

## LEPROSY IN NETHERLANDS NEW GUINEA

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Netherlands New Guinea, which comprises the western half of the island of New Guinea, has an area of about 152,000 square miles and an estimated population of 1,000,000. Only the coastal tribes and a few in the interior, about 300,000 people in all, are under government control. Large areas of the interior are still unexplored, and living conditions there are extremely primitive. Leprosy has not been found in the interior, so this report deals only with a number of coastal areas.

The natives living near the coast are divided into many tribes, each with its own language and customs. On the north coast, Protestant missionaries started work almost 100 years ago, while Roman Catholic work began in the south some 50 years ago. The people along the coast have now largely adopted Christianity. There are schools in most of the villages, established by the missionaries but now largely supported by the government; illiteracy among young people is decreasing rapidly. The lingua franca taught in the village schools is Malay. Withal, the people are still primitive and the level of hygiene is low.

New Guinea has a wet tropical climate, with large rain forests covering the lower parts, and extensive swampy areas. There is little indigenous economic activity. At present the most important commercial activity is oil production, mainly centered in the western area.

Only a few hundred miles of usable roads are found in the entire country, and these are in the vicinity of the principal settlements; otherwise, there are only native trails. Most of the villages can be reached only by sea. Travel by native canoes is uneconomic, and shipping is a major government problem.

The population includes, besides the native Papuans, about 10,000 Europeans and part-Europeans, 3,000 Chinese and 10,000 Indonesians. Native houses, mostly built on pilings, are usually occupied by more than one family and are often badly overcrowded. The staple food in the coastal areas is sago, but farther inland yams, sweet potatoes and taro are used.

Malaria, the most important disease, is the principal cause of a very high death rate among children, often reaching 50 per cent. Almost all natives acquire yaws and intestinal worms; hookworm infestation is common, but the typical features of hookworm disease are seldom seen. Tropical ulcers, impetigo, fungus diseases, filariasis, conjunctivitis and

tuberculosis are common. Except for moderate invasions of influenza and dysentery, serious epidemics have not occurred during the past three decades.

Although definite avitaminoses are seldom seen, nutrition is rather poor. Even the fittest of the people, who have survived the ills of childhood, still have low general resistance. Most of them have hypochromic anemia, with hemoglobin not over 60 per cent Sahli (10 gm.); children and pregnant women are usually even more anemic.

#### THE LEPROSY SURVEY

It had long been known that leprosy was endemic in the island group off the west coast of New Guinea, near Indonesia, and that more recently it had spread to the western part of the main island. Several local public health officers had reported cases in different areas. Especially in the Wandammen district, at the southwestern part of Geelvink Bay, it was known that the incidence was high.

About 300 patients were on the local records before the survey. In 1950 two European nurses were sent to the Wandammen Bay area to care for 80 patients in a leprosy village. A smaller village has been established at Fak Fak, in the southwest. At both places sulfone treatment has been introduced. However, other health problems prevented a more extensive approach to the leprosy problem until the survey here reported.

This survey was made during a period of six months in 1952, one of us (N.R.S.) representing the South Pacific Commission, under whose



TEXT-FIG. 1. Sketch map of Netherlands New Guinea, showing the areas and localities with which the present reports is especially concerned.

auspices the work was done, and the other of us (D.L.L.) representing the New Guinea government.<sup>1</sup> It must be borne in mind that only certain areas were visited, in most of which leprosy was known to be endemic. In other areas the situation may be different, so our figures cannot be applied to the country as a whole.

We examined about 17,000 people, mostly Papuans, and saw 525 cases of leprosy. Diagnosis was made only when bacilli, anesthesia, or both could be demonstrated. Several doubtful cases are not included in the figures. Registered but not seen during this survey are another 95 cases, making a total of 620 known cases.

At the end of the year, 140 patients were isolated and treated in leprosy colonies (Miei, with 110, and Fak Fak, with 30), 20 were being treated in general hospitals, and 24 were isolated in a leprosy village on Numfoor without receiving treatment. Some of the rest are more or less isolated near the villages, in most cases in an unsatisfactory manner.

*Distribution of cases.*—The distribution of known cases from the

TABLE 1.—*Distribution of known leprosy cases in Netherlands New Guinea; prevalence per thousand.*

Area	Population of whole district	Population of part visited	People seen in part visited	Cases seen	Cases known	Minimal prevalence, whole district	Minimal prevalence, part visited
Hollandia	20,000	8,000	710	1	1	0.05	0.1
Biak	28,000	4,000	673	8	14	0.5	3.5
Numfoor	6,000	5,000	1,499	28	28	4.7	5.6
Japen	22,000	10,000	4,305	40	58	2.6	5.8
Manokwari	6,000	5,000	1,052	12	12	2.0	2.4
Wandammen Bay	6,000	4,000	3,296	221	221	36.8	55.2
West New Guinea, mainland	10,000	5,000	1,097	45	65	6.5	13.0
Waigeo, island group	5,000	3,000	2,106	104	106	20.1	35.3
Fak Fak	14,000	5,000	838	32	56	4.0	11.2
Marauke	19,000	5,000	1,306	34	59	3.1	11.8
Total	136,000	54,000	16,882	525	620	4.5	11.5

<sup>1</sup> The present report, the first one on leprosy in Netherlands New Guinea to appear in an international periodical, is in addition to an official one which one of us (N.R.S.) made to the South Pacific Commission under the same title: *Leprosy in Netherlands New Guinea*. South Pacific Commission Technical Paper No. 56, (mimeographed; 2 shillings sterling). That report contains a narrative account of the survey, supplementing the present one.

districts visited is shown in Table 1. In the population of 136,000 the known cases are 4.5 per thousand. Some areas with high prevalence were visited in these districts, and in a population of 54,000 a minimum prevalence of 11.5 per thousand was found. As only part of the population was examined, the actual prevalence must be higher.

*Sex distribution.*—Males predominated, although by a smaller margin than in many places, with 285 (i.e., 54%) against 240, a ratio of only 1.2 to 1.0.

*Age distribution.*—As will be seen from Table 2, 26 per cent of the patients seen were children below the age of 16. The largest ten-year group was 11-20, with 27 per cent, followed by 31-40, with 24 per cent.

TABLE 2.—*Distribution of cases by age and sex.*

Age group	Males	Females	Total	Per cent
0- 5	4	2	6	1
6-10	26	17	43	8
11-15	43	46	89	17
16-20	37	17	54	10
21-30	59	37	96	18
31-40	66	57	123	23
41-50	40	58	98	19
50+	10	6	16	3
Total	285	240	525	99

*Type of the disease.*—The figures on this matter are shown in Table 3. One-half of the cases were tuberculoid, mostly of slight degree, four-fifths of them being rated as T-1. At the same time, however, 43 per cent were of the lepromatous type, many of them advanced; one-third of them

TABLE 3.—*Distribution of cases by type and sex.*

Sex	Total	Lepromatous	Indeterminate	Tuberculoid
Male	285	148 (52%)	17 (7%)	120 (42%)
Female	240	77 (32%)	18 (8%)	145 (60%)
Total	525	225 (43%)	35 (7%)	265 (50%)

were rated as L-3. Many of the lepromatous cases were in leprosy institutions or had been isolated by the people of their villages, so that on further investigation the actual type rate may prove to be somewhat lower. Rates in the more intensively investigated areas, such as Wandammen Bay and Weigeo, are the most accurate (see Table 4, later).

There was a notable predominance of males among the lepromatous cases: no less than 66 per cent of them were males, the sex ratio in this respect being 2:1. Less than one-third of the females were lepromatous (against 51 per cent among males), while 60 per cent of them were tuberculoid.

The average duration of known symptoms in 207 lepromatous cases was  $6\frac{1}{2}$  years.

*Some clinical features.*—Most of the tuberculoid cases showed minor tuberculoid macules, similar to those described in other dark-skinned peoples. A few cases with severe reacting tuberculoid macules were seen.

The distribution of the macules in the 120 patients who had only single lesions was as follows (the figures denoting percentages): scapulas and shoulders, 40; arms, 25; nates, 20; flanks and hips, 6.5; legs, 5; chest, 1.5; head, 1; and abdomen, 1.

Probably most of the cases that were classified as of the indeterminate group will prove to be tuberculoid after longer observation and repeated examinations and lepromin testing. Such a complete study was not possible during the survey.

Among the lepromatous cases, it was noted that heavy, prominent nodulation was uncommon. Most patients showed only diffuse infiltrations and deep nodules. Severe laryngeal involvement was seen in only one case, moderate involvement in three cases. Severe eye involvement and blindness caused by leprosy were rare, but milder eye lesions were common.

A remarkable finding was that, among 8,000 people without symptoms of leprosy, ulnar nerve thickening was found in 7 per cent, and thickening of the great auricular in 1.5 per cent. In some of these there was moderate finger contracture, but this appeared to be due to yaws. In cases where the ulnar nerve was especially large or hard, the ulnar area of the hand was tested for anesthesia, but it was never found.

There was a distinct sex difference in these cases. Of the males, 11 per cent showed ulnar enlargement, and 2.25 per cent enlargement of the great auricular, while of the females only 3 per cent and 0.5 per cent, respectively, showed these conditions. In school age boys we found some thickened nerves, but none in girls of this age. Almost all who showed this sign were more than 10 years old, and only a few were under 20.

Although in an area where leprosy was not endemic it was found that the frequency of thickened nerves was only one-third of that in some endemic areas, no significant correlation was found between the frequency of leprosy and that of thickened nerves. In areas with numerous leprosy cases the frequency of nerve enlargement was often lower than in areas where only a few cases were seen.

*Leprosy in the Wandammen area.*—The most thorough investigation was made in this area, where 80 per cent of a known population of 4,000 were examined. Among them there were seen 221 cases of leprosy, a prevalence of at least 55 per thousand.

Leprosy was brought into this area some 50 years ago. Now, of 30 villages studied, only one was found free of the disease. In some villages the frequency was 14 per cent, after only 30 years history.

The type index was 40 per cent, 53 per cent in males and 26 per cent in females. The sex index was 48 per cent, with ten per cent more women examined than men. The child index was 23 per cent.

A history of contact was given in 70 per cent of 120 lepromatous cases. In 88 per cent of these it was house contact, as follows (the figures denoting percentages): parents, 30; brothers and sisters, 9; husband or wife, 4; grandparents, 3; children, 3; other relatives, 43; and non-relatives, 8.

Regarding the high percentage of "other relatives" contacts, it should be understood that, among these people, a house usually holds more than one family and that relatives often stay for long periods. A child has many "fathers" and "mothers," and more "brothers" and "sisters." Many relatives care for the child after weaning, and he may stay for long periods of time in houses other than that of his parents. These customs, not limited to this area, have certainly increased the spread of leprosy.

*Detailed data for other areas.*—Data such as those just given for Wandammen have also been worked out for other areas visited, and are given in Table 4.

TABLE 4.—Distribution by sex, type and age in other areas.

Area	No. of cases	Sex index	Type index			Child index
			Total	Males	Females	
Japen	40	53	40	48	32	30
Biak, Numfoor and Manokwari	48	67	60	63	56	21
Waigeo	104	55	46	54	36	32
West New Guinea mainland	46 <sup>a</sup>	54	30	32	26	39
Fak Fak	32	81	65	65	66	16
Merauke	34	53	32	33	31	29
Wandammen	221	48	40	53	26	23
Total	525	54	43	52	32	26

<sup>a</sup> One patient from this area, seen at Hollandia, is included here.

*Treatment at the Miei colony.*—The patients in the leprosy colony at Miei, now 110, have been treated with sulfones for periods up to two years with good results. For a short time Diasone was used, but it has been substituted by DDS. The latter is given up to 100 mgm. each day only, since there is no medical officer at Miei. Some of the patients showed severe, persistent anemia which required prolonged treatment before sulfone treatment was begun.



## THE INTRODUCTION AND SPREAD OF LEPROSY

The oldest known endemic area is the Radja Ampat ("Four Kings") island group in West New Guinea. There has been long contact between this district and Indonesia; in fact, many of the people are part Indonesian. The disease was probably introduced more than 150 years ago, perhaps even much earlier.

From these islands the disease was spread along the north coast by Chinese and Indonesian traders and bird-hunters. For a long time the Biak and Numfoor people have made canoe voyages to the west, and there are several villages of Biak and Numfoor people in that area of high prevalence. In spite of regular contact by the Biak people, however, the disease did not spread on that island as it did in the western settlements and in the Wandammen Bay district.

Probably from Wandammen Bay, leprosy was introduced into the island of Japen 20 years ago, and about 10 years ago to the Waropen coast, on the New Guinea mainland south of Japen. There are respectively 22,000 and 10,000 people in these small areas, and villages containing as many as 2,800 inhabitants, and since one often finds 20 to 30 people in one house it can be expected that many cases will develop in the near future. There are now 58 known cases at Japen, with most of the large villages along the south coast of the island represented.

During the past century there has been little contact with the eastern part of the north coast of New Guinea proper; the large Mamberamo river is a definite boundary. The 5 known patients there are all from other areas. Now, with improved communications and a permanent demand for labor in the Hollandia area, the danger of spreading the infection is great.

No cases from the interior are known. Since no investigation has been undertaken in the administered parts, and since the interior near the Australian border is *terra incognita*, it is impossible to make any other statement about the situation. Now that boys from the interior attend schools at coastal settlements, and officials from the coast including native assistants are employed in the interior areas, there is reason to pay much attention to these people.

Leprosy has been introduced only recently in a tribe near Sorong. In 300 people examined out of a population of 600, 26 cases were found, a prevalence of 44 per thousand. It is not known how far into the interior the disease has spread from here.

In the southwest, in the Fak Fak district, the disease has been introduced from Indonesia, perhaps via the island of Ceram. There are more cases there among Indonesians, part-Indonesians and Chinese than among Papuans, which may account for the unusual figures of this district. It was stated by local Chinese and Indonesian people that the disease was first seen here about 30 years ago. This is not confirmed by the child and type rates, and is probably incorrect.

The average duration of illness was  $9\frac{1}{2}$  years, 3 years more than elsewhere in New Guinea. The level of hygiene among Chinese and Indonesians here is higher than among Papuans. As conditions here are different from those in other areas, it is not necessary to explain the figures by race differences.

Far to the southeast, at Merauke, some 30 years ago only a few cases were known among Indonesians along the coast. Now leprosy is found in several coastal Papuan villages, and has spread to the interior along most of the rivers. Of a tribe living along the Maro River, 640 people were examined from a known population of 850, and 28 cases were found, a prevalence of at least 33 per thousand after some 20 years history.

Probably other areas remain less heavily infected, but rapid spread is to be expected since cases are known from many parts of this district, and general conditions are favorable for extension.

#### SUGGESTIONS FOR A LEPROSY CAMPAIGN

With many gaps in our knowledge, we may say that the prevalence along the coast is at least two per thousand, and increasing in many areas; while other places, now leprosy free, are being exposed to infection. Thus there is ample reason for paying special attention to leprosy in New Guinea.

Even if the total number of infectious cases should be found to exceed 2,000, it would be much easier to create facilities for isolation and treatment than to attempt to handle this situation at the village level, where the problems which exist in every primitive community are especially troublesome in New Guinea. The low level of education makes it often impossible to use the approach of reason. Lack of hygiene, overcrowding of house, and other unsatisfactory conditions are difficult to change. Since the Papuans have as yet only the beginning of a cash economy, they cannot be expected to contribute to the expense of an adequate program of health service and education to give the attention required for a serious antileprosy campaign, as it is but one problem among many.

A full-time leprosy officer; a central, well-organized leprosarium; and central registration are necessary for an adequate campaign. Since most patients are not willing to move long distances from their homes, the colonies at Miei and Fak Fak should be developed and new ones established at Sorong and Merauke and probably at other places. The central leprosarium would care for local patients, and others personally preferring the central institution. Those patients requiring special medical, surgical or laboratory service could be sent from other areas.

The most important function of the central leprosarium would be to train nurses and native assistants, for the local institutions and as special workers. They would seek out new cases, follow up contacts and released patients, and educate their own communities regarding leprosy, in a way that European medical officers could not do. Thus they would be of great help in persuading patients to avail themselves of the treatment



facilities of the institutions. Compulsory segregation would prove a failure in New Guinea.

Some of these native workers would be able to treat uncomplicated and noncontagious cases as outpatients or in small colonies, as it is both impossible and undesirable to concentrate all patients in large institutions.

Newly arrived European physicians and nurses should also be assigned to the central institution to study the diagnosis and treatment of leprosy, before proceeding to their posts. Education regarding leprosy of the European population in general, and the officials especially, is needed here as everywhere.

Since a complete program of leprosy control is out of the question under existing conditions, it would be wise to pay much attention to the children and young people. For patients in general, but especially for children, the level of education in the institutions must be high. Parents dislike being separated from their children, but often they are quite anxious to have them educated, and are willing to send them to boarding schools. When the parents realize that schooling is available in the leprosy institutions, they will send their children more readily, with benefit to both the children and the villages to which they would return after discharge. After several years in these institutions, young people will have acquired industrial training as well as knowledge of leprosy, and will return to their villages as more or less important people; they will be of great help in disseminating a better understanding of leprosy. Moreover, the need for skilled labor which exists throughout New Guinea will make these discharged patients still more welcome in the community, and will encourage others to come for early treatment.

#### SUMMARY

In a leprosy study in Netherlands New Guinea, 17,000 people were examined and 525 cases of leprosy seen. The known incidence of leprosy in the controlled coastal area is now over 2 per thousand, and the actual incidence is probably much higher. The situation is discussed in some detail and suggestions are made for an antileprosy campaign.

#### RESÚMEN

Los autores hicieron un estudio de la lepra en partes de Nueva Guinea Holandesa; islas y regiones costaneras. Estas son las únicas regiones donde la lepra ha sido introducida, probablemente de Indonesia. No se sabe si la enfermedad existe en el exterior.

De entre 17,000 habitantes, la mayoría Papuanos, se encontró 525 casos de lepra. Otros 95 se sabe han sido registrados, indicando una prevalencia de 2 por mil. Quizás la prevalencia verdadera es más alta. En la región de Wandammen en Geelvink Bay hubo 221 casos, con una prevalencia de 55 por mil.

Hubo leve predominancia de varones; la frecuencia en niños es alta; y aunque 50% de los casos fueron tuberculoides leves, los casos lepromatosos fueron 43% del total, y muchos de ellos avanzados. Casos lepromatosos demostraron mayor prevalencia en varones (51%) que en hembras (32%), pero los tuberculoides predominaron en las mujeres. Se notó engrosamiento del nervio ulnar en personas sin otro signo de lepra. Esto se halló mayormente en hombres adultos, y no hubo correlación con la prevalencia de lepra.

Se hacen recomendaciones para una campaña anti-leprosa.