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ECOLOGY AND HEALTH[1,2]

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Health in any society should be defined in terms of prevailing ecological conditions—that is, in terms of the cultural and environmental variables affecting the population. This implies that instead of setting universal health standards we should ask how to define a satisfactory health level for a given set of conditions—and then look into ways to achieve that level.

Health Goals: Their Ecological Component

There is a general tendency to consider health, however it is defined, as an accomplishment that has fixed and universally valid goals. For example, the lexicon of international western medicine defines a healthy person as one who has a hemoglobin level of 15 grams per 100 ml of blood, whose feces contain no parasites, whose intestinal flora does not exceed limits cited in an international textbook, etc. Psychologically, this "healthy" man is expected to have a Western sense of humor, show no signs of depression, etc.

This Olympian definition of health automatically categorizes most of the world's inhabitants as being ill. Thus it is logical that this concept of health should go hand in hand with the idea that tremendous efforts are needed to reach "satisfactory" health levels—without considering a population's environment, levels of historic development, life styles, socioeconomic reality, etc.

Instead of accepting this universalized definition, it is our belief that health should be defined in terms of ecological reality—both biotic and cultural. Thus, just as a biologist is used to thinking in terms of ecological niches and knows that a species' success relates intimately to its niche, so a health professional should have a clear awareness of a human population's ecological niche, and should define a satisfactory state of health in terms of all the variables, including cultural variables, present in that niche. Of course, the most optimistic will try to "improve" the niche until it resembles some ideal found in the textbooks. But unfortunately, the truly ideal niche is neither well-defined nor permanent, and the possibilities for change are minimal in most countries. Furthermore, most of the textbooks are written in large cities—whose ecological drawbacks are known to all.

The ecological concept of health presented here does not imply perpetuation of a natural system with no attempts at improvement. Rather, it implies a quest for improvement, but in terms of the system's own reality. It implies trying to optimize the system without necessarily achieving international goals that may turn out to be unnecessary, undesirable, or utopian. By way of illustration, a national sport is a permanent source of community recreation. The fact that Olympic championships are won or lost does not affect the sport's value as a recreational device.

Two cases drawn from Latin America's complex reality may help to further illustrate this point. Consider the following

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facts: Medical students learn that a person's normal hemoglobin level is 15 g per 100 ml. In one tropical petroleum-producing region it is customary for companies to require that their workers pass medical examinations. A physician working for one of these companies has set 11 g per 100 ml as the normal minimum level, since his own blood does not exceed this level. The workers, meanwhile, have learned to give themselves iron intravenously in order to raise their hemoglobin levels, which are almost always below the minimum, and thus pass the examination. The opposite situation occurs when other workers high in the Andes request removal of up to one-and-a-half liters of blood in order to relieve the symptoms of chronic altitude sickness and lower their hemoglobin levels to that required by the company physician. We ask ourselves, Who is healthy? Who is sick? And given these complex conditions, Who enjoys a satisfactory state of health? It is evident that medical texts do not provide adequate information about conditions affecting people's lives in terms of their ecological reality.

If we accept this ecological concept of health, we should ask ourselves How can we proceed to define a satisfactory health level for the ecological niche under consideration? and How can we undertake to attain this level? It is clear that neither the sanitary engineer, the physician, nor any health professional alone can be prepared to undertake this task. Thus a multidisciplinary team is imperative. Sociologists, anthropologists, health professionals, political authorities, religious leaders, and others should comprise this team, which should specify and regulate the health activities within a particular community whose boundaries are defined in ecological terms.

Although we are convinced of the need for establishing multidisciplinary teams to specify, orient, and oversee the benefits derived from health, we do not believe that these teams should begin operating without a prior program of research. Moreover, it is necessary for the members of a multidisciplinary team to share a common philosophy, be accustomed to intercommunication, and be capable of working in an environmentally restricted area. Obviously, at least within the Latin American frame of reference, only the universities can provide these teams.

An Example: The Niche of the Andean Miner

As a specific step toward investigation of the health problem in terms of ecological conditions, we wish to present a model which we consider feasible and suitable for use in the Andean region. Within this area we have selected the special environment of the High Andes mining population, because we feel this environment has particular significance for health and well-being in the region.

The Problem

Andean mining is the most important economic pursuit in Bolivia, Peru, and Chile. Nevertheless, in the regions where they are carried out, mining activities constitute an invasion of ecological niches that is alien to the natural, ancestral habitat of the mining regions' populations. Moreover, the mining niche is assaulted by two severe influences—that of mining *per se* and that of high altitude, the two factors acting in combination. It thus seems clear that environmental assault is an extremely important consideration in the health of Andean miners.

General Research Goals

The goals of our projected study are as follows:

• To determine the extent to which the high-altitude environment affects the well-

being and health of the Andean mining population;

• To define the standards of living and corrective medical activities needed to create an optimum state of health for this population.

Multidisciplinary Teams

It will be necessary to identify centers in the Andean region that can organize multidisciplinary teams geared for work in the health sector. However, it should not be necessary for optimal team size and membership qualifications to be achieved at the beginning. The important thing is to have a dependable nucleus of people operating in an appropriate environment.

Other Requirements

• Economic support will be needed, so that team members will be able to devote sufficient time and attention to the assigned task.

• The work will also need PAHO/WHO advisory services, especially in the difficult areas of programming and evaluation of results.

Future Activities

• The participating teams should meet at the end of their preliminary operations.

• Results obtained should be used to extend the system of activities to other centers, in conjunction with budget increases based on local support.

• Depending on the success attained, and as a final measure, an effort should be made to establish the system at the Health Ministry level.

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An indispensable ingredient in these activities is the participation of two PAHO facilities—the Pan American Center for Human Ecology and Health (ECO) in Mexico and the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS) in Peru. The infrastructure and operation of these two centers are directly related to environmental health, the main topic of this meeting.[4] In this regard, it is proposed that the formative and normative aspects of the work, as well as the evaluation of research projects, be performed in close collaboration with ECO. The role of CEPIS would be to provide consultative services and human resource planning in the technical field of environmental sanitation—which obviously bears a key relationship to environmental health. It will be necessary, then, to estimate optimal future investment in environmental health research in terms of the savings anticipated from effective utilization of the two abovementioned centers, and to consider budgetary allotments ensuring that the centers can count on the necessary scientific and technological research facilities.

Despite the obstacles, we are convinced that health is a concept to be understood as a function of environment, life style, and philosophy of life. These variables, once determined, will permit the health professional to function secure in the knowledge that his activities are contributing to social betterment, and are not merely working toward universal goals which may be unsuitable or impossible to attain.

In this regard, it is satisfying to note that despite the complexity of ecosystems and the differences between them, efforts made in the area of environmental health have led to adoption of general measures such as the Ten-Year Health Plan for the Americas. A commentary on this plan by Vicente M. Witt[5] states: "They [the plan's authors]

[4]The 16th Meeting of the PAHO Advisory Committee on Medical Research, 11-15 July 1977.

[5]Vicente M. Witt, Planes nacionales de saneamiento ambiental en las Américas y las metas del Plan Decenal de Salud (1971-1980), en: *Simposio sobre Ambiente, Salud y Desarrollo en las Américas,* Centro Panamericano de Ingeniería y Ciencias del Ambiente (Publicación CEPIS No. 28), Lima, Perú, 1976, p. 140.

emphasized the need to approach problems in a practical manner during the new decade and they pointed out the importance of establishing goals that come as close as possible to reality by analyzing the need for an infrastructure and the need for planning available material, financial, and human resources as well as planning for those resources needed to reach the goals. They also considered new development trends and emphasized the need to approach and attack social and political problems in conjunction with plans for economic growth." Among other things, it would seem self-evident that only multidisciplinary teams can provide the advice needed by governments seeking to implement this ambitious ten-year plan.

In conclusion, we believe that although the health-related ecology problem is especially noteworthy in the Andean region, the problem is in fact a general one—and so the model presented here should not be restricted to certain zones of the Americas; rather, it should be understood that Health and the Environment are indivisible in any region inhabited by man.

SUMMARY

Health is commonly conceived as having fixed and universal aims, while conditions interposed by environmental and cultural conditions are often ignored or at least shunted to one side. Rejecting this point of view, the author asserts that health in any society should be defined in terms of ecological reality—that is, in terms of the cultural and environmental variables affecting the population. He also notes that acceptance of this concept does not imply perpetuation of a natural but static situation. Rather, it implies searching for ways to improve the situation without necessarily striving for international goals that may be unsuitable or impossible to achieve. The concept also implies that we should ask how to define a satisfactory health level for a given set of conditions—and then consider how to achieve that level.

The search for answers to these questions and subsequent programs based on the results will require a multidisciplinary approach. Within this context two PAHO facilities, the Pan American Center for Human Ecology and Health (ECO) and the Pan American Center for Engineering and Environmental Sciences (CEPIS), can provide strong support for activities in the Americas. Specifically, ECO is in a good position to collaborate on ecological planning, model-building, and research evaluation, while CEPIS is geared to provide advice and assistance in the key field of environmental sanitation.