward complete and correct reporting. Morbidity reporting, however, is essentially a different procedure from death registration, and it should not be expected that a similar line of action will be of the same effectiveness.

In mortality reporting, the initial problem of defining the event on which the report should be made is a simple one, since in man, death is one of the most easily recognized of biological phenomena, and therefore the first step in establishing a reporting system, that of defining the event to be reported, is clear-cut. Classification of the reported events can be taken up as a separate problem. Once a record has been obtained of all the events and a classification has been made, both internal and external evidence may be used to appraise the reliability of classification and to work toward its improvement.

In morbidity reporting, however, the event of reporting, although defined for each reportable disease, depends on a decision, frequently complex, which must precede reporting of the event. Since classification precedes the event of reporting, one has only a record of events classified independently by a large number of individuals with different training, experience, interests, and willingness to report.

In consequence, the total number of events reported depends upon a variety of factors, not readily subject to quantitative measurement, which can exert as great an influence on the data as can the true fluctuations of incidence in the population. In planning improvement in the usefulness of reported morbidity data for administrative and epidemiological analysis, it must be realized that, in effect, improvement must be planned, not in one reporting system, but in as many systems as there are reportable diseases, each with its own problems of medical and public health importance; clinical and laboratory diagnosis; and the unknown effects of current and future research, public health action, and popular interest. A simultaneous attack on all these fronts against each of the communicable diseases cannot be considered a practical problem with the resources at hand. Scrutiny of present-day epidemiological problems reveals several whose solution might be hastened if adequate and complete statistics on incidence were available.

Efforts to concentrate immediate improvement of the reporting system on a selected communicable disease problem would, while serving as a testing ground for further improvement of the whole system, provide a working area of tractable size and afford a solid statistical base for broader investigation of a current epidemiological problem.

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HAVE YOU READ. . . ?

(Continued from page 14)

BIOLOGICAL WARFARE

What you should know about biological warfare. U.S. Government Printing Office, Washington, D.C. (February 1951). This official U. S. Government booklet points out that "Biological attacks could be made by enemy forces or by secret agents. The attacks could be aimed at people, animals, or food crops. But – biological warfare is no secret super-weapon. There are defenses against it and you should know what they are." This booklet points out some of the things that should be done as defensive measures.

INTERNATIONAL SANITARY REGULATIONS

International sanitary regulations (Editorial). J.A.M.A. 147(1): 62-64 (1951). This editorial describes some of the WHO Sanitary Regulations, pertaining to diseases such as plague, yellow fever, and typhus, unanimously approved by the Fourth World Health Assembly on May 25, 1951. Unless modified by the Fifth World Health Assembly the regulations will go into force in all countries concerned on October 1, 1952.