

*directing council*

PAN AMERICAN  
HEALTH  
ORGANIZATION

XX Meeting

*regional committee*

WORLD  
HEALTH  
ORGANIZATION

XXIII Meeting

Washington, D. C.  
September-October 1971

Provisional Agenda Item 30

CD20/13 (Eng.)  
26 August 1971  
ORIGINAL: ENGLISH

PAHO RESEARCH POLICY AND PROGRAM

A Review of the PAHO Research Program, 1962-1971

The PAHO Advisory Committee on Medical Research reviewed during its 10th meeting the objectives and accomplishments of the Pan American Health Organization research programs covering the period 1962-1971.

In transmitting the report to the Member Countries, the Director hopes that suggestions made in this review will serve as a basis for finding ways to improve and ensure the success of the health programs of the Hemisphere.

Annexes

A REVIEW OF THE  
PAHO RESEARCH PROGRAM  
1962-1971

ADVISORY COMMITTEE ON MEDICAL RESEARCH  
TENTH MEETING

Washington, D.C.  
14-18 June 1971

A SUMMARY

PAN AMERICAN HEALTH ORGANIZATION  
Pan American Sanitary Bureau, Regional Office of the  
WORLD HEALTH ORGANIZATION

Washington, D.C.

REF: RD 10/8

A REVIEW OF THE PAHO RESEARCH PROGRAM:  
1962-1971

A SUMMARY

In the course of its deliberations, since 1962, the Advisory Committee has repeatedly reaffirmed that evaluation of the PAHO research program should be based on its relevance to the health needs of the Americas. Hence a major committee role is to help determine priorities within the program. Accordingly, it was thought appropriate for the Tenth Meeting of the Committee in June 1971 to re-examine the objectives and accomplishments of the PAHO research program for the past nine years. As a basis for this review and evaluation a report on the PAHO research program 1962-1971 was prepared by a consultant, and submitted to the Committee in advance of the meeting. The report included a survey of the major health problems and causes of death and illness in Latin America, a detailed analysis of the PAHO research activities in the last decade in relation to health problems in Latin America, and a discussion of the accomplishments of the PAHO research program, and of the role of the Committee itself.

The deliberations of the Committee opened with an introductory statement by the consultant, Dr. F. Mortara, who outlined the procedure used in getting data for the report, including consultation with members of the Committee.

The discussion that followed can be divided into four parts: comments on the consultant's report; general comments on the achievements of the program in the past decade; a discussion of the future goals and priorities of the program; and specific recommendations as to how the Committee might

best function in the future.

At the outset, it was quite generally agreed that the consultant's report represented both a most helpful outline of the health situation in the Americas for the period in question and an excellent review of the Committee's activities and avowed policies over the same period. The three tables showing the allocation of funds (in amazingly meager totals) among the various programs were considered especially valuable and the fact that the report was extraordinarily well documented throughout its references and annex also greatly enhanced its value.

The PAHO research program is a research support instrument of a certain type: its funding is necessarily very small in relation to the continental health research needs, and it has relatively little in-house facility to conduct research. Consequently, it must depend largely both on outside funds and outside investigators. Therefore, the program must consist principally of multiple, relatively small, individual projects plus more substantial support to only a very few specialized research centers.

Offsetting these constraints are two major advantages: PAHO is in an excellent position to know what other research activities are going on in the various countries within its region; and as a highly respected international organization, it is able to stimulate research projects of local and international scope in a way not always possible for purely national, voluntary, or governmental agencies.

In a very real sense, therefore, PAHO itself is able to maintain: a highly knowledgeable constant surveillance of the health situation in its area of responsibility; a current inventory of what research and educational programs are in progress; and an identification of the problems related to

the application of individual health measures. It is these problems that form the basis of PAHO's research program.

When a particular set of problems are being investigated elsewhere, the PAHO research aim should be to maintain scientific and professional liaison with such efforts. When it deals with problems that are receiving insufficient attention, the PAHO research effort can exert its greatest impact.

To operate productively in such a role requires that the Secretariat have a well-defined set of guidelines by which to assign priorities to individual projects, and have ready access to the Advisory Committee Chairman, individual members of the Committee, and consultants.

In actuality the above description represents what PAHO, with the help of its Advisory Committee, has been attempting to do. Moreover, with the benefits of nine years' experience, a set of priorities have emerged. In fact, Table III of the consultant's report reveals that for 1970 two-thirds of the allocation of funds went for research in nutrition, maternal and child health, a study of child mortality, vector-borne diseases, and zoonoses.

The discussion that followed considered: how the Committee could evaluate the PAHO research program; and whether it could be of greater help in setting guidelines and priorities for the future.

With respect to a formal evaluation of the PAHO research program for the last decade, the Committee acknowledges that there are no recognized methods for evaluating the impact of a research program on so large a bio-social phenomenon as the health status of a continent. Yet if we are to continue to improve the program, some evaluation must be made. It was reported that in one research program, an evaluation was made by assigning

the various sectors, for example, nutrition, to one or more experts on the Committee and holding an all day session on: the status of the sector when the research was started; the portion of the research properly attributable to the particular research program under scrutiny; and to what extent problems in that sector had been clarified by the results of research.

Regardless of these considerations, in terms of a factual and rigorous evaluation, the Committee felt that it could reasonably state that this year's review of the PAHO research program of the last decade reveals an emphasis on what are now considered to be major unsolved health problems in the Americas, and generally represents an imaginative attack on these problems.

Regarding priorities, it was pointed out that although statistical data on mortality and morbidity have traditionally provided the basis for assessing the relative importance of health problems, a certain caution is desirable in establishing priorities in this manner. Problems such as those in the mental health field, for instance, would be likely to be underrated. The excellent PAHO study of mortality in childhood, still in progress, is already showing the importance of malnutrition in contributing to deaths usually ascribed only to communicable diseases. Future priorities should take such data into consideration and pay increasing attention to the study of socioeconomic factors in relation to health and disease. A suggestion concerning the usefulness of defining intermediate goals, as different from ultimate goals, received the general approval of the Committee.

A serious concern was voiced concerning the prompt and efficient application of the results of research, particularly in the case of PAHO-assisted investigations. If positive findings are not put to use in improving the content and practice of health programs, the research would only have

academic significance and its support by an organization such as PAHO would be open to question.

Regarding more specific guidelines on priorities, the Committee believed that given a choice between a particular health program aimed at children under five and one aimed at the postponement of disease and illness in those over five, the former has the greater priority.

Other guidelines of the Committee gave priority to projects that:

1. attack problems that cross national boundaries;
2. include epidemiological field studies;
3. emphasize prevention, the organization, and improved efficiency of health care.

It was clear from the Committee's discussion, that the four subject areas already mentioned that had received more substantial support continue to enjoy a high priority. As far as possible a few others should be given similar status--among them Chagas' disease and studies on the health aspects of population growth. The Committee found it striking that only very limited resources are being devoted to research in the field of environment, although beginnings of a more active program have been initiated in the Lima research station.

Not infrequently the solution of important health problems requires informed action by professionals in other fields. Such is the case, for instance, of the role of housing in the control of Chagas' disease and of safety measures in connection with deaths resulting from vehicular accidents. A high priority should be given to transmitting technical information to the pertinent agencies of governments.

Problems connected with population growth were considered as requiring

increased attention. The view was expressed that such questions as "Why families want numerous children," and "How many children are really wanted," need to be answered before efficient population-control measures can be adopted. Studies of the relationship between environmental factors, including economic parameters and population growth, and of the consequences of population growth on health and socioeconomic development, were cited as representing high research priority.

Other general points were: the research program and its advisory structures should be continuously reviewed to ensure that it represents the best type of instrument for the job at hand. Another point was that the health component is an essential feature in socioeconomic development, and this should be brought to the attention of agencies responsible for financing development activities.



A REVIEW OF THE  
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1962-1971

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TENTH MEETING

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## REVIEW OF THE PAHO RESEARCH PROGRAM 1962-1971\*

1. Request of the PAHO/ACMR for a review of the objectives and accomplishments of the PAHO research program in the past decade

In his introductory remarks to the first meeting of the PAHO Advisory Committee on Medical Research, Dr. A. Horwitz, Director of the Organization, said that the functions of the Committee would be: "To review the existing and proposed research program and make appropriate suggestions, and to recommend the basis of a long-term research policy for present and future projects, to be approved by the Governing Bodies of the Pan American Health Organization."<sup>1</sup>

Immediately the Committee settled down to a discussion of what kind of research would be most consistent with the functions and goals of the Organization. Their first reaction was to refuse to accept the common distinction between "fundamental" and "applied" research, stating that: "All genuine research is fundamental if it contributes to the more complete understanding of the multi-faceted aspects of complex problems."

The Committee was also concerned with priorities. They thought it "obvious that the research will have to be planned and priorities established" and expressed definite views on the basis for the establishment of priorities. "The research project must be relevant to the field of health, and it must somehow promise dividends in terms of new and significant knowledge and of increased human welfare. Research on diseases with high morbidity and mortality would tend to have a high priority. The sine qua non for support is that there be competent individuals in the centers with adequate facilities to carry on the project. It is also important that the research project does not duplicate other research underway. Other things being equal, preference should be given to those programs which are peculiarly significant for Latin America or to those which involve international cooperation." Finally, even if several of the above conditions are not fulfilled, the Committee felt that a project might be considered if its support will have a favorable effect on the research potential of the country.

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\*Prepared by Dr. Franco Mortara, formerly from the Office of Research Planning and Coordination, World Health Organization, Geneva, Switzerland, serving as consultant to the Pan American Health Organization.

The above statement was later quoted by the Commission on Research of the AMA as "a blending of considerations of readiness and of social merit."<sup>2</sup>

The Committee resumed several times its discussion of priorities. Apparently unhappy over its earlier refusal to accept a distinction between fundamental and applied research, the Committee reconsidered the matter at its third meeting. At that time, they "recognized that in spite of agreement among scientists that science and the application of science constitute a single balanced effort, the problem of basic versus applied research has to be dealt with because it continues to exist in the minds of many people who are in a position to influence research development." The Committee further stated that training in basic research fosters qualified competent men and its neglect would constitute a backward step into mediocrity. After pointing out that some basic problems may be better dealt with elsewhere (than in Latin America), and that care should be taken that studies of currently important medical problems obtain support, the Committee observed that certain research objectives do not require the use of expensive apparatus or complex biophysical or biochemical procedures, and singled out epidemiological research in this context. "Thus - concluded the Committee - both the so-called "fundamental" and "applied" aspects of biomedical science remain essential parts of the research process directed toward the acquisition of new knowledge. The important policy problem for PAHO is to maintain a balance emphasis in these respects."<sup>3</sup>

In 1968, the Committee, presented with a proposal for revision and expansion of the PAHO Research Program,<sup>4</sup> made several suggestions concerning the text of that document. Some of them, of particular relevance for the present report were:

"The program outlined.....should be placed in the context of the total PAHO research effort in Latin America."

"The relevance of the program to the health needs of the Americas should be emphasized."

"The reason for the initial choice of subjects for multinational programs should be clearly stated."<sup>5</sup>

The implications of the Committee's suggestions are very important. From the outset, and throughout its first seven years of existence, the Committee had been given an opportunity to become acquainted with every aspect of the PAHO Research Program, and they were free to comment on the activities and proposals reported to them. They had invariably commented favorably on those activities and endorsed proposals, at times with qualifying remarks, after reviewing them individually.

Each time that a specific research activity was submitted for consideration by the Committee, introductory remarks usually identified the field of research as a "public health problem," often providing statistical and other information with a view to better defining its scope and importance. It must have appeared to the Committee that something was lacking in such presentations, namely the order of importance of the proposed field of study in relation to the major health problems in the region and to the basic objectives of the Organization. Hence the renewed request that "the relevance of the program to the health needs of the Americas should be emphasized."<sup>6</sup> In so doing the Committee was in fact reappraising its own role as an advisory body to PAHO on research methods. As a result, it decided to devote, at its next meeting in 1970, one half day to an assessment of its own functions and activities.

In anticipation of these discussions, and to facilitate the task of the Committee in reviewing the PAHO research program and its own role, the Director requested two short-term consultants, Drs. Robert Dyar and Charles V. Kidd, to secure background information for the ninth meeting of the Committee and to solicit the views of the members of the Committee by correspondence and, as far as possible, through personal interviews. In fulfillment of this assignment, the consultants sought, in particular, answers to the following questions:

- Has the PAHO research program significantly influenced biomedical research in the region? What has been its significance relative to: (a) domestic efforts; (b) other international agencies; (c) foreign governments?
- Has the balance between basic and applied research been significantly and productively influenced by the PAHO activities?
- Is the program adequately directed towards the major disease threats to the Central and South American countries?
- What have been the central strengths and weaknesses of the PAHO program?

These questions were addressed in writing to all members of the Committee. They were accompanied by a set of notes on the past, present, and future of biomedical research in Latin America, and on the role of the PAHO research program.<sup>7</sup>

It was suggested by the consultants that at the June 1970 meeting, the Committee be asked to address themselves to the following questions:

- What further review and evaluation of the research

program do they desire? Should this constitute the agenda, or a major portion of the agenda, for the Tenth Meeting of the Committee in 1971?

- What role does the Advisory Committee desire to play in the development and implementation of any proposal for review of biomedical research activities in Latin American countries?
- Have the research developments in the Latin American countries been such that a study similar to the one underlying the document "Science Policy in Latin America" is again indicated for 1970-1971 or thereafter?

Replies were received from several members of the Committee. Other members were personally interviewed by the PAHO Secretariat and by the consultants. The written replies included some excellent reviews of the status of biomedical research in individual Latin American countries, but yielded little response to the questions concerning the role of the ACMR. Personal interviews were more fruitful in this respect.

No criticism was voiced of current PAHO research policies and program, many aspects of which were deemed to be unique and of great value. A certain uneasiness was felt however, about the way the research program or parts of it are presented to the Committee and discussed by it at its annual meetings without consideration of the context within which they were planned and executed. Once more it was suggested that a greater effort should be made to relate the research activities of PAHO to its overall policies, objectives, and program, and that greater consideration needed to be given to the relevance of research carried out or assisted by PAHO to major health problems in Latin America and in the countries where the research is performed.

The Committee did review, at its ninth meeting, its functions and activities. It felt however, that it should continue its discussion of the general strategy and program priorities of PAHO so that its advice would be consistent with the general goals of the Organization. The Committee requested that the review of the objectives and accomplishments of the PAHO research program over the past decade should be completed for presentation at the 1971 meeting of the ACMR as a basis for planning the Committee's activities for the next five years.

The Director supplemented these suggestions by proposing that the Committee undertake as one of its most important tasks the consideration of ways and means of assisting the Organization in the preparation of a long-range research program. In addition, he urged that the Committee assume an active role in the planning and implementation of research education.



2. Major health problems and causes of death and illness in Latin America

Among the regions of the world, the Americas enjoy the unique advantage of a common, well defined, strategy for development evolved and accepted at the highest decision-making levels in all of their countries. The foundations for this strategy were laid down in the Act of Bogotá<sup>8</sup> and the Charter of Punta del Este.<sup>9</sup> The deliberations of the Task Force on Health at the Ministerial Level<sup>10</sup> (1963) constituted to follow up on the Charter of Punta del Este, prepared the ground for the Declaration of the Presidents of America<sup>11</sup> (1967), a document of truly historical significance.

In that declaration, American Chiefs of State recognized the fundamental role of health in the economic and social development of Latin America, and identified major problems and specific goals. The action program for health outlined in that document envisaged the following objectives:

- Control of communicable diseases and eradication of those for which methods for total elimination exists.
- Acceleration of programs for providing drinking-water supplies, sewerage, and other services essential to environmental sanitation in rural and urban areas, giving preference to lower income groups.
- Greater and more rapid progress in improving nutrition of the neediest groups of the population.
- Promotion of intensive mother and child welfare programs and of educational programs on overall family guidance methods.
- Priority for basic and advanced training of professional, technical, administrative, and auxiliary personnel, and support of operational and administrative research in the field of health.

In relation to the above objectives, the Presidents of the member states of the Organization of American States decided, among other things, to call upon the Pan American Health Organization to cooperate with the governments in the preparation of specific programs.

Pursuant to a resolution of its Directing Council,<sup>12</sup> the Director of the PAHO convoked in Buenos Aires, Argentina, in 1968, a Special Meeting of the Ministers of Health of the Americas. The purpose of the meet-

ing was to discuss and draw up a plan of operations for implementing the decisions adopted by the American Chiefs of State at their summit meeting in Punta del Este, Uruguay, in April 1967, and to define the national and international responsibilities for the solution of health problems of the Americas in terms of objectives, techniques, and procedures.

The working documents for that meeting<sup>13</sup> constitute a remarkable inventory of health problems and conditions in the Americas. The documents provide not only thorough reviews of the major health problems affecting the region but also a wealth of statistical data, information on the work in progress, and suggestions and recommendations for future activities.

Information supplementary to that contained in the report and working documents of the meeting of Ministers are contained in other publications of PAHO. "Facts on Health Progress"<sup>14,15</sup> analyzes through statistics, the results obtained and the trends in relation to the health goals of the Charter of Punta del Este, and evaluate the events that have taken place in the process of fulfilling those goals. The information contained in the volumes of the series "Health Conditions in the Americas" provide additional, invaluable, data on the evolution and present status of the most important health problems, enabling comparative analysis over the years and among countries.<sup>16</sup>

Together, these publications and documents provide an authoritative, comprehensive, fact-supported, portrayal of health problems in Latin America, their evolution, and the measures taken toward their solution, such as is not available for any other region of the world.

Clearly, health problems do not lend themselves to precise quantitative analysis that would allow enumerating them in a strict order of priority. It is possible, however, to identify, on the basis of the documentation to which we have referred, the major health problems of the Latin American countries, their trends, and the measures being taken for their solution.

## 2.1 Mortality, life expectancy, and population growth

Between 1960 and 1967 crude death rates in Latin America have decreased from 10.4 per one thousand population to 8.7. The crude death rate in the United States was, in 1967, 9.4. It must be pointed out that in several countries of Latin America registration of deaths is incomplete. It is also important to underline the striking difference in deaths under 5 years of age. The proportion of deaths in this age group was, in 1967/1968, 4.7 per cent in North America, 34.7 per cent in South America, and 41.1 per cent in Middle America. These figures clearly identify child morbidity and mortality as one of the most critical problem areas in health

in Latin America. Besides diseases of early infancy - the most important - the other principal causes of death are diseases of the heart, malignant neoplasms, influenza and pneumonia, gastritis and enteritis, and accidents.

Life expectancy, which had increased very rapidly between 1950 and 1960, continued to increase in the subsequent decade, but at a slower pace. Between 1960 and 1968 life expectancy at birth rose in Middle America from 60.4 to 61.9 years, and in South America from 61.2 to 63.5. By way of comparison, the figure was for the United States, in 1967, 70.4 years. The Charter of Punta del Este had established as one of the goals for the decade following its enactment, increasing life expectancy at birth by 5 years. In the 8-year period, 1960/1968, 65 per cent of the sought-for increase had been reached in South America, but only 38 per cent in Middle America.

The growth rate in Latin America in the past decade has been the highest of any large region of the world, reaching 2.9 per cent per annum in the years since 1960. The estimated population of Latin America in 1970 was 283 million. By the year 2000 the projected population of Latin America will increase to 638 million, but of course, unforeseen developments could substantially alter this projection.\* For instance, slight declines in the birth rates for both Middle and South America are evident in the second half of the 1960-1970 decade.

In many countries a high proportion of the population lives in small communities or in rural areas, but this proportion has been decreasing.

In response to the question "What are the major disease threats to Central and South American countries?" in the questionnaire addressed to the members of the PAHO/ACMR in 1970, one reply estimated that "the most important biological problem confronting Latin America is overpopulation and the disease states or problems traditionally connected with extreme overpopulation either exist already, for instance undernutrition, or will be strongly aggravated within the next few years."

## 2.2 Communicable diseases

When the Act of Bogotá was adopted in 1961, communicable diseases were reaping a massive toll of lives in Latin America. They still constitute a very important health problem but in most of the American countries mortality caused by infectious and parasitic diseases has declined considerably in the last ten years. In Latin America between 1956 and 1966 in the age group under five years, the death rate from infectious diseases

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\*Data from the U.N.

has dropped by 48 per cent; that for diseases of the digestive tract, usually gastroenteritis, by 44 per cent; and that for respiratory diseases, principally pneumonia and influenza, by 26 per cent. Nevertheless, infectious and parasitic diseases still account for 30 to 66 per cent of deaths from all causes in Latin America, excluding Argentina, Cuba, and Uruguay.<sup>17</sup>

Malaria was for a long time one of the greatest scourges in the Hemisphere. Great progress has been achieved in its control, the goal being complete eradication.

Of the nearly 500 million inhabitants of the Americas, approximately 36 per cent belong to originally malarious areas. At the end of 1969, about 41.3 per cent of the latter lived in areas in which malaria eradication is claimed, 26.7 per cent in areas in the consolidation phase, and 32 per cent in areas in the attack phase.<sup>18</sup>

In thirteen countries of the Americas for which data were available, there was an annual average of 43,368 deaths from malaria in the years 1950-1952. By 1960-1962, the average annual number in these same countries had decreased to 10,833 and by 1967 to 1,902.<sup>19</sup>

A major campaign for the eradication of malaria in Latin America has been in progress for almost two decades.

Smallpox continues to pose serious problems in only one country, Brazil. Vaccination programs have been carried out in the region for many years and the disease has been eradicated progressively from all of the Americas except from that one country. However, great efforts are being made in Brazil as part of that country's intensive eradication program. By the end of 1969, a total of 46,390,132 persons had been vaccinated from the outset of the program (50 per cent of the total population).

Only cases of the jungle form of yellow fever continue to occur. In 1969, 48 cases were reported to the Pan American Health Organization. A continental campaign for the eradication of Aedes aegypti is in progress. The continued presence of this vector has been responsible for periodic epidemics of dengue particularly in the Caribbean.

Despite the advances made in prevention and treatment, tuberculosis is still a serious problem in Latin America and in the Caribbean area. In his 1969 report, the Director of PAHO estimated that in Latin America there are still 85 million persons with the infection and 1,250,000 active cases. The governments and PAHO are giving high priority to measures to intensify the control of tuberculosis as specified in one of the goals of the Charter of Punta del Este.<sup>26</sup>

Leprosy still exists in all the countries of the Americas, with the exception of continental Chile. The true magnitude of the program is unknown because the available information is incomplete. About 200,000 cases, with three times as many contacts, are in the active register. Nearly 4,000 new cases were detected in 20 countries in 1969 or the most recent year.

The downward trend in the incidence of venereal diseases evident in North and Middle America since 1969 appears to have been interrupted. In South America the rate of reported cases has remained, during the same period, approximately at the same level. The PAHO Director stated recently that the increase in recent years in the number of reported cases of syphilis and gonorrhea constitutes a disquieting problem.<sup>18</sup>

The number of reported cases of yaws in the Americas has been steadily declining in the last decade. 680 cases were notified in 1965 but only 266 in 1968. Eradication of the disease from all countries in the region is the aim of governments and PAHO.

The sylvatic form of plague continues to exist in numerous countries of the Hemisphere. In fact the number of reported cases has increased, in the past decade, from 93 in 1959 to 424 in 1969.

The production of a modified live virus vaccine has opened up the possibility of controlling measles, a disease whose effects are far more severe in Latin American countries than in more developed areas of the world. In Latin America measles is a leading cause of death in children under five years of age, and death rates from this disease are over 100 times greater than in North America. The introduction of vaccination programs in a few countries has already resulted in dramatic reduction of measles cases and declines in mortality.

The incidence of poliomyelitis has been greatly reduced in South America, the rate per 100,000 inhabitants having fallen from 4.1 in 1958 to 1.9 in 1968. However, much remains to be done, through immunization and improvements in environmental sanitation to achieve results similar to those of North America where the disease has virtually disappeared.

Diphtheria and whooping cough continue to cause excessive mortality in many countries of Latin America. Most countries have immunization programs usually through the use of combined diphtheria, whooping cough, and tetanus immunizing agents (DPT), but a large number of children are not being protected. The number of registered deaths from tetanus has continued to remain high in most areas of Latin America, tetanus neonatorum being the most important aspect of the problem.

Typhoid fever continues to be a serious health problem in the region, with 35,000 to 40,000 cases reported each year.

Outbreaks of arthropod-borne diseases such as viral encephalitis, dengue, and hemorrhagic fever occur frequently. Influenza virus is often responsible for epidemics of varied importance. Infectious hepatitis is reported from practically all countries in the region.

Parasitic diseases are widely distributed in the Americas and are often very prevalent. There are millions of persons infected with ascaris, amoeba, onchocerca, leishmania, toxoplasma, hookworm, and a number of other parasites. Chagas disease occurs in almost every country, affecting perhaps as many as ten million persons. The disease therefore ranks high among the public health problems in the Americas.

Another serious health problem is that of schistosomiasis which in one country alone, Brazil, is estimated to affect more than 6,000,000 people.

A broad review of existing knowledge on the prevalence and incidence of the cutaneous, subcutaneous, and systemic mycoses throughout the Americas carried out in connection with an International Symposium on Mycoses<sup>20</sup> stressed the likelihood that most of these diseases are far more widespread than has heretofore been supposed. For instance with ringworm of the scalp, levels of infection ranged from 39 to 77 per cent in some areas. Chromoblastomycosis, mycetomas, and sporotrichosis occur or have been reported from nearly all the countries in Latin America. Systemic mycoses are responsible for high levels of morbidity and mortality throughout the Americas.

The significance of the zoonoses problem in Latin America is related not only to the large number of people affected, but also to the economic losses for which these diseases are responsible. Diseases such as rabies, brucellosis, hydatidosis, and bovine tuberculosis, constitute a particularly serious health problem.

In livestock, foot-and-mouth disease continues to be the principal health problem.

### 2.3 Non-transmissible diseases and health hazards

The non-communicable diseases most frequently encountered as causes of death in Latin America include those of the heart, malignant neoplasms, vascular lesions affecting the central nervous system and accidents. A PAHO study of patterns of urban mortality covering 12 major cities<sup>21</sup> disclosed that chronic diseases were responsible for two-thirds of all deaths in persons 15 to 74 years of age.

In the words of the PAHO Director, "The chronic diseases, a

characteristic of urban industrial society in the Twentieth Century, are clearly emerging as major health problems in the Americas."<sup>18</sup>

Although figures enabling us to quantify the extent of the problems are not available, there is evidence that mental illness and impaired dental health are widespread and require serious attention.

Freedom from hunger, one of the fundamental human rights, is far from being universally achieved. In Latin America malnutrition is highly prevalent and is the cause of much suffering and of death, especially in children.

Recent research has clearly demonstrated the synergism between nutritional deficiencies and infectious and parasitic diseases. One direct consequence of malnutrition is retarded physical development. Lower productivity in adulthood and possible permanent effects on the mental development are strongly suspected, although it has not been possible so far to assess these effects quantitatively. At a Technical Conference on Nutritional Activities in Local Health Services, recently convened by PAHO,<sup>22</sup> it was stated that in Latin America the chief causative factors of malnutrition are socioeconomic, educational, and administrative. "The first two affect the production, distribution, cost, acceptance, and utilization of food; the third prevents nutrition programs from being adequately implemented. Among the most important socioeconomic factors first are low purchasing power, inefficient agriculture, insufficient mechanization, poor transport services, antiquated systems of food storage and conservation, and inadequate facilities for credit and sale. In addition there is widespread ignorance of the most elementary principles of domestic economy - most mothers do not know how to choose the right food, how to prepare and conserve it, or how to spread it out equitably among the members of the family.

Among the administrative factors preventing the efficient implementation of nutrition programs are the shortage of statistics (which inhibits the proper planning of activities at the local level), the insufficient number of specialized nutrition personnel, the inadequate training of health personnel in nutrition and dietetics, and the lack of coordination between government departments."<sup>23</sup>

Problems in the field of occupational health are gaining importance.

At the beginning of the present decade, the labor force in Latin America was approximately 94 million persons, of which number about 44 per cent were employed in agricultural pursuits, nearly 20 per cent in industry, and 36 per cent in commerce and services.

Industrial workers, frequently with no experience because of their rural origins, handle dangerous products without the slightest idea of the

hazards entailed. The application of modern techniques, in an effort to bypass certain steps which more developed countries had to go through, represent additional hazardous factors, which are demonstrated by the high accident and occupational disease rates which exceed anywhere from six to ten or more times those in the nations more industrialized.

In two studies conducted in Peru among workers in lead storage battery factories and those employed in lead metallurgy, 56.9 per cent and 60.3 per cent were poisoned by this metal. In Venezuela lead poisoning rates as high as 23 per cent were encountered. Arsenic poisoning reached 86.5 per cent in Brazil and 88.7 per cent in Peru. In Mexico, 50 per cent of the workers exposed to chromium experienced dermatitis and 10 per cent had serious nasal ulcers in the septum which finally became perforated. In Chile 11.4 per cent of the workers exposed to solvents experienced occupational disabilities. There are many other occupational hazards besides those of a toxic nature. For instance, the rapid mechanization of agriculture and the use of complicated machinery among poorly trained workers increases considerably the number of accidents in developing countries. It has been estimated that some 15 per cent of national incomes are lost due to disability in industry. Research in this field could lead to the adoption of efficient preventive measures.

#### 2.4 Ecological factors

One of the goals of the Charter of Punta del Este, was "to supply potable water and sewage disposal for at least 70 per cent of the urban population and 50 per cent of the rural population during the present decade, as a minimum."

This recommendation implicitly recognized the fact that no small part of the total health problems of Latin America are of environmental origin.

In the decade 1960-1970 much progress was made but an enormous task remains to be accomplished.

By the end of 1969, approximately 105.9 million people in urban areas constituting 72 per cent of the urban population, were being served through house connections or public hydrants. In the rural areas, of a total of 126.5 million people, only 20.2 million (16%) were served with a water supply. That means that a total of 146.3 million people, most of them living in rural areas, must yet be provided with water supply systems.

Progress concerning proper sanitary elimination of excreta and of waste water was considerably slower. About 39 per cent of the urban



population was served by sewerage systems, an increase of 11 per cent since 1960, but in the rural areas conditions were truly deplorable, since only about 2% of the people have access to sewerage systems, conditions having remained almost stationary throughout the decade.

In the field of solid wastes the main problem concerns refuse and garbage collection in urban areas. In rural areas conditions are not considered as representing a major sanitation problem. The shift of rural populations to urban areas has further increased the pressure on the urban public services and in many areas, particularly in the major cities, the situation is now critical.

The present deficit of housing in Latin America is estimated at approximately 20 million units. The total construction of housing for all income groups is only 400,000 units per year, whereas to cope with the estimated needs, an annual construction of 3.2 million new houses would be required. The connection of poor housing with the health of the inhabitants is evident, Chagas disease being an obvious example. Many diseases are related to over-crowding.

Other environmental problems include concern with pollution of the air, water, and land and the development of river basins.

## 2.5 Health planning and evaluation

Among the long-term measures recommended to the Governments in the Charter of Punta del Este for the prevention of disease and the protection and recovery of health, one of the most important was to prepare national plans for the next ten years. For this purpose, planning and evaluation units were to be established in the ministries of health.

The PAHO Director recently summed up regional efforts in the health planning field by stating that by the end of 1969, 12 countries had national health plans and 7 others were in the preliminary stages of planning. Nevertheless, only 5 of the 12 countries with health plans had reached the stage of consolidating measures for their implementation at the local level.<sup>18</sup>

## 2.6 Resources for health services

In most countries of Latin America, the goals of health planning and implementation of this process have been jeopardized by the weakness of the infrastructure, and of its two main components: resources and

administration.

A problem facing all countries of Latin America is shortage and poor distribution of personnel qualified in the various branches of health work. Manpower is the key problem in the expansion of health services.

One of the problems requiring constant attention is the availability of reliable data. Such questions as the extent of present shortages and future demands related to proposed or planned expansion of services, the output of training programs for the various categories of health workers, expected losses through death, retirement, and transfer to other occupations, need to be answered.

The most appropriate utilization of health personnel is an extremely complex and crucial issue. For instance, "by looking at the amount of time various kinds of workers spend at various tasks, one may identify time which is wasted and tasks which could be more economically performed by others. Innumerable examples could be cited of specific cases where utilization practices were changed and new health occupations developed, leading to lower total costs for salaries and training, the tapping of new labor supplies and improvement in the quality of service."<sup>24</sup>

Adequate material resources are also needed and must be rationally used.

Financial resources are essential. Those at present available cannot satisfy the growing demand for services. Problems to be met as prerequisite to an increase in the financial resources available to the health sector are, "the programming and instrumentation of the maximum internal effort for institutional coordination, definition of priorities, optimum use of existing resources, and the consequent achievement of the highest possible productivity and coverage; and an evaluation of the capacity to absorb additional funds."<sup>25</sup>

## 2.7 Delivery of health services

The organization and delivery of comprehensive medical care presents many problems, theoretical and practical. Almost universally, one of the major concerns in the health field centers on the coordination and increased efficiency of systems for the provision of health care, and ways for making health services available, accessible, and utilized by the largest possible number of people. For this purpose the most advanced techniques of system analysis are being increasingly utilized.

Deserving of particular attention are administrative methods and practices. Manpower, facilities, and finances are the basic elements

of health services; administration is the organization and management of these resources. Poorly organized and administered, the most adequate resources will fail to provide the services needed. Different management of the same resources may produce different results.

## 2.8 Education and training of health personnel

There are two aspects in the development of health manpower, quantitative and qualitative. More qualified health personnel is needed to man existing services and provide for their expansion, but their respective training programs must be continuously reviewed and revised "to adapt them better to the needs of the health services and to place at the disposal of students teaching materials that will facilitate their training."<sup>26</sup> To establish and operate a suitable mechanism for such a permanent review and the adaptation of teaching programs to the current and future needs of health services is a problem the importance of which cannot be underestimated.

## 2.9 Communications in the health field and in biomedical sciences

Vital statistics and epidemiological data; the product of field, laboratory, and clinical research; and the outcome of studies and experiment in administrative practice and techniques would be of little value if they were not brought quickly to the attention of those health workers who might benefit from them.

Many diverse channels of communications serve that purpose, such as libraries, meetings, congresses, symposia, and professional and scientific literature. The problems are to provide these channels, and to see that information is conveyed as speedily as possible to those for whom it might be important. It is a common and sad finding that techniques and contents of health services almost universally lag behind actual knowledge and experience.

### 3. Objectives of the PAHO research program

If, in the health field, we know more than we put into practice, is more research necessary? If so, what kind of research and according to what priorities?

A study of the structures and processes through which decisions relating to public health and biomedical research are made in Latin America was carried out in 1965 at the suggestion of the PAHO/ACMR by a study group. The group did not ignore the fact that the need for research is often being questioned, particularly in poor countries. "In the field of health - they said - as in other fields, more is known about the cause and cure of diseases than is being applied. Why, then, should countries with limited resources - as is true of all the countries in Latin America - devote part of their resources and part of their precious stock of highly trained manpower to a search for knowledge, when the urgent tasks are to use existing knowledge for the betterment of the people's health? Why not let more richly endowed countries produce new knowledge, which can then be freely used to elevate standards of well-being? These are real and complex questions, and they deserve serious attention. Among persons without scientific training and among some dedicated public health workers, it is frequently held that biomedical research is a luxury underdeveloped countries can ill afford. Virtually all observers who have studied research in developing countries have encountered this attitude." "However, - they continued - the countries of Latin America have no alternative so far as the conduct of research is concerned. They must support research, both basic and applied. Ultimately, the rationale for this support is based on the performance of social functions by science. The social purpose may be the enrichment of man's knowledge of the world. Or it may be the solution of health problems, and it is in this more limited sense that the social responsibilities of science are invoked. The relative emphasis to be placed on different ways of fulfilling the social purposes and responsibilities of science is an important and a perplexing problem. To be specific, there are hundreds of times more deaths in Latin America, particularly of infants, from diarrheal diseases and from lower respiratory diseases than there are from cancer. The urgency of giving health authorities the knowledge they need to deal with the real problems they face cannot be denied."<sup>27</sup>

It was already mentioned earlier in this report that the ACMR had discussed on several occasions what kind of research would be more consistent with the functions and goals of the Organization. It had concluded that "the so-called fundamental and applied aspects of the biomedical sciences remain essential parts of the research process directed toward the acquisition of new knowledge. The important policy problem for PAHO is to maintain a balanced emphasis in this respect."<sup>3</sup>

The study group went further and analyzed the relative needs for basic and applied research in relation to the health problems of Latin America. They thought that "the conduct of basic research is essential to the development of scientists for the future, to the maintenance of a tradition of learning, and to the inculcation of a quantitative, skeptical approach among students. Basic research in biomedicine is required fundamentally by the values of science and not by the need for raising health levels. These values of basic research and the need to sustain it are cited because this view runs counter to the philosophy of those who argue that relatively poor countries should not concern themselves with basic research." The group hastened to stress however, that "Basic research is not in any sense superior to applied research. Those engaged in it are not doing more significant or more difficult work. Basic research should not be on problems unrelated to the practical problems of a nation, and it should not be given an automatic priority. One of the most fallacious and destructive myths of science is the inherent intellectual superiority of basic research and of those engaged in it."

The group also noted that it is a paradox that the Latin American countries that urgently need applied science as a tool of development find science turned in other directions - toward basic research. As for the reasons for this paradoxical development, the group observed that "Efforts to strengthen applied research in Latin America encounter philosophical and practical problems. All the forces that have led to the preeminence of basic research continue to exist. From within the scientific community, the doctrine - in many respects a sound one - that the way to build science is to support points of strength militates against the development of a strong applied research effort. The doctrine of support of strength is fostered by assistance from outside Latin America, which tends to put existing excellence high on the list of criteria that determine eligibility for research support."

"Biomedical research shares this common characteristic of all science in Latin America. Thus, research in public health administration and public health practice has lagged behind laboratory research for a number of reasons. Latin American physicians are typically trained to be practicing physicians. They are strongly attracted to metropolitan areas where economic, social, education, and cultural opportunities are most plentiful. Departments of preventive medicine are often weak or non-existent, and there are only ten schools of public health. Public health measures are administered by ministers of health. In some countries these ministers have proud traditions of accomplishment, including research. In others, however, the attainment of a continuing high professional level of administration of public health has proven difficult and there has accordingly been little or no research. Another factor that may account in part for the relative lag in public health research is that this type of inquiry is strongly affected by local traditions and practices. Consequently, it is difficult to transfer experience from one country to

another. Laboratory research, on the other hand, though affected by local conditions, is to a greater degree conducted uniformly throughout the world. Training in one country is relatively easily transferred and used in another country."

The group concluded that "One indispensable element of a general movement to strengthen applied research in health, and in fact in all fields, is the exercise of vigorous leadership by those who are the leaders in research. Without their prestige, influence, and active support, it would be difficult to achieve a markedly stronger applied orientation."<sup>27</sup>

In the introduction to "PAHO Research Activities 1961-1966,"<sup>28</sup> Dr. Horwitz briefly described the PAHO research program in the following way: "The program broadly encompasses the stimulation of those fields of biomedical research and research training that are related to the objectives of PAHO. Within the guidelines provided on a periodic basis by the PAHO Advisory Committee on Medical Research and the recommendations of consultants, the Organization implements its research program by identifying problems and opportunities with emphasis placed on those that are amenable to being studied by multicountry collaborative efforts and by exploring the possibilities of obtaining support for research projects that meet the standards of excellence required by granting agencies."

At the special meeting of Ministers of Health of the Americas (1968), it was stated that the PAHO research program had the following basic objectives:

- To expand the capacity of the peoples of the Americas to protect themselves against the major diseases that affect them.
- To contribute to the attainment of the health goals defined at the Meeting of American Chiefs of State in Punta del Este.
- To help improve the effectiveness of health expenditures of the nations of the Hemisphere.
- To elevate the quality of the training of physicians and other health workers and to strengthen the institutions that educate them.
- To establish conditions that will encourage more physicians and health-related scientists to remain in Latin America.
- To promote and support health research in priority areas, and to coordinate these programs with activities sponsored

by other international and national bodies.

-To strengthen the existing biomedical research capacity of institutions in the Member Governments, to unite them more effectively, and, as a long-term possibility, to establish and administer research institutes under the aegis of PAHO.<sup>13</sup>

A relatively small proportion of the research is conducted by the staff of PAHO. Most of the research activities are carried out by investigators usually working in academic institutions or research institutes. The role of the Organization is to initiate and stimulate research projects and to provide limited financial support. A number of grants are awarded, however, to individual investigators for research initiated by them. In determining research needs, the Organization makes wide use of consultants. Subjects of particular interest are discussed in a variety of scientific meetings, conferences, and committees, whose findings and recommendations are often published as research documents (Annex I).

The PAHO research program is reviewed annually by the Advisory Committee on Medical Research whose reports are submitted to the PAHO Directing Council for final approval.

For financing its research program, the Organization relies to a great extent on outside sources. Expenditures for research reached \$3,642,583 in 1970.

4. PAHO research activities in the last decade in relation to major health problems and causes of death and illness in Latin America

In the following analysis, PAHO research activities are reviewed in relation to major health problems in the same order as they were listed earlier in the report. Disciplines not falling within the field of health, such as, genetics or immunology, are reviewed next to the health problems with which they are more closely related.

Information on research activities was derived mostly from the following sources:

- Annual Reports of the PAHO Director
- Reports of Meetings of the PAHO Advisory Committee on Medical Research
- "PAHO Research Activities 1961-1966"<sup>28</sup>
- "Research in Progress 1970"<sup>29</sup>
- Personal communications from pertinent PAHO Technical Departments and Units
- PAHO Research publications

4.1 Adult mortality

An inter-American investigation of mortality was conducted during the years 1962-1964 in 10 cities in Latin America, one in the United States, and one in England. It was funded by the National Institutes of Health, USPHS. Its primary objectives was to provide a comprehensive account of the causes of mortality of adults in highly diverse and widely separated populations. A total of 43,298 deaths were investigated. Interim reports of the investigation were presented to the ACMR at its second, third, and sixth meetings. The final report was published in 1967.<sup>21</sup>

The Committee commented favorably on the quality, volume, and significance of the results of this research, and suggested that such studies should be extended to all Latin American countries including urban and rural areas, and on a continuing basis. It also commented that further research is needed to elucidate the etiological factors responsible for the marked contrast in mortality evidenced by the study in the cities included in the investigation in the categories of cardiovascular diseases,



cancer of certain sites, and several other causes of death.

The questionnaires completed in connection with the inter-American investigation of mortality from Bristol and San Francisco were used also in a study of multiple causes of death funded by the National Center for Health Statistics, USPHS, in 1967-1969. Data from questionnaires corresponding to 3,506 deceased persons between 35 and 74 years of age were studied to evaluate the completeness and accuracy of the reporting of underlying and associated causes on death certificates, and to determine the frequency of combinations of causes in terms of age, sex, and residence.

#### 4.2 Child mortality

With financial assistance from the Agency for International Development of the United States, a wide-scale inter-American investigation of mortality in childhood was started in 1968 and is still in progress. The deaths of approximately 35,000 infants and children under five years of age in 13 widely separated areas of Latin America are being investigated. In order to compare the data on the children who died, with similar data for the general population, approximately 20,000 living children under five years of age are also being studied. The ACMR was informed of the proposed study in 1968,<sup>30</sup> and reviewed a detailed progress report in 1970.<sup>31</sup> A notable feature of the investigation is that it is being conducted in conjunction with the medical schools and is thus being used in teaching. The ACMR urged continued support of this study.

#### 4.3 Population dynamics

The research aspects of the growth of human populations were first discussed by the ACMR in 1964. The Committee felt that such research would include studies of human reproduction, hereditary and environmental factors in sterility and fertility, preventable malformations; demographic studies of live-births, abortions, fetal deaths, and maternal deaths; and studies of family size and constitution in relation to socioeconomic factors in urban and rural communities.<sup>3</sup>

An epidemiological study of population dynamics in Peru has been underway since 1966 with financial support from the World Health Organization and the Peruvian Center for Studies on Population Development. The major aim is to make a longitudinal study of women of childbearing age that would provide a complete record of pregnancies and their outcome, intervals between pregnancies, and their effects on early fetal, late fetal, and infant mortality.

A technical group was convened in 1969 to explore the relationship between maternal nutrition and family planning in the Americas. It was financed by PAHO and the United States Agency for International Development. The group evolved practical standards for nutrition in pregnancy and lactation and procedures for improving maternal nutrition through local health services. It also made recommendations for the orientation of future research in this field.<sup>32</sup>

As part of the Latin American training program in the biology of reproduction, courses sponsored by PAHO, the Ford Foundation, and the Population Council were organized in 1967 and 1968. Since at the present time not a single university in Latin America has all the facilities and personnel necessary to offer a good training course in reproduction, ten research and training centers from four universities in Argentina, Chile, and Uruguay, have pooled their resources in order to offer a program in this field. A progress report on this program was presented to the ACMR in 1968.<sup>33</sup>

Working in close cooperation with PAHO, the World Health Organization is currently sponsoring a feasibility project for expanded research and development of research training in the field of human reproduction. Two consultants, one a member of the WHO Headquarters staff and the other a PAHO representative, recently visited several Latin American countries to review the present status of reproduction research and research training. The long-range aim of the project is to help in the establishment of a network of research and training centers.

PAHO research activities included studies in Chile related to methodology for estimation of population in areas of the National Health Service, evaluation of fertility in the country as a whole, and in Valparaiso, and evaluation of recent trends in infant mortality. In Brazil, studies have been made in relation to induced abortion in São Paulo, and fertility and demographic aspects of health planning.

#### 4.4 Genetics

With financial assistance from the United States Atomic Energy Commission, acting through the intermediary of PAHO, geneticists at the University of Michigan Medical School have participated in a multidisciplinary study on primitive populations in Latin America. These studies that started in 1962 with observations on the Xavantes Indians in Mato Grosso, Brazil, are still in progress. Other populations studied include the Makiritare Indians of Venezuela and the Yanomana Indians of Brazil and Venezuela. From the findings, it appears that the genetic structure of these tribal groups differ in many important ways from that of civilized populations.

A Special Session on the Biomedical Challenges Presented by the American Indian was held by the ACMR in 1968.<sup>34</sup>

#### 4.5 Communicable diseases

The ACMR was made aware of malaria research needs and opportunities in Latin America from its first meeting. It reviewed progress reports on research activities of the malaria eradication program at its second, third, sixth, and seventh meetings.

In the past decade, a number of specific problems related to the task of the eradication of malaria in Latin America were investigated. It must be emphasized that the PAHO program has derived a great deal of benefit from research sponsored by the World Health Organization in other regions.

A malaria eradication epidemiology team (1961-1963) working in the Pacific coastal plain of Central America contributed significantly to a better understanding of the causes of the failure to halt malaria transmission in problem areas.

A series of operational research projects investigated in the last decade included problems such as the potential usefulness and limitations of mass drug administration by paid auxiliaries; mass drug distribution by medicated salt; screening for drug resistant malaria parasites; insecticide testing; optimum schedules for antimalarial drug therapy; and the use of antimalarial drugs by intramuscular injection.

Current research includes studies of the causes of inadequate progress of malaria eradication programs and alternative attack measures for malaria eradication; investigation of certain problems facing vector control; epidemiological factors affecting malaria transmission; many aspects of the direct attack on the malaria parasite - including the development of new antimalarial drugs; host-parasite relationships; and methodology of assessment of antimalarial operations. Most of these investigations are collaborative projects between PAHO, WHO, and many universities and research institutes.

Although no basic problem having an important bearing on malaria eradication appears to be left completely devoid of attention, considerably more effort is needed in certain areas such as the study of new methods of attack on malaria transmission; determining the constellation of factors which are responsible for the pattern and the dynamics of malaria transmission in each epidemiological situation; and developing and standardizing more objective methods of evaluation.

Tuberculosis research and the opportunities in Latin America for investigations in this field were reviewed by the Committee in 1963.<sup>35</sup> It was felt that Latin America offers excellent and unique opportunities for studying problems such as the role of drugs in public health programs.

The following year, resuming discussion of this subject, the Committee expressed the opinion that the major questions requiring study were not of a kind to be settled in the laboratory. Instead, they would require large scale field-studies with appropriate laboratory support. The Committee recommended a major research attack on the remaining key questions in tuberculosis, convinced that nowhere could such a research program be conducted more satisfactorily than in Latin America. However, this recommendation does not seem to have been followed by relevant research activities within the PAHO research program in subsequent years.

A review of leprosy research in Latin America was presented to the Committee at its first meeting.<sup>36</sup> In 1968 the Committee was appraised of a survey of research activities in leprosy in several Latin American countries<sup>37</sup> and discussed a proposal for the establishment of an international center where all talents and available means could be used with the greatest effect.

The Organization is supporting, in Colombia, research aimed at growing M. leprae in an animal model, the golden hamster. Research carried out in several countries of the Americas independently from PAHO programs includes attempts to grow the causative organism of leprosy in artificial media and in animals. The mechanism of action of Dapsone (DDS) and of thalidomide are being studied and should provide a rational basis for therapy. Factors involved in drug resistance are also being investigated.

No research is funded by PAHO in venereal diseases, a subject that was never submitted to the ACMR for consideration. The increased incidence of these diseases, a phenomenon present in Latin America as in most parts of the world, might call for renewed research interest. Subjects suitable for field research in Latin America might include the psychosocial aspects of venereal diseases, and an evaluation of the reasons for the apparent failure of health education programs to increase general concern about the diseases and to improve understanding by physicians of the necessity for systematic reporting.

Comprehensive reports on plague in the Americas were presented to the ACMR in 1962<sup>38</sup> and 1963,<sup>39</sup> both containing recommendations for research. However, no research in this field was funded by PAHO.

Other communicable diseases currently devoid of research activities within the PAHO research program include poliomyelitis, diphtheria, pertussis, and tetanus. Earlier, PAHO had played a very important role in connection with the development of live poliovirus vaccines, particularly through the

Organization, in collaboration with WHO and the Sister E. Kenny Foundation, of the first and second International Conferences on Live Poliovirus Vaccines.<sup>40,41</sup> The advisability of field trials of typhoid vaccine was suggested by the Committee at its second meeting<sup>42</sup> but there is no evidence of follow-up. Trials with measles vaccine in a virgin population are being carried out, with PAHO funding, among the Xikrin tribe of Brazil.

The important group of arthropod-borne virus diseases and the related problem of Aedes aegypti control have received great attention by the Organization. Research and research needs in this field were reviewed by the Committee at its first<sup>43</sup> and second<sup>44</sup> sessions.

After examining the report of the study group on the prevention of Aedes aegypti-borne diseases<sup>45</sup> the Committee strongly encouraged, in 1970, support of the recommendations of the study group. These included cost-benefit studies of control programs and an active and expanded program of epidemiological, vector, and virus research that would combine resources to meet the needs of the entire group of vector-borne diseases in the Americas.

At Cornell University Medical College, with financial support from the U.S. Army Medical Research and Development Command, and with the collaboration of PAHO, studies are being conducted on sera and specimens collected in Mexico and Central America. The purpose of these investigations is to study the ecology, geographic distribution, and the importance to man and domestic animals of Venezuelan encephalitis virus and several other recently discovered arboviruses, and to determine the factors involved in virus movement from one area to another, particularly the role of migratory birds as possible intercontinental transporters of arbovirus. At the same institution a parallel study of Heron ecology and North American encephalitis virus has been carried out since 1967.

Chagas' disease is one of the greatest public health problems in the Americas. A comprehensive report of the PAHO Advisory Group on Research in Chagas' Disease was presented to the ACMR at its first session.<sup>46</sup> The Committee recommended a broad-front of attack "to encourage the many and diverse views of the problem, all of them complementary, none of them more 'basic' or 'fundamental' than the others." The following year, the Committee heard a report on research opportunities in the chemotherapy of Chagas' disease in the Americas.<sup>47</sup> In 1964, the Committee recommended that further studies of antigenic differences and differences in virulence and drug resistance among various strains of T. cruzi as well as of other immunological aspects of the disease should be pursued.

In 1965, the Committee urged that longitudinal studies be set up to provide information now lacking on the fate of those infected. In 1970, it remarked that little research seemed to be in progress on the chemotherapy of Chagas' disease and it expressed the hope that efforts in this field will be intensified in the future.

The pertinent PAHO technical unit reports that excellent and valuable research on various aspects of Chagas' disease is being conducted especially in Brazil and Chile but also in Argentina and Venezuela. However, the overall amount of research has been small and it has not led to important progress toward control and management of the disease. Control methods remain essentially as they were 10 years ago and there is still no adequate drug. Research support from PAHO has been small, but well planned and coordinated.

One study, carried out from 1964 to 1967, attempted to determine the effect of irradiation on the biology of Rhodnius prolixus, the principal vector of Chagas' disease in Venezuela. Research on the chemotherapy of the disease started in 1963 and is continuing. A study of methods for changing the virulence and other characteristics of T. cruzi in culture media, and a cooperative study of complement-fixation antigens for the diagnosis of Chagas' disease are in progress. A grant has been awarded to study the experimental production of myocarditis. The production of a complete bibliography on the disease is in progress. In the view of PAHO staff, subjects requiring attention include: comparative study of insecticides; evaluation of housing improvement for control of the disease; standardization of the interpretation of the electrocardiogram in Chagas' disease; longitudinal studies of the cause of the disease and of its progress; search for an effective drug and for a simple diagnostic test.

Research needs in schistosomiasis were brought to the attention of the Committee at its first session.<sup>48</sup> In 1964, the Committee strongly recommended support of a research program in this field.

Since 1967 the Organization provides financial support for an International Center for Identification of Snails for the study of schistosomiasis in Brazil. A guide for the identification of the snail intermediary host of schistosomiasis in the Americas was produced in 1968.<sup>49</sup>

Independently from PAHO support, a substantial research program is conducted in Brazil, and research is carried out in the United States, Puerto Rico, and St. Lucia.

In general, the research effort in this field in Latin America and the PAHO contribution are small compared to the importance of the disease reputed to affect about 7,000,000 people. Areas needing increased attention are epidemiology, development of better control measures, and chemotherapy.

The specific problem of onchocerciasis was never brought to the attention of the ACMR since PAHO does not support research in this field. Very important research is being conducted in Africa with significant results. Nevertheless, studies on vector ecology and field investigations on the use of insecticides for vector control could profitably be instituted in Latin America.

Very little support was given by PAHO to research on other parasitic diseases such as leishmaniasis and amoebiasis. Concerning toxoplasmosis, after hearing a report of a study group<sup>50</sup> the Committee recommended in 1967 that because the disease seems to be one of the most prevalent human infections, further research, both at laboratory and epidemiological levels, is required to elucidate its natural history and its future control.<sup>51</sup>

A survey of Latin American training and research centers in parasitology was presented to the Committee in 1970.<sup>52</sup>

The status of medical mycology in Latin America was discussed by the Committee in 1970.<sup>53</sup>

Comprehensive reviews of research needs and activities in the areas of zoonoses and foot-and-mouth disease were presented to the Committee at its first and second sessions.<sup>54,55,56,67</sup> At various intervals, the Committee was brought up-to-date on the activities of the zoonoses and foot-and-mouth disease centers. Each time it recognized the importance of the work of these centers and recommended continuous and increased support.

Expenditures in these fields represent one of the largest outlays within the PAHO research budget (about 25 per cent), second in importance only to nutrition.

Within the area of study on zoonoses are included four major diseases: rabies, brucellosis, bovine tuberculosis, and hydatidosis. Research activities are described in detail in the annual reports of the Pan American Zoonoses Center, a project assisted jointly by PAHO/WHO, the Argentine Government, and the United Nations Development Program,<sup>58</sup> and the Pan American Center for Foot-and-Mouth Disease.<sup>59</sup> Guidance for the Centers is provided by a Scientific Advisory Committee. The final report of that Committee's last meeting, held in 1969, was presented and discussed by the ACMR at its ninth session.<sup>60</sup>

There is no evidence of any PAHO-sponsored research in the field of food hygiene other than those inherent in the work of the Zoonoses Center.

#### 4.6 Immunology

A report on immunology in Latin America was presented to the

Committee in 1965.<sup>61</sup> Support was requested for several institutions suitable for possible development into research and training centers. The Committee endorsed these recommendations.

Two Centers were established, both jointly supported by PAHO and WHO. One, originally located in the Escola Paulista de Medicina, was later moved to the Instituto Butantan, São Paulo, Brazil. The other, in Mexico City, coordinated through the Children's Hospital, utilizes the laboratory facilities and permanent staff of seven cooperating institutions. Progress reports on these Centers were presented to the Committee in 1967<sup>62</sup> and 1970.<sup>63</sup> The ACMR regarded with approval the successful development and expansion of these Centers.

A special session on the immunology of parasitic diseases was held by the Committee in 1967.<sup>64</sup>

#### 4.7 Non-transmissible diseases and accidents

The principal non-transmissible diseases such as heart disease, cancer, cardiovascular diseases, and accidents, have so far been given very little place in the deliberations of the Committee.

As regards cancer, after hearing in 1963 the report of a Planning Conference on Epidemiological Research on Cancer in Latin America,<sup>65</sup> the Committee gave its enthusiastic approval to the proposals contained in the report and accorded them a high priority.<sup>66</sup>

An important contribution to cancer research was the assistance given by PAHO toward the establishment of cancer registries in Brazil, Chile, Colombia, Cuba, Jamaica, and Peru.

As an outgrowth of findings on cancer in the Inter-American Investigation of Mortality, a study of cancer of the lung and smoking habits was carried out in Buenos Aires, Argentina. Currently an investigation direct from PAHO Headquarters, on the relation of smoking patterns to cancer of certain sites is being conducted in eight cities in Latin America. It should be completed in 1971.

Even taking into consideration the cancer research carried out independently of PAHO support in various universities and cancer institutes of the region, it is obvious that much remains to be done concerning conditions responsible for the large numbers of deaths. For instance in 1967, malignant neoplasms were among the first five principal causes of death in 13 Latin American countries and in 13 other areas. In the same year, when age-adjusted death rates were considered, the United States and Canada ranked below Argentina, Uruguay, Cuba, Chile, and Costa Rica.



The importance of heart disease as a cause of death in Latin America is shown by the fact that in 10 of the 22 countries for which data were available, diseases of the heart were in 1967 the most important causes of death; in most of the other countries it was one of the five principal causes.<sup>29</sup>

In past years research on atherosclerosis was supported by PAHO. Studies to determine differences in the severity and extent of the disease among several population groups and on the relation of atherosclerosis to environmental factors, both funded by NIH/USPHS, were completed in 1966.

In early adult life total accidents and those from motor vehicles rank high as causes of death. With adjustment for age, the largest death rate from motor vehicle accidents in the Hemisphere is in Venezuela (38.5 per 100,000 in males). The problems related to the high mortality caused by accidents especially among young adults, were never discussed by the Committee, and no PAHO-supported research in this field has been reported. However, discussion of this topic is included in the agenda of the next meeting of the PAHO Directing Council.

#### 4.8 Nutrition

Nearly one third of PAHO's research expenditures are in the field of nutrition. The nutrition research program of PAHO was outlined to the ACMR at its first meeting. Four research areas were given the highest priority:<sup>67</sup>

- Endemic goiter
- The etiology and pathogenesis of anemias
- The effects of nutrition on patterns of growth and psychomotor development in children in Latin America
- Interrelationships between nutrition and infection

Later, protein-calorie malnutrition (including the development of low-cost high-protein food mixtures) was placed among the top research priorities. Most of the research is carried out at the Institute of Nutrition of Central America and Panama (INCAP) whose activities were first brought to the attention of the Committee in 1963.<sup>68</sup> The Committee strongly urged continued support of all phases of INCAP's research programs.

Research in nutrition is also conducted at the Caribbean Food and Nutrition Institute under the joint sponsorship of PAHO/WHO and the Food and Agriculture Organization of the United Nations (FAO).

An extensive review of PAHO-supported research activities in nutrition was presented to the Committee at its seventh meeting. It included discussion of studies on the relation of nutrition to physical growth and mental development;<sup>69</sup> an experimental investigation of brain development during malnutrition;<sup>70</sup> tests on the efficacy of iodized oil prophylaxis in endemic goiter;<sup>71</sup> and prevalence studies in nutritional anemias.<sup>72</sup>

At the same time the activities of the Caribbean Food and Nutrition Institute were also reviewed by the Committee. Its main overall objective was described as "The improvement of the food and nutrition situation in the fifteen countries of the English-speaking Caribbean, through four main types of activities: coordination, advisory services, training, and field investigations (or applied research)."<sup>73</sup>

In 1969 the Committee reviewed a statement on the activities of INCAP over the previous two decades. It was explained that since its establishment, INCAP had progressively expanded the scope and range of its services until it functioned at a continental level. However, these expanded services had been developed without a secure financial basis on which to operate at so broad a scale. Since grant support for INCAP that had constituted a major source of financing had progressively diminished for reasons beyond the Institute's control, PAHO proposed to expand its financial support to INCAP on a permanent basis to enable it to function as a regional resource institute in the field of human nutrition.

The Committee recorded its recognition of INCAP as one of the effective mission-oriented institutions in Latin America and concurred with the proposed action of PAHO to provide adequate financial assistance.

While reaffirming its support of the research activities of the Institute, the Committee recommended however, that PAHO endorse and encourage research in the newer areas of nutrition, particularly those concerned with the adaptation of population groups to diets, and with the initial evaluation of dietary standards currently applied to the geographic area in question. It also expressed its interest in being involved in any future assessment of the INCAP program in relation to regional needs.<sup>6</sup>

The research activities supported by PAHO in the last decade in the field of nutrition are described in detail in the two volumes "PAHO Research Activities 1961-1966"<sup>28</sup> and "Research in Progress 1970."<sup>29</sup> The main problems investigated were protein-calorie malnutrition, nutritional anemias, endemic goiter, and hypovitaminosis A. The latter continues to be one of the serious problems affecting the people of several countries in Latin America. Because the solution of this problem is made more difficult by the scarcity and the high cost of foods containing Vitamin A, research has centered, in recent years, on the possible use of synthetic hydrosoluble Vitamin A.

In connection with studies on the relationship between nutritional deficiencies and the mental development of the child, a longitudinal study was begun in 1969 in four rural villages, in two of which efforts will be made to improve the nutritional status of children through a supplementary diet.

A Symposium on Iron Metabolism and Anemia was held at the time of the Committee's eighth meeting.<sup>74</sup> In 1970, the Committee reviewed the findings of nutrition surveys of Central America and Panama conducted by INCAP/ICNND and held a special session on metabolic adaptation and nutrition.<sup>75</sup>

The nutritional aspects of the inter-American investigation of mortality in childhood received special attention. As the investigation progresses, the outstanding role of nutritional deficiencies is evident, in particular, the form of protein-calorie malnutrition as underlying or associated causes of death in children.<sup>76</sup>

The Pan American Health Organization also sponsored studies to determine the effectiveness of iodized oil in the prevention of endemic goiter. The results of these studies have shown that administration of ethiodol to large population groups is technically feasible, safe, and effective in the control of endemic goiter.

#### 4.9 Maternal and child health

Presenting to the Committee at its first session a proposal for a research policy in maternal and child health in Latin America, the PAHO regional advisor stated that two characteristics distinguish that field from other areas of health. They are the biological growth of the human organism and the attitude of special concern expressed by society for this segment of its population.<sup>77</sup>

The proposal called for international collaborative research on problems such as reproductive wastage, premature birth, congenital anomalies, and normal and retarded physical and mental development. It stressed the value of epidemiological studies relating maternal and child health to the social, economic, and cultural structure of society. It gave examples of studies aimed at identifying high risk groups within a given population and testing the advantages of giving to these groups priority in the provision of services. Prospective studies of maternal and child health services operations were also suggested, their aim being to test different ways of providing services.

At its second meeting, the Committee reviewed these proposals. It recognized the validity of the emphasis upon malnutrition in the PAHO research program and hoped that other significant contributory factors

to child morbidity and mortality would receive appropriate consideration.

The deliberations of a planning meeting for research on congenital anomalies were brought to the notice of the Committee in 1963.

In 1968, a report was presented to the Committee on research on disturbances in fetal homeostasis.<sup>78</sup> In the following year, the Committee held a special session on perinatal factors affecting human development.<sup>79</sup>

At the conclusion of this session the Committee indicated that PAHO should make efforts to promote basic and applied research on this subject and expressed its support of the establishment in Montevideo, Uruguay, of the Latin American Center for Perinatology and Human Development as a cooperative project of the Government, the University of Uruguay, the Ford Foundation, and the Organization.

#### 4.10 Mental Health

In 1964, the Committee after having been apprised of the work of the Mental Health Information Center on Latin America, recommended that an epidemiological survey be undertaken of mental disorders in Latin America. This proposal was taken up again in 1966.<sup>80</sup> At that time the Committee endorsed proposals for collaborative studies of the prevalence and incidence of specific diseases, such as epilepsy and alcoholism, and suggested that attention should also be paid to mental retardation caused by birth injuries and to mental damage caused by phenylketonuria.<sup>81</sup>

PAHO-supported research currently in progress includes a study into patterns of communication in the families of schizophrenic patients in Argentina; studies on the epidemiology of alcoholism in Chile; a medical-anthropological investigation of alcoholic behavior and a general survey on the prevalence of mental disorders, both in Chile.

#### 4.11 Dental health

At its first meeting, the Committee after reviewing needs and potential in dental public health research in Latin America,<sup>82</sup> endorsed a proposal for a study of the feasibility of reduction of dental caries through fluoridation of salt in areas where water fluoridation is impracticable. With assistance from a five-year NIH grant, the project was implemented in Colombia.<sup>83</sup> In 1964, the Committee recommended the establishment in São Paulo of a Latin American Center for Dental Research and Epidemiology.

Progress reports on PAHO-assisted dental health research were made to the Committee in 1969. These activities included a national study on the prevalence of dental disease in Venezuela, a national dental survey in Colombia, studies on self-applied topical fluoride among school-children in Brazil, and on salt fluoridation in Colombia. A study of prevention of dental caries through the use of pit and fissure sealants was started in 1970 in Venezuela.

#### 4.12 Occupational health

The interest of the Organization in the area of occupational health was brought to the attention of the Committee through a review of studies on chronic manganese poisoning in Chile.<sup>84</sup> These studies, carried out from 1963 to 1970 with financial assistance from the NIH/USPHS, aimed at elucidating the mechanism whereby chronic industrial inhalation of manganese ore induces a schizophrenia-like syndrome, followed by either parkinsonism, or a Wilson's disease-like syndrome.

In 1961, PAHO was instrumental in the organization of the Institute of Occupational Health and Air Pollution Research in Chile. During the life of the United Nations' project in occupational health for which PAHO served as the executing agency, the Institute conducted some 32 investigations on a variety of problems. A Pan American Network of Air Pollution Sampling Stations, assisted by PAHO, started its operations in 1967.

#### 4.13 Radiation

The Organization has assisted several research projects in the field of radiation. A study of high background radiation was carried out in Brazil during the period 1963-1969. The areas studied were known to have abnormally high levels of ionizing radiation exposure because of radioactive minerals in the soil. In Jamaica an investigation of Cesium-137 in milk started in 1964 and is still continuing.

#### 4.14 Clinical research

In 1968, at the request of PAHO, a member of the Committee visited nine Latin American countries in order to review the status of existing activities and opportunities in clinical research and, on the basis of his findings, to make proposals for a new program. The report on the visits, and a proposal for the support of research and research training in clinical

medicine<sup>85</sup> were discussed by the Committee at its seventh meeting. The Committee endorsed the need for a program of research support in the area of clinical medicine but felt that in the initial period the program must be regarded as exploratory, and all aspects of it must be flexible.<sup>5</sup>

The following year, the Committee was informed that a pilot program for advanced training in clinical research had been developed jointly by PAHO and the Wellcome Trust. The program began in 1969 for an initial three-year experimental period. As suggested by the Committee, a panel has been constituted to serve on a rotating basis for the appraisal and evaluation of the applications.

#### 4.15 Environmental sanitation and engineering

In his lecture "The Unreasonable Man," Professor Abel Wolman, a member of the PAHO/ACMR, took the position that "The promised land of modern science and technology has been overpromised to the common man. His lot still remains abject, sad, and almost hopeless in too great a part of our globe."<sup>86</sup>

The problem of ecological factors in health and disease has been the object of much attention by the Committee and by the Organization. A review of research in environmental health in Latin America was presented to the Committee at its first meeting.<sup>87</sup> At its second meeting, the Committee noted issues to be resolved in future years. They remarked that "The entire spectrum of environmental adjustment by engineers waits upon research in depth by medical scientists to disclose the realities of the impact of the environment on man."

The proposal was endorsed to interest various governmental agencies and universities in joint efforts toward the establishment of sanitary engineering institutes concerned with the environmental problems of basic and applied research.<sup>88</sup>

At its third meeting, the Committee held a special session on "Environmental Determinants of Community Well-Being."<sup>89</sup> The following year, taking note of the report at the Special Session, the Committee recommended that a research consultant mission of PAHO travel to selected areas in Latin America to analyze and evaluate the environmental health potentials of the institutions visited giving special attention to the availability of existing facilities and to the research interests of the scientific staff. Emphasis was to be given for practical reasons to urban and rural water supplies, waste disposal, and air and water pollution.<sup>90</sup>

A paper on sanitary engineering research potential in Latin America was presented to the Committee in 1966.<sup>91</sup> The Committee recognized that research in this field in Latin America is quite limited and emphasized

that support should be given to people rather than to projects. In the following year the Committee heard a report of the PAHO program of research, education, and training in the environmental sciences and engineering.<sup>92</sup>

The PAHO-assisted research on problems concerning the provision of water and sewer services is, for all practical purposes, an applied research program. Areas investigated have included: treatment processes, materials, design factors, water demands, network analysis, planning, structural organization, finance and accounting, administrative procedures, construction programming and control, operation and maintenance and investigation to apply systems analysis and operations research techniques. The specific projects are listed in the volume "Research in Progress 1970."<sup>29</sup>

In the area of disposal of solid wastes, problems currently investigated include: household garbage incinerators, and sanitary and economic aspects of municipal processing of composts. There is a pressing need for investigation of incineration techniques not leading to air pollution and problems of contamination of water and soil.

Research in the field of housing is done in Latin America by only a few institutions. A certain stimulus to research in this field results from the activities of the Inter-Agency Committee on Housing and Urban Development and the Inter-American Housing Center of the OAS. PAHO does not provide direct support to research in this field.

#### 4.16 Health planning

Courses on health planning have been conducted by PAHO at the Pan American Health Planning Center in Santiago for the past eight years. The research activities of the Center which operates with support from the United Nations Development Program (UNDP), PAHO, and several countries, were presented to the Committee at its seventh meeting.<sup>93</sup> These training and research activities constituted the basis for the implementation in 1968 of the Pan American Program for Health Planning. Based in the Latin American Institute for Economic and Social Development in Santiago, Chile, the program receives financial assistance from the UNDP and PAHO, and technical cooperation from the UN Economic Commission for Latin America. Research conducted by the program in 1969 included: typology of health policies, a project designed to classify countries using criteria that make it possible to identify the essential characteristics of the planning process. The Health Planning Center research plan contains as its nuclear element the development of a Link model which may be used for analyzing (in terms of the inputs required and the most probable consequences on the health sector) various health policies via numerical experimentation.

The research plan also contains short- and medium-term projects involving: epidemiology; demand, utilization, and management of health services; allocation of resources; and determination of the relationship of health phenomenon to various aspects of socioeconomic development.<sup>94</sup>

In Colombia, WHO and PAHO are conducting a project in comprehensive health planning research. The objective is to build within a functioning health service the capacity to appraise its own activities together with the ability to analyze, implement, and evaluate corrective action.

An evaluation method for measuring the effectiveness of PAHO programs is being developed by the staff of the Organization. A progress report on this project was given to the Committee in 1970. A Markovian model of the birth-life-death process was presented and discussed.<sup>95</sup> The Committee considered this approach a useable additional tool for the evaluation and the planning of health services and programs. However, it felt that the dearth of accurate demographic data in many regions places some limitations on its immediate application.<sup>7</sup>

The objectives of a study on health manpower and medical education conducted in Colombia since 1964 by the Ministry of Health and the Colombian Association of Medical Schools with the collaboration of PAHO and the Milbank Memorial Fund were outlined to the Committee in 1967.<sup>96</sup> The Committee expressed the hope that, because of their importance, PAHO would continue to encourage similar studies in other countries. It also voiced the opinion that studies of this type should be extended as soon as possible to non-medical manpower needs, that is, in the environmental health field and in health administration.<sup>97</sup>

A study on health, resources for health, and medical education is currently in progress in Argentina. As part of this study, field data were collected for the International Cooperative Investigation on the Utilization of Medical Care Resources.

An investigation of human resources in the Caribbean area is in the planning stage. The Organization is also cooperating on a survey of human resources in the US-Mexico border area, on studies of physical resources and manpower in dentistry in Colombia and Venezuela, and on those concerning nursing personnel needs and resources that are being carried out in Bolivia, Costa Rica, and Ecuador. A study on the health services and the functions and training of auxiliary personnel in Colombia is being conducted with assistance from PAHO and the United States Agency for International Development.



#### 4.17 Delivery of health services

Papers on research needs in medical care and in the economics of health and medical care were presented to the ACMR at its first meeting.<sup>98,99</sup> They summarized the recommendations of a special advisory group. These included: systematic research into the administrative principles of medical care - organization and administration of equipment, personnel, and services; and the practical application of the findings for better distribution, improved efficiency, and lower costs.

The Committee stressed the importance of research in medical care. It reemphasized this statement at its second meeting after having reviewed several proposals for PAHO-supported research in this field. These included a comparative study of medical care in Latin America; a plan for the establishment of a Research and Demonstration Center of Integrated Medical Care;<sup>100</sup> a study of systems of health-medical services in the city of Bogotá, Colombia;<sup>101</sup> and studies on the economics of health and medical care.<sup>102</sup>

The Committee did not return to this subject until several years later when in 1968, it discussed opportunities for operations research in the health services.<sup>103</sup> The Committee endorsed the potential value of operations research and suggested that to the extent possible these techniques should be built into future PAHO research programs. After reviewing areas of interest to PAHO in which these techniques may be useful, it suggested that one suitable area might be the standardization of water supply technology.<sup>5</sup>

A further statement of PAHO's interest in operational research in health economics and medical care was discussed by the Committee in 1969.<sup>104</sup> The ACMR was informed at that time that PAHO in cooperation with the Government of Argentina and the University of Buenos Aires and also with the technical assistance of the School of Public Health of Columbia University had established in Buenos Aires a Latin American Center for Medical Administration to be devoted primarily to operational research. Once more the Committee endorsed this rather new aspect of the research activities of PAHO.

A study of the social and psychological factors that determine the demand for and the use of medical health services is in progress in Santiago, Chile, under the joint auspices of PAHO and WHO.

The comprehensive health planning research project in Colombia has already been mentioned.

#### 4.18 Education and training of health personnel

The need for research in medical education attracted from the beginning the attention of the Committee.<sup>105,106</sup> In 1970, a half-day session was devoted to a review of the major problems in medical education that offer opportunities and need for research.<sup>107</sup>

The PAHO Director classified the most important problems in the field of health science education as: those connected with the relationship between the secondary school and medical education; those that concentrate on the educational process itself; and those that arise from the interdependence of medical education and the system of health services. The Committee noted that it was essential for research to be done not only on the content and process of education, but also on its objectives in terms of the most effective development of human resources for health. It agreed that research in medical education is urgently needed, and that means should be provided for stimulating activity in this field. It was proposed that the ACMR consider forming a subcommittee to examine this question further and prepare a follow-up session for one of its future annual meetings.<sup>108</sup>

One may consider as preliminary or perhaps, basic to any future program on research on education in the health sciences the surveys and studies carried out at various times by PAHO or with its support.

In 1967, for instance, PAHO conducted a survey of medical education in Latin America, and in 1968, a study of the Latin American schools of public health. The reports of those studies<sup>109,110</sup> contain not only an abundance of facts about the history, curricula, faculty, facilities, and resources of each school, but also a discussion of their problems. Some problems were identified as being of greater importance for the future development of the schools. They could well constitute the basis for a program of research in education in the health sciences.

The study on health manpower and medical education in Colombia already mentioned<sup>95</sup> is a remarkable undertaking whose results should prove of value well beyond the narrow limits of the country where it was carried out. A methodology was developed for the study to measure the need for and the use of health services by the population in order to estimate the number and kind of medical and paramedical personnel needed to furnish health services promptly and efficiently at a cost compatible with local resources.<sup>111</sup> Thus, at considerable effort, a pattern was established that could serve as a guide for similar studies elsewhere in Latin America. The study also provides an important frame of reference to orient scientific research activities in the health field towards problems of the greatest urgency. The preliminary results of the study<sup>112</sup> provide very useful data that could serve as a basis for possible comparative studies of health

manpower and medical education encompassing other Latin American countries.

In the field of nursing, studies on nursing personnel needs and resources are being carried out in Bolivia, Costa Rica, and Ecuador with assistance from PAHO. A study of nursing staff functions and activities was carried out in Guatemala; similar studies are underway in Brazil, Guyana, and Montserrat, and a nurse-utilization study is being carried out in one area of Peru.

A study of health services and the functions and training of auxiliary personnel is being conducted in Colombia with assistance from PAHO and the United States Agency for International Development.

The Organization is also cooperating in studies of physical resources and manpower in dentistry in Colombia and Venezuela that are expected to develop methodology for similar studies in other Latin American countries.

Another survey concerned sanitary engineering education in Latin America.

In Mexico, evaluation of the eight schools of veterinary medicine was carried out.

The training of personnel capable of conducting worthwhile research activities in the biomedical and health sciences constitutes one of the Organization's highest priorities.

The great and pressing needs for research training were presented to the ACMR at its first and second meetings.<sup>105,106</sup> It was stated that priority would be given to research in the field of greatest importance for the improvement of health in Latin America. The subject elicited the greatest interest on the part of the Committee because of its magnitude and its fundamental importance in Latin America. The Committee strongly supported the proposal for the development of Latin American institutional resources for research training.

With the financial support of the United States Agency for International Development, studies were conducted in the period 1964-1967 to explore the feasibility of education and training programs in population dynamics with emphasis on training for research and on population studies. As a result, research training programs in health and population dynamics were instituted at the School of Public Health of the Faculty of Medicine at the University of Chile and at the School of Hygiene and Public Health of the University of São Paulo. Supplementary funds for the continuation of this project through 1969 were provided by the USAID. A working group on research on human reproduction held in Santiago in 1968 recommended that a collaborative study on human reproduction be conducted with parti-

cipation of several Latin American countries.

Plans for the establishment of a Latin American Regional Center for Advanced Training and Research on the Health Aspects of Population were discussed by the Committee in 1970. The ACMR endorsed the current PAHO policy of supporting a network of training activities based on existing capabilities, which would be integrated into general health programs and serve the Hemisphere as a whole, rather than setting up a special center.<sup>107</sup>

The Inter-American Program of Biostatistics Education, funded by UNDP, received additional support for several years from PAHO and USAID funds to develop training and research on the interrelations of health and population dynamics.

The WHO survey of the present status of reproduction research and research training in Latin America, part of a world-wide review, was mentioned earlier in this report.

A project primarily concerned with the establishment of sanitary engineering research as an organized regular and continuous activity in four cooperating universities, has been presented by the Government of Venezuela to the United Nations Development Program for Technical and Financial Assistance, PAHO being the executing agency. This project would follow a project in progress and in its final stage, assisted by the UNDP, with the same four Venezuelan universities on teaching of sanitary engineering.

At its seventh meeting, the Committee was informed in detail of these developments and of the establishment of a regional center for environmental sciences and engineering in Peru. It was reported that the response of governments and institutions to the education and training program stimulated and partly supported by PAHO created an atmosphere of optimism as to what might now be stimulated and accomplished in the field of research in the environmental sciences, especially applied research.<sup>113</sup>

The PAHO/WHO Immunology Research and Training Centers established in São Paulo and in Mexico City were mentioned earlier in this report.

With financial support from the NIH/USPHS, the Department of Microbiology, Cornell University Medical College, gives research training in virology, ornithology, ecology, and tropical medicine to Latin American predoctoral and postdoctoral trainees. The curricula include extensive field training in Mexico and Central America.

A regional reference and training center for applied research in nutritional anemias was established in Caracas in 1965, which continues

to operate with financial support from the William-Waterman Fund (1965-1968) and PAHO.

A PAHO reference laboratory and training center for endemic goiter research was set up in 1965 in Santiago with financial assistance from the William-Waterman Fund. The Center's purpose is to provide facilities for standardizing laboratory procedures and iodine determinations and is working in collaboration with 12 other laboratories in Latin America and the Boston Medical Laboratory.

A pilot program for advanced training in clinical research developed jointly by PAHO and the Wellcome Trust was mentioned earlier in this report.

In the decade 1959-1969 the World Health Organization awarded in Latin America 40 research training-exchange of research workers grants, and 14 research grants to individual investigators.

#### 4.19 Communications in biomedical research

Discussions by the Committee of the subject of communications in biomedical research at its second meeting<sup>114</sup> led to a recommendation that PAHO study the problem further. At the third meeting, the results of surveys of selected primary biomedical periodical publications in Latin America was presented.<sup>115</sup> A proposal for an experiment designed to improve the use, distribution, and to some extent the financial situation of selected publications, was endorsed. In 1965, the Committee heard and welcomed a proposal for the establishment of a regional medical library center.<sup>116</sup> Four years later the first progress reports on the PAHO Regional Library of Medicine, established by the Organization in Brazil in 1967,<sup>117,118</sup> were very well received by the Committee. In 1969, gift and exchange activities were conducted with 188 libraries in Brazil and 363 similar institutions in other South American countries. The project is funded by the government of Brazil, the United States National Library of Medicine, the Commonwealth Fund, and PAHO.

At the most recent meeting of the Scientific Advisory Committee of the PAHO Regional Library of Medicine (October 1970) it was reported<sup>119</sup> that the Library now has 30 staff members including 8 librarians and 13 assistant librarians employed by the Escola Paulista de Medicina, the host institution. The international post of Chief of Technical Services was filled and recruitment was underway for three additional posts.

The collection of biomedical journals now consists of 3,649 titles. The Library aims at completing collections of the 2,000 most important titles back to 1960 but will make no special effort to acquire pre-1960 journals.

Future plans for development include an education program for medical library technicians, librarians, library managers, and users. Other projects envisage the possible establishment of a service to make use of the tapes in the computer-based MEDLARS system of the United States National Library of Medicine and the organization of an audiovisual facility that will bring together a collection of scientific films, magnetic sound tapes, film strips, and video tapes.

The Advisory Committee noted, however, that with the financial resources presently available no significant further expansion of the Library's services appears possible. It strongly urged that a search for additional funds be made to permit further development of the Library.<sup>120</sup>

The review of PAHO research activities would be incomplete if mention were not made of the Lectures on the Biomedical Sciences delivered since 1965. The first lecture, by René Dubos, dealt with "Man and His Environment."<sup>121</sup> In 1967, Abel Wolman spoke on "The Unreasonable Man."<sup>86</sup> Joshua Lederberg, in 1968, lectured on "Health in the World of Tomorrow," the theme selected for World Health Day on the occasion of the twentieth anniversary of WHO.<sup>122</sup>

5. Accomplishments of the PAHO research program in the past decade

During its discussions of the general strategy and program priorities of the PAHO research program, the Committee has repeatedly sought assurance that within that program greater emphasis would be placed on research directly related to major health problems and causes of death and illness in the Americas.

Did the program in the past decade, in fact, conform to these views?

The wise decision of the ACMR to request a detailed report of the PAHO research activities in the past decade in relation to the major health problems in Latin America will afford the Committee an opportunity to reply to this question and to express its views on the emphasis to be placed in the future on specific areas.

Although the principal aim and main purpose of this report were to provide factual information to serve as a basis for discussion by the Committee, a few comments appear justified.

The accomplishments of PAHO in the field of research are numerous and important. A research program encompassing a variety of subjects and providing assistance to practically all Latin American countries has been established. From a very small beginning with a minimum of administrative superstructure, an outlay of approximately \$3.5 million annually was reached and is being maintained. Although the program is being supported mainly from outside sources, the importance of the catalytic function of PAHO in securing sources of funds and identifying appropriate avenues for their use can not be underestimated.

Research centers such as INCAP, the Pan American Zoonoses Center and that for Foot-and-Mouth Disease, the immunology research and training centers, the Latin American Perinatology Center, and others, who have benefited from PAHO support and guidance have earned for themselves international reputations for the excellence of their work.

A large number of consultants have been made available to assist institutions and individual scientists in their research activities. Meetings and conferences were organized that presented invaluable opportunities for discussion of research problems and exchanges among workers in given fields. A remarkable series of research documents have been published (Annex I).

The broad range of health problems affecting Latin American countries has made and will continue to make it impossible for the Organization - with its limited resources - to encompass all the problems within its

research program. Therefore, selection is necessary.

The assignment of priorities is no easy matter. The Charter of Punta del Este and the report of the special meeting of Ministers of Health had indeed identified health problems of particular importance, but had wisely avoided giving to each problem a relative order of priority in relation to the others.

One of the characteristics of the PAHO research program has been its reliance on outside sources of support. Inevitably at times the tentative priorities set by PAHO had to be reconciled with those of the granting agencies, the two not necessarily always coinciding.

Another aspect of the difficult task of priority setting is that research cannot be done at will. It can be stimulated, and perhaps investigators can be steered in certain directions by the offer of support. The essential requirement, however, is the availability of qualified investigators in the priority area having at their disposal sufficient facilities to enable them to carry on work of the desired quality.

The research conducted independently from support from PAHO by Latin American universities, research institutions, clinical centers and often also by the health services must be also taken into account in order to avoid wasteful duplication. The same consideration applies to the support given for biomedical research in the region by sources outside Latin America. Among the latter, the contributions of the National Institutes of Health, USPHS, in the form of research grants on a variety of subjects to Latin American scientists and institutions throughout the last decade, those of numerous private foundations, and the support currently being given for population research by the United States Agency for International Development are particularly significant.

Another difficulty in setting up priorities is the general lack of national research policies. As the study group on science policy in Latin America remarked: "Since the recommendations of the conference of Punta del Este, the Latin American countries have been elaborating plans of development. However, such plans usually fail to give proper consideration to the development of science as an integrated and highly important part of the general development plan."<sup>26</sup>

The need for priority setting was stressed at a recent symposium on science policy and biomedical research where it was stated that: "All embracing, comprehensive research programs are today possible in only a handful of nations.... Accordingly, after providing a sufficient range of trained scientists to assure the general education of the next generation, frequently it is necessary to focus the research and research training endeavor on a relatively restricted number of areas."<sup>123</sup>



All of the above considerations appear to have been responsible for PAHO's early decision to devote to a few subjects a large share of its resources for the support of biomedical research in Latin America.

### 5.1 Distribution of research expenditures by subject

As an indication of the breadth and emphasis of the PAHO research program in recent years, a breakdown of research expenditures, by subject, in 1967 and in 1970, is given in Tables 1 and 2. A comparison of priorities in those years is given in Table 3.

Total expenditures amounted to \$3,155,998 in 1967 and \$3,642,583 in 1970. In the latter year, PAHO contributed 29.8 per cent of the funds; United States sources, government and private, 51.4 per cent; the World Health Organization, 3.6 per cent; and other sources, 15.2 per cent.

Expenditures for research in nutrition, at INCAP and elsewhere, and on foot-and-mouth disease occupied first place in both years. Together they represented 56.5 per cent in 1967 and 47.6 per cent in 1970 of the total research budget. When expenditures for research in the zoonoses are added, the percentages increase respectively to 62.9 and 50.7.

Nutrition, foot-and-mouth disease, and the zoonoses had been given high priorities within the recommendations of the special meeting of Ministers of Health. PAHO was also guided in its decision to give such ample support to these subjects by the desirability, often stressed by the ACMR, to strengthen existing institutions and research centers.

Only three other subjects in the years under consideration (1967 and 1970) were each allotted more than 5 per cent of the total research budget. In 1967, these were: reference and training centers, malaria, and biomedical communications; and in 1970, the child mortality study, malaria, and the Regional Library of Medicine. The amount of support given to the other subjects included within the PAHO research program range from 4.1 per cent to fractions of 1 per cent of the total research budget.

It may be helpful to mention that neither the tables, derived from official data, nor pertinent PAHO publications, such as "Research in Progress 1970" are sufficiently comprehensive in portraying the research activities of the Organization. In fact, seemingly for purely administrative reasons, certain activities were not classified as research as, for instance, a number of studies on personnel needs and utilization in the fields of medical care, nursing, sanitary engineering, veterinary medicine, dentistry, and auxiliary personnel. These were classified in the "Report of the Director for 1969" as special studies (pages 85-86) but do not appear

in "Research in Progress" nor in the official figures on research expenditures. Perhaps it would be desirable if in the future all research activities whether carried out in the laboratory or in the field were given a place within every account of the Organization's research program regardless of the official classification of the funds that supported them.

## 5.2 Suggestions for future activities

It should not be construed as criticism of past policies to propose, if circumstances permit, that within the PAHO research program greater emphasis might be placed on certain areas. The following suggestions are not all-inclusive and only reflect the personal judgment of the reviewer.

Social and economic research related to the field of health, and studies of problems in the administration and delivery of health services should yield results worthy of the investment put into them. As very aptly said by Weinerman:<sup>124</sup> "To the extent that serious research is directed to the socioeconomic and organizational aspects of medical practice, the prospects for an effective 'fit' of health services to the needs of the community are enhanced." The type of studies that - over the years - will build up the knowledge necessary for establishing policies in the field of medical care were divided by the same author into the following categories: (1) collection and analysis of basic information concerning various forms of medical practice; (2) studies of the social role of the physician; (3) evaluation of specific methods of medical practice; and (4) methodology of research in this area.<sup>125</sup> Obviously, similar studies can be conducted on other health professions. A review by Anderson of the body of knowledge that emerged over 20 years regarding the characteristics and operation of the health services systems in the United States<sup>126</sup> could well serve as a guide to the type of investigations that might profitably be stimulated and supported in Latin American countries by PAHO.

Manpower studies including investigations of utilization patterns would also fall within this category.

Within the PAHO research program, communicable diseases were given, on the whole, adequate attention. However, Chagas' disease is responsible for a health problem of such magnitude that it calls for investigation of every possible way for its solution. The recommendations of the Committee for field studies on tuberculosis should be reexamined with a view to possible implementation. The increasing incidence of venereal diseases might justify including research in this field within the PAHO research program. Various recommendations of the Committee for research in parasitology must still be implemented.

There appears to be room for greater effort in the area of non-transmissible diseases. Heart diseases, malignant neoplasms, and accidents are among the major causes of death and illness in Latin America. Studies, in particular, aimed at identifying the groups at greatest risk for these diseases and conditions, and testing possible preventive action would appear to be very desirable.

Also, in the field of maternal health, efforts at the identification of high-risk groups should prove valuable in singling out these groups within the population for priority action.

As already mentioned, a member of the Committee was of the opinion that the most important biological problem confronting Latin America is over-population. Although the United States Agency for International Development is very active in support of research in the field of population dynamics in Latin America, PAHO's catalytic action in this area and in the biology of human reproduction should prove very helpful.

Expenditures for research in the environmental sciences and engineering amounted in recent years to approximately two per cent (1.8 per cent in 1967 and 2.2 per cent in 1970) of the total research budget. Considering the importance of the problems and the very high priority given to environmental sanitation by the Charter of Punta del Este and by the governing bodies of the Organization, it is to be hoped that research in this field will receive much greater support and impetus in future years.

Areas that also seem to require greater research support are occupational health and air pollution.

In the field of air pollution the main subjects to be studied according to the pertinent PAHO unit should be those which permit: (1) a proper diagnosis of the problem; (2) a prediction of the future trends; (3) an estimation of the health and economic damages; (4) the design of proper administrative practices; and (5) adequate solutions dictated by local conditions.

Research on the health aspects of housing, perhaps sponsored in collaboration with other pertinent agencies, would seem to fall well within PAHO's responsibilities.

The Committee recently reviewed the major problems in medical education that offer opportunities and need for research;<sup>107</sup> its recommendations should serve as a basis for PAHO's future research policy in this important field.

Needs and opportunities for research in health education were never

discussed by the Committee. There seems to be little doubt that many health programs fail or are slow in developing because of unknown factors. Research into the reasons why people behave in certain ways, why they fail at times to make full use of available health facilities, and research into the set of values in which people believe in a specific population, or on what they think of their environment and how they would like it changed, are topics that come to mind. Many other questions are waiting to be answered. Health education research by PAHO should pay off well.

The possibility of carrying out a survey of biomedical research in Latin America and of its sources of support with a view toward identifying research potentials and determining the possible existence of substantial gaps and overlaps appears to be worthy of study. The significance of study of resources was stressed by the PAHO Study Group on Biomedical Research Policy in Latin America.<sup>27</sup>

6. The role of the PAHO Advisory Committee on Medical Research

Its own appropriate functions in the planning and implementation of the PAHO research program have been a matter of concern to the Committee throughout its existence.

Several observations made by members of the Committee singly or collectively were summarized in a report on the operation of the Committee discussed at the Ninth Meeting in 1970.<sup>7</sup>

It was acknowledged that the meetings are stimulating; that background material for the meeting is well prepared; that a decade of experience has demonstrated the value of the Committee's work. All of its members wished the Committee to continue and to be strengthened.

The Committee wished to be in a position to advise the PAHO Director in a manner consistent with the long-range objectives of the Organization. This it could do only if it is made aware of the Organization's long-range objectives and if it is informed on all research conducted or supported by PAHO.

At the conclusion of these discussions, the Committee recommended the following specific changes:

Extension of the effectiveness of the Committee by involving a large number of active research workers in its tasks. A broader range of professional backgrounds and wider participation by younger investigators would be helpful in this respect. To this effect, consideration might be given to reducing the average length of service on the Committee and/or to establishing subcommittees to be chaired by a member of the ACRM.

The convening of more than one meeting a year with some of them to be held in Latin America.

Development of a closer working relationship between the Secretariat and the Committee, perhaps by involving the Secretariat with the work of subcommittees.

Establishment of the chairmanship as a continuing responsibility having closer links with the Secretariat, and perhaps the involvement of some additional staff for the Department of Research Development and Coordination.

Other comments appear in the records of interviews of Committee members by PAHO staff and consultants.

At the time of the single annual meeting, the Committee is often

overwhelmed with details. There are too many items on the agenda, mainly progress reports, and inadequate time for discussion. There is no continuity of follow-up; proposals are discussed and recommendations are made, but the Committee is seldom informed of the outcome of its deliberations.

Concern was expressed for the need for greater dissemination of the papers presented to the Committee and for greater sharing and feedback to the countries and scientists concerned.

The Committee would like to see greater effort made toward the implementation of research findings.

This reviewer would like to add a few suggestions of his own.

It could be arranged that at each meeting of the ACMR a national investigator - PAHO grantee - should report on his research and also on the biomedical research facilities, resources, progress and trends in his country.

It would be helpful for the ACMR to meet with representatives of other international or bilateral granting agencies active in Latin America. The respective interests and plans could be discussed. The resulting information would be invaluable to the ACMR in advising PAHO on its research program.

The Committee could help toward the fulfillment of some of PAHO's research objectives by interesting scientists and institutions outside Latin America in working on pertinent aspects of the major health problems of Latin American countries. For example, it could invite the collaboration of scientists in a given field through communications to pertinent scientific publications.

More could be accomplished in biomedical research in Latin America through the formal collaboration of Latin American medical schools and research institutes with parallel institutes in other countries, not necessarily in the Western Hemisphere, for joint research in priority areas. Members of the ACMR should be in a position to foster such collaboration.

The Committee might wish to recommend to PAHO the organization of regional and/or travelling seminars on biomedical research planning and policy, perhaps in collaboration with UNESCO.

The Committee might also wish to request the PAHO Director to convey to the appropriate authorities of member countries its recommendations for a more extensive and systematic use for research training of PAHO and WHO funds, perhaps by assigning to this activity part of the monies now being used for the Fellowship Program.

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ANNEX I

PAHO SCIENTIFIC PUBLICATIONS

- No. 44 Live Poliovirus Vaccines. Washington, D.C., PAHO, 1959.
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- No. 115 Plague in the Americas. Washington, D.C., PAHO, 1965.
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- No. 208 Financing of the Health Sector. Washington, D.C., PAHO, 1970.
- No. 222 Metabolic Adaptation and Nutrition. Washington, D.C., PAHO, 1971.



TABLE I

## FUNDS FOR PAHO RESEARCH PROGRAM 1967\*

Source and Distribution by Subject  
(U.S. Dollars)

	<u>% OF TOTAL</u>	<u>PAHO</u>	<u>OTHER SOURCES</u>			<u>TOTAL</u>
			<u>United States</u>		<u>OTHER</u>	
			<u>Government</u>	<u>Private</u>		
Nutrition (INCAP-other)	38.6	176,994	939,949	93,175	10,510	1,043,634
Foot-and-mouth disease	17.9	-	95,184	-	470,194	565,378
Reference centers and research training	9.3	49,337	135,940	36,449	70,330	242,719
Malaria	8.4	161,562	-	-	105,000	105,000
Zoonoses	6.4	51,780	4,000	-	144,953	148,953
Biomedical communications	6.0	25,000	50,000	35,000	80,000	165,000
Dental Health	1.9	4,582	54,181	-	-	54,181
Environmental sciences and engineering	1.8	30,199	-	-	27,521	27,521
Endemic goiter	1.8	1,720	50,233	3,750	1,200	55,183
Health statistics	1.6	-	51,950	-	-	51,950
Arboviruses	1.6	-	49,102	-	-	49,102
Maternal and child health	1.2	37,000	-	-	-	-
Occupational health	.9	-	28,830	-	-	28,830
Health manpower	.9	20,000	-	7,387	-	7,387
Population dynamics	.6	17,400	-	-	-	-
Mental health	.5	-	-	14,984	-	14,984
Cancer	.2	-	-	7,747	-	7,747
Seroepidemiology	.2	-	7,555	-	-	7,555
Chagas' disease	.2	5,300	-	-	-	-
<b>TOTALS</b>	<b>100.0</b>	<b>580,874</b>	<b>1,466,924</b>	<b>198,492</b>	<b>909,708</b>	<b>2,575,124</b>

\*From: Special Meeting of Ministers of Health of the Americas. Working Papers, page 238, 1968.

TABLE II

## FUNDS FOR PAHO RESEARCH PROGRAM 1970

Source and Distribution by Subject  
(U.S. Dollars)

RANKING ORDER	SUBJECT	GRAND TOTAL	% OF TOTAL	PAHO	U.S.A.		WHO	OTHER
					Government	Private		
1	Nutrition (INCAP-other)	1,348,563	37.0	249,429	610,535	311,936	-	176,663
2	Foot-and-mouth disease	385,943	10.6	385,943	-	-	-	-
3	Child mortality study	369,765	10.1	1,213	368,552	-	-	-
4	Malaria	301,731	8.3	58,694	196,015	-	47,022	-
5	Regional Library of Medicine	202,684	5.6	44,675	-	50,000	-	108,009
6	Research Development and Coordination	-	-	-	-	-	-	-
7	Health planning center	149,239	4.1	147,622	1,617	-	-	-
8	Perinatology center	125,600	3.5	-	-	-	-	125,600
9	Zoonoses	123,813	3.4	58,088	-	46,526	19,199	-
10	Studies of health services	114,813	3.1	20,081	-	-	27,000	67,732
11	Viral and rickettsial diseases	97,506	2.7	-	97,506	-	-	-
12	Environmental sciences and engineering	80,483	2.2	2,866	60,803	-	16,814	-
13	Occupational health	-	-	-	-	-	-	-
14	<u>Aedes aegypti</u> control	79,885	2.2	42,465	-	-	-	37,420
15	Mycology	79,317	2.2	-	79,317	-	-	-
16	Toxicology of pesticides	54,778	1.5	54,778	-	-	-	-
17	Preventive medicine	29,298	.8	-	15,000	14,298	-	-
18	Plague	26,271	.7	-	-	-	-	26,271
19	Research training	26,271	.7	-	-	-	-	-
20	Parasitic diseases	17,744	.5	-	-	17,744	-	-
21	Other	15,966	.4	-	-	-	15,966	-
		9,755	.3	-	-	-	-	9,755
		8,208	.2	6,289	-	-	-	1,919
		21,221	.6	12,597	-	5,416	3,208	-
TOTALS		3,642,583		1,084,740	1,429,345	445,920	129,209	553,369
PERCENTAGE OF TOTAL			100.0	29.8%	39.2%	12.2%	3.6%	15.2%

TABLE III

## EXPENDITURES FOR PAHO RESEARCH PROGRAM

By Subject and Per Cent of Total 1967 and 1970

	<u>1967</u>		<u>1970</u>
<u>Subject</u>	<u>% Of Total</u>	<u>Subject</u>	<u>% Of Total</u>
1 Nutrition (INCAP and other)	38.6	Nutrition (INCAP and other)	37.0
2 Foot-and-mouth disease	17.9	Foot-and-mouth disease	10.6
3 Reference centers and research training	9.3	Child mortality study	10.1
4 Malaria	8.4	Malaria	8.3
5 Zoonoses	6.4	Regional Library of Medicine	5.6
6 Biomedical communications	6.0	Research Development and Coordination	4.1
7 Dental health	1.9	Health Planning Center	3.5
8 Environmental sciences and engineering	1.8	Perinatology Center	3.4
9 Endemic goiter	1.8	Zoonoses	3.1
10 Health statistics	1.6	Studies of health services	2.7
11 Arboviruses	1.6	Viral and rickettsial diseases	2.2
12 Maternal and child health	1.2	Environmental sciences and engineering	2.2
13 Occupational health	.9	Occupational health	2.2
14 Health manpower	.9	<u>Aedes aegypti</u> control	1.5
15 Population dynamics	.6	Mycology	.8
16 Mental health	.5	Toxicology of pesticides	.7
17 Cancer	.2	Preventive medicine	.5
18 Seroepidemiology	.2	Plague	.4
19 Chagas' disease	.2	Research training	.3
20		Other	.8