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B. (i) Methods of Improving the  
Reliability of Raw Statistical  
Data Required for Health  
Programs

Methods of Improving the Reliability  
of Raw Statistical Data Required for Health Programs

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Great progress has been made in recent years in appreciating the importance of statistics in the planning and development of public health programs. However, it must be admitted that realization of the need for statistics has not yet become second nature to the persons in charge of executing such programs. This probably is due to the fact that, in medicine, everyday thinking continues to be based on empiricism, that is, the personal experience of the physician and other professional workers. Although many professional workers, when engaged in other fields of research, invariably seek the explanation of natural phenomena in the precise significance of figures, in medicine, they continue to be wary of statisticians, those who are humorously supposed to be able to prove everything, including the truth.

But on the other hand, it is not only the professional workers in public health who seem to be responsible for this attitude, but also the statisticians themselves. In many countries they have not reached an adequate professional standing, or learned the language and basic concepts of the scientific field in which they must work, namely public health, and are thus unprepared to sell their product - - statistical data - - to practising and public health physicians, nurses, sanitary inspectors, social workers, health educators, etc.

These two factors, skepticism on the part of public health professional workers as regards the usefulness of statistics and the lack of technical training of statisticians, have contributed to the perpetuation of important errors in the information that is collected, processed, and analyzed, and to insufficient interest in the utilization of inadequate data.

A. Utilization of Statistical Data in Public Health Programs. It is unnecessary to repeat the arguments that prove the importance of statistical information in the field of public health, since they are well known to every one. It is sufficient therefore to recall that such data are indispensable to the

planning, development, evaluation, and improvement of health programs, both technically and administratively.

B. Types of Statistical Data Required. These may be summarized as follows:

1. Vital Statistics. If the goal of public health is the improvement of the health of mankind, it may be easily deduced that the first task of public health agencies is to know the vital factors regarding the people. From this point of view data from censuses, of deaths, births, marriages, divorces, etc., are indispensable.

2. Morbidity Statistics. Man, whether he live in isolation or in community with others, is constantly exposed to the deleterious effects of environment. Throughout the history of peoples, cultural factors expressed by creativeness in all realms of thought, have left a residue of progress that enables man to defend himself better against those aggressive factors. Thus, for example, the risk of death of the younger generations lessens and there is a gradual change to a longer life expectancy. It is possible that this natural evolution of races faced with the risks of premature illness, death, and disability can be accelerated through specific action on the part of public health. But if this is to be effective, such action should not be carried out blindly, but should rather follow a pre-established plan, based on statistical data that show us the magnitude and the relative importance of the various risks we wish to diminish.

The difficulties of obtaining more or less exact morbidity indices are, however, well known. They have been stressed at congresses and meetings of experts and it seems unnecessary to repeat them here. But it is advisable to keep in mind the need for compiling at least some types of morbidity statistics for planning public health programs. The extent and detail of such information would depend on the particular factors in each country; on these, a summary was given in the report presented by the experts of the World Health Organization. (WHO Technical Report Series No. 53, 1953)

3. Resources on Statistics. Vital and morbidity statistics can be used to determine the magnitude and relative importance of the problems that must be solved by a public health service. At a second stage, it is equally important to have data showing the amount of material resources and personnel available for initiating the activities agreed upon.

4. Statistics on Services to the Community. In developing a health program, the personnel and the equipment provide a certain volume of services that are of benefit to the community. These services represent large sums of money provided directly or indirectly by the inhabitants themselves, and it is the responsibility of those in charge of programs to render a complete account of the funds received and of value derived from them. To comply with this obligation, therefore, an account must be kept of the services provided to the community.

The statistical data which have been enumerated provide the basis on which to plan, develop, and evaluate the health programs wisely.

5. Socio-Economic Statistics. Every day the idea that health is closely linked to other aspects inherent in community life is being more widely realized. There is a close interrelationship between the economic, cultural, and social development of a community and the health problems that affect it. Hence it would be irrational to project plans for the future that tend to promote, protect, and improve health if at the same time solutions for other community problems were not analyzed and tested: the economic situation of its inhabitants, means of communication, housing, the nature of industrial and agricultural production, the need for instructing children, the habits of the population, etc.

Perhaps the day is not far off when physicians will, as a matter of course, share their technical discussions with professors, industrialists, agricultural experts, and engineers. Perhaps it will not seem strange if in such discussions the agenda of a maternal and child program, for example, includes, in addition to specific headings on the subject, others related to schools, roads, agricultural production, etc.

We feel that the foregoing explains why it is necessary for the public health services to plan progressively for the compilation of statistical data that will provide information on these subjects.

C. Sources of Error. Errors occurring in statistical information used by the public health services originate at two levels: in local areas, where the data are collected, and in departments of statistics, where the data collected by local units are processed.

1. Sources of Error at the Local Level. The following are the most important:

(a) The Community Itself. For economic, cultural, educational, and psychological reasons, to mention the most significant ones, the members of a community fail to record data having a direct bearing on health programs (vital statistics, for example), or the inhabitants do not request aid from treatment centers, yet these services are the source of statistical information that is basic for planning and developing health programs.

(b) Professional Workers in Health. The professional workers contribute to the number of errors found in the data: when physicians, for example, do not report cases of diseases, or when they incorrectly apply the International List of Diseases, Injuries, and Causes of Death, they are underestimating and distorting statistical data. Likewise, nurses, social workers, educators, and sanitary inspectors, either because they lack technical training in such matters, or for some other of the reasons pointed out in this report, constantly introduce errors of varying degrees of seriousness in recording their daily activities.

(c) Statistical Workers and Auxiliary Personnel. A large number of these workers lack sufficient technical training to be able to discover the errors contained in the original information and to adopt procedures to decrease them.

2. Sources of Error at the Central Level. The departments of statistics, which are the offices charged with the preparation, analysis, and publication of statistical data, also have responsibility for the number of errors to be found in data. Such errors are produced in the different phases of the preparation process: review, coding, transfer to punch cards, mechanical verification, classification, manual and mechanical tabulation, and publication.

D. Procedures to Improve the Accuracy and Reliability of Data. As a basis for discussion, it would be worth while to point out, in general lines, what procedures should be followed to improve the accuracy and reliability of the statistical data necessary for planning and carrying out public health programs. In accordance with the ideas set forth at the beginning of this paper, at least the following points should be considered:

1. Improvement of Original Data. This includes various phases:

(a) Definition of the Statistical Systems Used in Health Programs. The definition of the statistical systems used is an essential step in improving the quality of the data. From this point of view, the following systems should be defined: vital statistics, morbidity statistics, statistics of resources, statistics of services to the community, and socio-economic statistics.

(b) Definition of the Functions of the Agencies Responsible for the Statistical Systems. In a single country there generally are various agencies charged with the collection and preparation of the statistical information used by the health services. There are legal, traditional, or other reasons for this fact. It is plain that a multiplicity of services performing similar functions increases the number of errors in statistical data. It is therefore advisable to establish precisely the functions that each of the agencies concerned is to carry out.

(c) Coordination of the Agencies Responsible for the Statistical Systems. For the reasons given in paragraph (b) above, it is essential that the most practical and effective coordination machinery be established for the different agencies responsible for the statistical systems, in order to prevent duplication of work, to improve the quality of the data, and to facilitate the timely use of the information provided by each agency.

(d) Standards for Collecting, Recording, and Transmitting Data. Most of the chiefs of the departments of statistics in the countries, and particularly the directors of international organizations interested in such matters, have emphasized the difficulty of obtaining current data and the impossibility of using them as a basis to establish valid international statistical comparisons. These difficulties arise from the lack of uniformity in the standards used in collecting, recording, and transmitting the original information. Among the procedures that could be used to diminish such difficulties, the following are worth mentioning: correct definition of the facts recorded; determination of the types of data to be collected; standardization and uniformity in the design and use of forms, so as to record only such information as will serve effectively in the planning, development, and evaluation of public health programs; standardization in the preparation of reports and establishment of time schedules for the transmittal of the original information to the

central department of statistics; delineation of the geographic areas covered by the offices or centers that collect data. Progressive application of these principles should contribute greatly toward increasing the accuracy of statistical information and at the same time facilitate comparison of data on a national or international scale.

(e) Principles for the Processing of Data. The statistics departments that process the data can contribute effectively toward increasing the accuracy of the information by following certain principles of organization and establishing well-defined standards for planning and directing the different stages which include preparation, analysis, publication, and establishment of time limits for the receipt of data.

2. Dissemination of the Importance of Statistics for Professional Public Health Workers. As was stated, professionals who work in public health attribute little value to statistics in the planning and development of health programs, hence their lack of interest in using them regularly. This means the loss of a valuable tool for increasing the accuracy of data: the constant check on errors, by thousands of persons, and the resulting possibility of diminishing these errors, whether through the effort of the professionals themselves as they produce and record statistical data, or through the incentives given by the personnel in the statistics offices.

The following are some of the ways in which the collaboration of professional public health workers could be enlisted:

(a) To produce statistics of the best possible quality, putting into practice the procedures described above.

(b) To ensure that, in addition to being of good quality, these data are current. It is not surprising that physicians and similar professional workers who receive statistical publications discard them without even a glance, if the contents refer to events that occurred two, three, or more years previously. Obviously, then, the central departments should transmit up-to-date material for publication.

(c) The purpose could be served also by the teaching and dissemination of information on statistical methods and their application to health programs, at various levels: schools of medicine, nursing, and others; courses for public health specialists; shorter-term statistics courses for practicing physicians, nurses, etc.; programs of direct collaboration between statisticians and professional workers in health

in problems relating to the planning, development, and evaluation of health programs, or in the clinical field (design and development of experiments, tabulation and analysis of data, etc.), or in the administrative field; dissemination of information on the application of statistical methods, in scientific societies, at seminars, etc.

3. Technical Training of Statisticians. The professional degree of biostatistician is not granted by teaching institutions, universities, or specialized schools, in the majority of countries in the Americas. Therefore, work related to this field is, in public health services, performed by persons varying widely in educational background: from those having taken regular liberal arts courses without special studies in statistics, to those whose university training included special courses in public health and in statistics applied to public health. This fact has led to confusion and inaccuracy in the definition of what is a statistician. Hence, the classification and rating of statisticians in public health services vary widely: sometimes they are classified as administrative personnel; at other times, as technical-auxiliary workers; and, in a few institutions, they are given a status equal to that of university professional workers. This situation has caused their salaries to be very low, thereby removing an important incentive that would attract qualified personnel.

A vicious circle is thus established: a lack of interest on the part of the workers in raising their professional standing, owing to the low salaries paid; and a lack of interest on the part of the authorities of the services in increasing the salaries of the workers, owing to the fact that their technical training is insufficient to warrant such increases.

If statistics is to be given the recognition it deserves; if the increasing use of this tool is desired, not only in the field of public health, but in all activities pursued by communities or peoples who seek a better future, then it is necessary to break this vicious circle without delay. The two factors that cause this vicious circle may be broken simultaneously in a long-range program. But the first steps of this program should be taken at once: 1) better remuneration and the establishment of a functional system of classification and ratings for statisticians; and 2) advanced technical training of statisticians.



These principles can be stated only in very general terms, leaving to each country, according to its economic, social and cultural resources, the task of defining and developing the various stages of the process.

In any case it is worth recalling, in regard to the advanced training of statisticians, that these workers fall into two groups: 1) those who act as consultants and analysts; and 2) those who collect data. The first group should have a high technical status and the second should possess sufficient knowledge to be able to record and handle original data, prepare various types of indices, and make preliminary tabulations and simple calculations.

Consultants and analysts, require higher education, if possible at the university level, and with specialized courses in Schools of Public Health or in organizations having international programs of advanced training. As a temporary measure, Schools of Public Health can offer courses at an intermediate level, specifically designed for statisticians.

The advanced training of auxiliary personnel could be achieved by means of shorter and more elementary courses given in Schools of Public Health, combining theoretical instruction with intensive practical work in the statistical offices of public health services.