

19 Measures of Morbidity

In many countries with highly developed vital-statistical systems, the death-rate, from all causes or from specific causes, has been for more than a century the principal measure of health progress – or lack of progress – and one of the main instigators of epidemiological research. In Great Britain it has, for instance, revealed the disappearance of cholera and the great decline in the typhoid fevers; it has shown the dramatic reduction of diphtheria, and, in the last thirty years, the spectacular fall in the mortality-rates of childhood. While these, and other striking gains, have at some ages been offset by new and serious problems, e.g. the rise in cancer of the lung in both sexes and the incidence of diseases of the heart in men of middle life, it has, nevertheless, become increasingly apparent that such low rates of mortality need to be supplemented by measures of morbidity. How much *sickness* is there in the population and in its many component groups, sickness which does not necessarily end fatally but which nonetheless calls for investigation and preventive measures (e.g. rheumatism in its various aspects)? It is this situation which is leading in a number of countries to the development of a system of morbidity statistics and, in general, to much discussion of the very difficult problems that they raise.* On the one hand such statistics are required for the purposes of medical administration, to indicate the population's requirements for medical care at home and in hospitals, etc.; on the other hand they should serve the needs of research into the factors that influence the incidence of illness of different kinds and into the steps that may contribute to prevention and cure.

Special Problems of Morbidity Statistics

Compared with the statistics of death, statistics of sickness present some very substantial problems. Thus (a) death is a unique event

* Morbidity Statistics, World Health Organisation Technical Report Series No. 389, 1968 and Report by the Permanent Commission and International Association on Occupational Health, Sub-Committee on Absenteeism. J. of the Soc. of Occ. Med. 1973, 23, 132.

whereas illness may occur repeatedly in the same person from the same or different causes; (b) death occurs at a point of time whereas illness exists over a duration of time; (c) in spite of modern problems, death is simply and precisely defined whereas illness varies very greatly in its severity, ranging from negligible effects to a condition which is completely disabling. In the measurement of morbidity it is clear that all these aspects have to be taken into account.

Under (a) we shall have to consider whether in calculating the amount of morbidity that occurred in a given period we should add the *number of persons* ill or the *number of illnesses* or both. For some persons will be ill more than once.

Under (b) we shall have to consider whether we wish to know the number of *new illnesses that arise* in a given period or the number that were *extant* in that period, whether they first arose in it or extended into it from a previous period.

Under (c) we shall have closely to consider what we *intend to count* as morbidity in any given circumstances. Thus we may, perhaps, categorise sickness broadly as (1) congenital or acquired defects, injuries or impairments (such as a residual paralysis from a past attack of poliomyelitis, visual and auditory defects); (2) latent or incipient diseases usually not recognised by the person affected but revealed by laboratory or other tests, e.g. diabetes or tuberculosis; the question arises as to the point at which they are to be regarded as clinically manifest diseases, and variations in the answer to that question must influence the incidence of that disease (thus the number of cases of respiratory tuberculosis can increase considerably, though, in a sense, artificially, with the introduction of mass radiography); (3) manifest disease recognised by the patient or by his medical attendant. Which of these various components we intend to count will obviously depend upon the circumstances and upon our needs but, if false comparisons are not to be made, the inclusions and exclusions on each occasion must be made perfectly clear in publishing our results.

Sources of Morbidity Statistics

The usual sources of morbidity statistics, and the principal special problems arising in each, are as follows:—

The survey of sickness in which a representative sample of a population maintains a diary or is interviewed and each member is asked details of the sickness experienced over some defined preceding period of time. (The point prevalence rate, described below, will relate to the sickness ac-

tually occurring on the day of the survey.) The definition of sickness is usually based on subjective rather than objective criteria and, with the interview approach, the accuracy of the records depends upon the memories of the participants for relatively minor events in their lives (one to two months is usually the limit) as well as upon their knowledge of the name or nature of their illness. On the other hand, no other method can bring to light *all* the sickness, major and minor, experienced by a population.

General practitioner statistics of visits and consultations. If fully maintained these records are more reliable in amount and kind than those obtained by survey, but they are necessarily limited to those sick persons who choose to consult their doctors. Many minor illnesses will thus go unobserved and the amount unobserved will undoubtedly vary with such characteristics as sex, age, social class, etc.

Hospital in-patient statistics are usually complete within their own field and likely to provide a firm diagnosis. But usually morbidity implies a *rate* and it may be very difficult to define the population from which are drawn the admissions to a particular hospital. Who are the exposed to risk who would go to such-and-such a hospital in the event of a major sickness? The statistics can also be influenced materially from time to time by changes in medical practice, e.g. cases of illness today may be treated at home which before the introduction of the antibiotics could have found their way to hospital. In general, the diseases to be seen in hospitals are, of course, highly selective – by the nature of the illness, its severity and its required treatment.

Sickness absence records reveal, as their title shows, who was absent from work and, usually, why in terms of a doctor's diagnosis of the cause of the illness. However, since the certificate is often an open one, the diagnosis will not invariably reflect the doctor's real opinion. It is important to note too that the incidence of sickness absence must vary according to the nature of the sick person's job. Thus a fractured radius or a mild gastro-enteritis may not keep a clerk from work but make it impossible for a bus driver to report for duty. The statistics are, of course, limited to those employed in industry, etc., and therefore exclude large sections of the population. The durations of illness will be affected by the tendency to return to work on particular days of the week, e.g. a Monday. The statistics will also be influenced by the workers themselves – how readily they choose to absent themselves for minor complaints which obviously may be affected by loss of income. In other words, we are inevitably dealing with the frequency and durations of *absences* and not with the frequency and durations of pathological conditions; the former

may overstate or understate the latter and may do so differently between persons, jobs, etc.

Notifications of disease are usually limited to infectious diseases and depend upon an adequate supply of doctors to provide the information. They will be influenced by the difficulties of diagnosis, by the degree to which laboratory assistance is available and by the readiness of practitioners to notify (which may well vary with the importance of the disease to the public health, e.g. typhoid fever compared with measles). However, in spite of known omissions and imperfections, they can be important as indicators to the medical officer of health of the presence of disease in the community, of the danger of a possible epidemic and of the need for preventive action, e.g. by isolation or identification of the source of an epidemic. Such, indeed, is their primary purpose. They can, however, be of considerable importance in revealing the epidemiological features of a disease, e.g. its distribution in space and time.

Registration of all cases of a disease, e.g. cancer or tuberculosis, is another system by which sickness in the population may be identified and measured. The register may permit long-term studies of a chronic disease, its course and response to treatment, as well as its epidemiological features.

In spite of the problems outlined above, all these sources of data have their own value and, in their proper sphere, can contribute to administration, research and knowledge.

Rates of Morbidity

In deciding upon appropriate rates of morbidity, the illnesses that exist in a population during a given time interval may first be classified as follows:—

- (1) Illnesses beginning during the interval and ending during the interval.
- (2) Illnesses beginning during the interval and still existing at the end of the interval.
- (3) Illnesses existing before the beginning of the interval and ending during the interval.
- (4) Illnesses existing before the beginning of the interval and still existing at the end of the interval.

For each of these categories we shall need to decide whether we take as our measure the number of *persons* sick or the number of *spells of illnesses* occurring, e.g. if in a given time interval a patient has three attacks

of bronchitis, do we count one person or three attacks? (Maybe we shall need both.)

The most useful morbidity rates in the total population or at specific ages will, then, be these:—

1. The *Incidence Rate* defined as the number of illnesses (spells or persons as applicable) *beginning* within a specified period of time (categories 1 and 2 above) and related to the average number of persons exposed to risk during that period (or at its mid-point). In short, the object is to show the number of cases of sickness *arising* in a given interval, e.g. how many persons fell sick with influenza in the third week of the year.
2. The *Period Prevalence Rate* defined as the number of illnesses (spells or persons as applicable) *existing at any time* within a specified period (all 4 categories above) and related to the average number of persons exposed to risk during that period (or at its mid-point). In short, the object is to show the total number of cases of sickness which *existed* during a given interval, e.g. how many persons were sick with enteric fever during the month of July.
3. The *Point Prevalence Rate* defined as the number of illnesses *existing at a specified point of time* (all 4 categories above) and related to the number of persons exposed to risk at that point of time. In short, the object is to show how many cases of sickness were in existence *on this day*, e.g. how many persons were sick with enteric fever on July 15th.
4. The *Average Duration of Sickness* (and the frequency distribution upon which it is based). Such an average may be in terms of (a) *the total population exposed to risk* to give the average duration of sickness per person, (b) *the number of persons sick* to give the average duration of sickness per sick person, or (c) *the number of illnesses* to give the average duration of sickness per illness. In all these measures of duration, consideration must be paid to the circumstances of the four categories set out on p. 217. Is it intended to limit the duration to that experienced *within* the defined period or is any note to be taken of the durations *preceding* the period but extending into it (categories 3 and 4) or of durations *following* the interval of illnesses that began within it (category 2)? There can be no categorically 'right' or 'wrong' procedure. The decision must turn upon the nature of the circumstances and the availability of the data. As already stressed above, it is essential in publication

that full details be given of the procedure actually in use. The Subcommittee on Absenteeism referred to in the footnote to p. 214 recommends to industry (1) that, normally, *calendar* days of absence should be used but that *working* days are permissible so long as their use is clearly stated, and (2) that the record should include all absences of one day or more up to 365 days, and, again, any variation from this should be clearly stated.

The terms *incidence* and *prevalence* perhaps need special reference for they are often misunderstood. The basic distinction, as shown above, is that incidence refers to *new* cases whereas prevalence refers to *all* cases, new and old. Prevalence describes, it may be said, the static situation actually existing at a specified point of time (or over a specified period) e.g. how many persons are then ill? By incidence, on the other hand, we measure a changing situation over a defined period, e.g. how many persons are falling ill in that interval? Another feature of interest may lie in the number of persons who experience in some interval of time (say a year) 0, 1, 2, 3 or more spells of sickness or absence from work. What proportion of a labour force contributes to the sickness absenteeism? What proportion makes repeated contributions?

Summary

Statistics of morbidity are required to supplement statistics of mortality, but in definition and analysis present much greater difficulties than the latter. As the English proverb says, stone dead has no fellow. In view of these difficulties it is essential in publication that full details be given of the definitions used, the method of collection of the data, and of the analyses applied to it. The most useful measures comprise the incidence rate showing the frequency with which new cases of disease arise and the prevalence rate showing the frequency with which established cases exist, either during a specified interval of time or at one specific point of time. Measures illustrating the duration of sickness can also be usefully employed.