

Pan American Health Organization

PAHO/ACMR 16/5
Original: English

SIXTEENTH MEETING OF THE
PAHO ADVISORY COMMITTEE ON MEDICAL RESEARCH

Washington, D.C.
11-15 July 1977

HUMAN ECOLOGY RESEARCH AND TRAINING NEEDS IN THE AMERICAS

The issue of this document does not constitute formal publication. It should not be reviewed, abstracted, or quoted without the consent of the Pan American Health Organization. The authors alone are responsible for statements expressed in signed papers.

ADVISORY COMMITTEE FOR MEDICAL RESEARCH

HUMAN ECOLOGY RESEARCH AND TRAINING NEEDS IN THE AMERICAS

Working paper prepared by:

Dr. S. W. Bennett, Director
Pan American Center for Human
Ecology and Health

Introduction

The products of research form the basis of the technical cooperation program of international agencies. A main function of international agencies is to facilitate the transfer of information obtained from research projects and to assist in the appropriate adaptation of the newly acquired knowledge in different environments. The proposed research program for the Pan American Center for Human Ecology and Health focuses on its international role and is aimed at stimulating and promoting human ecological research in national institutions and increasing effective communication between member states.

The Ten-Year Health Plan for Americas that the Ministers of Health approved as the goal of the member states and the Secretariat of the Pan American Health Organization implies the need for research in certain areas. What is becoming apparent to those of us who work at the Center for Human Ecology is that, in addition to the obvious specific research needs implied in the plan, such as the technologies needed to provide low cost rural water supplies, other types of research, more global in concept, are equally necessary. One of the fundamental problems facing health administrations and development planners is how to integrate the immense quantity and variety of information at their disposal into a comprehensible useful holistic framework. Decision makers are becoming increasingly concerned that the complex interactions that result from the development process should not lead to adverse health effects or destruction of the environment. The problem is how does one go about doing that without seriously interfering with economic and social development.

Research in Human Ecology and Health

Human ecologists view health in the context of the total community and focus on the interactions of man's activities with his physical, social and biological environment and the effects those interactions have on man. By its very nature, research in human ecology focuses on the community and is conducted on a multidisciplinary basis.

Each community is viewed as a unique ecosystem with a separate

identity and with its own needs and capacities. Each community forms its own complex multiple interacting system. The community ecosystem concept implies that solutions to problems will depend upon the characteristics of each system and that absolute norms or standards may not apply to different community ecosystems.

The research process is not different. The problem must be defined, information collected concerning what is known about the problem, a research hypothesis stated, a study designed and executed, the data analyzed and the results disseminated. However, an international agency probably should concentrate on supporting applied or methodological research oriented to priority problems.

The Center for Human Ecology and Health is part of the Division of Environmental Health and among our responsibilities, related to the Division's mission, is the study of the impacts on human health of changes in the environment. Community research in environmental health is costly and difficult. It is costly because of the massive effort necessary to accurately measure environmental variables and to simultaneously ascertain a defined health effect. It is conceptually difficult because of the problem of defining cause and effect relationships where large numbers of variables are involved and multiple outcomes occur.

There are specific methodological problems in environmental health research. The first is to accurately measure one or more environmental variables on a small enough geographical scale so that variations within communities can be related to different human exposure levels. The second is to determine how to measure individuals' exposure to a pollutant as they move from place to place in their daily life. The home, work, and recreational environments may each have significant differences related to the opportunity for an individual to be exposed to an environmental hazard. The third difficulty is that many environmental effects operate over long periods of time and thus some research projects will need to examine 5 to 25 year exposures. Similarly the expected health effects are, comparatively speaking, rare events so that large populations will have to be observed to detect significant variations in incidence or prevalence of disease.

Environmental hazards are not found singly, and separating the individual effect from multiple interacting, even synergistic, effects is difficult.

The epidemiologist faces particularly complex technical problems of detecting disease. The effects of environmental factors are often subtle, have relatively limited immediate measurable effect on the human organism, and are difficult to standardize. The difficulties in ascertaining in children the important but minimal neurological and behavioral effects of chronic low level exposure to airborne lead from smelter stacks is but one example. Frequently we are able to measure a physiological change such as an enzyme's activity but that measure may not be related to an important change in health status.

In addition to the methodological problems described, there are newly recognized problem areas which should become the subject of research projects. Perhaps most important is to learn to understand how human behavior affects communities with respect to the environment. The individuals' perception of his environment may affect his willingness to change his behavior, using less gasoline for example, for his own and his community's welfare. Equally important will be studies of public administration systems to see how to develop the capacity within government to implement and manage holistically designed ecologically sound plans of action. If we do not develop effective environmental control systems properly designed plans will not be implemented. Implementation will require community participation. We will need to study how to motivate individuals and communities to act in their own self interest.

Implementation in a manner appropriate to individual communities implies research into the problems of the transfer of technology. We need to learn how to assist a government to select and modify technologies to best fit its particular needs.

What the foregoing discussion means is that many of the methods and research designs that served so well in the studies of infectious and chronic diseases will have limited application in determining the health effects of environmental change in communities. The problems of designing and implementing environmental control programs pose

equally difficult questions. No single discipline or scientist can be expected to master the methodologies required to study such complex interactions.

The Role of a Center in PAHO's Program

Centers are concentration of technical manpower which focus their activities in defined areas. They can form an important technical resource within the Organization for its research program and usually tend to have personnel trained and experienced in research. In order for a Center to effectively carry out its mission the Center's role and position within the overall research policy and program of the Organization has to be clearly defined. The policy and priorities, including the allowable commitment of resources, need to be stated explicitly so that the Centers can contribute appropriate support to the Organization's program.

With the concentration of multidisciplinary technical resources, the Centers may be of assistance in the technical review of research proposals. They may also serve as evaluators of completed research or research-in-progress.

Just as vital for the Centers as is knowledge of the policy is a central coordinating mechanism to help avoid duplication, to aid in assigning tasks to the appropriate place, and, most importantly, to monitor the entire set of research activities to insure that the balance is in accordance with the Organization's policy.

Because ECO is basically a multidisciplinary Center concerned with a broad approach which can be felt to overlap with other units' or Center's responsibilities, we are particularly aware of the need for a central coordinating mechanism. It exists to some degree now but the demands on it will increase in the future.

The Research Program of the Center for Human Ecology and Health

The Center's program has evolved from the experience obtained during almost two years of operation. We propose to concentrate on developing appropriate activities considering the role of an international agency, the needs of governments as expressed to PAHO, and the rather limited capacity of the Center in relation to the potential need for support. The strategy is for ECO to assume a catalytic role by identifying research priorities, searching for national institutions willing and capable of conducting projects, and supporting the national institution in developing their capacities in human ecological and health research and training.

ECO's proposed research and training program consists of a set of 10 priority problem areas. We have already started the process of identifying the national centers which share an interest in and have or can develop the capacity to conduct research and for training in one or more of the specified areas. The proposed project areas are:

1. Research on and Development of Environmental and Health Impact Assessment Methodologies.
2. Early Environmental Intervention. The prevention of Infestations and Infection Resulting from Development Projects.
3. Research and Development of Environmental Interventions to Control Endemic Disease.
4. The Health Effects of Environmental Pollutants - The Development of Appropriate Control Programs and Standards in Developing Countries.
5. Development Planning Public Administration and Environmental and Health Protection Agencies - The Implementation of Health Protection Strategies.
6. Human Adaptations to Stressful Environments.
7. The Health Hazards of Migration and Colonization - The Problem of Adaptation to New Ecosystems.
8. The Development of Curricula in Human Ecology and Field Training Programs.

9. The Development of Environmental Epidemiological Training Programs Linked to Environmental Laboratories.
10. The Development and Evaluation of Early Warning Systems.

The role that ECO proposes to play concerning the support of national institutions is related to the research process described earlier. The Center should not become directly responsible for primary data collection since its staff and resources are too limited. But it can be of use by providing national centers with assistance in problem identification, information retrieval and analysis, research design, project management, analysis, and publication of results. Similarly the Center should in general, not attempt to conduct training programs but should support training activities in institutions with educational facilities, experience and competence. Our usual role will be to support, supplement and extend existing national resources.

In each case the support will take the form of strengthening multidisciplinary community based activities.

The list of the 10 proposed priority research and training needs for Latin America is tentative and subject to modification as more experience is gained. The reasons underlying the selection of each area are briefly described below.

1. Research on and Development of Environmental and Health Impact Assessment Methodologies is the subject related to the greatest number of requests from member states that ECO has received so far. Many national institutions are aware that methods exist but they have little or no experience in their application. Most available methods were developed in temperate climates emphasizing environmental quality rather than human health, were first done in highly industrialized societies and in different political and administrative systems. There is a need to develop appropriate methods and training applicable to the American Region.

2. Early Active Environmental Interventions - The Prevention of Infestations and Infection Resulting from Development Projects.

Early interventions may result in preventing health hazards and related problems. For example, in man made reservoirs in tropical and subtropical areas, snail intermediate hosts of schistosomiasis often cause severe epidemics. In specific areas to be inundated, snails may be surveyed and destroyed before inundation. Aquatic floating weeds such as water lettuce and water hyacinth may cause severe infestations causing many problems in addition to production of disease vectors such as snails, and also mosquitoes transmitting encephalitis. These weeds can be surveyed and destroyed in some areas at far less cost than attempts at control later. Epidemiological survey and quarantine to prevent certain non-endemic human diseases can be utilized to prevent introduction of disease in some new development projects. These interventions would be most effective at the periphery of range or when isolated from certain vectors or diseases.

3. Research and Development of Environmental Interventions to Control Endemic Disease is oriented towards developing new ecologically based strategies for the control of disease. Examples of potential problems where the human ecological approach may contribute, vary from developing environmental programs to eliminate the ecological niche of the vector of Chagas disease, to developing programs to promote healthy lifestyles to prevent coronary artery disease.

4. The Health Effects of Environmental Pollutants concentrates on helping individual countries, regions or communities to develop control programs and to adopt environmental standards that are appropriate to their special circumstances. Most existing standards were developed in industrialized nations and are not necessarily applicable to the ecosystems encountered in Latin America and the Caribbean. The goal will be to learn how to help countries improve their capacity to analyze their environmental health problems so that they can create programs specifically designed to meet their needs.

5. Development Planning, Public Administration and Environmental and Health Protection Agencies is a program area which addresses itself to the commonly found problem that plans are frequently not implemented. One cause of failure to implement is that even technically excellent plans often fail to consider the responsibilities and capacities of the public

agencies that will be responsible for the execution of the plan.

The goal will be to learn how to include into development and environmental and health control plans, the constraints that may exist because of the existing public agencies. With such limitations recognized from the outset the probability of implementation will be improved.

6. Human Adaptations to Stressful Environments. It is increasingly apparent that when humans adapt to extreme environmental conditions such as the tropical rainforest, high altitudes, or dense urban populations, they undergo a complex series of psychological, behavioral and physiological adaptations. In many cases these adaptations result in changes which are interpreted as disease rather than successful adaptations. Community standards related to health may not be realistic and can even indicate preventive measures or treatment when none is needed. The goal will be to investigate human colonization at the extremes of ecological ranges to learn how the process of adaptation affects community health practices.

7. Health Hazard of Migration and Colonization focuses on the problem that humans are adapted, behaviorally, culturally and immunologically to their place of origin and when moved to a new ecosystem often encounter new agents and vectors of disease. Their previous adaptive mechanisms often are maladaptive in the new circumstances. Mortality and morbidity rates of migrants is high. Similarly migrants may import agents and contaminate a previously uninfected region including exposing existing residents to new health hazards. The goal will be to learn to build into colonization projects and into health systems of receiving areas, measures designed to facilitate healthy adaptations to new communities.

8. The Development of Human Ecological Curricula and Field Training Programs is vital if Latin America and the Caribbean are to develop the human resources required to staff their expanding health and environmental health programs. The training programs will vary from short courses for established community health workers to postgraduate. Public education strategies and primary grade educational units will also be developed in an effort to introduce ecological concepts into communities.

9. The Development of Environmental Epidemiological Training Programs is critical. If the member states in the Region are to conduct studies in communities concerning the health effects of environmental

factors they must train the necessary physician epidemiologist. This relatively new field requires that the physician be trained in toxicology, environmental and occupational health as well as in the principles and practices of epidemiology. The training must be done where there is access to an environmental laboratory because the problems concern linking the levels of environmental contaminants to changes in human physiology, function or pathology and secondly demonstrating that the observed changes constitute a health problem or disease. Such specialists are in critically short supply and their absence may delay or impair the effectiveness of future programs.

10. The Development and Evaluation of Early Warning Systems.

An early warning systems could be developed for Latin America to discover or call attention to new, unrecognized, or emerging environmental health hazards particularly related to development programs and industrialization. Analysis of both monitoring programs and especially evaluation of the pollutants resulting from present and planned industry, mining and other development projects could warn, often in advance, of hazardous substances in the environment. An early warning system analyzing planned development projects could also assist in suggesting alternatives to industry to prevent production of certain pollutants. It could also provide critical guidance in design of air and water monitoring systems and epidemiological surveys.

Cooperating Centers

Once the research and training priorities have been established the search for national collaborating institutions begins. There are three major considerations to keep in mind in the identification of cooperating institutions.

The institution must have a demonstrated interest and professional competence in the project area.

In general it must have a multidisciplinary study already in progress. A "multidisciplinary team" could contain one or more biomedical, environmental, and behavioral scientists, or other professionals depending on the area of study. In some occasions this nucleus could be lacking and the first step could be to assist the institution to include a behavioral scientist, or other professional that may be lacking.

The third major consideration is a demonstrated capacity or potential of the multidisciplinary unit to complete a task which contains, in an integrated form, elements from each discipline.

Institutional stability and facilities are also important but will vary from one project area to another.

ECO has established two contracts to identify national collaborating institutions. The Institute of Ecology (TIE) in the United States has now completed a world study of ecological institutions with funds from the National Science Foundation and an additional small grant from ECO to study human ecology institutions and personnel in Latin America. A small grant to the University of Texas has identified institutions capable of providing training in human ecology.

Conclusion

The research and training program described above, if approved, will occupy a considerable portion of the Center staff's time for several years. Obviously modifications will be made, but if the program is considered basically sound and realistic then the Organization can start implementation immediately. Some beginning steps have

already been taken. Our first experiences indicate that the proposed strategy will be workable and that national institutions will welcome the opportunity to collaborate.

Science and the problems of human health are universal. An international agency with its operating sub-units such as Centers, can be a useful mechanism to stimulate and support much needed research and training. It can be an agent improving the transfer of information and technology to the benefit of all member states.