

REGIONAL ADVISORY COMMITTEE ON HEALTH STATISTICS

FOURTH REPORT



PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
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REGIONAL ADVISORY COMMITTEE ON
HEALTH STATISTICS

6-10 June 1966

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I. INTRODUCTION

The Regional Advisory Committee on Health Statistics met in Washington, D. C., from 6-10 June 1966. Dr. Abraham Horwitz, Director of the Pan American Sanitary Bureau, opened the meeting and welcomed the members of the Committee. The recommendations made by the three previous meetings of the Advisory Committee (1, 2, 3) were reviewed and the Committee was informed of the extent of their implementation in the field of health statistics. The objectives of the Fourth Meeting were then outlined. The first was to review the recent recommendations of the Technical Discussions (4) held during the Nineteenth World Health Assembly (1966) on the improvement of vital and health statistics, and also of the Technical Discussions (5) held during the XVI Meeting of the Directing Council of the Pan American Health Organization (1965) on the same subject. Immediate action is needed to carry out those recommendations in Latin America. Other goals for the meeting were to outline the program for the preparation and introduction of the 1965 Revision of the *International Classification of Diseases*, in Spanish and Portuguese, and to consider the status of mechanization and use of computers in health statistics in Latin America, making specific recommendations for action in this field.

II. REGIONAL ACTIVITIES FOR INTRODUCTION OF THE 1965 REVISION OF THE INTERNATIONAL CLASSIFICATION OF DISEASES

The Nineteenth World Health Assembly (6) in May 1966, adopted the detailed list of categories and subcategories recommended by the International Conference as the Eighth Revision of the *International Classification of Diseases*. This Revision will come into effect on 1 January 1968.

Scope of the 1965 Revision

Major changes in the *International Classification of Diseases* have been made to keep abreast of advances in medical knowledge and of shifting emphasis in

health programs in various parts of the world. Changes have been substantial in various sections of the *Classification*. The diarrheal diseases have been moved to the section on infective and parasitic diseases. The categories on viral diseases were greatly expanded to reflect the increased knowledge of the enteroviruses, the exanthematic viral diseases, and the arthropod-borne viral diseases. Considerable elaboration was made to show different clinical manifestations of various infectious and parasitic diseases.

The section of the *Classification* dealing with allergic diseases was deleted and these conditions were allocated to the anatomic sites principally affected. The section on mental diseases was completely revised in accordance with the suggestions made by psychiatrists from various countries. The classification of dental conditions was greatly expanded to accommodate the needs of growing programs of dental public health.

The cerebrovascular diseases were transferred from the section on diseases of the central nervous system and sense organs to that on diseases of the circulatory system. Provision was also made for the classification of disease complexes involving cerebrovascular diseases, coronary artery diseases, and hypertensive diseases.

The causes of stillbirth and the diseases of early infancy were brought together to form the new section on diseases and conditions peculiar to the perinatal period. Malnutrition in infants was transferred to diseases of endocrine glands, nutritional diseases, etc. Deleted from the *Classification* was the characterization of diseases of early infancy as "immature" and "without mention of immaturity." The classification of congenital malformations was expanded to identify more specific structural defects of congenital origin. For those countries contemplating the use of three-digit categories only, attention was called to the loss of considerable specificity in these two sections unless coding is carried to the fourth-digit level.

The sections on external causes of injury and the nature of injury underwent major modifications. In the E Code more emphasis was given to circumstances surrounding the accident, especially those involving falls and fire. Provision was also made for the classification of violence, circumstances undetermined. In the N Code more detail was provided, especially on drug reactions, which should make the *Classification* more useful for hospital morbidity records.

The problems involved in the publication of the Spanish and the Portuguese versions of the *International Classification of Diseases* were reviewed by the Committee. Attention was called to the need to obtain agreement on the meaning of the categories in the proposed Spanish and Portuguese editions. Also considered was the problem of defining satisfactorily the three- and four-digit categories by inclusion terms which would be interpreted in the same manner by the various countries. The assistance of the national health services should

be obtained in securing the review of the titles and of some of the inclusion terms by appropriate medical groups in the various countries. The importance of securing the cooperation of the medical profession in obtaining satisfactory terminology was stressed.

In accordance with a recommendation of the Third Advisory Committee on Health Statistics (1964), the Pan American Health Organization will publish the Portuguese version of the *International Classification of Diseases* with the collaboration of the Latin American Center for Classification of Diseases and of the health services of Brazil and of Portugal. The preparation of the Spanish version will be the responsibility of the World Health Organization and the Regional Office for the Americas will participate in its preparation.

The Latin American Center for Classification of Diseases is taking measures in this direction by reclassifying terms contained in the tabular list of the Seventh Revision into titles and subtitles of the Eighth Revision. The Center recognizes the need for adding the new terms in medical nomenclature to bring up-to-date the inclusion terms of the categories of the *Classification*.

In an attempt to simplify the rules for selecting the underlying cause of death, which are admittedly complicated, the World Health Organization has sent various alternative approaches to several countries for comments. The purpose is to clarify and simplify the rules in such a way as to reduce the differences in their interpretation.

Reference was made to the inadequacy of mortality tabulations by a single underlying cause in assessing important health problems in the Latin American countries. For example, malnutrition, an underlying condition in various disease processes, is now lost from official mortality statistics. The use in Latin American countries of a limited multiple-cause coding procedure would be advisable.

Adaptation for Morbidity

The Committee was informed of the plans of the National Center for Health Statistics of the United States Public Health Service in preparing an Adaptation of the *International Classification of Diseases* for hospital indexing and hospital morbidity statistics. It was unanimously agreed that the Pan American Health Organization should prepare for the Region, in Spanish and in Portuguese, an Adaptation which can be used for coding both morbidity and mortality data as well as for the indexing of hospital records. The previous Adaptation in Spanish (7) has amply proved its usefulness in the Region.

Tabulation Lists

The 50- and 150-cause lists for mortality and morbidity tabulations were discussed. It was felt that neither of the present lists (A and B), nor perhaps

any other list of comparable size, could be wholly sufficient and satisfactory for the statistical needs of all national health services. The B List is inadequate for use in the Region because of the lack of specific items such as avitaminosis and malnutrition. Also, a separate rubric for abortions is essential in any abbreviated list to be prepared for the Latin American Region. However, any list that might be devised for international use should provide an adequate minimum base which could be extended in developing national lists in the Americas.

Seminars and Training Courses

Since the Eighth Revision of the *Classification* will come into force in January 1968, the Committee emphasized the urgent need for training programs on its use. The general policy of the Latin American Center is to give assistance to countries upon request. In view of the importance of the Eighth Revision, the Committee strongly urged that the Latin American Center and the Pan American Health Organization take the initiative in promoting the introduction of the new *Classification* in Latin America, documenting the changes, preparing training material on the use of the new *Classification*, and undertaking other activities that will be useful in this transition period. The Organization should provide the Latin American Center with resources to carry on the necessary program of assisting the countries to change over to the Eighth Revision in 1968.

Countries should be made aware of the need for training their personnel in the use of the new *Classification*. In this respect promotional activities should be developed soon in view of the short time available. The National Center for Health Statistics of the United States Public Health Service has made a valuable contribution in providing training material which has been translated and adapted into Spanish, and has again offered to the Organization and the Latin American Center the use of material which will be developed.

The Committee believes that schools of public health and health agencies should play a vital role in the introduction of the 1965 Revision by promoting its use and an understanding of the changes and the new rules of classification of diseases, and by developing courses for personnel.

The Committee was also of the opinion that the Latin American Center could gather and provide information on how causes of death are coded in various countries.

RECOMMENDATIONS

1. The Committee recommends that, in the preparation of the Spanish and the Portuguese editions of the 1965 Revision of the *International Classification*

of Diseases, the assistance of the national health services should be obtained in arranging for the review of the titles and inclusion terms by appropriate medical groups.

2. The Committee further recommends that the Latin American Center for Classification of Diseases prepare a limited multiple-cause coding procedure with special attention to malnutrition and diseases of particular concern in the Region, and encourage its use in Latin American countries.

3. The Committee recommends the preparation of the Adaptations of the *Classification* which will serve for morbidity and mortality statistics and for indexing hospital records in Latin America. Sufficient copies should be made available in both Spanish and Portuguese for use by the various countries.

4. The Committee also recommends that the Pan American Health Organization take the necessary steps to promote the dissemination and use of the 1965 Revision of the *Classification* in Latin America through seminars, training courses, teaching material, etc., and provide the Latin American Center for Classification of Diseases with sufficient resources to carry on the program with the countries.

III. IMPROVEMENT OF THE COLLECTION AND USE OF HEALTH STATISTICS

As background material, the Committee reviewed the documentation (8, 9) and the report (4) of the Technical Discussions at the Nineteenth World Health Assembly and the report (5) of the Technical Discussions of the XVI Meeting of the PAHO Directing Council. Following this review, a series of recommendations, with special steps for action, were adopted.

Reports of the Technical Discussions

The Technical Discussions at the Nineteenth World Health Assembly, held in May 1966, were devoted to the subject "The Collection and Use of Health Statistics in National and Local Health Services." In preparation for that meeting, a suggested outline for use by the countries in discussing the subject had been circulated to the Member States. The replies were analyzed, reviewed, and presented in summary form in the background document for the Technical Discussions. (8) The General Chairman (9) referred to the favorable climate for the adoption of measures destined to improve the quality and quantity of vital and health statistics, and to the urgent need to delineate the role and responsibilities of the health statistician.

The discussions were directed to five questions:

1. What statistical information is most valuable for the planning and evaluation of health services in developed and developing countries?
2. What methods of collecting data are most suited to the different types of information required?
3. How can the needs of both national and local services be satisfied?
4. Do health statistics have the right place in the organization of health services?
5. What are the special needs for training in this field at professional and technical levels?

The Technical Discussions of the XVI Meeting of the PAHO Directing Council (5) in 1965 were devoted to the topic "Methods of Improving Vital and Health Statistics." Members of a panel had prepared working documents on specific aspects of the problem. The discussion groups recommended a series of actions to be undertaken for the immediate improvement of vital and health statistics.

Population and Vital Statistics

Attention was called to the need for health administrators to have available population data for the planning and conduct of health programs. The importance of the 1970 census of the Americas and of the early publication of census data was emphasized. Special mention was made of the need for current population data for local areas.

The Committee then turned its attention to problems of vital statistics registration. The complex administrative organization of vital statistics systems in the Latin American countries has always presented difficulties of coordination among the agencies involved in the registration and production of statistics. The vital statistics of many countries of the Americas are deficient and require major improvements in both quality and completeness. Adequate vital statistics are basic national requirements. There is an urgent need to develop methods for extending registration systems as rapidly as possible. Training courses for local registrars have been initiated in Paraguay. The international agencies concerned with vital statistics should cooperate in the provision of similar training programs in other countries.

In areas or countries where vital statistics data are deficient, interim solutions should also be considered and experimentation with new methods is advisable. Two methods for obtaining data on births and deaths and estimates for the country were discussed: retrospective household surveys and sample registration areas.

In retrospective household surveys, information is obtained through the interview of a member of the household on the number of births and other vital

events in a specific period. Comparison of data from the survey with the records of vital events registered in the area provides an estimate of the reliability of the registration system and the survey, and may lead to an estimate of the total births and deaths. If the events recorded are limited to those which occurred in the immediately preceding three or six months, data are more nearly complete than data obtained for a longer period in the past. Household surveys could be repeated in the same area at three- or six-month intervals to ensure complete recording of births and deaths occurring during a specific period of time. Experimentation with this approach is under way in Paraguay.

The establishment of sample registration areas in a country with a deficient registration system is another method of providing vital statistics data for health purposes. Sample registration units must be chosen, using probability sampling methods in order to estimate reliable rates for the country from the data collected. The sample registration area has the advantage that the costs of recruitment and training of personnel are reduced to those for the specific areas. Training can more easily be provided for local registrars in the sample registration units and well-defined procedures can be developed to ensure and maintain complete registration. The registration procedures developed should be extended to the entire country gradually, but meanwhile useful estimates of birth and death rates would be obtained.

In Venezuela inspectors are employed who are responsible for improving registration procedures in each state of the country. These inspectors receive training in methods of improving registration. This was reported to be a satisfactory method of improving vital statistics.

Statistics on deaths by causes are limited in coverage by the fact that a large proportion of the population in the countries of the Americas do not have access to medical care. Another factor is that medical certification of death is deficient owing to a lack of training of physicians and often of interest in proper reporting procedures. In view of the extensive use of cause-of-death statistics for health planning, special programs should be developed to improve medical certification. However, since it will take years to bring the quality of cause-of-death statistics to an acceptable level in some areas, presently available data, even though deficient, should be utilized fully.

Various methods of improving medical certification were discussed, including training in this respect in medical schools and as part of refresher courses for physicians and the promotion of interest in the medical profession by demonstration of the practical uses of the information derived from death certificates. One means of stimulating interest would be to publish the results of the Inter-American Investigation of Mortality in a summary form suitable for general distribution to the medical profession. It was also suggested that, in addition to annual reports, periodic distribution of abstracts on mortality by cause of death would arouse interest in improving medical certification.

On the occasion of the introduction of the Eighth Revision of the *International Classification of Diseases* an instruction film on medical certification of death could be developed and used in medical schools, health departments, etc. Another means of educating the medical profession would be for the statistical services to query for information concerning incomplete death certificates.

Morbidity Statistics

Hospital discharges and outpatient consultations constitute a major source of data on morbidity in Latin America. Although these data do not fully represent the total morbidity of the population, they nevertheless provide a good basis for health planning. Since in Latin America the public sector usually provides the major part of medical care, it is easier to establish good hospital statistics systems there than in countries where medical care is provided principally in private hospitals. It was agreed that the establishment of a system of hospital statistics must proceed gradually. A first step might be to collect discharge data from governmental hospitals. Subsequent steps would be to extend the system to private hospitals and to include outpatient data. Reference was made to the importance of full local utilization of these data, which would ensure the provision of good data at the source.

As the hospital statistics system is extended, the volume of data increases and thus the possibility of tabulating only a sample of the records by a national office should be considered in some countries.

A second source of morbidity statistics is the notification system for communicable diseases. The Committee emphasized the priority to be given to the notifiable diseases. By limiting reporting to diseases for which effective preventive measures are available and for which epidemiological information is needed for eradication and control programs, more complete reporting of communicable diseases might be obtained. Notification of smallpox is of great importance for the Region of the Americas, since the eradication program for this disease is being intensified. Similarly, the notification of malaria is becoming increasingly important as the eradication programs enter the consolidation and maintenance phases and the malaria services are being integrated with the general health services.

The role of morbidity surveys as compared to morbidity reporting systems was discussed. It was agreed that the surveys are an important tool of great potentiality. Well-planned health surveys provide valuable information on morbidity of the population, health needs, attitudes toward health, diseases, health services, etc., which cannot be obtained in any other way. Such data make it possible to analyze health needs in relation to many variables, including social and economic factors. Surveys do not replace registration and reporting systems, but supplement them as additional sources of data.

Studies of morbidity from hospital and health center records and from population surveys provide useful data on health and medical conditions and practices. They are of value to the medical profession for constant appraisal of the current situation.

Health Resources

The Committee agreed that data on health resources, including facilities and manpower, and on services are essential for proper planning and efficient administration of public health programs. This area, in which the health administrator has an important role, is receiving greater recognition. The facilities and manpower available must be determined, needs must be well established and institutions provided to prepare the manpower required. There are many problems of definitions and of data collection. Nation-wide systems of statistics on health resources and services should be established for obtaining information on a continuing basis. Two methods were discussed, namely, periodic inventories and permanent registers.

Education and Training

Training of statistical personnel should be intensified at all three levels—professional, technical, and auxiliary—and should be carefully planned on the basis of a proper evaluation of needs. A balanced program is needed to satisfy requirements for all three levels of personnel.

An excellent example was given of the estimated number of persons who should be trained in each category in the next five years in Argentina. To meet the minimum needs in that country, 41 professional statisticians, 401 statistical technicians, and 7,125 auxiliary personnel are required. The qualifications and functions for each category have been specified and plans are being made for courses and in-service training. To facilitate and standardize this training, particularly at the intermediate and auxiliary levels, training manuals, visual aids and other teaching materials are needed. Similar precise studies should be made in each country.

The problems of retaining the services of personnel, particularly those at the auxiliary and intermediate levels, were mentioned and adequate remuneration was considered an important element in reducing losses of trained personnel in these groups.

Courses in schools of public health should be designed and provided in accordance with the specific needs of the students and the changing programs. The role of the administrator and his understanding of the necessity of statistical data for planning and evaluation was pointed out.

Two international centers for research and training in health and population dynamics have been established recently in the Schools of Public Health in

Santiago, Chile, and São Paulo, Brazil. This development was noted with interest by the Committee. The objectives of these programs are to relate health and population dynamics and to diffuse knowledge of the process of population growth and its implications for health programs and activities among medical personnel, faculty of medical schools and other institutions, health personnel, health planners and administrators, and personnel in associated fields where health is involved. The first four-month course in health and population dynamics is scheduled to be held from 1 August to 30 November 1966 in Santiago, Chile. In São Paulo staff have been selected for training in demography and health (a pediatrician, a sociologist, and an economist) and it is anticipated that a course in population dynamics will be offered annually starting in 1967. Extension of such teaching and research programs to other countries has been recommended.

Research

In the centers on health and population dynamics, the research methodology will be taught in order to prepare potential investigators for population studies in Latin America. However, research was stressed as an essential component in all the programs discussed by the Committee. Included were research projects using sampling methods for morbidity surveys, sample registration areas and retrospective studies of mortality, studies of medical practices and of coding practices, the investigation of causes of infant and child mortality, and multiple factors of causes of death. Operational research should be an integral part of programs for the development of information for effective planning.

Organization of Statistical Services

The Committee fully supported the recommendations concerning statistical offices and systems in ministries of health, which were made in the final report of the Technical Discussions held at the XVI Meeting of the PAHO Directing Council.

The Committee was in agreement that the health organization of each country should have a competent statistical unit located in a major organizational unit of the ministry of health. This unit should be responsible to the chief executive officer of the organization so as to serve equitably the various programs and to be responsive to the needs of all parts of the health service. The statistical unit should have full appreciation of the need for timely production of health statistics. It should also coordinate its efforts with those of other statistical organizations.

RECOMMENDATIONS

1. The Committee recommends that the health agencies support actively the 1970 census in the Americas.

2. The Committee also recommends that the Pan American Health Organization promote the improvement of vital statistics through training of civil registrars, experimentation with methods of establishing registration systems and estimating birth and death rates through surveys or sampling registration areas in several countries, and exploring methods of maximizing the use of the available data on mortality.

3. For the improvement of statistics on causes of death, the Committee recommends that, on introducing the Eighth Revision of the *International Classification of Diseases*, the Latin American Center produce a film on medical certification for use in medical schools, health centers, etc.; that the national health services promote interest among the medical profession by demonstrating the practical uses of the information derived from death certificates; and that the Pan American Health Organization publish the results of the Inter-American Investigation of Mortality in a summary form suitable for general distribution to the medical profession.

4. The Committee recommends that national health services establish nation-wide systems of statistics on health resources, including health manpower and facilities and services.

5. The Committee endorses the recommendations of the Technical Discussions of the Directing Council (5) in this field which are included here:

- (a) Adequate organization of the national statistical system for the planning, operation, and evaluation of health programs and coordination of the system within the ministry and with other agencies.
- (b) Establishment of a records and reports system for essential statistics for health administration in the operation of programs and measurement of performance.
- (c) Stimulation of the establishment and active work of committees on vital and health statistics in order to coordinate statistical services and improve the functioning of national systems of statistics.
- (d) Designation by the ministries of health, with advice of international organizations, of study groups to define the technical areas of work in health statistics and the essential items which the countries should include in statistical systems in order to permit international comparability.
- (e) Promotion of leadership to stimulate the use of statistical information in health activities by health personnel at all levels in health centers, hospitals, schools of medicine, and professional organizations.
- (f) Participation and incorporation of statisticians as active members of the health team.
- (g) Simplification and standardization of systems of vital and health statistics, including hospital statistics and statistics of resources, at national, regional, and local levels.
- (h) Development of operational research for improvement of statistical systems.

6. The Committee also recommends that each country study its require-

ments for statistical personnel, that the training of personnel be intensified at all three levels—professional, technical, and auxiliary—and that the Pan American Health Organization collaborate in producing materials for national use in such courses.

7. The Committee recommends that, in all programs, the ministries of health and the Pan American Health Organization promote operational research on methods of improving statistics and of providing essential data for planning and on basic research in the health field.

IV. MECHANIZATION AND USE OF COMPUTERS IN HEALTH STATISTICS

A special subject considered by the Committee was the modernization of statistical systems and the introduction and use of computers as a means of achieving rapid progress. Several working documents were available to the Committee members, who also described their own experience with computers in their programs. The group visited the U. S. National Center for Health Statistics to observe the data-processing center. Following the discussion of programs, recommendations were formulated for the introduction of modern data-processing methods for rapid development in Latin America.

Reference Documents

Three working documents provided background information for the discussions on mechanization and the use of computers in health statistics. The Regional Office for Europe of the World Health Organization convened a conference in Copenhagen, Denmark, from 17-21 November 1964. The report (10) of that meeting, entitled *The Application of Automatic Data-Processing Systems in Health Administration*, cited the following advantages of automatic data-processing by a computer center:

- (1) it accepts and reads in large quantities of variable data;
- (2) it stores large quantities of data and holds them continuously available in a small space for instant reference or for retrieval in bulk;
- (3) it selects data for computation and carries out a prescribed sequence of logical operations on those data;
- (4) it carries out internal arithmetic relating to the data;
- (5) it discriminates between alternative procedures according to the varying results of its own calculations;
- (6) it stores the results of the processing and amends the original data where necessary;
- (7) it prints out selected data in different formats and on a variety of documents;
- (8) it carries out all these functions with extreme rapidity.

The Final Report (5) of the PAHO Technical Discussions on Methods of

Improving Vital and Health Statistics gave the following comment regarding the use of computers:

Electronic computers are important and are making possible developments that were impossible previously and are revolutionizing our thinking and our activities. They contribute enormously to the processing of data and increase the potential uses as well as the rapidity of preparation of reports. The health statistician must not lag behind the economists, scientists, and industrialists in using computers. He must be able to use the latest modern techniques available. However, more important than technical development is good organization and here, too, modernization is needed at every level from that of local recording and reporting to the final interpretation and communication of the centralized data and its transformation from information into decision and action.

In the "Interim Report on Electronic Data-Processing in Public Health" (11) in the United States in 1963 the following statement was made:

The use of Electronic Data-Processing (EDP) in Public Health and Medicine is currently quite extensive and growing at a rapid rate. The Public Health Service has 11 digital computers operating in its intramural activities. Two state health departments have their own installations, while 16 state and three large city health departments have access to and are using EDP. There are 13 state and two large city health departments with quite definite plans to begin using EDP in the next two years.

Thus in the United States computers are an important instrument or tool for the processing and analysis of the basic health data for policy decisions in health programs. The U. S. National Center for Health Statistics obtained its first computer in 1961 and is now in the process of acquiring its fourth computer, each time changing for equipment of greater capacity. The expansion in this program demonstrates that the demands on the computer were originally underestimated.

Health Surveys

The U. S. National Center for Health Statistics is at present collecting and processing data-utilizing computers in four distinct areas: (a) health interview survey; (b) health examination survey; (c) health records survey; and (d) vital statistics. The program of the National Center in the collection, processing, and analysis of data was described in a working document. (12) The uses of computers are multiple and many of the analyses would have been impossible without them.

A description was given of the several uses of computers in the study of health manpower and medical education, a cooperative program of the Ministry of Public Health of Colombia, the Colombian Association of Medical Schools, the Milbank Memorial Fund, and the Pan American Health Organization. One of the major features of this program is the national morbidity survey of around 60,000 persons in 10,000 families, of which a report was given in a working document. (13)

Vital Statistics

The processing of vital statistics data—that is, births, deaths, fetal deaths, marriages, and divorces—is one of the fields in which the introduction and use of the computers has resulted in timely publications. At the U. S. National Center for Health Statistics the time between the end of the collection period of vital statistics data and their publication was reduced from about one year and a half to three months as computer operation became more efficient and new time-saving devices were introduced. Because of the reduction of clerical and typing time, print-out pages directly from the computer in a form suitable for publication represent a great advantage. The importance of magnetic tape as a space-saving storage medium was stressed. Also, reference was made to the advantage of computers in record-linkage systems in vital statistics as well as in other fields. Records of an individual may be matched and information from both sources used (for example, from birth and death certificates). Other uses of computers in the field of vital statistics include the development of mathematical models.

Hospital Statistics

Hospital information deals with (a) the hospital facility *per se*, (b) the patient, and (c) the medical practices followed. The computer operations established for the processing of hospital statistics by the Commission on Professional and Hospital Activities in Ann Arbor, Michigan, were described. At present data from approximately 800 hospitals are in the system and around six million patient discharges in a year are being processed currently. Recently this hospital program has experienced very rapid growth. The program was initiated using tabulating equipment and was converted to computer operation in 1961. In this hospital discharge study, complete coverage with data on all patients discharged is required of participating hospitals. Reports are rapidly given back to the hospitals which are the suppliers of the information. The form for the case abstract and sample pages of tabulations for this hospital study were then made available to the Committee. The usefulness of these tabulations was discussed in terms of:

- (a) Speed of tabulation feed-back. Records for a given month received one day are returned to the producer-consumer hospital the following day with a substantial reduction in “turn around” time.
- (b) Frequency of reporting.
- (c) Opportunity for training hospital personnel through personal contact.
- (d) Improving hospital records through analytical interpretation of reports and immediate feed-back.

Research at the Institute of Nutrition of Central America and Panama (INCAP)

The steps taken by the Institute of Nutrition of Central America and

Panama in the selection of a computer were described. As INCAP is a specialized research agency sponsored by the Pan American Health Organization and the six countries of that region, its principal objectives are to investigate nutritional problems in the area and to advise its members on possible solutions. The Institute studies a large number of pertinent variables of a biological, sociological, anthropological, agricultural, and economic nature. Because of the need to interrelate several variables, data-processing by conventional methods was no longer considered efficient and possible. Such methods did not permit the necessary analysis.

A careful study of alternate systems was carried out over a period of approximately one year and the final decision to obtain a computer was based on cost and on the type, versatility, and servicing facilities available. On this basis an IBM 1620 system was selected; as ancillary equipment a 1622 card-read-punch unit and a 1443 printer were included. The system has capacity for expanding memory storage facilities through basic core and disk attachments.

The system will be in operation in June 1966 and will be used in the control and evaluation of longitudinal research endeavors. In a limited way, it will be used in some administrative fields, dealing principally with cost analysis by program and budget projections.

Role of Schools of Public Health in Training for Computer Operations

The role of schools of public health in connection with training in computer operations and use of computers was discussed. First, the situation for a public health school closely associated with a university and particularly with medical institutions was described, namely, that of the School of Public Health of Columbia University. The following computer facilities and their locations are available: (a) the University Computing Center equipped with an IBM 7094 system and (b) the Medical Center with two IBM 1401 systems, one used entirely in administration and the other exclusively for medical data-processing. The head of the medical data-processing unit is a pediatrician, knowledgeable in programming and statistics.

The basic activities of this School of Public Health in relation to computer operations are as follows:

1. *Education.* Students in hospital administration receive orientation through lectures; students in public health should receive some orientation with respect to computers, but at present do not. Students specializing in statistics receive a six-week training course in Fortran language, with laboratory practice. About one of every four in this last group goes beyond this, to become fairly skilled in programming.

2. *Consultation.* Persons who consult with the statistical group in the School in regard to the design and analyses of their research are advised with

respect to the applicability of computer systems to their particular problems.

3. *Research activities.* Studies of prevention of dental caries by various agents, bioassay, congenital defects, patterns of medical care, theoretical epidemics, demographic studies and exploration of population models using Monte Carlo methods, and exploration of the use of computer systems in the diagnosis of disease are examples of the research projects.

Application of computer systems in schools of public health and medical schools have been furthered by such efforts as those of Dixon and Massey at the University of California at Los Angeles, and of Sterling at Cincinnati in developing generalized biomedical computer programs.

In connection with the possible utilization of computer services, it was pointed out that this would be dependent upon or conditioned by local circumstances prevailing in each case.

Computer Program in a State Health Department

The great diversity of computer applications in practically all aspects of health data and statistics was recognized. The experience (14) of the State Health Department of Michigan in the gradual introduction of computer use in their activities, under conditions of full integration, was described.

The process was initiated following a developmental framework established after evaluating alternatives on the basis of the efficiency and economy of the operation. There was agreement on the advisability of renting time on the available university facilities in preference to reliance on the complex facilities of a proposed centralized four-center system operated by the State. It was then necessary to reorient personnel within the health department in order to carry out the systems development for the data-processing activities. Some additional staff were secured, particularly for certain key positions, and in this connection there were difficulties in recruiting qualified persons. At all times the concept of a service center built for the various programs of the health department was stressed. By the fall of 1966 the use of the computer will have demonstrated the need for on-site computer equipment.

Computer Programs in Latin America

A brief presentation was made of the preliminary results of a survey conducted by the Pan American Health Organization on the use of computers in the health field in Latin America. A list of the computers reported in use in health statistics is given by countries in the accompanying table. The suggestion was made that a complete inventory of all available computer facilities in government health services and universities in the Region would be of value.

In some countries such as Argentina, Brazil, Costa Rica, Guatemala, Jamaica, Mexico, and Panama computers are already in use in processing health information of various types.

Other countries are in an advanced stage of planning for computers. Argentina is currently developing its integrated health statistics information system at the national level and is conducting a careful feasibility study to determine the type of equipment to be used. The Committee felt that Argentina's conceptual approach of analyzing the over-all problem very carefully had merit and supported similar careful planning in other countries.

General Discussion

The problems of the scientific and research uses of computers and also the uses for administrative processing of payrolls, budgets, etc., were discussed. Although there was an unavoidable conflict between the administrative needs and those of a technical nature, the Committee stressed that the basic conditions for the installation of a computer should be established first and that advanced planning is required. Conflict between scientific and administrative uses would be avoided by planning for a machine of satisfactory size and capacity. Advice in selecting electronic data-processing equipment should be available from sources independent of the firms selling such equipment. Comments were made regarding the necessity of expert advice and standardized international programs in the field of health.

In making the transition to mechanized data-processing it is necessary to maintain flexibility without losing sight of the basic objectives and letting the computer become an end in itself. The computer is a tool. There is often an exaggerated fear in establishing computer installations because of high costs and lack of qualified personnel. Retraining of personnel would prevent displacement of existing personnel. Cost problems could be reduced if ways could be found to take advantage of education discounts; careful thought should be given also to the alternatives of buying or renting electronic data-processing equipment.

The use of package programs which tend to freeze the user into restricted types of analyses should be avoided, but standardized computer programs which can be used repetitively or adapted to a variety of programs should be encouraged.

Full utilization of the time of the computer on routine work should not be planned, as some time of the computer should always be reserved for technical, exploratory, and investigative work. Routine work should be processed during the night shift, reserving the daytime hours for higher technical operations which require highly specialized and trained personnel. Reference was made to

Electronic Data-Processing Systems Reported in the Survey of the Pan American Health Organization in the Americas

Country	Agency	Equipment	Applications
Argentina	Municipality of the City of Buenos Aires, Secretariat of Public Health	IBM 1401, 8K, 4 magnetic tapes	Death rates in children and adults; hospital bed control; outpatient visits to hospital; hospital services cost; dental services; drug control.
	"Instituto Obra Médica Asistencial"	Bull Gamma 30, 20K, 3 magnetic tapes	Programming in progress.
Brazil	University of São Paulo	IBM 1620, 20K, 1 disk drive	Community population census; medical records; fertility studies; cardiology and neurology research; dental research; Inter-American Investigation of Mortality; library programs for statistics.
	Department of Sanitary Sewage	IBM 1401, 8K, 4 magnetic tapes	Location of oceanic interceptors of sewage.
	"Fundação Leão XIII" and National School of Public Health	Service Bureau IBM 1401	Living conditions in "favelas."
	Association of Brazilian Medical Schools	Service Bureau IBM 1401	Pre-university students of medicine, population study in Guanabara State and Rio de Janeiro.
Costa Rica	Costa Rican Social Security Fund	IBM 1401, 8K, 4 magnetic tapes	Mainly administrative; hospital discharges; diagnostic and operation indexes; some research work.
	General Office of Statistics and Census	IBM 1401	Vital statistics and demographic data.

Electronic Data-Processing Systems Reported in the Survey of the Pan American Health Organization in the Americas
(cont.)

Country	Agency	Equipment	Applications
Guatemala	Mechanized Technical Office of the Ministry of Public Health	IBM 1401, 12K, 4 magnetic tapes	Some vital statistics; persons receiving health services; malaria eradication; cancer campaign; morbidity and communicable diseases. Planned demographic studies; university populations; nutrition research planned.
Jamaica	Institute of Nutrition of Central America and Panama (INCAP) Census Bureau University of the West Indies	IBM 1620, 20K IBM 1401, 20K IBM 1620, 20K, 1 disk drive IBM 1620, 20K, IBM 709, 33K, 9 magnetic tapes CDC G-20, 16K, 4 magnetic tapes CDC G-15, 1 magnetic tape IBM 1401	Census data. Epidemiological samples; biochemistry department; tropical research unit. Research in uterine work and cervical dilatations; pyelogram analysis.
Mexico	"Centro Nacional de Cálculo," National Polytechnical Institute "Centro de Cálculo Electrónico," National University of Mexico		Automatic medical diagnosis; mechanics of vision.
Panama	"Contraloría General"		Mainly government administration; birth and death registration and statistics; hospital statistical data of the Province of Panama; medical and nursing manpower in medical care units of the country.
U.S.A.	National Center of Health Statistics	IBM 7010, 60K, 9 magnetic tapes IBM 1401, 4 magnetic tapes	Vital record certificates; interview and health records from the National Health Survey; methodological research.

three types of activity: the first was involved with production or routine work such as the processing of current vital statistics; the second with separate one-time tasks for which a general purpose system technique would be indicated; and the third consisting of research and developmental work in custom-built programming.

The sharing of computer facilities was considered to be practical if there is sufficient pre-planning. Depending on the type of application or personnel available, the user could provide his own programming in the data-processing center. In this connection, the use of data banks presents problems which have to be resolved in the light of the circumstances pertaining to each case, taking into consideration priorities, availability of time and personnel, confidentiality of data, costs, etc.

Whatever the administrative structure of the computer center, the technical staff in the subject-matter field should have close working relations with the computer staff. A team approach is desirable, involving a system analyst and health expert who would be concerned with both the processing of the data and their use. Programmers should be familiar with the subject matter as far as feasible. Subject-matter staff should be able to communicate with the programmers as well as with the computer staff. Detailed documentation of all programs and systems development is necessary and in fact should be an absolute prerequisite for every application of a computer facility. Such a requirement should protect the system in case the designer would not be available to provide operational instructions. Instructions with detailed information would be available in a reference manual describing procedures to solve the problems which arise during the normal operation of the system.

RECOMMENDATIONS

Examination of the statistical system of Latin America indicates clearly the urgent need for obtaining complete, timely, and efficient statistical data for the preparation of national plans of development and for the evaluation of progress. As programs for the improvement of collection of data are developed (Part III of this report), obstacles hampering progress in the production and utilization of vital and health statistics can be overcome by establishing efficient statistical systems compatible with the available resources and by introducing modern methods of processing data. The following recommendations are directed to the rapid introduction of such methods.

1. On the basis of the many successful experiences and the advantages derived from the use of modern systems of data-processing which facilitate the management of large amounts of information with great speed, accuracy, and flexibility, the Committee recommends that the Pan American Health Organization establish the basic prerequisites for installation of a computer, including: (1) a feasibility study with identification of initial application encompass-

sing data required and costs; (2) plans for simultaneous improvement of the basic data; (3) training of those who collect and transmit data for processing; and (4) planning for the full utilization of data from the computer.

2. For sound planning in this field, the Committee recommends that national health services conduct an inventory of computers in the public sector (governmental and universities) in order to determine their capacity level and appropriate types of utilization. The possible use by health agencies of existing equipment should be investigated. Due consideration should be given to the acquisition of equipment when justified and to the advantages and disadvantages of centralizing a computer system in the health sector or of a coordinated system in several public sectors.

3. The Committee recommends that the Pan American Health Organization provide advisory services with a team approach for the entire system, extending from the source of the basic information to its correct utilization. In addition, technical personnel from the countries will profit from opportunities to observe systems in operation in other countries.

4. In order to create a continuous exchange of information and take advantage of the experience available in the field, the Committee recommends that the Pan American Health Organization collect and distribute a bibliography of programs, documentation, and teaching material.

5. In view of the great value of computers in health programs in vital statistics, notifiable diseases, hospital statistics, and health service statistics, the Committee recommends that the Pan American Health Organization develop a vigorous program of conferences and seminars, covering a wide range of fields including (a) the role of computers in the entire health field; (b) orientation courses for high-level health executives; (c) organizational and communication problems of computer installations; and (d) provision of short-term training courses for systems analysts, programmers, etc. Since the potential of computer systems is enormous but the costs considerable, the Organization has an important service to render in developing constructive assistance in this field to maximize the advantages. In this connection the Organization should take advantage of personnel with experience from the U. S. National Center for Health Statistics and from statistical offices of the countries, utilizing their services for short-term consultation to the countries and for participation in seminars.

6. The Committee further recommends that the Pan American Health Organization explore methods of establishing a computer installation and center in a geographically central location in Latin America for (a) training of personnel for health services; (b) development of systems applicable in several countries; and (c) research and pilot operations in the development of methodology. The successful operation of such a center would serve to rapidly advance scientific progress in Latin America through the stimulation of national activities in this field.

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