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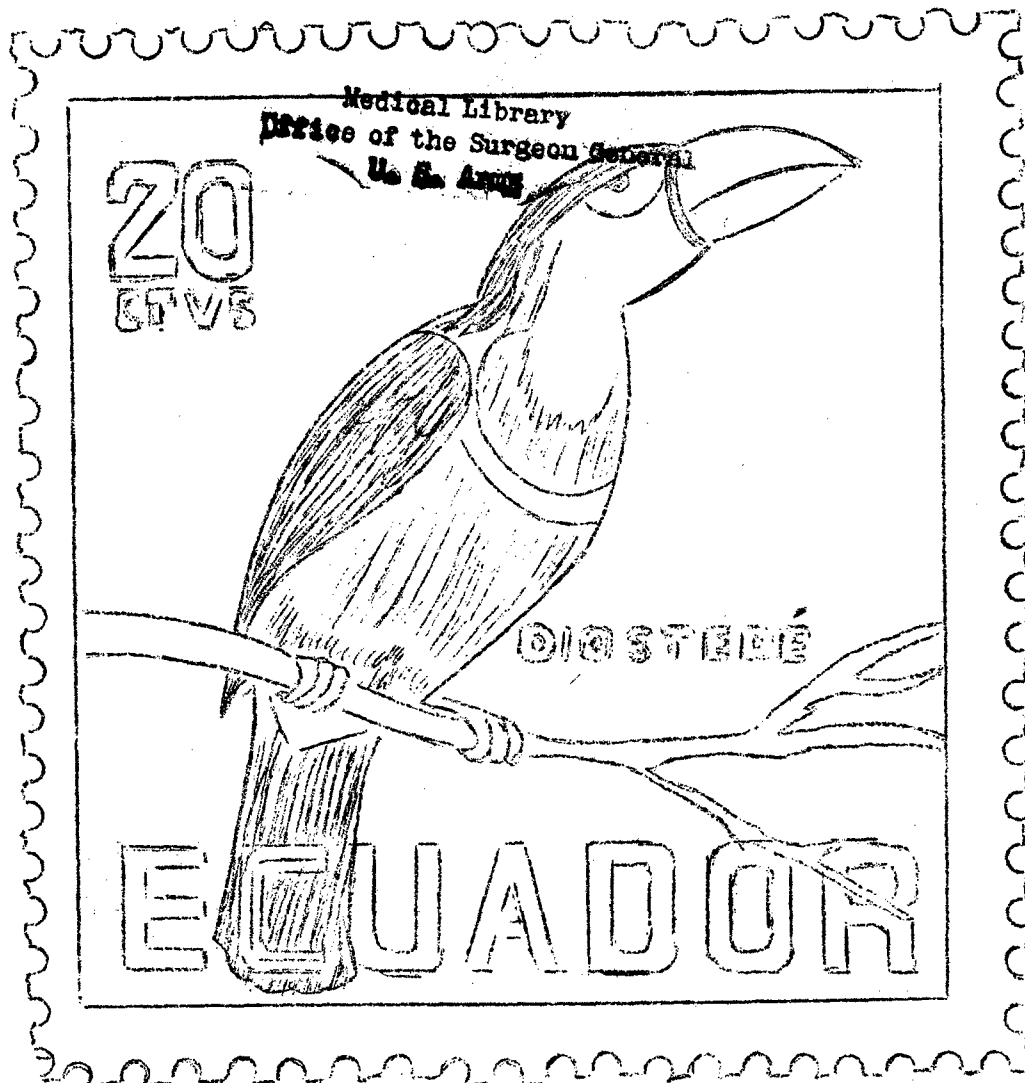
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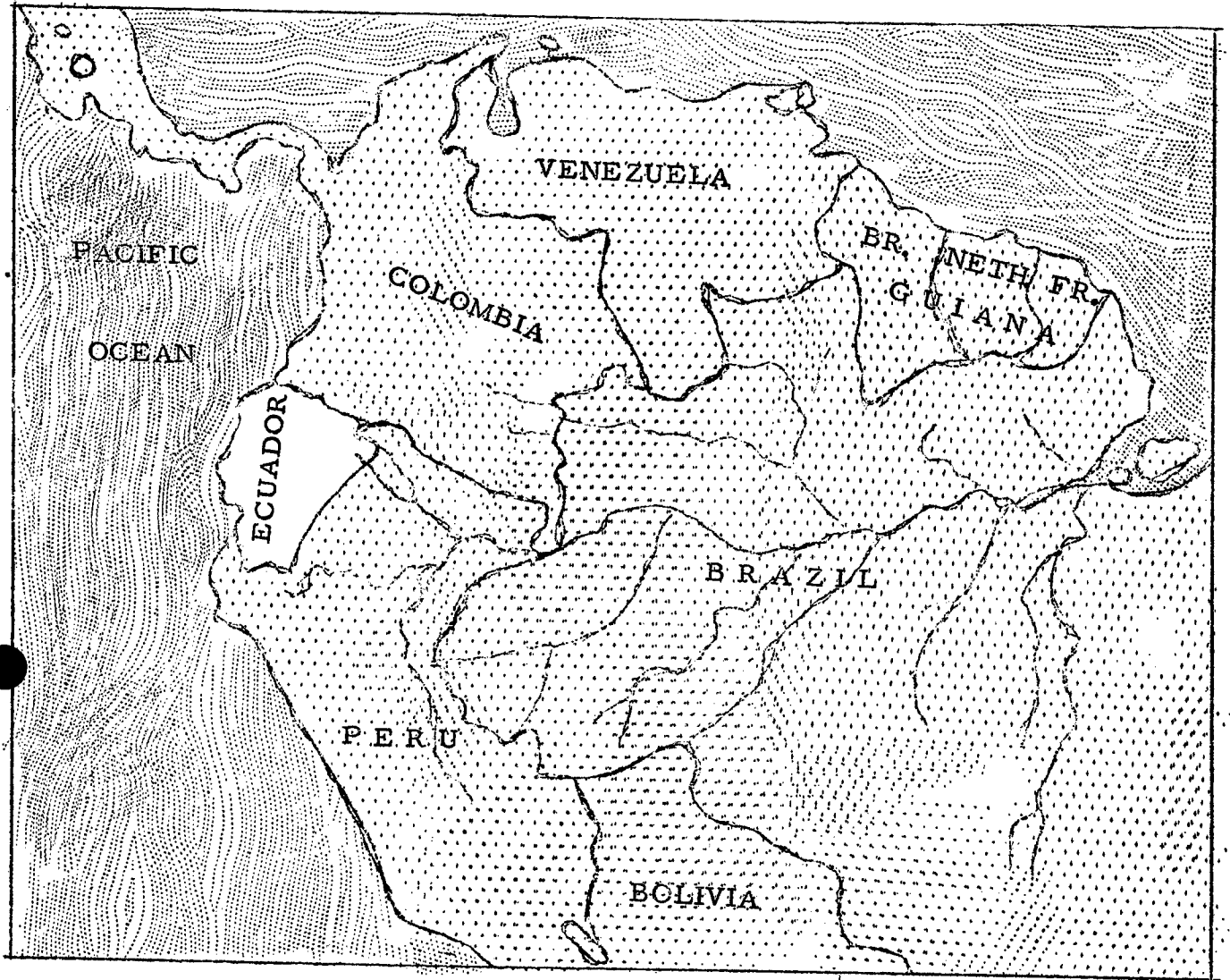
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ECUADOR IN RELATION TO HER NEIGHBORS

ECUADOR

I. GENERAL BACKGROUND

1. Location and Extent.

Ecuador is, in translation of the official name, "The Republic of the Equator" because it sits astride that imaginary line where it crosses northwestern South America. This country is bounded by Colombia on the north, Peru on the east and south, and the Pacific Ocean on the west. The continental area is approximately 104,000 square miles, roughly the size of Colorado. Also under the Ecuador flag are several small islands immediately off the coast and the Galapagos Islands (Archipiélago de Colon), which lie about 650 miles west in the Pacific. This latter group includes 13 large and numerous small islands with a total land area of some 3,000 square miles. Most of these islands are uninhabited barren cinder cones.

2. Brief History.

The numerous tribes of Indians who lived in most of what is now Ecuador were conquered by the Incas in the mid-fifteenth century. About 100 years later the Conquistadores overthrew the Incas and established Spanish rule, which endured for nearly 300 years. During the great liberation era of South America, while Napoleon was harrying Spain in Europe, General Sucre won Ecuador's freedom from Spain; and Bolivar included her with Colombia, Venezuela, and Panama in his Gran Colombia. In 1830 Ecuador proclaimed herself an independent nation under her own constitution. The next century saw turbulent political developments as a few intense rivals sought control of the government. In one period of 27 years, Ecuador had 22 presidents. However, since Ecuador's sixteenth constitution was adopted in 1946, the government has become much more stable. An important part of Ecuadorian history is the longstanding boundary disputes with Colombia and Peru. While these have seldom led to open warfare, they have been a potent factor in the formation of the national animosities and character. In the interest of hemispheric solidarity, most of the boundary disputes were settled, at least temporarily, by the Rio de Janeiro pact in 1942. In the same year, with the consent of Ecuador, the United States established military bases in the Galapagos Islands and on the mainland which were maintained until the end of World War II.

3. Topography and Climate.

a. Regional Character. Ecuador has three sharply distinct topographical regions: the Pacific coastal region (the Litoral), the

Andean mountainous highlands (the Sierra), and the Amazon forests and savannahs east of the Andes (the Oriente).

b. The Litoral which lies between the Andes and the ocean varies in width from 20 to 115 miles. It is not a flat plain for there are several ranges of low mountains and the land rises to fairly high plateaus between rivers. The area is drained by several rivers which receive the melted snow of the Andes. Many of these have marshy banks which favor the breeding of mosquitoes and other insects. Off-shore, there are two ocean currents: the Humboldt current flows north with cold south polar waters, while the Central American current (El Nino) carries warm water southward. These influence the rainfall of the Litoral with the result that the northern part has an abundant rainfall, and the southern part is much drier and even semi-arid in places. The mean annual temperature along the coast is fairly warm (between 70° and 85° F.) with the cooler months being July to November. The humid, warm climatic conditions of most of the coastal region permit the cultivation of tropical crops. Much of the uncultivated Litoral is covered with heavy forests. The Santa Elena Peninsula, in which petroleum deposits are located, is quite arid. The Litoral is well inhabited. About 40 per cent of the population of Ecuador lives in this zone.

c. The Sierra. The Andes Mountains rise abruptly once the 1,500-foot contour line has been reached moving inland from the Pacific. These mountains are fairly narrow in their course through Ecuador, being between 75 and 185 miles wide. They form a double chain with a high plateau between. Many of the peaks in the Sierra are of volcanic origin, particularly in the northern portion. The principal peaks and their elevations in feet are: Yanaurcu, 14,881; Cotocachi, 16,328; Imbabura, 15,028; Mojanda, 14,038; Cayambe, 19,186; Saraurca, 15,502; Pichincha, 15,918; Antisana, 18,715; Cotopaxi, 19,613; Corazon, 15,871; Iliniza, 17,405; Quilindana, 16,174; Carihuairazo, 16,515; Chimborazo, 20,576; Tunguragua, 16,690; Altar, 17,730; and Sangay, 17,464. The plateau from which these peaks arise is itself very high. Consequently, the peaks may be elevated only 5,000 to 6,000 feet above the plateau. The Sierra is cross-compartmented by several rivers which flow through distinct valleys. The Mira, Patate, Chambo, Guallabamba, Paute, Zamora, Chinchipe, Naranjal, Jubones, Tumbes, and the Catamayo are the principal rivers of this region. Since much of the plateau is above the timber line, there are practically no trees except the introduced eucalyptus. The Sierra constitutes a "cereal" zone in which temperate-zone crops can be cultivated. High in the mountains, below the line of perpetual snow (about 16,000 ft.), is a windswept zone of grass and low vegetation called paramo which is extensively used for grazing.

Because of the altitude, the climate of the Sierra varies from temperate on the plateau to arctic on the perpetually snow-covered peaks. In the sheltered valleys the daytime temperatures are comparable to those of early spring, and woolen clothing is comfortable. After sundown the air becomes sharply chilly and an overcoat is necessary at night. On the paramos and the mountains, heavy clothing is required both day and night. At very high altitudes special clothing for extreme cold is imperative. The rainy seasons on the Sierra are February to May and during October and November and the average annual rainfall is 58 inches. During the remainder of the year no rain falls, and water supplies become short. The Sierra zone is the most densely populated area of Ecuador, containing approximately 58 per cent of the population and most of the cities, usually situated in river valleys. Along the length of the plateau run the Pan American Highway and the principal railroad right-of-way. Quito, the capital city of the Republic, is situated 9,378 feet above sea level. The nearby peak of Pichincha, although nearly 16,000 feet high, rises not quite 7,000 feet above the city.

d. The Oriente. This vast region of extensive jungles, forests, and savannah is only sparsely inhabited by about 2 per cent of the population. Hot and humid, it has scarcely been touched by civilization. Here live the head-shrinking Jivaro Indians, untamed and sometimes actively hostile. The principal northern tributary of the Amazon River is the Napo River of this region. There are numerous other streams, including the Cononaco, the Curaray, the Conambo, the Bobonaza, and the Pastaza. Much of this area is relatively unknown. Temperatures are always hot. Rainfall is heavy and the climate has been likened to a "turkish bath." There are no significant roads or routes of travel, except for the water courses.

4. The People.

The people of Ecuador are a composite mingling of several races, not the homogeneous mixing with loss of racial distinctions so often observed in other countries. There were estimated to be 3,783,931 inhabitants in Ecuador in 1956. The population has been increasing lately at about 2.5 per cent each year. Almost half of the people are pure-blooded Indians, and approximately another quarter are mestizos of mixed Indian and white blood. The Indians have tended to preserve their ancient habits, costumes, and languages. European culture has often taken the form of a thin veneer, and only occasionally has it sent deeply penetrating roots into the substance of the indigenous peoples. About 15 per cent of the population is Negro or mulatto, most of them living in the Esmeraldas Province in the northern Litoral.

Only about 10 per cent of the population is white. For many years the whites occupied a dominant role in the country and controlled most of the land and wealth. Life expectancy at birth in Ecuador is approximately 52 years. Although elementary education is stated to be compulsory, and nearly 3,500 schools are provided, only about half of the children of school age attend. Consequently, the illiteracy rate is high. Only slightly more than half of the people over 10 years of age can read and write. Spanish is the official language of the country and approximately half of the population use this language, with many of the remainder speaking Querchua, a native Indian tongue. In the Oriente most Indians speak Jivaro. The predominant religion is Roman Catholicism and religious fiestas and processions in the Spanish style occupy an important place in the lives of the people. There are still pagans, especially in the eastern isolated regions. Complete religious freedom prevails. The Ecuadorian people are predominantly agricultural. Industry in the country is for the most part still of the "cottage" type and consequently has not disrupted the distribution and mores of people to the same extent that other countries have been affected. The topographical division of the country into such distinct regions as the Litoral and the Sierra has also divided the people ideologically. The inhabitants of the Litoral act and think quite differently than do the people of the highlands. Guayaquil is a large bustling port city of 40,000 population, and the major crop and petroleum exports of Ecuador originate in the Litoral. Accordingly there is more commercial interest in the Litoral than in the Sierra. In the mountain fastnesses with a high proportion of pure-blooded Indians in the population, life is much slower and much less commercial. The Indian of the Andean Sierra is not ambitious and does not actively seek profit or develop a profound sense of nationalism.

5. Diet and Housing.

The topography of Ecuador markedly influences dietary habits. In the Litoral the major staple is rice. Tropical vegetables and fruits--plantains, bananas, mangoes, and breadfruit--with fish, palm oil, fowl, eggs, and a little meat complete the diet. In the Sierra, corn and potatoes are the staples and meat is much used. Cereals generally are more plentiful. Wheat and barley are grown and consumed. Guinea pig is a common item of diet. Housing varies between the two inhabited sections of the country. In the lowlands where the climate is warmer and less demanding, housing, especially in rural areas, is less solid than in the highlands. The highland Sierra is cold enough to require well constructed houses. Volcanic stone of the area is often used for building.

II. SOCIO-ECONOMIC FACTORS INFLUENCING HEALTH

6. Agriculture and Industry.

Agriculture employs nearly half of Ecuador's million and a half workers and produces more than one-third of the national income. In the lush, hot north Litoral many tropical fruits and exportable crops are grown. These include cacao, coffee, rice, and bananas, the most valuable cash crop. Cotton, sugar cane, and tobacco are raised in sufficient quantities to support local food-processing and textile industries. The higher Sierra region is farmed for wheat, corn, barley, temperate fruits, and potatoes. Toquilla straw is harvested and fashioned into straw hats, misnamed "Panama" hats, for export. Sugar refineries and flour mills are operated. Small amounts of soap, vegetable oils, rubber, and leather are produced. Cement and lumber are made for domestic use. Altogether, manufacturing employs about a quarter of the country's labor force and produces about 16 per cent of the national income. Mining is not as important as manufacturing, employing only about 6,000 people and producing only 2.4 per cent of the national income. Sulfur, gold, silver, and copper are the minerals of importance. Petroleum has been found and refined in the Santa Elena Peninsula of the Litoral, yet only sketchy geological surveys have been undertaken so far. Cattle-raising and grazing are carried out in the highlands on land suitable for such endeavor. Commercial fishing and fish processing are conducted for the most part by foreigners. The exportation of guano from island territories was formerly a lucrative enterprise.

7. Standards of Living.

Generally, the Ecuadorians dependent upon agriculture are self-sufficient for food and clothing of low standard. The worker in the industries makes wages only slightly higher than the cost of bare necessities. The average annual income of nonagricultural workers is about 9,500 sucres (approximately U.S. \$635), and for white-collar workers about 11,825 sucres (U.S. \$790). Housing is in short supply throughout the country, more so in urban than in rural areas. In general the economy of Ecuador is underdeveloped and the standard of living is low as compared with that of industrialized and developed countries of Europe and America.

8. Water Supplies.

Water supply systems are available in all the cities and in many towns of Ecuador. The two major cities, Quito and Guayaquil, have a

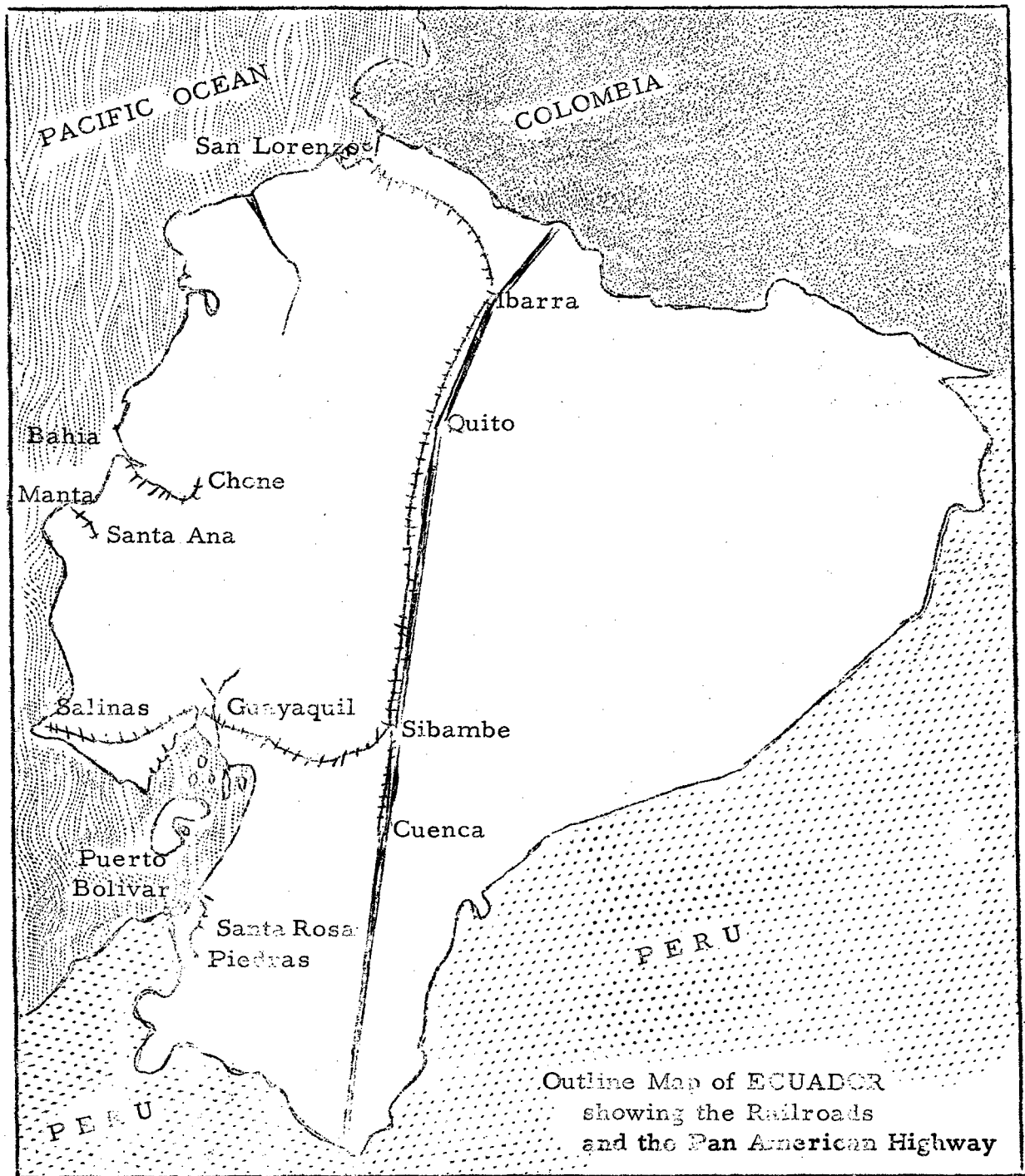
fairly adequate system of water supply, providing safe water to a high percentage of the quarter million inhabitants. The larger cities and towns frequently use purification methods such as sand filters and treat the water with chlorine before distribution. The smaller towns often rely on chlorination alone. These water supplies are frequently contaminated and only recently-boiled water should be considered potable. The usual sources are rivers or other natural bodies of water. Wells are being drilled in increasing numbers to provide more dependable and safer water supplies. Much of the effort to improve water supplies was supported by the Inter-American Cooperative Public Health Service and is now being assisted by the United States Operations Mission of the International Cooperation Administration, United States Department of State.

9. Waste Disposal.

Water-carried sewage systems have not kept pace with modern progress. Quito, the capital city, disposes of 90 per cent of its sewage through a combination sanitary-storm sewer. About 78 per cent of the houses are connected to this system which discharges the untreated sewage into the Machangara River. Guayaquil, the major seaport, has a similar combination waste-storm sewer system, to which about 65 per cent of the houses are connected and which discharges the raw untreated effluent into the Guayas River. Altogether, only 14 cities in Ecuador have some type of water-carried waste sewage disposal system serving between 30 and 90 per cent of the houses. No completely modern and sufficient sewage treatment system exists in Ecuador (1959).

10. Transportation.

a. Rail. The mountainous character of Ecuador has impeded transportation. Seven unconnected railroads, with a total length of 694 miles, serve the country. The busiest and most adequate railroad connects Quito and Guayaquil. The construction of this 3-foot 6-inch gauge line represents a major engineering feat. The extremely rugged terrain over which the right-of-way passes requires continuing heavy maintenance effort and results in a high operating cost. Consequently, there is little money remaining for the routine replacement of rolling stock. This railroad connects the principal cities of the Sierra with the main port of the Litoral (see map 2). The railroad between Guayaquil and Salinas has more than 90 miles of a 108-mile route open and operating. The Ferrocarril del Norte between Quito and San Lorenzo, Esmeraldas Province, operates trains twice a week over the 232 miles of its track. The Manta-Santa Ana has a short line of 37 miles open. There is a narrow-gauge railroad 48 miles in length between Chone and Bahia. Another narrow-gauge right-of-way runs from Puerto Bolivar



to Piedras with almost 47 miles of track. The narrow-gauge Ferrocarril El Oro connects Puerto Bolivar and Guabo via Machala and Pasaje, a distance of about 16 miles. Another major railroad is the Sibambe-Cuenca route for 72 miles of a projected 92-mile length. All of the railroads of Ecuador, except the Guayaquil-Salinas line, are operated by a government corporation, the Empresa de los Ferrocarriles del Estado.

b. Highway. The Pan American Highway (Tulcan, Quito, Latacunga, Cuenca to Loja) is the backbone of Ecuador's nearly 6,000 miles of roads. Approximately 3,500 miles of highway are classified as improved. Other roads connect Guayaquil with Vinces, Babahoyo, Manta, and Portoviejo, and a paved highway goes to Salinas. There are also roads from Machala through Pasaje and Giron to Cuenca and from Machala to Piedras. A less-than-adequate road connects Piedras to Loja. The age of the automobile has not fully arrived in Ecuador and, although considerable use of trucks for domestic hauling now takes place, maximum use of highways by trucking has not been achieved because of the lack of domestic heavy industry to produce motor vehicles. Petroleum production and refining output is now adequate to meet domestic needs and to permit some export, but maximum use of roads would require importation of fuels.

c. Air. Air travel and transportation are important in Ecuador because of the difficulties inherent in surface movement. There are five large Ecuadorian aviation companies--Aerovias Ecuatoriana C. A. (AREA); Compagnia Ecuatoriana de Aviacion (CEA); Aerovias Nacionales del Agro (ANDA); Transandina Ecuatoriana C. A. (TRANSANDIA); and Vias Aerias Nacionales, S. A. (VIANSA)--which provide domestic and international service. Foreign airlines serving Ecuador are Air France, Aerovias Nacionales de Colombia (AVIANCA), Pan American Grace Airways (PANAGRA), and Braniff International Airways. Both Quito and Guayaquil have airports which handle super G constellations routinely. Other Ecuadorian cities served by scheduled airlines are Babahoyo, Bahia, Cuenca, Esmeraldas, Loja, Manta, Portoviejo, and Santa Rosa. The airports at any of these cities will accommodate planes equivalent to DC-3's (C-47's).

d. Water. More than 10 steamship lines make scheduled sailings to and from Ecuador. The Flota Mercante Grancolombiana, a joint merchant fleet venture of Ecuador and Colombia, owned 20 per cent by Ecuador, serves American and European ports. The principal port is Guayaquil yet this city is not a satisfactory seaport because it is 35 miles up the Guayas River, which is silting, shallow, and difficult for maneuver. Consequently, most ships load and unload at the Island of

Puna, about 30 miles downstream. Esmeraldas, in the north is a banana port and San Lorenzo, some 40 miles northeast, offers the most promise of eventually providing the country with a good deep-water port. Most of the coastal rivers are navigable for miles, especially by small shallow-draught boats.

11. Communication.

There is a telephone system in both Quito and Guayaquil. Service is automatic but not completely reliable. A radio telephone system has recently been constructed to serve the principal cities of the highlands. International telegraph service is available in Quito, Guayaquil, and generally along the railroad. There are 50 or more commercial radio stations operating in the principal cities and towns. The best known station in Ecuador is HCJB "La Voz de los Andes," a powerful short-wave station operated by an American missionary group. This station broadcasts in English and in several European languages. Airmail to and from the United States requires from two to five days. Surface mail and parcel post is considerably slower.

III. ANIMALS OF MEDICAL IMPORTANCE

12. General.

Animals of medical importance have been listed in Appendix A. No mention has been made of large animals such as the puma, tiger, and cayman. These animals may maul, bite, or kill a person, and this hazard is generally understood by all men except the most inveterate of city dwellers. The treatment of these injuries is much the same as for other lacerations and contusions, with the exception that anaerobic infection is very apt to follow bites and deep scratches and the additional hazards of possible exposure to rabies and tetanus must be considered.

IV. DISEASES

13. Altitude Sickness.

Until acclimatized, visitors to the Ecuadorian Sierra may suffer discomfort or even incapacitation because of the high altitude. These effects vary with individual response to elevation. Some of the more common manifestations are breathlessness following only slight exertion, giddiness, palpitations, nausea, forgetfulness, and mental torpor. Frequently descent to lower regions brings marked improvement relatively quickly. A polycythemia usually develops in individuals living

for sustained periods at high altitudes where the atmospheric oxygen partial pressure is reduced. This phenomenon has a compensatory function and may be used as a measure of the acclimatization to altitude which has taken place. The finding of an erythrocyte count of 6 to 7 million suggests that a person has lived sufficiently long in the high altitudes to be expected to be able to fulfill routine tasks adequately, all other factors being normal.

14. Malaria.

This disease has been a serious scourge in Ecuador and is endemic in the low zones of the Litoral and up to elevations as high as 8,500 feet above sea level in some of the valleys of the Andean region. A seasonal character is observed, with the greatest incidence in May, representing a period of greatest transmission from February until May in the urban areas and prolonged until August in the rural regions. The principal vector in the lowlands is Anopheles albimanus and in the mountain country is A. pseudopunctipennis. In some of the Andean valleys transmission occurs throughout the entire year, with A. albimanus transmitting during the rainy season and A. pseudopunctipennis during the dry season. The most favorable breeding places for the vectors are collections of rain water, natural or artificial pools in cultivated fields, and pools formed along river banks during the rainy season. In 1957 an intensive antimalaria campaign was inaugurated, using both house spraying and atabrine chemical suppressant. DDT was the insecticide employed by the government, but Dieldrin, provided by United Nations Children's Fund (UNICEF), was also used. However, A. albimanus has developed resistance to Dieldrin. More than 30,000 houses were sprayed each year for the last two years. The plan includes the entire Litoral and many Andean valleys. The results have been favorable. The malaria infection rate (based on a survey of endemic areas and applied to the population as a whole) was published by the Pan American Health Organization as 17.4 per 100,000 persons in 1956.

15. Yellow Fever.

In the Andean Sierra Aedes aegypti, the vector of urban yellow fever, was not found at altitudes greater than 3,650 feet but was fairly common in the Litoral in past years. The Government of Ecuador organized a National Yellow Fever Service in 1943 and took active measures to rid the country of A. aegypti. The coastal and valley zones of infestation were treated, using DDT as a larvicide. The

campaign was completely successful and the last focus of A. aegypti was eradicated in 1953. Final verifications have been completed and Ecuador now is free of urban yellow fever. Jungle yellow fever, with mosquito vector probably of the Haemagogas genus, has occurred among the indigenous peoples of the Oriente. The eradication of jungle yellow fever from the Oriente by measures similar to those used in the rest of the country would be an exceedingly difficult, if not impossible, task. However, no cases of jungle yellow fever have been known to occur in Ecuador since 1951. The explanation for the disappearance of the jungle yellow fever virus from the arthropod and simian reservoirs is not known.

16. Plague.

Plague occurs in two provinces of Ecuador: Lojas and Chimborazo. The disease is of the sylvatic type and exclusively rural, rabbits, squirrels, and other wild rodent species being the reservoirs. The annual number of human cases has varied from 7 to 81 in the past five years. The death rate in human plague cases in Ecuador for the period 1947-1950 was reported to be 11.4 per cent. This low mortality was attributed to prompt treatment with sulfathiazole or streptomycin. Historically, plague was a serious problem in Guayaquil. From 1909 to 1939 over 7,800 cases occurred in that city alone. The disease spread from Guayaquil to the surrounding provinces but now has been eradicated from all except the two provinces mentioned. A continuing program of rodent control, flea control with DDT, port quarantine, and surveillance is directed by the National Antiplague Service. This service exterminates more than 300,000 rats in an average year.

17. Typhus.

Both epidemic (louse-borne) and endemic (flea-borne) typhus occur in Ecuador. In the Andean Sierra the combination of cold weather, a relatively poor people, and lack of facilities for bathing and changing clothes presents an ideal environment for the propagation of lice. The causative agent, Rickettsia prowazeki, was first isolated from lice in the Sierra in 1940, although the presence of epidemic typhus was proved serologically the year before. There has been a continual decrease in the number of reported cases of epidemic typhus in the years 1953 through 1957, the rate dropping from 14.6 to 4.6 per 100,000 population. The decrease is largely due to the use of DDT as a delousing agent. In the Litoral sporadic outbreaks of a milder form of the disease occur. The disease resembles endemic (murine) typhus epidemiologically. The vector has not been accurately

determined. Between 10 and 20 cases of endemic (murine) flea-borne typhus are reported in an average year. There has been no definite evidence of success of control measures.

18. Intestinal Parasitization.

Infections with helminths are exceedingly common. Hookworm is found chiefly in the mining districts. The poor sanitation of the environment and the lack of footgear contribute to the spread. Ascaris lumbricoides, Trichuris trichiura, and Strongyloides stercoralis are the parasites most commonly encountered.

19. Infectious Hepatitis.

This may be a common disease, particularly in the form of inapparent infections of children. It frequently attacks North American adults residing in Ecuador. The spread of this disease is apparently fostered by insanitary surroundings, by exposure to cases in the communicable stage, and by injudicious consumption of contaminated foods or beverages.

20. Diarrheas and Dysenteries .

Bacterial diarrheas, including typhoid and paratyphoid infections, are frequent, as are amoebic and other dysenteries. About 1,500 or more cases of typhoid are reported annually for a rate in excess of 40 cases per 100,000 population (1956). Gastritis, enteritis, colitis, and other similar diseases of the gastrointestinal tract, excluding diarrhea of the newborn, ranked third in 1956 as a specific cause of death. Undoubtedly, the lack of adequate environmental sanitation and of safe potable water supplies contributes to the spread of these diseases.

21. Tuberculosis.

Fulmonary and other forms of tuberculosis are widely prevalent. The reported incidence for 1956 was 117.7 and the death rate 32.9 per 100,000 population. The Ecuadorian Antituberculosis League (Liga Ecuatoriana Antituberculosis), a quasi-private organization receiving public funds, has specifically an assistance mission. It has built a number of hospitals, sanatoriums and dispensaries, and maintains more than 1,000 beds throughout the country for tuberculosis patients. The National Antituberculosis Service of the National Department of Health has the responsibility for purely preventive measures. In cooperation with UNICEF and Scandinavian and Danish Red Cross

organizations, it launched a campaign of BCG inoculation which by 1950 had vaccinated 78,000 persons under 20 years of age. This BCG campaign has been continued and 70,145 vaccinations were accomplished in 1956. During that year more than 145,000 x-ray examinations were reported, with a positive finding of 3,874 cases (2.7 per cent). All of the modern drugs are available and are utilized in the treatment of tuberculosis.

22. Rabies.

This disease was apparently first introduced into Ecuador in 1942. It spread rapidly throughout the country and the number of humans infected provoked immediate countermeasures. Great numbers of ownerless dogs were killed, muzzling was required, and strict surveillance of imported dogs was enforced. In 1956 there were 33 human cases of rabies. No antirabies vaccine is produced in Ecuador.

23. Treponematosiis.

In 1950 Ecuador reported 12,000 cases of yaws among 40,000 Negroes in the province of Esmeraldas. It was said that no case was known in whites or mestizos. A campaign against yaws, using penicillin, was begun that year and hope was expressed that eradication would be accomplished within a year. This has not been completely realized. In 1956 there were an estimated 4,541 cases and the program has deteriorated to one of control only, in which only 541 cases were treated during that year. Pinta, another nonvenereal treponematosiis, is found in Ecuador, chiefly in pure-blooded Indians. Four foci were reported as existing 20 years ago: Valle de los Chillos, Pichincha; Santa Rosa, El Oro; Valle de Catamayo, Loja; and Tena, Napo Pastaza. These foci may have been largely eradicated since penicillin has become readily available.

24. Leprosy.

Information on the status of this disease in Ecuador is inadequate. Apparently only three provinces--El Oro, Azuay, and Loja--have been surveyed. At least 492 known cases had been diagnosed by 1954. There were, in 1950, some 100 lepers in asylums. The Central Board of Public Assistance is charged with the responsibility of their care. The disease appears to be limited to the southern portion of the country with small isolated foci in other parts of the country. Figures released by the Pan American Health Organization (PAHO) in 1958 indicated that there were only 150 known cases of leprosy in 1955, yet this number is considered too low to be entirely reliable.

25. Smallpox.

Outbreaks of this disease, probably of the alastrim form, occurring in the recent past have involved thousands of people. Mortality has been low generally because of the mildness of the disease. In the past few years there have been more than 1,300 cases (average for five years) reported annually. In 1959 there were sporadic outbreaks and the port city of Guayaquil often reported cases of smallpox. Facilities for the production of dried smallpox vaccine were installed in Ecuador in 1951, but mass vaccination has not progressed as planned because of lack of funds and of trained personnel. In 1958 Ecuador reported 321,875 persons were vaccinated or revaccinated. In the same year, 1,342,050 doses of dry vaccine and 30,000 doses of glycerinated lymph vaccine were produced. Most vaccinations in 1958 were accomplished in Pichincha Province, including Quito, the capital city.

26. Trypanosomiasis.

American trypanosomiasis or Chagas' disease occurs in Ecuador in the Litoral region. The only naturally infected vector in Ecuador is Triatoma dimidiata, a species of cone-nosed or reduviid bug. According to an article in the Ecuadorian medical literature, cone-nosed or "kissing" bugs are quite common in the country. Chagas' disease is primarily a disease of children, particularly in the acute form. The symptomatology of the chronic form which most frequently affects adults is not impressive nor pathognomonic. The development of a complement-fixation test for the laboratory diagnosis of the condition has provided a much more satisfactory method of confirming clinical impressions. The use of this new adjunct permitted the identification of 17 cases in Ecuador in 1949 and 31 in 1950. More recent data are not available.

27. Respiratory Disease.

The latest (1955) available figures on leading causes of death in Ecuador list bronchitis as second, with a mortality rate of 219 per 100,000, and influenza and pneumonia combined as fifth, with a mortality rate of 94 per 100,000. Since medical certification was absent in 80 per cent of the bronchitis deaths and in 66 per cent of the influenza and pneumonia deaths included, it is possible that these figures are not completely acceptable as fact. Nevertheless, the figures indicate a high incidence of respiratory disease. No information is available concerning the prevalence of asthma, hay fever, or common colds.

28. Childhood Diseases.

The leading specific cause of death in Ecuador, as reported in 1955, is whooping cough. The deaths attributed to this disease in that year included 692 with and 7,376 without medical certification. Inasmuch as whooping cough becomes less frequent as an attributed cause of death when medically certified, the accuracy of the data is questionable. Information on the prevalence of the exanthematous diseases is not available. However, deaths from measles in 1955 numbered 376 with and 2,344 without medical certification. Diphtheria occurs and in 1956 the incidence rate was 14.1 per 100,000 population. Figures published by PAHO indicate that 5,728 children were immunized in 1956 with diphtheria-pertussis-tetanus combined vaccine.

29. Venereal Diseases.

Syphilis is still a problem. In 1956, 8.5 per cent of 12,105 serologic tests were positive. This finding indicates improvement over results of a survey accomplished in 1946 in Guayaquil, which established a prevalence of 19.21 per cent in whites and 25.3 per cent in Negroes. The other venereal diseases are common. Control programs in Ecuador are hindered as they are elsewhere by lack of technicians and money. Prenatal clinics are active in combatting venereal diseases. Pinta, a spirochetal nonvenereal disease, produces a lasting positive serologic test for syphilis.

30. Dietary Deficiencies.

These conditions are being intensely investigated by the National Nutrition Institute (INNE). Surveys have shown deficiency of calcium to be fairly widespread. Riboflavin is frequently deficient. The deficiency of iodine in the diets of inland people increases the incidence of goiter.

31. Other Diseases.

Brucellosis is officially reported to have a low human incidence, based on sera-agglutinin tests conducted in Ecuadorian laboratories. Poliomyelitis has a low clinical incidence, with only 30 to 40 cases per year being reported. It seems likely that in Ecuador poliomyelitis occurs as a subclinical or inapparent infection in young children. Data are not available on the incidence of the infectious encephalitides. Trachoma is found only extremely rarely. Dengue has been reported but no statistics on incidence are available. Moreover, the elimination of Aedes aegypti may have reduced this hazard. Relapsing fever,

perhaps spread by Ornithodoros ticks, may be present. Fungus diseases and dermatophytoses are common and the climatic conditions of the Litoral and Oriente favor the propagation of these diseases. Bartonellosis (Oroya fever or Carrion's disease), a febrile disease with accompanying macrocytic anemia, occurs in Ecuador. A cutaneous form of the same infection is called verruga peruana. Both the febrile and the cutaneous forms are spread by Phlebotomus sandflies which are night biters.

V. MEDICAL AGENCIES

32. Public Health Administration.

The National Department of Public Health (Direccion General de Sanidad) is an agency of the Ministry of Social Welfare and Labor. Under its supervision are several services and sections, the Leopoldo Izquieta Perez National Institute of Hygiene, and a National Institute of Nutrition (see Appendix B). The Direccion General de Sanidad is located in Guayaquil. Brief notes on the subdivisions follow.

a. National Antiplague Service is charged with the important function of maintaining the ports free of this internationally quarantinable disease. This is accomplished by rodent and flea control, the fumigation of shipping and, secondarily, by attacking known foci of sylvatic plague in the interior.

b. National Yellow Fever Service. Organized in 1943 to control jungle yellow fever in the Oriente, this service has not confined its efforts to that region alone. Working in the Litoral and Sierra, it has completely rid Ecuador of the Aedes aegypti mosquito. The country has thus been freed of urban yellow fever. Jungle yellow fever seems to have disappeared spontaneously. The service continues to function by conducting immunization programs and protection testing.

c. The National Antimalaria Service. Created in 1948, this service has been engaged in mosquito control measures, diagnostic and survey laboratory support, and administration of curative and suppressant medication.

d. National Antituberculosis Service. Engaged specifically in preventive antituberculosis measures, this service conducts the BCG vaccination program and mass x-ray surveys.

e. The National Antityphus Service studies the epidemic typhus problem and seeks solutions through use of DDT and other louse-control measures. Murine typhus in the Litoral is also being studied by this Service.

f. The National Antirabies Service combats this disease by dog control, vaccination, and diagnostic laboratory services.

g. The National Service for Industrial Hygiene was recently established in the Direccion General de Sanidad to investigate and correct occupational hazards to health.

h. The National Maternal and Child Welfare Service is the largest and best of the national services. It deals with school health, nursing, health centers, social service, and health education. It maintains two health centers each in Guayaquil and Quito and one in Cuenca, Portoviejo, Loja, Esmeraldas, Ambato, Sangolqui, Cayambe, and Latacunga. Five additional centers were opened in 1958.

i. The National Epidemiology Service. Recently established, this service operates in two sections, one for the Litoral and one for the Sierra. This arrangement is desirable because of the extreme differences between these two regions. Because of the recent inauguration of this service, its functions are still largely in the study stage.

j. The Leopoldo Izquieta Perez Institute of Hygiene. A major agency under the Direccion General de Sanidad, the Institute functions both as a health laboratory and a research institution. Established in 1941, the Institute has Departments of Diagnosis, Chemistry and Bromology, Biologic Products Control, Immunology, Bacteriology, and Parasitology, and Sections of Pharmacodynamics, Epidemiology and Biostatistics, and Culture Media, Sterilization and Microphotography. The Institute publishes a periodical--The Ecuadoran Review of Hygiene and Tropical Medicine--in Spanish. The Pan American Health Organization has budgeted for consultant personnel for the Institute. A study for reorganization of the Institute with full-time personnel was made in 1957, but has not yet been implemented. The Institute has a manufacturing laboratory where vaccines are prepared. BCG vaccine sufficient for the country and 30,010 doses of glycerinated and 1,342,050 doses of dried smallpox vaccine were produced in 1958. Typhoid vaccine and a combined diphtheria-pertussis-tetanus vaccine are other products.

k. The National Institute of Nutrition (INNE) at Quito was established in 1950 to study the nutrition of Ecuador, to seek solutions of nutritional problems, to provide nutrition education to the public, and

to investigate the possibility of dietary supplement for those who need it. The Institute has assembled an excellent staff, some of whom have received training in countries other than Ecuador. Co-operation is maintained between the Institute of Nutrition and the Department of (Nutrition) Chemistry and Bromology of the National Institute of Hygiene.

33. Hospitals.

Hospitalization in Ecuador is provided by facilities operated by the various governmental or paragovernmental agencies. The Ministry of Social Welfare and Labor directly supervises some hospitals in the capital, while hospitals in the other cities and provincial centers are supervised, financed, and operated by Central Boards of Public Assistance, autonomous agencies under the jurisdiction of the Ministry of Social Welfare. In addition, private hospitals are available. There are 58 general hospitals, with a total of 5,415 beds; 19 tuberculosis units, some located in but separate from general hospitals (1,820 beds); 5 isolation hospitals (395 beds); 4 pediatric hospitals (420 beds); 3 psychiatric hospitals (1,171 beds); 2 maternity hospitals (423 beds); 1 leprosarium (141 beds); 1 cancer unit, part of a general hospital (32 beds). Total hospital beds exceed 9,025. Of these, 4,200 are operated by public assistance agencies, 1,539 by the Ecuadorian Antituberculosis League, 395 by the National Institute of Social Security, 293 by National Health Service, 2,007 by the Central Board of Public Assistance of Guayaquil, 374 by the Ministry of Defense, and 217 by the Maternal and Child Health Division (1959). Facilities for an additional 1,000 beds are either still under construction or have recently been completed. A listing of hospitals and clinics is given in Appendix C.

34. Adjunct Health Agencies.

a. The Ecuadorian Antituberculosis League (LEA). This is a paragovernmental agency dedicated to the curative and social aspects of tuberculosis. It receives a large portion of its funds from the national government and hence it is supervised by the Direccion General de Sanidad. It provides, supports, and maintains more than 1,500 beds for the care of tuberculous patients. It also furnishes drugs for treatment, and nursing and technical operating personnel. The curative program is directed by professionally qualified specialists. The alleviation of personal socio-economic problems arising from tuberculosis is a function of the League. Home visits are made by the Social Visitation Service.

b. The Ecuadorian Cancer Society (SOLCA) fulfills services for cancer patients similar to those performed for tuberculosis patients by the LEA. The scale of operations of the SOLCA is smaller than those of LEA, since the degenerative diseases are still less important numerically in Ecuador than the infectious diseases.

c. The National Social Security Institute (Instituto Nacional de Prevision) is a compulsory social insurance system established more than 20 years ago. It operates two branches: the Pension Fund (Caja de Pensiones) and the Social Insurance Fund (Caja de Seguro). The first serves state, bank, insurance company, and its own employees, the military, and some voluntarily associated agencies such as municipal police and fire departments. The Social Insurance Fund embraces non-public employees. Coverage is not yet complete, as agricultural and self-employed workers and domestics are not included. Insurance is provided to widows and orphans, and for sickness, maternity, disability, old age, and occupational injury or disease. Several hundred hospital beds are operated by the Social Security Institute.

d. Pan American Health Organization (PAHO). This regional agency of the World Health Organization is the continuation of the long-established and successful Pan American Sanitary Bureau. Many important contributions have been made to Ecuador. Present programs include continuation of aid to improve and reorganize the National Department of Health by establishing new subdivisions as required and fostering a stable system of civil service type public health careers. Assistance has been given to the Institute of Hygiene and the Institute of Nutrition through grants of equipment and fellowships for training of personnel. Consultant services have been provided. Consultant aid and some equipment and drugs have been furnished to further the malaria eradication program. Help is planned in the conduct of a leprosy survey. Equipment for the manufacture of dried smallpox vaccine was given to Ecuador in 1951. Nursing educators are being provided for the schools of nursing.

e. International Cooperation Administration, United States Department of State. A United States Operations Mission has been actively engaged in Ecuador for several years. It has assisted in the treponematosis and malaria eradication programs. Health education has been an important objective of the United States Operations Mission. The raising of environmental sanitation standards has been a major project through assistance in construction, improvement, or rehabilitation of water supply facilities for cities, towns, and villages, and also in assisting the people to construct sanitary latrine facilities.

Maximum cooperation with the Ecuadorian National Services is an un-failing characteristic of all International Cooperation Administration activities.

f. United Nations Children's Fund. This agency of the United Nations has been active in the malaria and treponematosi eradication programs, providing materials, transportation, and laboratory and spraying equipment.

VI. MEDICAL PERSONNEL

35. Physicians.

There were approximately 1,400 physicians registered with the Direccion General de Sanidad in 1958. This provides one physician for approximately each 2,800 people. The distribution is not ideal, however, for the cities of Quito and Guayaquil, with 15 per cent of the population, have 77 per cent of the physicians.

36. Dentists and Veterinarians.

There were about 400 dentists in Ecuador in 1958. Again 72 per cent of these are located in either Quito or Guayaquil. There were nearly 40 veterinarians in Ecuador.

37. Nurses and Others.

There were 284 graduate nurses reported. Almost 200 graduate midwives are active. Ecuador is gradually creating a trained corps of paramedical personnel such as laboratory technicians, health educators, dietitians, social workers, and statisticians.

VII. MEDICAL EDUCATION

38. Medical Schools.

There are three medical colleges in Ecuador, all government supported. These are the School of Medicine of the Faculty of Medical Sciences of the Central University of Ecuador at Quito; the School of Medicine of the Faculty of Medicine of the University of Guayaquil; and the School of Medicine of the Faculty of Medical Sciences of the University of Cuenca. The universities are autonomous, but are financed by the state. The medical course at each of the universities is seven years in length. Admission is open to both sexes after completion of

the secondary school course. Approximately 250 doctors of medicine are graduated each year.

39. Schools of Dentistry.

The Central University at Quito, and the Universities of Guayaquil and Cuenca each has a School of Dentistry. The five-year course leads to the degree of Doctor en Odontologia.

40. Schools of Nursing.

Nurses are educated in the Central University of Ecuador School for Nurses in Quito and the School of Nursing of the University of Guayaquil. The former has been modernized recently and it is planned to improve the Guayaquil institution.

41. Schools for Veterinarians, Pharmacists, and Midwives.

Both the Central University of Ecuador and the University of Guayaquil educate veterinarians, midwives, and pharmacists.

42. Medical Periodic Publications.

There are a number of medical associations which contribute to the knowledge of medicine in Ecuador. The Association of the School of Medicine publishes the Bolletin de Medicina y Cirugia. The Ecuadorian Society of Pediatrics sponsors extension courses and lectures for physicians. The Medical-Surgical Society of Guayaquil publishes its Anales. The Institute of Hygiene publishes the Revista Ecuatoriana de Higiene y Medica Tropica. The Revista de la Facultad de Ciencias Medicas is published by the University of Cuenca.

APPENDIX A

ANIMALS OF MEDICAL IMPORTANCE IN ECUADOR

Mosquitoes

Medical Significance

Aedes

- A. taeniorrhynchus*
- A. scapularis*
- A. camposanus*
- A. terreus metoecopus
- A. fulvus

All are possible vectors
of dengue

*Experimental vectors of
yellow fever

Anopheles

- A. albimanus
- A. apicimacula
- A. aquasalis
- A. boliviensis
- A. darlingi
- A. eiseni
- A. gomezdelatorrei
- A. mediopunctatus
- A. neivae
- A. pseudopunctipennis levicasilloi
- A. pseudopunctipennis pseudopuncti-
pennis
- A. pseudopunctipennis rivardeneirai
- A. punctimacula
- A. rangeli

Malaria

Malaria

Malaria

Malaria

Culex

- C. azuayus
- C. chidesteri
- C. corniger
- C. dolosus
- C. guayasi
- C. levicastilloi
- C. mollis
- C. nigripalpus
- C. pipiens quinquefasciatus
- C. quitensis
- C. bastagarius
- C. comminator
- C. conspirator
- C. durni

None of known medical
importance in Ecuador

APPENDIX A (continued)

Mosquitoes (continued)

Medical Significance

Culex (continued)

- C. eastor
- C. educator
- C. elevator
- C. putumayensis
- C. taeniopus
- C. pilosus
- C. chryselatus
- C. imitator
- C. babahoyensis
- C. bihaicolus
- C. maculatus

Haemagogus

- H. equinus (?)
- H. panarchys
- H. soperi
- H. spegazzini falco
- H. haemagogus boshelli
- H. haemagogus garciai

Any or all may be vectors
of jungle yellow fever

Lice

- Pediculus capitis
- Pediculus corporis
- Phthirus pubis

Epidemic typhus

Flies

- Musca domestica)
- Stomoxys calcitrans)
- Dermatobia cyaniventris
- Cochliomya hominivorax
- Chrysops discalis

Mechanical spread of filth
diseases

Myiasis

Myiasis

Nuisance biters

Ticks

- Amblyomma cajennense
- Amblyomma dissimile
- Ornithodoros sp.
- Ixodes ricinus

Relapsing fever(?)

APPENDIX A (continued)

Fleas

Medical Significance

Xenopsylla cheopis
Pulex irritans
Ctenocephalus canis
Ctenocephalus segnis
Ceratophyllus fasciatus
Rophanophyllus cavicola
Hectopsylla suarezi
Tunga penetrans

Plague

Possible vectors of sylvatic plague and of murine typhus to man

Chigoe

Reduviids

Eutriatoma carrioni
E. venosa
Triatoma dimidiata
T. pinto
Panstrongylus rufotuberculatus
Rodnius prolixus

Chagas' disease

Mites and Bedbugs

Sarcoptes scabiei
Trombicula americana
Cimex lenticularis
Cimex rotundatus

Scabies

Chiggers

Phlebotomus Flies

P. leopoldi
P. camposi
P. dysponetus
P. barreto
P. gomezi
P. shannoni
P. nordestinus
P. traidoi
P. monticolus
P. apicalis
P. vespertilionis
P. pentacanthus
P. guayasi

Any or all of these flies may be vectors of Bartonellosis (verruca peruana, Carrion's disease)

APPENDIX A (continued)

Scorpions

Centrusus magaritatus

Hadrurus lunatus

Chactas rosenbergi

Medical Significance

Painful sting

" "

" "

Spiders

Lactrodectus mactans

(black widow)

Painful bite

APPENDIX A (continued)

SNAKES

Species	Common Name	Type of Venom	Antivenin Indicated
Pit vipers			
<u>Bothrops atrox</u>	Fer de lance, Equis	Hematoin	Antibothropic serum
<u>B. schlegeli</u>	Toboba de pestana, eyelash snake, bo- caraca	Hematoin + neurotoxin	Anti <u>CROTALID</u> serum
<u>B. bilineatus</u>	Serpiente papagayo	Hematoin	Antibothropic serum
<u>B. nasutus</u>	Horn-nosed viper	Hematoin	Antibothropic serum
<u>B. castelnaudii</u>		Hematoin	Antibothropic serum
<u>B. montecelli</u>	Rabo de chucha, opossum tail	Hematoin	Antibothropic serum
<u>B. microphthalmus</u>		Hematoin	Antibothropic serum
<u>B. xantogramus</u>		Hematoin	Antibothropic serum
<u>Crotalus durissus</u> <u>terrificus</u>	Tropical rattle- snake, cascabel	Hematoin	Anticrotalid serum
<u>Lachesis muta</u>	Bushmaster	Hematoin + proteolysin	Antilaquetic serum
Coral snakes			
<u>Micrurus (Elaps)</u> <u>mipartitus</u>	Coralilla, coralino, coral snake	Neurotoxin	Antielapid serum
<u>M. corralinus</u>	Coral snake	Neurotoxin	Antielapid serum
<u>M. lemniscatus</u>	Coral snake	Neurotoxin	Antielapid serum
Sea snake			
<u>Pelamis (pelamy-</u> <u>durus) platurus</u>	Culebra del mar, yellow-bellied sea snake		

(For assistance in recognizing important poisonous snakes, see Annex 1 to this appendix.)

ANNEX I TO APPENDIX A

"If the physician can identify the bushmaster, rattlesnake, and coral snake, he can gamble with safety in using the Anti-bothropic serum for all other cases [of snakebite]."

Herbert C. Clark
Amer. J. Trop. Med.
22:37-49, 1942

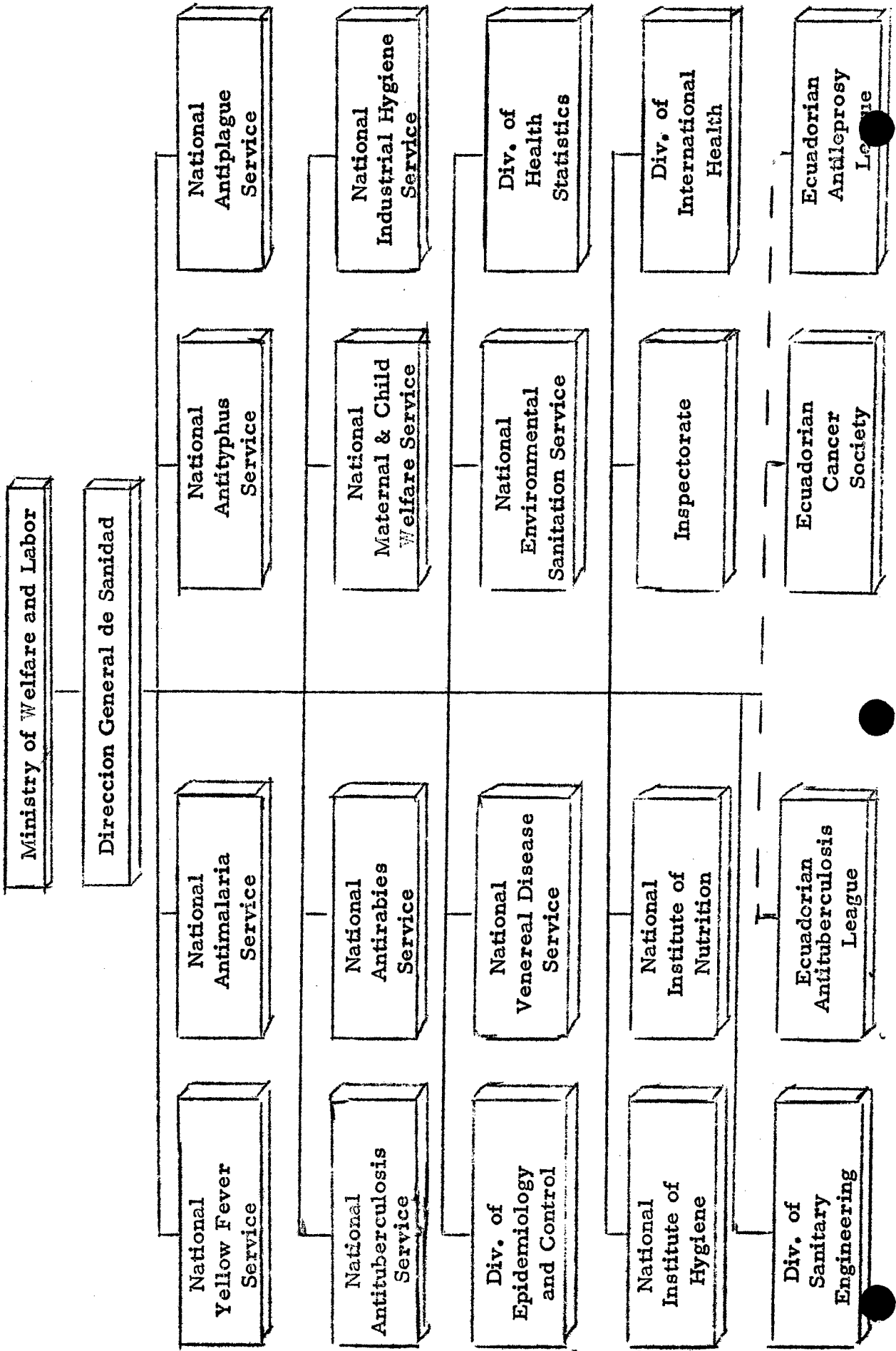
Bushmaster--the largest poisonous snake in the New World, up to 11 feet long--is light brown with black diamond markings. Scales are raised in center giving a warty appearance (often called La verrugosa, "the warty one" in Spanish). Head is roughly ovoid in shape, body is fairly thick and heavy, and tail ends in sharp pointed spine perhaps half an inch long. Lays eggs to reproduce.

The tropical rattlesnake--a large snake, average length almost 5 feet. Brown with black diamond markings similar to bushmaster. Has a true rattle like those of United States rattlers and uses it when disturbed. Young snakes may have only a button. Aggressive and may bite without coiling or striking.

Coral snakes--generally small and of secretive, burrowing habits, these snakes are distinctively marked. All coral snakes have bright colored bands of red, yellow and black completely circling the body. The red bands always are next to yellow bands on poisonous (true) coral snakes. A memory aid to identification is the traffic light. If red is next to yellow or yellow next to red, consider the snake poisonous. There are nonpoisonous snakes which mimic the coral snakes in coloration but these never have red and yellow bands next to and touching each other as does the true coral snake.

APPENDIX B

ORGANIZATIONAL CHART OF THE DIRECCION GENERAL DE SANIDAD



APPENDIX C (continued)

<u>Province of Guayas (continued)</u>		<u>Province of Pichincha</u>	
Guayaquil	Asilo "Calixto Romero"	Quito	Clinica Quito
"	Clinica del Seguro Social	"	Hospital Vaca Ortiz
"	Clinica Montero	"	Hospital San Juan de Dios
"	Clinica Parker	"	Hospital de Maternidad, Nueva Clinica
"	Clinica Panchana Valle	"	Hospital de Maternidad
"	Clinica del Dr. Alfredo Valenzuela V.	"	Leprocomio de Verde Cruz
"	Clinica "Arreaga Gomez"	"	Hospital Civil "Eugenio Espejo"
"	Hospital Alejandro Mann	"	Hospital Territorial Militar
"	Clinica "Rosales"	"	Clinica Ayora
Daule	Hospital General	"	Clinica Narvaez
Ancon	Hospital Ancon	"	Clinica Roman
<u>Province of Imbabura</u>		"	Clinica Pichincha
Otavalo	Hospital General	"	Clinica Neuro-Psiquiatrica
Ibarra	Hospital Civil "San Vincente de Paul"	"	Sanatorio del Dr. Endara
<u>Province of Loja</u>		"	Clinica "Moreno"
Loja	Hospital Rosillo	"	Hospital de Aislamiento
"	Hospital San Juan de Dios	"	Manicomio
<u>Province of Los Rios</u>		"	Clinica del Seguro Social
Vinces	Hospital Civil	"	Clinica Pasteur
Babahoyo	Hospital Martin Icaza	Santo Domingo	Hospital Dunham
<u>Province of Manabi</u>		Cayambe	Hospital San Jose
Portoviejo	Hospital Civil	<u>Province of Tungurahua</u>	
Manta	Clinica Acosta Rosales	Pillaro	Hospital General
"	Hospital General	Banos	Hospital General
Chone	Hospital Civil	Ambato	Clinica de la Caja del Seguro
Bahia de	Hospital Civil	"	Clinica Obstetrica
Caraquez		"	Hospital Delfina Moreno
		"	Hospital San Juan de Dios
		"	Hospital de Ninos