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# DISEASES PREVENTION AND CONTROL RESEARCH ACTIVITIES

## WITHIN THE FRAMEWORK OF THE STRATEGIC AND PROGRAMMATIC ORIENTATIONS 1995-1998*

***Division of Diseases Prevention and Control***
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# DIVISION OF DISEASES PREVENTION AND CONTROL

## RESEARCH ACTIVITIES WITHIN THE FRAMEWORK OF THE STRATEGIC AND PROGRAMMATIC ORIENTATIONS 1995 - 1998[1]

## I. BACKGROUND

A set of eight broad regional goals has been extracted from the policy guidelines accepted globally in the Ninth General Program of Work of the World Health Organization. These goals cover the main objectives of the work of the Pan American Health Organization (PAHO): increasing the span of healthy life, ensuring universal access to services, addressing the health problems of priority groups, population issues, disease prevention, control or elimination, environmental health, and promoting of healthy lifestyles and behavior. In order to meet the regional goals, the **Strategic** and **Programmatic Orientations** for the Pan American Health Organization, 1995-1998, will form the basis for health action in the Americas for the forthcoming quadrennium, and will guide the strategies to be employed in addressing the priority health problems through a set of appropriately crafted programs.

The **Strategic Orientations** provide directions to be followed in the medium and long term and are of such consequence and amplitude as to merit the designation "strategic". They are intended not only to guide the work of the Pan American Sanitary Bureau but also to suggest priority areas of action for the Member States. The **Programmatic Orientations** that should be followed within each of these have also been established. Each includes the main areas in which the Organization as a whole—countries and the Pan American Sanitary Bureau—will work and describes more specifically the lines of action along which the Bureau will direct its technical cooperation to the Member States.

### Strategic Orientations

The Organization's governing bodies have identified five strategic orientations: Health in Development; Health Systems Development; Health Promotion and Protection; Environmental Protection and Development; and Disease Prevention and Control.

*Health in Development* is important to the Organization as it emphasizes the crucial role of health as an indicator and objective of human development. The reform of the health sector and the role of the State in sector reform as a whole are issues of critical interest.

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[1] *OPS/HCP/HCT/052.95*

*Health Systems Development* seeks to redress the inequities in access and coverage that are the cause of many of the most pressing health problems. The most important operational aspects to be considered are decentralization and strengthening the establishment of local health systems.

*Health Promotion and Protection* addresses the need to face the behavior and lifestyle issues that underlie a wide range of disease problems. The emphasis must be on individual as well as community behavior; the problems range from those associated with poverty such as malnutrition to those associated with the risks brought about by demographic and social change.

*Environmental Protection and Development* is a response to the need to comply with global and regional commitments, as set out clearly at the United Nations Conference on the Environment and Development (UNCED), to preserve, protect and restore the environment; the focus is on the relationship of the environment to human well-being.

*Disease Prevention and Control* seeks to describe the steps to be taken to deal with traditional communicable diseases, new and resurgent problems such as AIDS and tuberculosis, as well as to address the important noncommunicable diseases. The Region's successes in disease eradication are stimuli for the development of well focused programs in this area. Within PAHO, the Division of Disease Prevention and Control (HCP), is responsible for the prevention and control of communicable and noncommunicable diseases, and is concerned with this strategic orientation as well as the related program priorities. Implementation of corresponding lines of action also falls under its responsibility.

## II. INTRODUCTION

The function of the Division of Diseases Prevention and Control (HCP) is to strengthen national capabilities to implement effective prevention and control programs which are technically feasible, economically viable, and socially acceptable. The main goals are: to integrate disease prevention and control activities within the local health systems, to promote community participation and to advocate for the efficient use of the available resources within local programming. HCP does not conduct prevention and control activities per se. Rather, it promotes the strengthening of the infrastructure in both field and laboratory operations, providing under its mandate the tools to assist the national counterparts in initiating or implementing their own prevention and control activities efficiently and effectively. Technical cooperation is provided within the framework of the four Programs

and three Centers that make up HCP. The Programs are: AIDS, Communicable Diseases, Noncommunicable Diseases and Veterinary Public Health. The Centers are the Caribbean Epidemiology Center (CAREC), Pan-American Center for Foot and Mouth disease (PANAFTOSA), and Pan-American Institute for the Protection of Food and Zoonosis (INPPAZ). A description of the functions of HCP is attached as Annex 1.

**1. Situation Analysis of Diseases under the Responsibility of HCP**

All the countries in the Region of the Americas are experiencing changes in the profiles of their populations and the health problems they confront. They have all shown declines in infant and childhood mortality and increases in life expectancy at birth, a result primarily of the control of infectious diseases in the early years of life. As populations have aged and become concentrated in large urban areas, chronic and degenerative diseases, particularly cardiovascular diseases and cancer, have become more important as causes of morbidity and mortality. The countries that have reduced early mortality the most and have achieved the lowest birth rates have the highest incidence of chronic diseases, while at the other end of the spectrum are countries with high infant and child mortality caused primarily by infectious agents that produce diarrhea and acute respiratory illness as well as diseases that affect adults and children such as malaria and tuberculosis. Even the countries that have reduced infectious diseases must maintain programs capable of preventing their recurrence and dealing with new problems, such as HIV/AIDS, hemorrhagic fevers, and hantavirus infections.

As mortality from communicable diseases in the early years of life has declined, there has been an increase in chronic and degenerative diseases. There are few countries of the Region in which cardiovascular diseases account for less than 20% of all deaths and in many countries such diseases are responsible for over 30% of deaths. Although most of the countries have shown reductions in age-specific rates for both sexes, especially among the population over the age of 45, in many cases these rates could still be reduced substantially. Cancer currently accounts for more than 10% of all deaths in all the countries, and in some it accounts for as much as 20%. The fact that mortality from lung cancer is increasing and death rates from cervical, breast, and stomach cancer remain very high is particularly noteworthy, considering that a large proportion of these deaths could be avoided.

Violence, especially domestic violence and other intentionally inflicted injury, has become one of the most serious public health problems in the large cities of the Region. In Colombia, for example, homicide is now the leading cause of death in the general

population. Between 1987 and 1992 the total number of violent deaths in that country surpassed the total number of AIDS deaths in the entire Region during the same period.

Infectious diseases, including zoonoses, continue to be significant health problems in the Americas, in spite of the existence of well-known and effective means of treatment and control. Foremost among these is malaria, the incidence of which has increased in areas experiencing influxes of migrants looking for new opportunities. Around 40% of the population of the Americas lives in places in which conditions are ecologically propitious for the transmission of malaria, and more than 200 million people live in malaria transmission areas. The number of cases increased considerably in the affected countries between 1974 and 1991 and then began to decline again in 1991.

Despite the existence of a cost effective cure, tuberculosis is another ancient scourge which is not under control in many countries due to weak control programmes, and accounts for over 100,000 deaths in the region each year. The emergence of multi-drug resistence and the spread of HIV-TB coinfection exacerbate this public health threat.

Since the early 1980s, the Region has experienced numerous epidemics of dengue. Dengue has become endemic, with periodic epidemic outbreaks in most of the countries located in tropical zones, providing evidence of high rates of *Aedes aegypti* infestation. Outbreaks of dengue hemorrhagic fever have occurred, and there is a continuing risk of major epidemics of this form of the disease.

Chagas' disease persists as a problem, mainly in rural areas of tropical or subtropical zones. The disease is associated with low socioeconomic levels and poor quality housing. It is estimated that at least 16-18 million people in the Region live in dwellings infested with *Triatoma infestans* or other household vectors of Chagas.

Leprosy is endemic in most countries, with approximately 350,000 existent cases in the Region. Other food-borne and water-borne infectious agents, such as *Escherichia coli* O157:H7 and *Cryptosporidium*, are new threats compounding the endemic problems caused by *Salmonella* and *Shigella*. Hemorrhagic fevers have caused illness and death in Venezuela and Argentina.
Various types of hepatitis virus infections are endemic in most countries.

While the control of childhood infections has resulted in part from improved living conditions and nutrition, the greatest successes in this area have been achieved through immunization programs. In addition, promotion of the use of oral rehydration salts has

reduced deaths from diarrhea significantly, and systematic approaches to the management of acute respiratory infections in children is likewise reducing mortality from this common cause of childhood illness. Nevertheless, diarrhea and ARI remain top killers of children under five in the Region and especially affect the poorest segments of the population.

The cholera epidemic that began in January 1991 has affected almost all the countries in the Hemisphere. By late 1993 close to one million cases had been reported, and the disease is showing a tendency to become endemic in areas in which basic sanitation is deficient and the educational level of the population is low.

Continued success in controlling these diseases will require strong and effective programs that reach all segments of the population. It also will be important to ensure that preventive measures, such as safe food-handling and water disinfection, are implemented to reduce the incidence of common infections.

The upward trend of sexually transmitted diseases continues. AIDS has now spread to all of the countries of the Region and, although the characteristics of the epidemic vary from country to country, in general heterosexual transmission is becoming increasingly prevalent. The risk of transmission tends to be higher among poor populations. By March 1994 a cumulative total of 445,000 AIDS cases had been reported in the Americas, and 250,000 of those affected had died. It is estimated that at least 3 million people in the Region are HIV-infected.

Rabies is a continuing problem, though considerable success has been achieved in controlling rabies transmitted by dogs. Many other viral, parasitic, and bacterial diseases and zoonoses remain endemic or epidemic in the Americas.

## 2. Programmatic Orientations

### 2.1. Major Areas of Work in Disease Prevention and Control

In view of the situation described above, major areas of work for the Organization have been identified as follows:

a. Programs for the control of diseases of childhood, such as diarrheal diseases and acute respiratory infections, should be maintained and strengthened. Leprosy control efforts should also continue. Research must continue into the development of new technologies suitable for application at the community level for the prevention of infections.

b. Practical methods for preventing food-borne and diarrheal diseases, including safe food processing and handling and water disinfection, should be implemented as soon as feasible.

c. Significantly greater effort should be made to support programs aimed at preventing the spread of HIV infection and other sexually transmitted diseases and reducing their impact. Such efforts need to be coordinated with other intergovernmental, multilateral, and bilateral agencies and nongovernmental organizations, including HIV/AIDS programs of the United Nations and Inter-American systems.

d. Programs for the control of vector-borne diseases, particularly those for malaria, and other parasitic, viral, and bacterial infections, including tuberculosis, which pose serious threats to public health in the Region, should continue to be given priority. In addition, countries must be assisted in confronting new types of infections which result from changes in human behavior and the environment.

e. Veterinary public health programs should be directed toward improving animal health and agricultural productivity and enhancing the quality and safety of foods. Emphasis will be placed on assuring access to international markets through the establishment of and compliance with international standards.

f. Noncommunicable diseases, particularly cancer and cardiovascular disease, as well as injuries and violence must receive increasing attention as populations age and social conditions change. Approaches to the prevention and control of these problems must include effective surveillance and research and be coordinated with efforts to improve living conditions and promote healthy lifestyles and community involvement.

### 2.2. Lines of Action

The Division will orient its technical cooperation with the countries so as to:

- eradicate or eliminate certain health problems, including poliomyelitis, leprosy, rabies transmitted by dogs, onchocerciasis, and transmission of *Trypanosoma cruzi* by blood transfusion and by domiciliary *Triatoma infestans*;

- develop a more complete understanding of the causes and risk factors responsible for food-borne and diarrheal disease and methods for their prevention;

- on the basis of improved knowledge, implement simple and cost-effective measures in communities and families to maintain food and water free of infectious agents, in order to reduce mortality from diarrheal diseases;

- support national efforts to coordinate activities for the control and prevention of HIV/AIDS and for reducing its impact on populations and on infected persons;

- strengthen local capacity to prevent, diagnose, and treat sexually transmitted diseases, especially in primary health care services;

- target programs to known risk groups and risk factors, employing the basic approaches of risk analysis and stratification;

- improve capacity to detect changes in the occurrence of infectious diseases and to assess potential impact on the public's health, so as to implement timely and effective prevention and control;

- support national efforts for the control and eventual eradication of prevalent zoonoses and other infectious diseases that threaten human health or compromise agricultural productivity;

- strengthen national capacity to organize and develop integrated food protection programs and epidemiological surveillance systems for food-borne diseases;

- collect relevant information about the distribution and determinants of health problems as an essential prerequisite for the planning, execution, and evaluation of programs;

- enhance national and local capacity to assess the social and economic impact of violence, injuries, and chronic diseases, so as to establish priorities and secure resources for interventions;

- promote the integration of disease control programs into health services, particularly at district and local levels, with appropriate decentralization of authority and resources.

### 2.3. Research Objectives

It is within the context of these major areas of work and lines of action that research will be promoted, sponsored, and coordinated by the PAHO Division of Disease Prevention and Control. Priniciple research objectives will include:

a. Identifying gaps in knowledge that must be filled to improve prevention and control programs.

b. Promoting and supporting the generation and dissemination of knowledge needed to fill the identified gaps, bearing in mind the needs and possibilities of each country.

c. Identifying national researchers and institutions that could collaborate with the Organization's sponsored research efforts, and stimulating the formation of research networks.

d. Promoting the strengthening of national institutions that can and will carry out research and research training.

e. Compiling, analyzing, and disseminating information on research findings in order to make information on health research readily available to researchers, administrators, and policy makers.

## 3. Disease Prevention and Control: General Research Priorities

The Regional health situation makes it necessary to understand the specificity, complexity, and determining factors of morbidity and mortality in the countries of the Region, and differentials by social group, with a view to generating new knowledge for the prevention and control of the diseases most significant for public health. There is also an urgent need to develop and evaluate intervention methods and techniques for preventing and controlling these diseases. These needs also form the basic core of priority research activities in this field. Based on the main areas of work and research objectives, the principal lines of research which all HCP Programs will promote are as follows:

### 3.1. Basic epidemiologic and socioeconomic studies for the development and evaluation of disease prevention and control interventions

- Sociocultural, environmental, and epidemiologic studies of the behavior of diseases of public health interest in the Region, geared to the development of intervention models for their prevention and control based on the specific characteristics of these diseases in various social groups and geographic contexts.

- Design and evaluation of these models, particularly those that include social participation strategies, as well as studies of the cost-effectiveness of various forms of intervention.

### 3.2. Development and field testing of new methods and techniques for disease prevention and control

- Development, testing, and evaluation of methods applicable at the field level, for detection of communicable and non-communicable diseases of public health importance, particularly through the use of new biotechnology techniques such as monoclonal antibodies, PCR, and peptides synthesis.

- Development of vaccines through projects that utilize or develop conjugation techniques, purification of proteins, antigen delivery systems, and methods for typing microorganisms.

- Studies and analyses of promising compounds derived from natural plant extracts for the development of drugs through the use of modern biological testing techniques.

### 3.3. Development and evaluation of models for inclusion of disease prevention and control in health services

- Studies of the problem-solving capacity of the services for prevention and control of diseases of public health importance, and of the cost-effectiveness of interventions.

- Analysis and evaluation of models to integrate vertical prevention and control programs into health services at the various levels of care.

## 4. Research Areas to be Promoted by Specific Programs and Centers

The research focii of the programs and centers are described below, most of which fall within the lines described above.

### 4.1. AIDS/Sexually Transmitted Diseases

Research in these fields has gained importance in the Region as countries began to recognize the importance and speed of the spread of the AIDS epidemic. The areas of research to be promoted encompass a broad range of topics, from ethnographic to epidemiological research.

*4.1.1. Social and behavioral research.*
This is critical for stopping the spread of the AIDS epidemic. This will include: studies on the importance and impact of sexual habits on the risk of infection with the HIV virus; studies on the evolution of sexuality in youth and its relation to AIDS; studies on household and community response to HIV/AIDS; studies on sexual negotiation, the empowerment of women and the female condom, and the sexual culture and practices in young people.

*4.1.2. Operational research.*
Will include: Multicenter studies to validate the AIDS/STDs educational material package to be introduced into school curricula; assessment of the impact of educational activities among youth; and development and evaluation of a prototype questionnaire to collect anonymous information on needs and common demands of people needing or undergoing counseling.

*4.1.3. Epidemiological research.*
Will include: impact evaluation of current prevention and control programs; the implementation of general population surveys to measure behavioral indicators; validation of algorithms for STDs management; validation of alternative algorithms for HIV diagnosis in Reference Laboratories; validation of preventive indicators; and development of statistical models to correct reporting delays in AIDS surveillance.

*4.1.4. Clinical research.*
Studies to be promoted include: a retrospective analysis of pediatric pathology; clinical trials to measure the efficacy of Tuberculosis chemoprophylaxis in HIV(+) PPD(+) adults; formation and follow up of a cohort study of HIV(-) persons at high risk; retrospective study to review the HIV case definition and the follow up of discordant couples to measure heterosexual transmission of HIV.

*4.1.5. Laboratory and vaccines.*
Research will be directed to HIV antibody detection in oral fluids; a transversal study of the safety of blood banks in Latin America and the Caribbean; validation of a simple and quick test for syphilis; and the collection of baseline data in Brazil in order to identify appropriate sites for future vaccination trials.

## 4.2. Communicable Diseases

*4.2.1. Malaria and other Vector Borne Diseases*
Trials that are being conducted using spatial fogging of selected areas to offer protection, preventing infection and with this, reducing the spread of vector borne disease to other areas, will be expanded. Similarly, different insecticides and means to applied them will be tested. The use of barrier spraying with long lasting insecticides should be further explored, not only for protection against malaria, but also against leishmaniasis, yellow fever as well as selvatic arboviruses. The use of personal protection, in many cases, has also been left to the side or not totally explored. Even though the use of insecticide impregnated bednets are being evaluated in some countries, their use in the Region is limited to their acceptability. If the use of bednets is not part of the culture, or the use of beds is not part of the culture, they are of little value, impregnated or not. The introduction of a measure that changes the day to day habits of the population may be of little value, even if it is effective. Considering that a large part of the population at greatest risk for malaria in gold fields sleeps in hammocks, the efficacy of insecticide impregnated hammocks or barriers under hammocks (attached impregnated cloths) to prevent malaria, will be assessed.

Malaria vaccine development and evaluation will be another priority area. In a population-based field trial in Venezuela, the SPf66 malaria vaccine was safe, immunogenic and efficacious against *P.vivax* and *P.falciparum* infections. Around 7% of vaccines reported light side effects mainly after the 2nd and 3rd doses.

Antibodies to SPf66 were found up to a year after the 3rd doses. The protective efficacy of the vaccine was estimated to be 55% for *P.falciparum* and 41% for *P.vivax*[2]. These promising results obtained in Latin America have stimulated a new and bigger trial to be conducted in Colombia.

Malaria control in mining areas has been a major challenge mostly because of the instability of the population, precariousness of living conditions and the ecological imbalance produced in such situation. In this areas, the role of health services for malaria control, specifically the influence of accessibility as well as the effect of decentralization, must be evaluated in different countries. Others areas of research will be population-based studies in developing areas, analysis of exposure factors related to environmental changes, and evaluation of specific interventions in special areas.

The general consensus in the Region is that the "government" alone cannot resolve the problems of ***Ae. aegypti*** and dengue/DHF. However, a frequent concern in programs counting on community involvement is whether the positive effect of short-term interventions can be sustained. Research on methods that might increase the sustainability of such programs such as a) addressing other health and sanitation problems considered important by the community such as pest mosquitoes, lack of refuse collection, poor conditions of roads and the lack of a functioning sewage system; b) collaborating with other private or municipal organizations working concurrently in the community and c) integrating community activities with routine government disease prevention services. Studies will also be promoted to generate methodologies for community participation and for producing a change in behavior in relation to mosquito breeding places so to promoting the development of "a culture against dengue".

*4.2.2. Tuberculosis*

a. TB/HIV research: Immunological depletion due to HIV infection increases the risk of TB caused by endogenous reactivation in persons previously infected with *Mycobacterium tuberculosis (MT)*. Newly acquired TB infection in HIV infected patients can also spread and progress rapidly to active disease. Hospitals for Infectious Diseases, where HIV infected and TB patients are simultaneously assisted, present ideal conditions for rapid spread of infection

[2] (J.Inf. Dis., 170:396-402, 1994)

among immunodeficient patients. In order to identify the origin of infected strains and document the problem. Restriction fragment length polymorphism (RFLP) analysis of MT isolates will be evaluated comparatively with drug resistance tests and DNA fingerprinting. Assessment of TB chemoprophlaxis in coinfected individuals (as noted above) will also be continued.

b. Drug resistance: A multicountry study will be carried out to initiate surveillance of drug resistance in MT in South American countries following common guidelines to standardize and optimize drug resistance surveillance activities.

c. Operational Research: As revitalized control programmes are implemented, operational research to answer the problems of some or all programmes will also be promoted, including studies on methods to assure treatment supervision and adherence, causes of diagnostic delay, and improved estimates of the annual risk of infection in high-prevalence countries.

*4.2.3. Leishmaniasis*

Vaccines offer a unique challenge, because it is only recently that they have become available for protozoan diseases. Attempts will be made to continue the vaccine development and field evaluation of crude parasite and fractionate vaccines for cutaneous leishmaniasis in Brazil, Colombia, Panama, Peru and Venezuela. Since dogs do not respond to treatment for *Leishmania chagasi* infections, canine vaccines are another important research challenge in the reduction of Visceral Leishmaniasis. Two of such vaccines will continue to be tested in Brazil. One, which showed promise in Phase I and II trials in the laboratory has been extended to a Phase III trial in a highly endemic area. A second one, which has also shown promise in the laboratory, is waiting for the opportunity to be tried in the field.

Another area of interest is the development an evaluation of a dip stick that can make possible rapid diagnosis of an infected dog under field conditions. Others, which are still in initial phases of development, include the use of insecticides, that when applied to dogs (topical or in tags), interrupt the chain of transmission from dog to sandfly.

*4.2.4. Elimination of Diseases*

As part of the South Cone Initiative, as a way to prevent vectorial transmission of *T.cruzi*, a frontal attack is being conducted on intradomiciliary ***Triatoma infestans*** through the use of residual insecticides, health education and, when possible, house modification. It is expected that vectorial transmission of ***Trypanosoma cruzi*** will be interrupted in Uruguay in 1995, Chile in 1997, and Argentina and Brazil between 2002 and 2005. A remaining question is how to effectively treat children that are already infected. Chronically infected adults are not parasitologically cured when treated. On the other hand, if children can be cured by treatment, all serologically positive children that have been detected in a geographical area clean of ***T.infestans*** must be treated. In order to answer this question, the efficacy of drugs among schoolchildren (7-12 years old) seropositive for antibodies to ***T. cruzi*** will be tested through randomized controlled field trials.

In addition to ***T.infestans***, the Region has targeted for elimination non venereal treponematosis, onchocercosis and leprosy. In order to support elimination activities, epidemiological studies will be completed on non venereal trepanomatosis and onchocercosis. The former in Colombia, Ecuador and Venezuela and the latter in Brazil, Colombia, Guatemala, Mexico and Venezuela. These studies will serve as the basis for evaluating the elimination strategies. In leprosy, research will be focused on the evaluation, quality and problem-solving capacity of health services.

*4.2.5. Diarrhoeal Diseases*

Diarrhea is one of the main causes of death among children less than 5 years but current estimates of diarrheal mortality are not completely accurate, the reasons why children die from diarrhea are unexplored, and case management techniques being used remain often unassessed. Therefore studies are needed to: 1) describe the epidemiology of diarrheal deaths and determine the extent of their under reporting; 2) use verbal autopsies as part of a case-control study to examine why children are dying of diarrhea and what further can be done to prevent this; and 3) assess case-management protocols with the goal of identifying ways to improve them. Research of this kind will include a descriptive epidemiologic analysis of vital registration data for diarrheal deaths and assessment of the extent of under reporting; case-control analysis examining risk factors that distinguish children who die from diarrhea (cases) with 3 separate controls: children who die of acute respiratory disease or other causes, children who survive with severe diarrhea, and children who survive with

mild diarrhea; a survey to link the quality of the training message provided to children in the clinic with the outcome of their illness (death or severe dehydration developed after the Emergency Room visit) and subsequent knowledge concerning treatment.

Research is also needed to establish the health effects, social acceptability, economic feasibility and the sustainability of household level disinfection of water in storage containers designed to exclude contamination, using disinfectants produced in the community. These studies will be linked to assessment of the effect that the aforementioned interventions have on the incidence of cholera and other diarrheal diseases in communities with unsafe water supplies; to compare the frequency of various bacterial, viral and parasitic enteric infections in populations with and without the interventions; to identify factors that hinder or enhance acceptance and proper use of such water containers and locally produced disinfectants; to further assess the effect that the interventions have on the microbiological quality of the water; and to ascertain the feasibility of sustaining community based production of disinfectants (both mixed oxidants and sodium hypochlorite) in the local community.

Efforts to develop an effective vaccine for cholera caused by *V. cholerae 01* will continue to focus on the field evaluation of killed and live oral vaccines. A trial of the protection provided by killed oral whole cell/rB subunit vaccine against cholera, and against moderate and severe dehydration in cholera cases is the priority.

*4.2.6. Acute Respiratory Infections*

Research for control of acute respiratory infections will include work in the following areas:

a. **Investigations of health systems.** Such as evaluation of the efficiency and efficacy of techniques for controlling acute respiratory infections and their field application. Among the components that should be evaluated: 1) the manner in which the community health agents manage the signals and symptoms of acute inferior respiratory infections with distinct prevalence rates and the use of distinct antibiotics; 2) methods for teaching families to recognize symptoms for moderate and severe cases of acute respiratory infections; and 3) evaluation of distinct treatments in the cases where the patients who cannot be referred to secondary or tertiary facilities.

b. **Epidemiology and control of ARI.** This will include the evaluation of risk factors for acute respiratory infections in distinct geographical areas, especially those that can be modified, such as air quality and nutrition; normalization of methods for determining causes of death included in verbal autopsies and death certificates; and evaluation of new techniques for identifying etiological agents in acute respiratory infections.

c. **Studies on the interactions of pathologies related to the Sick Child Initiative.** This includes extension of studies on malnutrition and pneumonia within communities, establishing correlations between the etiologies; establishing whether there is any relationship between pneumonia and malaria in malarial zones; definition of the clinical criteria for evaluating patients with fever; and evaluation of the operational strategies for the application of the sick child initiative at the health service level.

d. **Ethnographic studies in ARI control.** Focused ethnographic studies using the already available manual in different geographical settings in order to obtain baseline data for developing messages to stimulate community involvement in ARI control and to improve program planners and care providers knowledge of home care practices.

This will include as assessment of the relationship of the following factors with asthma incidence, security and treatment (i) intestinal helminthiasis; (ii) increase in serum Ige; (iii) prevalence of bronchial hyperactivity; (iv) prevalence and quality of care for asthma; (v) obstructive bronchial syndrome in children under 5 years of age.

e. **Treatment and control of ARI.** To determine the prevalence of bacterial and viral pneumonia in the community; etiological and clinical therapeutic studies of pneumonia in children less than 2 months of age; and to establish a profile of pulmonary function in malnourished children less than 1 year of age.

f. **Surveillance of antimicrobial resistance of S. Pneumoniae and H. Influenza.** To determine sensitivity to standard antibiotics at the health facility level (Cotrimoxazole, Amoxycillin, Ampicillin & Procaine Penicillin).

g. **Field test of simplified technologies for ARI control.** This will include evaluation of use of timers developed by WHO/UNICEF for measuring

respiratory frequency in children in order to detect pneumonia within the community by non-medical personnel; establish the efficiency and MIC from bronchodilator inhalants in bronchial hyperactivity utilizing foot pump nebulizers (model developed by WHO) in peripheral health posts; and the efficiency and cost/effectiveness of concentrated oxygen use in the hospital treatment of ARI and wheezing in children less than 5 years of age in rural area hospitals.

### 4.3. Women, Gender and Tropical Diseases

This is a special area of work that cuts across all the areas listed above. Women are exposed, with varying degrees of intensity, to interrelated risk factors that make them vulnerable in different ways than men to bacterial, viral, and parasitic diseases. The factors may be clinical, contributing to morbidity and mortality caused by infection, and are linked to different epidemiological indexes, such as the prevalence and intensity of infection and the immunity of the host. They may be social, extending to cultural or economic factors that are conducive to higher clinical risk or that impede treatment to prevent or improve the clinical picture. Social factors include cultural patterns and behavior, illiteracy, low income, and the modest social condition of women, which makes their access to health services even more difficult.

In recent years a growing number of studies have been conducted on matters related to women in health and development, many of which refer to poor women in developing countries. As more knowledge is gained about the influence of tropical diseases on health and their financial cost for development, there is growing interest in determining the effects of such diseases, particularly for women. Millions of Latin American women suffer from American trypanosomiasis, schistosomiasis, malaria, filariasis, enteroparasitic diseases, and leprosy.

Women and men are particularly exposed to tropical diseases if they are poor and live in rural areas. The incidence and prevalence of any of these diseases in a given period indicates exposure, susceptibility of the host, and social vulnerability. In addition, the division of labor can also influence exposure.

In view of the above, some of the questions to be answered through research promoted by HCP are whether women and men are exposed to a different risk of contracting tropical diseases, whether the physiological characteristics of women make them more or less susceptible to those diseases, and whether their consequences vary according

to gender. For the purpose of delving into these question, advantage will be taken of the Small Grants Program, sponsored and financed by the Special Program for Research and Training in Tropical Diseases, United Nations Development Program/World Bank/WHO (TDR).

### 4.4. Noncommunicable Diseases

Research on cardiovascular diseases (ischemic heart disease), metabolic disease (diabetes mellitus), and injuries (particularly motor vehicle accidents) will be done focusing on ways to promote health examinations, to measure quality and results of care, and to define policies, traffic engineering and promotion.

A major thrust of the research agenda during the quadrennium will be on prevention and treatment of cervical cancer, with a focus on establishing the feasibility of reorienting cervical cancer prevention in the context of an integrated approach to women's health.

Cervical cancer is the most common cancer and the leading cause of morbidity, mortality and deterioration of the quality of life in women in the Americas. These deaths, affecting women in the most productive period of their lives, impose a preventable societal and economic burden. The natural history of cervical cancer allows for early detection, at stages where close to a 100% cure rate can be achieved. Moreover, the dramatic decline documented in both mortality and incidence of invasive forms in some countries of the American Region, provides irrefutable evidence that this problem can be solved. In addition, secondary prevention is regarded as highly cost-effective ([3]) and countries which have "reoriented" their programs, are beginning to show success.

In Central America, the overall impact of national or regional programs/activities to prevent cervical cancer has been low. With very few exceptions, a high mortality rate and a high incidence of invasive forms of cervical cancer remain virtually unchanged, and/or continue to increase. Programs and activities in most Central American countries have been affected by the following major limitations: extremely low coverage of screening, in part due to poor recruitment and lack of motivation of women in "high risk groups"; program activities have been focused on younger (low risk) women, who have often been submitted unnecessarily to repetitive screening; there have been inadequate training, equipment and standardization of procedures for collection of PAP smears; cytology laboratories have been affected by low productivity, poor quality and excessive delay in the processing of PAP; pre-

[3] Investing in Health. World Bank World Development Report, 1993

invasive cases detected have too often been diagnosed and treated inappropriately, or lost to follow-up; and registries and information systems to monitor and evaluate both the process and impact of these programs do not exist. In order to improve the situation, at least one demonstration center will be established in each of the participating countries to test the feasibility of "reorienting" cervical cancer prevention.

The feasibility of reorienting the program in each demonstration center will be tested in terms of: (i) achieving optimal coverage of PAP screening; (ii) increased laboratory productivity and quality assurance; (iii) screening focussed on high risk groups and periodicity adjusted; (iv) effective diagnosis and treatment services operational (for preinvasive lesions) circulable in at least in one clinic; and registries (v) and information system for monitoring, follow-up and evaluation are fully operational.

### 4.5. Veterinary Public Health

Since veterinary public health involves multiple aspects of animal health and production, food safety, biomedical models, prevention and control of zoonoses, and protection of the environment, its activities must be founded on intersectorial and interinstitutional collaboration. The following are priority areas for research.

#### *4.5.1. Food protection*

Research will be directed to: evaluating the cost-effectiveness of the prevention and medical attention of foodborne diseases (FBD); evaluating of the microbiological quality of street foods in major cities; assessing the risk of acquiring foodborne disease by food consumption; evaluation of the infective doses of *Vibrio cholerae* on street food in the conditions of Latin America; improving understanding of the behavior of street food consumers in order to define education programs to modify conduct so as to prevent foodborne diseases; and evaluating the cost-effectiveness of hazard analysis and critical control point (HACCP) application in the inspection of food of animal origin with relation to other systems.

Another area to be explored is the presence of chemical residues in food. Techniques for quality and safety control should be developed. The harmful effects of chemical residues must be evaluated to adopt simple detection techniques that facilitate international commerce of food. Similarly, a close observation of residues of veterinary drugs must continue as more drugs are introduced into the market. Therefore the objective of this line of research will be the standardization of

techniques and analytical methods to detect chemical residues in food and implement them in national laboratories of food analysis.

*4.5.2. Zoonosis*

a. **Rabies.** Research will be promoted on: development of a new slow release antigen vaccine; vaccines for wild animals; virus characterization through monoclonal antibodies; population dynamics, distribution, behavior, habitats and mechanisms for control of bats; cost-effectiveness of epidemiological surveillance for rabies; and risk assessment studies in those countries that eradicated rabies to establish adequate quarantine measures to prevent rabies re-introduction.

b. **Bovine tuberculosis.** This disease is a a source of economic losses in South America and a threat to human health. In order to identify sources of infections and carry out surveillance, use of DNA fingerprinting, using three probes: IS 6110, PGRS and DR will promoted. Preliminary data from a comparative analysis made with strains isolated from the South Cone countries suggests that most strains presents a unique pattern with IS6110 probe, while they could be grouped into different clusters by the combined use of PGRS and DR. Another study will be sponsored in order to evaluate different diagnostic tests (tuberculin, ELISA, gamma interferon), for rapid and specific diagnosis of TB in llamas.

c. **Equine encephalitides.** Venezuelan Equine Encephalomyelitis (VEE) is of concern because of its pathogenicity to humans. There are different subtypes and variants of VEE virus. Research is needed to map those encephalitic episodes, identify virus, develop a genetic typing, know pathogeneses of different variants.

d. **Echinococcosis/Hydatidosis.** Research for prevention, control and treatment of hydatidosis should continue in order to develop more efficient techniques for identification of dogs carrying Echinococcus as well as for developing vaccines to prevent hydatid disease both in humans and animals. Cost-effectiveness studies of the different models of control programs will be promoted in order to obtain sufficient information to adopt new elimination strategies.

e. **Other parasitic zoonosis.** Local situational studies of important parasitosis, such as taeniasis and cysticercosis, and fascioliasis should also continue. The development of simple and accurate diagnostic techniques for *Taenia solium* infection is needed, as well as more knowledge on the pathogenesis and immunology of human and animal cysticercosis, and for developing vaccines, particularly for pigs.

*4.5.3. Livestock and companion environmental impact*

In spite of the fact that livestock herds are growing, there is still no satisfactory and safe means for the disposal and elimination of the animal production wastes. Studies should be directed to: proper disposal and elimination of livestock wastes and residues without harmful effects to environment or public health; out health risk assessment in operational livestock units to assess human in environmental treats; and to identify mechanisms to protect human health and maintain environmental safety in a well balanced urban ecosystem.

*4.5.4. Foot and Mouth Disease (FMD)*

Foot-and-mouth disease affects cattle, sheep, goats, and swine and is target for eradication in the Region. Research will be done in order to support this objective in the following areas.

a. **Virology.** Studies will continue on improvement of techniques for controlling the potency of foot and mouth disease vaccine; molecular characterization of foot-and-mouth disease virus strains using R Nase I; two-dimensional mapping fingerprinting and by direct CDNA nucleotide sequencing; use of recombinant proteins in an ELISA test to detect antibody levels in different FMD ecosystems; to identify viruses and immunogenic determinants for the selection of vaccine strains as well as FMD mutants by monoclonal antibodies; immunity coverage and stability studies to select suitable strains for vaccine production; identification of other etiological agents which can produce lesions or syndromes similar to FMD, especially in disease free countries and areas. Viruses which are being studied are infectious Bovine Rinotracheitis (IBR), Blue Tongue (BT) and Bovine Leucosis.

b. **Epidemiology.** Epidemiological characterization of FMD ecosystems and analysis of risks associated with exportation of meat and genetic material will continue.

*4.5.5. Conservation of Human Primates*

For the conservation of human primates, it is necessary to reproduce of a limited number of high quality, fully conditioned animals for repopulation or to make them available for the benefit of human health. In order to meet this objective, ecological, reproductive and ethological studies will be promoted or be continued under natural conditions, and the identify species and to assess population distribution dynamics, to estimated risk of extinction and to determine effects of cropping on several species as well as reproductive and management studies of colony reared populations of *Aotus Nancymai, Aotus Vociferans, Saimiri Boliviensis Peruviensis* and *Saguinus mystax* and on adaptation patterns, reproduction and population dinamics of *Saguinus Mystax* and *Saguinus Labiatus* introduced in islands.

## III. THE CHALLENGE

The capabilities of countries to perform research has steadily increased. However, in the current fiscal climate, one of the main challenges for research promotion is to convince other agencies as well as countries that research pays off.

As it is impossible for the Organization to be involved in all research activities currently being carried out at the national level, or to be carried out in the future, PAHO should be highly selective and direct its efforts towards the most critical areas where research will have the highest impact. PAHO research resources are minimal when compared with those of other agencies or those available in the countries (see malaria example in table 1). Presently, extensive use of national resources, individual and/or institutional, are being made. Mobilization of these resources will ensure that the technical cooperation will have some permanent effect. Advantage is also being taken of cooperation with WHO Special Programs such the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR). Funds for malaria research from the Region provides an example of how a wide range of institutions can be brought together to support research objectives in one field (see table 1).

The lack of uniformity in the countries of the Region in relation to research, makes it necessary to foster collaboration among countries so that research activities are carried out in a more productive and efficient manner and results are quickly and widely disseminated. This objective is implicit in each of the areas of research promotion and support described above.

PAHO will continue to play a catalytic role in promoting, sponsoring, and coordinating research in the Region.

## ANNEX I

## FUNCTIONS OF THE DIVISION OF DISEASE PREVENTION AND CONTROL

Promotes, coordinates and supports the strengthening of national capabilities to implement prevention/control/elimination programs that are technically feasible, economically viable and socially acceptable for:

- Communicable diseases, by promoting prevention of tropical diseases (malaria, dengue, yellow fever, leprosy, leishmaniasis, filariosis and Chagas disease), acute respiratory infections, diarrhea (including cholera), tuberculosis and parasitic diseases. It also coordinates and supports epidemiological surveillance and control of other viral, bacterial and parasitic diseases; and promotes research on such diseases.

- Acquired Immunodeficiency Syndrome (AIDS) and sexually transmitted diseases, by collaborating with other United Nations agencies and the Inter-American System, promotes prevention of HIV and other sexually transmitted diseases; encourages the strengthening of national programs through the development and implementation of multisectorial and integrated medium term plans; and coordinates and supports surveillance of HIV/AIDS and related research.

- Diseases included in the area of veterinary public health, by promoting food protection and fighting zoonosis, with emphasis on the elimination of rabies, prevention and control of bovine tuberculosis and eradication of foot and mouth fever. Supports the conservation and reproduction of non-human primates and strengthens veterinary public health infrastructure and related research.

- Non communicable diseases, by promoting and supporting prevention and control of cardiovascular diseases, cancer and injuries, through the implementation of feasible and cost-effective policies, strategies and programs

**Pan American Institute for Food Protection and Zoonosis (INPPAZ)**

1. Serves as an international reference laboratory for food analysis, diagnosis of zoonosis, and production and quality control of biologicals. It provides biologicals, reagents and reference standards for vaccine and antigens production, as well as chemical and microbiological food analysis.

2. Collaborates in applied research on food protection development and strengthening, zoonosis control/eradication programs, and in strengthening

knowledge under the Center' specific areas of expertise through training, dissemination of information and transfer of technology. The Center collaborates in the process of review, preparation and standardization of norms on food protection and zoonosis control.

**Pan-American Center for Foot and Mouth Disease (PANAFTOSA)**

1. Provides technical collaboration to strengthen epidemiological surveillance programs for the eradication and control of foot and mouth fever and other vesicular diseases.

2. Functions as an international reference laboratory for the development of norms, and for conducting quality control of biological products and reagents used for foot and mouth disease diagnosis, prevention and control. It is also responsible for the development of research to manufacture new and more effective inmunogens, and for the promotion of technology transfer to national programs and the private industry.

3. Collaborates with foot and mouth disease-free countries in analyzing risks and strengthening quarantine systems for the prevention of foot and mouth fever and other exotic diseases.

**Caribbean Epidemiology Center (CAREC)**

1. Conducts epidemiological surveillance of diseases and evaluates the health status of the Caribbean population. Monitors and identifies disease trends and causes and collaborates in developing public health interventions.

2. Provides reference services on microbiology and immunology.

3. Promotes the strengthening of national laboratories through personnel training, introduction of new methodologies, performance evaluations, quality control and research promotion.

Table 1

## FUNDS FROM COUNTRY AND INTERNATIONAL AGENCIES FOR MALARIA RESEARCH IN THE AMERICAN REGION, 1985–1993 *

| | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|
| International Development Research Center, Canada, x) | ... | ... | 364,157 | 53,831 | 254,264 | 239,545 a) | 140,950 b) | 219,111 b) |
| Board on Science and Technology for Intern. Development. Institute of Medicine/Nat, Academy of Science, USA, x) | 228,900 | 187,604 | 97,012 | 44,132 | 28,004 | 25,000 c) | – | – |
| National Institute of Allergy and Infectious Disease, National Inst. of Health (NIH),USA, +), d) | 5,993,424 | 6,122,927 | 6,803,213 | 7,842,896 | 7,783,157 | 7,376,839 | 9,175,164 | 13,400,000 |
| Agency for International Development, USA, +), e) | 9,900,000 | 12,000,000 | 10,000,000 | 8,500,339 | 8,550,000 | 8,550,000 | 9,684,000 | 8,822,000 |
| US Army and USA Navy, +), e) | 8,240,000 | 8,611,000 | 8,631,000 | 6,303,000 | 6,014,000 | 10,163,000 | 19,600,000 | ... |
| Pan American Health Organization World Health Organization, PAHO/WHO) x) | 488,125 | 741,400 | 99,883 | 454,000 | 490,614 | 400,000 | 367,176 | 150,000 |
| Special Program for Research and Training in Tropical Diseases UNDP/World Bank (TDR) x) | 1,364,449 | 1,446,211 | 1,746,119 | 2,120,128 | 2,519,634 | 2,649,100 | 3,074,292 | 2,509,997 f) |
| Brazil ** x) | 250,000 | 759,248 | 50,000 | 532,930 | 30,000 | 261,072 g) | ... | 170,215 |
| Colombia ** x) | 25,000 | 80,000 | ... | ... | ... | ... | 1,287,203 | 1,687,500 |
| Mexico ** x) | 50,000 | 270,000 | 339,337 | 812,528 | 426,546 | 583,839 | 815,765 | 884,676 |

* In US dollars, except otherwise indicated.
x) Calendar year, 1993. +) Fiscal year, Oct/1992–Oct/1993.
a) Canadian dollars, Project in Peru. b) Canadian dollars, Project in Brazil
c) Field Research on mosquitoes in Venezuela
d) Funds for Institutions in the USA.
e) Most of the funds for Institutions in the USA
f) Funds invested in 62 projects, 45 of those in Canada and USA, ($1,977,417), 17 in 9 countries of the American Region ($532,580)
g) Funds from CNPq, FAPESP and FNS.
** Funds converted to US dollars, according to the annual average official exchange

Jun/30/94

ANNEX II

PAHO/HPC/HCT/94.46

# *PUBLICATIONS 1990 - 1994**

# *DIVISION OF DISEASE PREVENTION AND CONTROL*



*** Formal Publications, financed, promoted, and/or produced with the participation of staff of the Division of Disease Prevention and Control.**

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