Table 1. Epidemiological bulletins of the countries received at PAHO.

<table>
<thead>
<tr>
<th>Country</th>
<th>Publication</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Boletín Epidemiológico Nacional</td>
<td>Monthly</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Boletín Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>Brazil</td>
<td>Boletim Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>Canada</td>
<td>Canada Diseases Weekly Report</td>
<td>Weekly</td>
</tr>
<tr>
<td>Chile</td>
<td>Vigilancia de Enfermedades Transmisibles y Zoonosis</td>
<td>Monthly</td>
</tr>
<tr>
<td>Colombia</td>
<td>Boletín Epidemiológico Nacional</td>
<td>Monthly</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Semana Epidemiológica</td>
<td>Weekly</td>
</tr>
<tr>
<td>Cuba</td>
<td>Boletín Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>Comentarios Epidemiológicos</td>
<td>Monthly</td>
</tr>
<tr>
<td>Ecuador</td>
<td>Boletín Epidemiológico Semanal</td>
<td>Weekly</td>
</tr>
<tr>
<td>El Salvador</td>
<td>Boquete Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>Honduras</td>
<td>Boletín Mensual de Enfermedades Transmisibles</td>
<td>Monthly</td>
</tr>
<tr>
<td>Panama</td>
<td>Boletín Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>Paraguay</td>
<td>Boletín Estadístico-Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>Informe Epidemiológico</td>
<td>Monthly</td>
</tr>
<tr>
<td>United States</td>
<td>Morbidity and Mortality Weekly Report</td>
<td>Weekly</td>
</tr>
<tr>
<td></td>
<td>CDC Veterinary Public Health Notes</td>
<td>Weekly</td>
</tr>
<tr>
<td></td>
<td>Boletín Epidemiológico Semanal</td>
<td>Weekly</td>
</tr>
</tbody>
</table>

Malaria Program in the Amazon Region of Brazil

Amazonia accounts for 73 per cent of the malarious area of Brazil, as indicated in Figure 1, but its population is only 20 per cent of the total population of that area. Eradicating malaria from the Amazon region is considered a long-term undertaking, owing to factors that make it difficult to control the disease or that even favor its transmission.

The obstacles to malaria control include low demographic density, dispersion of the population, existence of nomadic groups, difficult access to areas close to the tributaries and subtributaries of major rivers during the dry period in the second half of the year, and flooding of fields in the second half of the year. The continuous migratory flows from areas free of transmission to Amazonia are assuming considerable importance in the epidemiology of malaria and are responsible for the heightening of the endemia in various parts of the region.

The factors that favor malaria transmission are associated with environmental conditions propitious to the maintenance of the endemia, such as temperature, humidity, and rainfall, which influence the life and development of the vectors.

Special mention should be made of the ramshackle construction of houses in the region, which allows the entry of man-biting mosquitoes, thereby contributing to transmission and, consequently, maintenance of the endemia.

Technical Problems

In Amazonia there are technical problems associated with parasites, vectors, and human groups.

In regard to parasites, studies initiated in 1961 in five states and territories (Amapá, Amazonas, Pará, Rondônia, Roraima) proved the existence of chloroquine-resistant strains of Plasmodium falciparum.

Insofar as vectors are concerned, Anopheles darlingi is the most important species: though susceptible to DDT, in some places where wall-less or uncompleted houses predominate it is able to transmit malaria because there are no potential landing places that can be sprayed.

With respect to man, his habits, and environment, there are problems that exert a sharp influence on the epidemiology of malaria. In keeping with Brazil's overall development policy and the aim of increasing the density

vides a summary every two months of the epidemiological situation of the diseases subject to the International Health Regulations in countries of the Region, as well as other epidemiological studies of regional interest. Other periodic publications such as the Boletín Informativo of the Expanded Program on Immunization and the Boletín of the Pan American Zoonoses Center contain reports on other diseases of interest to the Region; the Boletín Epidemiológico of the U.S.-Mexico Border Public Health Association and the Surveillance Report of CAREC are concerned primarily with epidemiologic situations of subregional interest.

5. Other publications, such as PAHO's Annual Report of the Director, which supplies general information on disease control programs in the Region, Health Conditions in the Americas, and Reported Cases of Notifiable Diseases in the Americas, include statistical data supplied by the countries on communicable diseases.
of population in hitherto uninhabited areas, the Government is promoting and conducting agricultural, settlement, mining, and hydroelectric projects, as well as highway construction. These projects have attracted migratory flows of workers and their families from other regions. Some of the migrants return to their places of origin, thereby spreading malaria to the areas or regions where it was no longer being transmitted.

Despite the fact that the Superintendency of Public Health Campaigns (SUCAM) performs semiannual house sprayings as a regular activity under development projects and collects blood samples and provides treatment to individuals with fever, the incidence of malaria has not diminished significantly. The concentration of SUCAM's work in areas at greatest risk increases the number of positive tests, sharply distorting the parasite indexes because of the many houses inspected more than once with positive results.

Tables 1 and 2 show, respectively, the number of DDT house sprayings (25/m²) and the parasite rates in 1978.

**Studies Toward the Solution of Problems**

Considering the technical problems that have hampered malaria eradication in Amazonia, as well as the possibility that the problems may become more serious, studies in the fields listed below are urgently needed:

- Malaria chemotherapy. Study of the susceptibility of *P. falciparum* to antimalaria drugs; study of the efficacy
of the new schemes for treating \textit{P. vivax} infections; and, finally, clinical tests and field studies of new drugs.

- Immunology. Serologic tests for use in diagnosis and epidemiological surveillance.
- Study of the ecology and biology of vectors.
- Control methods. Application of new insecticides in various epidemiologic situations, biological control of vectors, and combined methods.

Aware of these needs, SUCAM, with advisory assistance from PAHO/WHO, is undertaking the following research: study of the problem areas of Amazonia, in order to determine the reason for difficulties in applying control measures and to propose new methods in this field; tests of a new antimalaria drug (mephaloquine) for use against chloroquine-resistant strains of \textit{P. falciparum}, which are slated to begin during 1979-1981 in Pará State.

The Amazonia Development Superintendency (SUDAM), which is responsible for coordinating regional development, undertook a study, together with the ministries of health, social welfare, education and culture, and labor to define the minimum conditions for providing health and education services to workers of companies operating in the Amazon region.

Article 2 of Resolution 3,750/79 of the Governing Board of SUDAM provides as follows:

The minimum health and sanitation service to be provided to personnel of the company shall have the following objectives:

- Protect the population against regional endemias and prevent the introduction of endemic diseases not present in the Region, through measures with collective coverage.
- Promote individual medical care, for which purpose the officers of the companies included in the scope of this article shall:

1. Promote, in collaboration with the Superintendency of Public Health Campaigns (SUCAM/MS), the training of employees for the performance of malaria and schistosomiasis prevention, diagnosis, and treatment activities and for vaccination against jungle yellow fever.
2. Install a small laboratory on the premises of the company for diagnosis of malaria and schistosomiasis in accordance with specifications provided by SUCAM/MS.
3. Build, close to the laboratory, a dwelling properly covered with mosquito netting and having complete vertical walls, for malaria examination and treatment of patients.
4. Construct dwellings and houses which, even if rustic or temporary, have complete vertical walls on all sides; these should be situated in places well removed from pools of stagnant water or vector breeding grounds and be surrounded by an area with a radius of about 50 m having no vegetation.
5. Supply SUCAM/MS with detailed information on the routes of access roads to the area of the company, the annual program, the times at which clearing operations are carried out, the number of workers to be used, and their probable date of arrival at the worksite.

The Association of Amazonia Businessmen (AEA) signed an agreement with SUCAM with the aim of combating malaria at the site of agricultural projects. The following three clauses of the agreement are particularly worthy of note:

1. An AEA employee should be assigned to SUCAM to carry out the spraying and the epidemiological activities.
2. A small laboratory should be installed in the project area for malaria diagnosis.
3. Antimalaria drugs provided by SUCAM should be administered in all cases in accordance with the treatment scheme recommended by SUCAM.

(Source: Boletim Epidemiológico, 9(26), 1979. Ministry of Health of Brazil.)
Aedes aegypti Situation in Bolivia, 1980

In Bolivia, Aedes aegypti was found in 1980 in Santa Cruz Department in an area of approximately 85 km², which included the city of Santa Cruz and 45 adjacent localities. Along the navigable stretches of the Abuna and Mamoré rivers there were another 17 infested localities. The presence of the vector was also reported in Yacuiba, Todos Santos, and Puerto Suárez.

In 1943, Bolivia was the first country in the Americas to achieve A. aegypti eradication, after an intensive campaign. The country was officially declared to be free of the vector in 1948.

According to information from the National Epidemiology Division, A. aegypti surveillance was a responsibility of the Rural Endemic Disease Service from 1948 to 1957. In 1958, this responsibility was transferred to the National Malaria Eradication Service (SNEM). In 1966, the responsibility was again transferred, this time to the National Communicable Disease Institute (INET). In 1971 the surveillance program was reorganized as a result of a joint PAHO/WHO/INET study, and a plan was developed for A. aegypti surveillance throughout Bolivia. While sporadic surveys were made in some localities in Beni and Tarija, Santa Cruz Department, as well as systematic surveys at the international airport and railway terminal, surveillance activities at the national level were discontinued in October 1977.

On 7 February 1980, during field practices connected with a course on A. aegypti surveillance that was conducted in the city of Santa Cruz for the purpose of training personnel in entomologic surveys, A. aegypti larvae and adults were found and were identified by personnel participating in the course. The genus and species of the vector were subsequently confirmed at the Center for Tropical Diseases in Santa Cruz and in the laboratories of the Aedes aegypti regional eradication program in Bogotá, Colombia.

In view of the paucity of Ministry of Health resources at the local level, and in order to determine the area of dispersion of the vector, a survey was made around the area of El Trompillo international airport, where the first specimens of A. aegypti larvae and adults were found.

A small number of houses in alternate square blocks were inspected and the vector discovered in continuous areas from the airport to the center of the city and even in flower vases in the cathedral. No indices were taken, and therefore the density was not determined. According to information now available, only the city of Santa Cruz and two small nearby communities are infested. Of the 65 localities included in the surveillance plan, 27 have been surveyed, 24 of them with negative results (Figure 1).

Even though the source of the reinfestation cannot be precisely determined, it is believed that the A. aegypti might have been carried in airplanes from Cali, Colombia, an infested city with which Santa Cruz has direct air communication, both for passengers and freight.

Emergency Activities

WHO and the neighboring countries were officially notified in accordance with the International Health Regulations as soon as the reinfestation was recognized, and the following activities were begun:

- The health authorities requested PAHO to provide technical advisers from 2-7 March to assist in assessing the situation arising from discovery of the A. aegypti reinfestation in Santa Cruz Department and in the planning of control and eradication activities.
- The health authorities declared the A. aegypti infestation to be a health emergency and developed a plan to be put into practice at the earliest possible time.
- The immediate objectives of the plan are control of the vector, reduction of its density, and prevention of its dissemination, in order to protect the population against the risk of an epidemic. For a second stage the target of the plan is final elimination of A. aegypti.
- Using existing resources in the Health Unit, and with the cooperation of airlines and ground transportation companies—buses as well as railways—all aircraft arriving at or departing from the airport, passenger and cargo planes alike, are to be fumigated in order to prevent the vector from spreading within Bolivia and into neighboring countries. Fumigation has also been decided upon for rail and bus terminals and at vehicle checkpoints or surveillance stations along the highways connecting the city with the rest of the country. Vector control activities were ordered to be instituted around the international airport, hospitals and other selected areas, along with the application of insecticide at ultra low volume (ULV) in the city of Santa Cruz, and with sanitation activities and the elimination of breeding grounds.
- In order to obtain complete information on infestation in the city of Santa Cruz, an entomologic survey was launched to provide a clearer picture of the distribution and density of the vector.
- Yellow fever vaccine is being administered collectively to people traveling to enzootic areas, as well as to international travelers bound for countries where a certificate of vaccination is required. At the surveillance station on the Yapacani highway leading to the Ichilo area, which has a history of jungle yellow fever, vaccination will be compulsory. Health education, information, and community participation activities in support of emergency programs are being conducted with funds of the Health Unit.

(Biology and Vector Control Program, PAHO.)