Table 3. Annual distribution of associations of pathogenic enterobacteria and potentially pathogenic bacteria in children with diarrheal diseases.

Year	No. of stool cultures	Percentage of associations of two bacteria a	b	c	of three bacteria d	Total a + b + c + d
1971	884	1.9	6.56	0.57	0.75	9.84
1972	452	3.54	7.96	1.55	2.65	15.70
1973	583	5.32	6.35	1.37	1.37	14.41
1974	567	1.94	3.88	0.35	1.23	7.41
1975	469	2.98	5.97	1.91	1.70	12.57
1976	461	6.07	6.72	1.30	0.65	14.74
1977	411	3.64	5.11	1.46	4.86	15.08
1978	402	2.48	6.96	0.74	1.24	11.44
Total	4,229	3.35	6.17	1.09	1.65	12.27

a) Between two recognized pathogens.
b) Between one recognized and one potential pathogen.
c) Between two potential pathogens.
d) Between three bacteria with possible combinations of pathogens and potential pathogens.

Table 4. Prevalence of pathogenic and/or potentially pathogenic agents in children with diarrheal diseases.

Year	No. of stool cultures	With pathogens	With potential pathogens	Total
1971	884	32.23	10.86	43.1
1972	452	39.82	19.69	59.51
1973	583	39.96	10.81	50.77
1974	567	32.26	13.77	46.03
1975	469	32.62	20.25	52.87
1976	461	46.63	19.95	63.58
1977	411	35.03	25.30	60.34
1978	402	34.57	20.39	54.97
Total	4,229	35.72	16.31	52.04

of bacteria in one and the same child. More than 35 per cent of the patients with acute diarrheal diseases presented enteropathogenic germs. If the children in which potentially pathogenic bacteria were found are also taken into consideration and if these bacteria actually cause diarrhea, then in half the children (52 per cent) the diarrheal symptoms could be attributed to a bacterial agent.

It should be emphasized that there is a need to complete this study with research into the true function of potentially pathogenic bacteria in the pathology of diarrheal diseases, since their mere presence in a stool culture does not prove a cause and effect relationship.

(*Source:* Eiguer, T., N. Binsztein, and G. Spizzamiglio, Enterobacteria. *Archivos Argentinos de Pediatría* 78 (3): 354-362, 1980; *Boletín Epidemiológico Nacional,* Publication of the Office of National Disease Prevention and Control, and *Vigilancia Epidemiológica,* Ministry of Public Health and the Environment, Argentina, No. 9, 1981.)

Editorial Comment

Laboratory work is one of the fundamental aspects of epidemiological surveillance. The organized collection and prompt dispatch of specimens to laboratories must be the objective of day-to-day practice. The isolations made should be regularly analyzed so the services that treat children with acute diarrhea can do so on the basis of a better knowledge of the agent, which makes for better decisions in the diagnosis, treatment, and prevention of this group of diseases.

The epidemiological use of the laboratory, as is being done in Argentina at the Malbrán Laboratory, is a rational approach to the utilization of this valuable resource. It is also important to increase the exchange of information among countries of the Region.

Social Factors in Malaria Transmission and Control

The Working Group on Social Sciences Applied to Health of the PAHO Advisory Committee on Medical Research (ACMR) has prepared, in accordance with the mandate assigned to ACMR, a *Latin American Bibliography of Social Sciences Applied to Health.* It has also made a study of the social and economic factors that influence malaria transmission and control, in which it pinpoints those that are conducive to more efficient organization and planning of malaria control programs.

The recommendations of the Working Group, which were included in the ACMR report (Caracas, April 1982), cover the following:

- Review of the plan of work for future activities.
- Establishment in PAHO of a program of research on social sciences applied to malaria.
- Establishment of a technical advisory group in this field.
- Convocation of a meeting to discuss economic and social factors relating to malaria.
- Publication of a summary of the social and economic factors relating to malaria transmission and control.
- Appointment of a specialist in social sciences for the WHO Expert Committee on Malaria.

The report of the Working Group is summarized below.

Present Status of Malaria Programs

In the past two decades, domiciliary spraying with residual insecticides has eliminated endemic malaria in 40 per cent of the originally malarious area and in 75 per cent of the human population at risk. The price paid for the spectacular success obtained through comprehensive coverage with insecticides and antimalaria drug administration in some areas has been insecticide resistance of the vector and drug resistance of the plasmodia.

One of the main causes of the failure of the malaria control program in some rural areas is the lack of appropriate human and economic resources, especially at the local level, for ensuring the continuity of activities, in addition to the absence of a comprehensive approach to the problem. The planning and evaluation of malaria control measures have not taken into account the relationships between environmental conditions, induced changes, the sociocultural characteristics of the population, the level of socioeconomic development, and the biological factors involved in the transmission of the disease, all of which are fundamental elements of the epidemiological method.

In 1969 the World Health Assembly recommended a strategy that called for better adaptation to local conditions and needs, and for broader skills in malariologists in order to enable them to better identify epidemiological problems and their magnitude and thus apply technology most appropriate to local conditions utilizing available resources. However, many factors are still hindering the development of malaria control programs which are based on new approaches and structures, and the gaps in scientific knowledge have precluded the application of different strategies.

Many countries are facing a serious malaria problem; some are endeavoring to make good use of the scanty means available, but none can afford to wait for more efficient technologies to emerge.

The social sciences have made increasing and substantial contributions to our knowledge of health problems, and WHO has incorporated them into its training programs, including those in applied research, since 1948. Since the 1950s social sciences have also been included in PAHO programs. Nevertheless, few attempts have so far been made to comprehensively and systematically analyze the social and economic factors that can influence malaria transmission and control.

Malaria eradication programs have been assigning special attention to the evaluation of malaria control measures. In some cases, these evaluations have shown a marked deterioration in the malaria situation due to the difficulty of ensuring the continuity of the programs. Accordingly, the present approach of control programs attempts not only to reach the goals but also to maintain the achievements made, even if this means that the pace is slower.

The purpose of stratification in malaria control is to localize the pathological phenomenon and identify its epidemiological interactions. Stratification studies may begin at the local level, go on to encompass an entire area, and subsequently reach the national level. This process may proceed in the reverse order or simultaneously. The complexity of epidemiological stratification will vary according to the geographic variability of malaria in a country, the information and resources available, and the flexibility of malaria programs.[1]

The information obtained through stratification can help to determine, at the level of a homogeneous epidemiological area, which will vary from country to country, which combination of control measures or which individual actions are more effective in one place and at a given time. Thus the biological indicators for measuring the scope of malaria are analyzed jointly and harmoniously with the social indicators for preparing planning activities and for selecting the most appropriate objectives and strategies. By selecting these objectives and strategies, each "area" can be subdivided on the map into operating strata in which malaria measures will be applied either separately or in combination. The entire approach must be underpinned by a responsive and dynamic system of epidemiological information that makes it possible to promptly correct and gear the program to the new technology and makes it easier to identify problems and formulate working hypotheses to serve as a basis for further research.

Model of Socioepidemiological Study

Recognizing the social variables that interact with the biomedical variables, the Working Group constructed a conceptual model which provides a new analytical framework for the factors that determine the dynamics of malaria transmission and control. Certain principles were identified as essential to strengthening research:

- To establish a more complete and systematic conceptual framework through the joint efforts of malariologists and social scientists.

[1] Geneva, WHO, Malaria Action Program. *Guidelines for Planning Malaria Control*, 1981.

- To strengthen the training and research capacity.
- To apply the results of the research to malaria programs.

The ecological factors peculiar to the human host and the vector arthropod define the bounds within which social and economic factors can influence the prevention, prevalence, and distribution of malaria, the increase in risk for certain human groups, and the effectiveness and acceptability of control measures. In addition, certain ecological changes that are social in origin may have a major impact on the increase or decrease in the risk of malaria incidence (degree of exposure).

The Working Group recognized that the overall plan of the framework presented is not definitive and that its purpose is to stimulate discussion and to serve as a guide for research programs as well as a basis for the planning of malaria control programs.

Country Proposals

In reviewing proposals for conducting social studies on malaria, the Working Group mentioned activities in the following three countries:

Dominican Republic

After several years in which malaria transmission was virtually interrupted (28 cases in 1968), an increase in incidence occurred in 1977 primarily due to the immigration of agricultural workers from Haiti into sugarcane and other plantations. In view of the worsening problem, the Ministry of Public Health and Social Welfare of the Dominican Republic decided that any long-term strategy should be based on a better knowledge of the socioeconomic determinants of malaria. To that end, it established a research group composed of a number of malariologists, a health educator, an agricultural engineer, social research technicians, and several consultants in epidemiology and sociology.

The research plan included studies of two types:

- One, *retrospective,* based on data from the agricultural census and covering the relationship between the type of land ownership, the area farmed, and the number of paid agricultural workers in most of the municipalities of the country, and the incidence of malaria, the purpose being to make a statistical analysis by means of cross-tabulation and multiple correlation.
- The other, *prospective,* based on the observation of the relationship between the socioeconomic structure, the characteristics of migration, the macro-and micro-socioecological conditions, the activities of the malaria eradication program and the incidence of malaria in eight areas of operation of the Malaria Eradication Service.

Incidence will be analyzed according to five broad sets of factors: modes of production, characteristics of migration, macro-environmental variables, micro-environmental variables, and working conditions.

The importance of this research lies in the fact that it will provide new knowledge on the socioeconomic background of malaria that can be used for coordinating health programs and health policies, on the one hand, and planning and economic development, on the other. The specific results of the study will provide malaria control and eradication programs with the necessary information to establish new strategies for reformulating and reorganizing their activities. In addition, it will furnish a model for the planning and conduct of similar research on other vector-borne diseases in other countries of the Region of the Americas.

Nicaragua

Of special interest is the evaluation of the degree of acceptability of the health programs planned and executed by the "grassroots health seminars" in 1981. The purpose of one of these programs was to reduce the reservoir of plasmodia in the human population through the antimalaria treatment of the entire population affected.

Advantage was taken of the opportunity afforded by the country's current historical situation to mobilize the support of the population for a national campaign for the control of the spread of malaria: a positive factor was the spirit of community participation that could be expected following the revolution. Despite the fact that at the time of the report no statistical data were available on the control of the disease following the health seminars, the fact is that persons with malaria received treatment. Greater coverage (as much as 94 and 96 per cent) was obtained in the two areas with the highest malaria incidence. Subsequent studies will be made to evaluate the effect of the campaign on the incidence of the disease in the various areas of the country.

Guatemala

An investigation is planned to determine the effect of work on the voluntary collaborators, the community in general, and the malaria control program in particular. The study will endeavor to measure: the effectiveness of the network of voluntary collaborators as a drug distribution and epidemiological surveillance system; the cost of the system; and the degree of the population's awareness of the disease.

The importance of this research lies in the fact that Guatemala's experience is an example of the combination of two simultaneous approaches: the collection of blood slides and the conduct of sociocultural surveys. The results will pinpoint the role of community participation and the extent to which the population accepts and uses the services of the malaria program and of the community.

Conclusions

In the past 25 years, malaria eradication strategy has been based almost exclusively on the use of insecticides. The failure of that methodology in some areas has made it necessary to emphasize the need to deepen epidemiological studies and maintain a reasonable balance between social and biological factors that favor the transmission of the disease. This would provide a better understanding of the socioeconomic and historical processes that underlie the causal complex of the problem and make efficient antimalaria activities possible. In addition, it is important to continue to improve the systems for the epidemiological surveillance of the disease and to endeavor to incorporate in a simple way the new social and biological variables which come to light from the research process.

(*Source:* Research Promotion and Coordination, Division of Human Resources and Research, PAHO.)

Use of Locally Available Drinking Water for Preparation of Oral Rehydration Salt (ORS) Solution[1]

Mothers are encouraged to prepare oral rehydration fluid using only clean water. However, most people in rural areas of developing countries have no access to potable water and in some communities the only available water is heavily contaminated with fecal material.[2] Since only some 20 per cent of the population in developing countries has access to clean water, the risks involved in using untreated water to prepare the Oral Rehydration Salt (ORS)[3] solution, and the need to decontaminate water before adding the ORS ingredients, have prompted researchers to initiate various investigations to explore and further expand available knowledge on this question.

The following presents current research findings relating specifically to the growth of enteric bacteria in oral rehydration solutions prepared from ORS, the risks associated with the use of ORS solution which is not bacteria-free, and possible methods of decontaminating either the water used for preparing the ORS solution or the solution itself.

In the Region of the Americas, numerous studies have been conducted in which the growth of enteric bacteria in ORS solutions prepared with various types of water were compared. A study at the University of Maryland[4] used river water from Suriname and Honduras (containing about 10^3-10^5 bacteria/ml) and distilled water after boiling both sources for 10 minutes to prepare the ORS solution. Growths of enteropathogenic bacteria (*Vibrio cholerae, Escherichia coli,* and *Shigella flexneri*) on blood agar were harvested, then diluted with phosphate buffered saline, and added to different aliquots of the solution to achieve final concentration of about 10^2 bacteria/ml. Viable bacteria counts at 0, 6, 12, 18, 24, and 48 hours in solution while standing at room temperature (24-26°C) revealed an increase in the number of *V. cholerae* and *E. coli* at 12 hours, and a 2-3 log increase at 24 and 48 hours. *S. flexneri* did not increase in number and could not be recov-

[1] Excerpts taken from: Oral rehydration with dirty water. *Diarrhoea Dialogue,* Issue No. 4, 1981.
[2] *Lancet* 2:255-256, 1981.
[3] Composition for oral rehydration as recommended by WHO.
[4] Black, R. *et. al.* Proliferation of enteropathogens in oral rehydration solutions prepared with river water from Honduras and Suriname. Unpublished, 1981.