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## Disease in Micronesia: A Historical Survey

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Micronesia is an elastic term as it is used for the islands in the Western Pacific just north of the equator. In this article we will be using the term to refer principally to Palau, the Marshall Islands, and the Federated States of Micronesia (FSM). All these islands have a history of political association with the US that dates back at least to the end of the Second World War. European and American influence in the area reaches much further back than that-to the mid-nineteenth century, at least, when American whaleships and other vessels began making regular stopovers for rest and refreshment, and when American Congregationalist missionaries first found an audience for their message.

In truth, we know little about the burden of disease in the islands before contact with the West other than what little can be inferred from prehistoric human remains and genealogies and what the earliest visitors saw and recorded. Life for Pacific Islanders everywhere may well have been "nasty, short and brutish," as Hobbes suggests it was for his European ancestors. This we do not know. But we do know that sustained Western contact, especially during the last two centuries, impacted greatly on health conditions in the islands, both for good and for bad.

### The Scourge of the Ships

Just as the Marianas underwent a period of disease and depopulation resulting largely from foreign ship traffic in the late 17th and early 18th centuries ("disease of the ship" on Guam), so most of the remainder of Micronesia faced the same scourge a century or so later. As Western sailing ships reached the islands ever more frequently during the nineteenth century and contact between Micronesians and Westerners became more intensive, notable depopulation occurred owing to the diseases introduced from abroad.

The most devastating and best known of these was the smallpox epidemic that first broke out in 1854. When the American whaleship Delta came to anchor off Pohnpei in late February of that year, it put ashore two of its crew members who had contracted smallpox during the voyage and buried another. Pohnpeians promptly stripped the diseased men of their clothes and, according to one version of the tale, dug up the body of the other. The result was a severe outbreak of the disease, which raged through the island for several months, despite the efforts of an American missionary and physician to control the epidemic. Albert Sturges, one of the two American missionaries working on the island at the time, reported that a census of Kitti, the area in which we worked, showed a precipitous drop in population from 2,156 in May of that year to 1,039 in October-a loss of over half the population in just five months. "The mortality," Sturges wrote, "was even worse in the windward tribes, citing a population fall off in Sokehs from about 2000 to 1000 and adding that "the Net tribe may now number 200" since "a large proportion died." Eventually the disease ran its course, but not before claiming about 4,000 lives, or 40 percent of the island's population.

Just two years later, in February 1856, smallpox broke out on Guam after an American merchant ship put in there. The disease, which during the first few months claimed victims only in Hagatna, soon moved to other parts of the island. "By the end of August it had spread with the

speed of lightning-like an electric spark-to all the villages of the island," wrote one of the priests serving on Guam. By the time the epidemic had died out in November, a total of 5,534 people had died, according to a count made by the Governor of Guam. If smallpox had ravaged Pohnpei, it had been even more disastrous on Guam, which lost a full 60 percent of its population to the epidemic.

But smallpox was far from the only epidemic that raged through the islands during the nineteenth century. In 1843, a decade before the smallpox outbreak on Pohnpei, the British trader Andrew Cheyne was responsible for bringing influenza to the island. Cheyne then sailed on to Yap, where he put ashore two of his hands sick with "fever and ague," a disease that spread to the people of Tomil, taking fifty lives in just three days. As if this were not enough, Cheyne returned to Yap twenty years later and introduced a new influenza epidemic that claimed many more lives. Just a few years later, in 1872, another influenza outbreak occurred, this time in Palau where 200 people died within a few months.

The missionary letters from Pohnpei are punctuated with constant references to contagious disease throughout the last half of the century. Sturges writes, in 1863, that another sickness is going around and has already taken the lives of many high chiefs; in 1866 he reports on the "reappearance of dysentery... a disease that was fatal to the natives many years ago" and which has caused the death of a number of high chiefs. In another letter, he mentions that a Pohnpeian had recently "died of consumption, one of the most common and fatal diseases." The missionary sources report outbreaks of one disease or another every few years: influenza was rampant in 1856, 1871, 1874 and 1879; while measles outbreaks occurred in 1861 and 1894. As a result, Pohnpei's population at the end of the century was estimated at about 5,000, half of what it had been in 1840 before the heavy toll that foreign disease had exacted from the people of the island.

Other islands suffered similar periodic outbreaks of diseases against which island people had not yet developed any resistance. Reports of the American missionaries in the Marshalls around the mid-19th century have a familiar ring to them. On Ebon in 1859, influenza broke out; the disease "has worked its way into the lungs, and a number of the people have died of bronchitis." In a single month, Ebon, an island of a thousand people, lost a hundred lives. There was a recurrence of influenza there just two years later, one of the missionaries writes; but the problem was compounded when "a ship touched at Ebon and infected the people with measles." Then, another two years later, in 1863, there was "an outbreak of what seemed to be typhoid fever" that claimed 12 lives. But Ebon was struck its most damaging blows after the turn of the century; dysentery spread through the island in 1907 resulting in 150 deaths, and a year later still more died in an epidemic that took 400 lives throughout the Marshalls. Due to the delay of intensive foreign contact in the Marshall Islands, the onset of the cycle of population decline there occurred later than in the island groups to the west, but it was nearly as sharp. A German census in 1908 put the population of the island group at 9,267, showing a 30 percent drop in a population estimated at 13,000 at the time of German annexation in 1885.

Still, no island was ravaged by disease as terribly as was Kosrae. Already in 1848, well before the apogee of the whaling era, Captain William Jackson of the whaleship *Inez* judged the condition of the people "deplorable." He observed that "there is a general sickness prevailing, a species of fever. The people also have a foul disease raging among them, together with other maladies. Some were dying daily." Another ship captain who visited the island two years later observed that the population was "decreasing through the prevalence of colds, consumption, and other diseases." Benjamin Snow, the resident American missionary there, lamented the rate at which "our benighted people sicken and die." In 1854, within two years of his arrival, he remarked that "Hardly a week and sometimes hardly a day passes without hearing that someone

has died." Just a year later, Snow writes that 113 people have recently died of influenza; and a year after that he notes that another 125 have passed away of one sort of illness or another. Snow then begins his count-down on the population, providing annual census figures for the period 1855-1858 that show a decline during that period from 1,106 to 747, for an annual population loss of 11 percent. Females suffered a greater loss than males, resulting in a male to female ratio of 4:3. As a consequence, Snow observes, "It is quite fashionable on Kusaie where women are so scarce for one woman to have two husbands." The population continued to decline until 1890 or so, when it reached a low of 300, a mere one-tenth of the 1838 estimate of 3,000. In 50 years, then, the population of Kosrae declined by 90 percent, a loss comparable to that suffered by the Marianas over a century earlier.

The physical deformities of some of the adults, especially on Pohnpei and Kosrae, the two islands that absorbed most of the whaleship traffic from 1840 to 1860, attracted the attention of foreign visitors. One Pohnpeian woman had lost her eyes and half her face, while another man had lost his nose-both victims of what was in those days called "the pox." Missionaries offered vivid descriptions of the disfigurement that they found nearly everywhere and which they attributed to the prostitution that was rampant on these islands during the heyday of foreign ship layovers. The disfigurement, to the missionaries' way of thinking, stemmed from "a disease which is the wages of sin."

Even if the symptoms ascribed to "the pox" were manifestations of yaws rather than syphilis, as early writers often supposed, there is clear evidence that sexually transmitted disease was having a considerable impact on the islands. An abrupt drop in births was noted in many places during those years. "There are next to no infants on the island," Snow writes of Kosrae in 1855. Pohnpei was little better off: in a letter of 1854, Sturges bemoans the fact that there were only seven births in the last two years. There was a good measure of truth in the observation made by the captain of a British warship that visited Kosrae in 1853 that the "virus...which seals up the fountains of life" was in evidence everywhere. In Palau infertility was not as rampant, but still it was cause for concern. One visitor to that island in 1875 wrote: "Not two in five women bear children, and two or three children are considered a large family."

Overall, the intermittent epidemics brought on by contact with foreign ships-mostly influenza, measles, and possibly tuberculosis-were causing an enormous spike in death rates, while the infertility stemming from gonorrhea was depressing the birth rates. Benjamin Snow's comment shortly after he took up residence on Kosrae in 1852 is not much of an exaggeration: "Old age was the door through which most went to eternity. But now an old man and an infant are among the rarest things seen." Under such conditions rapid depopulation was inevitable. In Kosrae, as we have seen, the depopulation was massive; the island population dropped away from 3000 to 300 in half a century. Meanwhile, Pohnpei lost about half its population, falling from 10,000 to 5,000 in about the same period. The Marshall Islands dropped from about 13,000 to slightly more than 9000 in less than 30 years. Palau's population plunged from 8,000 to just over 3,700 by the early 1900's. If Chuuk and Yap escaped the worst of the depopulation during this time, it was only because these places were not the desirable ports for foreign ships that other islands in the area were. Yap wasn't visited often by ships until a flourishing copra trade began in the 1870's, while Chuuk only became a port of call for trading vessels and a residence for agents of firms late in the century.

During the nineteenth century the population drop in Micronesia could be estimated at between 30 and 40 percent overall. (See Graph 1) It was hardly a surprise that Westerners, like the German trader Alfred Tetens, were ready to shovel soil on the grave of these island cultures. "The weak, deteriorating natives will not be able to resist the advances of civilization. Before long the last Micronesian will have disappeared," he prophesied.



## The Arrival of Western Medicine

Colonial rule began in 1885-1886 when Germany annexed the Marshall Islands and Spain won recognition of its claims over the Caroline Islands. Even so, little was done to stem the diseases that had taken such a heavy toll of the island populations during the remaining years of the nineteenth century. Only at the turn of the century, when Germany acquired the Caroline Islands from Spain and consolidated its rule over the region, did a colonial administration make the first organized attempt to provide health services for island people.

The German administration assigned medical doctors to Yap and Pohnpei, its district offices in the Western Carolines and the Eastern Carolines, but medical personnel would later be sent out to other islands to provide medical services there for limited periods of time. Germans also opened the first hospitals that were intended to serve the local populations. (The Spanish had built an infirmary on Pohnpei soon after their arrival in 1887, but the facility was located within the walls of the colony and was meant to serve the Spanish administrators and their troops.) A few years before the turn of the century, the German administration in the Marshalls erected a two-building hospital on Jaluit capable of handling 95 people. Then, in 1903, a 40-bed hospital was opened on Yap, and a few years later dispensaries were begun in several villages on the main island, with two local health aides trained to serve in them. A health facility was also operating on Pohnpei under the care of a resident doctor. In 1913, the German administration had developed a proposal to open a hospital on Chuuk, but the Japanese takeover occurred before these plans could be realized.

From the outset, German authorities recognized the importance of taking measures to prevent the spread of infectious diseases carried by foreign ship crews and passengers. By 1901, they had designated the tiny island of Tabelau in Yap to be used as a quarantine station for all incoming vessels, especially those from Hong Kong where, as a German report put it, "the plague rages every summer." In time, quarantine measures were implemented in some of the other districts as well. The Germans also introduced regular vaccination to the islands, especially to protect against smallpox. (The American missionaries on Pohnpei had inoculated hundreds of Pohnpeians during the smallpox epidemic in 1854, thanks to the medical background of one of their number, but vaccinations never became a regular practice during the nineteenth century.) In 1901, soon after their arrival, the German medical staff vaccinated over 500 people on Yap, and a year later they were beginning vaccinations on Pohnpei. In 1906, they extended the vaccination program to Palau and Woleai as well as a few of the outer atolls in Yap; they could report the following year with little exaggeration that all the Western Carolines had been immunized against smallpox.

A further contribution made at this time was in the diagnosis of the nature of the problems that were afflicting island people. Robert Koch, the eminent medical researcher, during an early visit to Micronesia, was responsible for the discovery that yaws (then known as frambesia) was the cause of the disfiguration and bodily lesions that had long been attributed to syphilis. The estimates of the prevalence of syphilis in places like the Marshalls were greatly exaggerated, it was learned, even though gonorrhea continued to be widespread in many places. Medical examination showed that respiratory diseases, ranging from whooping cough to tuberculosis, had become a common health problem throughout the region. These were regarded as more serious than yaws, ringworm, intestinal parasites, and the host of minor diseases that were to be found nearly everywhere.

Even so, the German era was not without its major epidemics. The Marshalls experienced influenza outbreaks yearly between 1899 and 1905, the last of which was especially virulent and claimed nearly 200 lives. A dysentery epidemic on Yap in 1907 carried away 200 people, especially the elderly and children. An influenza outbreak in 1910 also claimed many lives. It was as if those islands that had been spared the worst during the previous century had now become the most vulnerable when the old epidemics made their periodic return.

The population decline continued in the Marshalls and Palau for a time before these islands began to recover, but it was the sudden precipitous drop in the Yap population that had German authorities alarmed. The Yap population fell from 7,400 to 6,200 during the first decade of the 20th century. (See Graph 2) Indeed, it dropped by 500 during a single year, 1908-1909, supposedly due to an outbreak of dysentery. The problem was compounded by the low birth rates in Yap-something that the German medical authorities blamed on infertility due to the spread of gonorrhea and upon the widespread practice of abortion. To counter the first of these, German officials attempted to put a close watch on ships to keep girls from boarding and infected seamen from coming ashore. They also did what they could to suppress the traditional practice of bringing in girls from other villages to serve as hostesses in the men's houses. Despite these measures, the Yap birth rate remained far lower than any other place for the next half century, even as diseases that might have proven much less lethal in other island groups continued to carry off Yapese in large numbers. The mystery of Yap's long population decline, well after other islands' populations had stabilized, was to confound the Japanese administration for years and would be debated by medical anthropologists even into the 1960's.

Japan, which occupied German-controlled Micronesia in 1914, at the outbreak of World War I, improved on the health services that had already been in place. The Japanese navy, which administered the islands from 1914 to 1920, established a small hospital in each of the district centers and assigned medical staff to provide treatment for the islanders. When the Japanese civilian administration replaced the navy, it expanded on the previous efforts: the hospital facilities everywhere were improved and staffed with trained physicians and nurses. In addition, a new hospital was opened on Kosrae, and medical teams were sent by motorboat or ship to visit smaller and more remote islands. Some islanders were offered basic training in health matters in an effort to improve basic hygiene and sanitation in their own villages.

The administration redoubled past efforts at vaccinating the island population against smallpox, and it also established leper colonies in Yap, Palau and the Marshalls to deal with the growing number of cases of Hansen's Disease. Despite all of this, the health problems noted during the German administration persisted: yaws was as much in evidence as ever, and then there were the usual diseases-amoebic dysentery, sexually transmitted infections, whooping cough and tuberculosis. The epidemics that periodically coursed through the islands taking scores of lives even as late as the early 1900s were gradually being brought under control. They still came and went-an outbreak of whooping cough that struck Yap in 1925 and another epidemic that took 207 lives in Chuuk the year before-but they were increasingly rare. The normal case load for the hospitals and dispensaries of this period was intestinal parasites, respiratory disorders and skin diseases. Japanese authorities reported that an estimated 90 percent of the population were infected with yaws; an equally high percentage had ascaris, and perhaps half of the population suffered from hookworm. The major causes of death throughout these years were almost equally divided into three general types: infectious diseases, respiratory diseases and what were called disorders in the digestive tract.

The problem that stymied Japanese health officials was how to reverse the steady decline in the Yap population that had been occurring since the turn of the century. Other island groups had seen a reversal of their earlier population decline. Palau, Pohnpei and the Marshalls were

all showing a rebound from the depopulation of the last century, and by 1930 Kosrae had over 900 people, three times its population 40 years earlier. (See Graph 2) Japanese records for the years 1925-1930 show only a slight difference between births and deaths everywhere except for Yap Island. (See Table 1) The population of most of the districts in the Japanese mandate may have stabilized; but Yap's clearly had not. Between the years 1925-1930, the birth rate on Yap was 14.4 while its death rate was 44.1. During the 15-year period between 1916 and 1930, records show an average of 74 births a year in contrast 205 deaths. Japanese medical experts attributed the high death rate to tuberculosis and an unnamed respiratory problem producing a catarrh. In 1930, for instance, 110 of the 167 deaths on island, or 66 percent, were ascribed to these two illnesses. In an effort to isolate the tuberculosis cases, Japanese officials opened in 1935 a sanatorium in Yap that housed 50 patients. Notwithstanding their efforts, however, the population decline continued through the remainder of Japanese administration in Yap.

<b>Births and Deaths, 1925-1930</b>				
	<b>Births</b>	<b>Birth Rate</b>	<b>Deaths</b>	<b>Death Rate</b>
<b>Yap</b>	99	14.4	303	44.1
<b>Palau</b>	135	24.4	119	21.5
<b>Chuuk</b>	358	23.8	372	24.1
<b>Pohnpei</b>	199	25.5	169	21.7
<b>Marshalls</b>	159	17.0	157	16.7
Note: Data from Japanese Government, Annual Report 1930, p. 141				

### The Early Post-War Years

World War II, which ended the period of Japanese administration in the islands, resulted in surprisingly few deaths from military action, everything considered. Losses in Palau, the Marshalls and Chuuk may have been hit hardest by the Allied bombing, with total casualties numbering a few hundred or so. The loss of life in battle throughout the war years would have been comparable to that caused by infectious disease over the course of two or three years during the previous century.

Ironically, the lasting effects of wartime privation on the general health of the Micronesian population proved far less severe than the consequences of the times of plenty that followed. When the US Navy conducted a health survey of the islands in 1948-1951, it rated the general health of the population as excellent. After examining 60 percent of the island population, the navy medical team found virtually no venereal disease in evidence, and the incidence of leprosy was low. It concluded that intestinal parasites, yaws, skin diseases and tuberculosis were the most prevalent diseases. Cases of yaws were easily treated with penicillin, the "wonder drug" developed during the war, while intestinal parasites could be handled by oral medication. Within a few years of the end of the war, yaws, long an endemic problem in the islands, was virtually wiped out. Clearly the most serious health problem, in the view of the medical team, was tuberculosis. Nowhere was the incidence of this disease higher than in Yap, where nearly five percent of the population tested positive for pulmonary tuberculosis. The team speculated that the constant spitting of betelnut might have contributed to the spread of the disease on that island.

Overall, throughout the islands the prospects for long-range population growth after years of stagnancy appeared very bright. Already by 1948 the birth rate for the territory had risen to 33 per thousand, while the death rate had dropped to 17. Hence, a population increase of 1.6

percent yearly could be anticipated over the short term, and the figure would greatly increase over the course of the next three decades. Life expectancy was estimated at 50-55 years for both males and females.

The survey team also noted the almost complete absence of malnutrition or obesity—an observation confirmed by the photos taken of islanders, nearly all of whom could be described as well-proportioned and physically fit. The survey found no indication of diabetes. The blood pressure study conducted by the naval team was inconclusive but showed no indication of hypertension in the islands. An independent survey done in 1947 on Pohnpei revealed that only 9.5 percent of those tested were hypertensive and that the average blood pressure for all those tested was 111/76.

Throughout the remainder of the slow growth era in the US-administered Trust Territory, health conditions in the islands were largely unchanged. In the early 1960s, most of the patients in the district hospitals were being treated for the usual maladies: gastro-intestinal conditions, parasites, respiratory diseases and infections. A major campaign was mounted against tuberculosis, the disease that had long been the greatest health threat: all district hospitals maintained special TB wards to isolate victims, and in 1960 the government undertook a program to vaccinate islanders against the disease. Leprosy was no longer considered a major problem in the islands, and the 35 active cases were managed on an out-patient basis. There were still occasional epidemics, some of them quite serious, like the polio outbreak in the Marshalls in 1962 that took 11 lives and left 190 persons crippled, and the measles epidemic in Chuuk that took several lives a year or two later. Still, it seemed that infectious disease was gradually being brought under control and that the scourge of epidemics was all but over. The birth rate in 1962 was encouragingly high at 37.2, and the death rate had plummeted to a very respectable 5.2.

### **The New Scourge of Affluence**

As the population was growing during the 1960s, so was the affluence of the islands due to the escalation of US subsidies, the multiplication of new jobs, and the expansion of the Trust Territory payroll. Between 1962 and 1977, the per capita income for Micronesians skyrocketed from \$60 to \$400; even with adjustment for inflation, the income had tripled over those 15 years. Ships from abroad arrived with increasing frequency, as they had a century before; now, however, they carried not infectious diseases, but cargoes of imported food-food that was once prohibitively expensive but was now affordable to many Micronesians for the first time. These ships also carried pickup trucks and outboard engines, conveniences that made it possible for people to dispense with much of the bodily exercise that had always been such an integral part of island life.

Meanwhile, the birth rate had been rapidly increasing since the end of the war, reaching 40 per thousand by 1966. Even Yap, which had been in a long population decline up to World War II, recovered and began to show an increase in the 1967 census. The death rate remained about 5 per thousand throughout the area. Consequently, population growth rose to well over 3 percent yearly, reaching as high as 4 percent in the Marshalls by 1980. (See Graph 2) Population was growing rapidly, and health planners were soon as concerned about keeping it under control as they were about the handling the normal burden of disease they faced.



Yet, a new set of health problems were just beginning to surface. The records for treatment in hospitals and dispensaries, however incomplete they might be, give a clear indication of the direction in which the burden of disease was headed throughout the remainder of the Trust Territory years and afterwards. The annual report for 1956 recorded just 8 cases of diabetes treated throughout the territory. In 1966, ten years later, the number of visits for treatment of diabetes grew to 280, and in 1976 the number grew to 522. (See Table 2).

**Table 2: Treatment in TT Hospitals and Dispensaries for Diabetes and Heart and Circulatory Disease, 1956-1976**

	Diabetes	Heart Disease
<b>1956</b>	<b>8</b>	<b>192</b>
<b>1966</b>	<b>280</b>	<b>1,082</b>
<b>1976</b>	<b>522</b>	<b>1,494</b>
Note: Data from Japanese Government, Annual Report 1930, p. 14		

The problems under the category labeled as "heart and circulatory problems"-which would include hypertension and heart disease-grew even faster. In 1956, there were 192 visits to the hospitals and dispensaries for treatment of these problems. Ten years later, there were 1,082 such visits; while by 1976 the visits increased to 1,494. (See Table 2) By contrast, the number of patients seen for treatment for chicken pox, measles, and gonorrhea held steady or declined during the same twenty-year period. The health department records may not have been complete enough to yield robust figures on morbidity, but they certainly were indicative of trends during those years.

As the local diet changed during these years, new nutritional problems surfaced. Infant malnutrition seemed to be a more common occurrence, perhaps partly owing to the growing popularity of bottle-feeding infants. Parents or care-givers unfamiliar with the nutritional needs of small children were cutting the formula for powdered milk to save money or substituting punch or Kool-Aid for milk. Others were replacing the healthy local foods once fed to children with white rice or junk food. Vitamin A deficiency was found to be a common condition in children, especially in Chuuk and Pohnpei. Doctors everywhere were soon recording abnormally low weights of infants.

Infants might have been smaller, but adults were becoming larger than ever, thanks to the shift toward a high-sodium, high-fat diet bulked up by less nutritious carbohydrates like white rice. In the years following the rescind of the ban on alcohol in 1960, after-work and weekend drinking became a popular recreation for many islanders. Thus, island people found themselves in a paradoxical situation with regard to islander body size. Although many infants were showing



abnormally low weights in early childhood, an increasing number of adults were overweight, with many plainly obese. Nutritional imbalances, at birth and in adulthood, were making islander people a target for disease at both ends of the life cycle: malnutrition in its various forms early on, and non-communicable diseases later in life.

The Chronic Disease Survey done in three of the FSM states in 1994 revealed how large a percentage of the population in these three places were suffering from diabetes and/or hypertension. (See Table 3) According to the survey, hypertension rates among Micronesians of these three island groups in the 45-55 age group run to about 45 percent, well above the 29 percent that is recorded for Americans. The prevalence rates for Kosrae, Pohnpei and Chuuk, which stand at about 45 percent for the 45-54 age group, rise to about 55 percent for the next age cohort (55-64) and peak at about 65 percent for the 65-74 age group. It is worth noting, however, that even in the 35-44 age cohort, the rate runs to 34 percent in Chuuk, and 24 percent in both Kosrae and Pohnpei.

**Table 3: Chronic Disease Survey, FSM 1994**

	Overweight (% of population)				Diabetes (% of population)				Hypertention (% of pop)			
	Kosr	Chk	Pohn	USA	Kosr	Chk	Pohn	USA	Kosr	Chk	Pohn	USA
35-44 yrs	78	80	84	36	7	9	14	—	24	34	24	16
45-54 yrs	84	79	84	39	21	22	19	8	40	48	45	29
55-64 yrs	79	68	71	44	33	18	21	13	51	57	55	47
65-74 yrs	59	53	67	41	9	9	21	19	50	65	71	58

[Note: Data based on S. B. Auerbach's survey of 1500 people in Chuuk, 600 adults on Kosrae, and 600 adults in Sokehs, Pohnpei. "Overweight" = BMI>27.8 (males), BMI>27.3 (females). "Diabetes" = OGTT>200. "Hypertension" = BP(sys)>140BP(dis)>90. Joseph Flear, Summary of the Health Priority Seminars, 1998]

Diabetes has become an even larger health problem in the islands, at least when compared with the United States. The FSM diabetes rate of about 20 percent for the age group 45-55 is more than double the US rate of 8 percent for the same group. Rates are even higher in certain island groups: the Kosrae rate for the 55-65 age cohort is over 30%, and in the Marshalls the rate is the same for all the population over the age of 15. Two of the consequences of the disease have been apparent lately; death due to renal failure has been on the rise, as have limb amputations. There is no doubt that the "sugar sickness," as islanders call it, is one of the major health problems in the islands.

It would appear that changing lifestyle patterns during this age of affluence have been largely responsible for the increase in those non-communicable diseases that might be termed the "Big

Three:" diabetes, heart problems and stroke. All three are linked with obesity, which has become a serious concern in the islands today. About 80 percent of the FSM citizens aged 35-54 screened in the survey tested as overweight. This is more than double the rate of 38 percent overweight found in this age cohort of the US, a country that is itself vexed with the problem of obesity. (See Table 3) The percentage of overweight islanders in the next age cohort, 55-64, falls to roughly 70 percent, but this could reflect the fact that many of those at especially high risk for diabetes, hypertension and stroke had already passed away by that time. Life expectancy for Micronesians, after all, is close to 65 years-a full ten years lower than in the US.

The toll that diabetes, hypertension and stroke are taking on the Micronesian population may be gauged by referring to Table 4, which shows the percentage of all recorded deaths during the six-year period (1991-1996) for which each of these diseases is responsible. Overall, the three life-style diseases-diabetes, hypertension and stroke-accounted for 46 percent of all adult (ie, 5 years or older) deaths during this period. Cancer deaths represented another 17 percent of the total. Non-communicable diseases, then, were responsible for nearly two-thirds of the deaths during those years.

**Table 4: Major Causes of Death, by percentage, 1991-1996**

	YAP	Kosrae	Chuuk	Pohnpei	Marshalls	All Islands
<b>Diabetes</b>	6	24	9	7	18	13
<b>Heart</b>	12	20	26	30	14	24
<b>Stroke</b>	10	12	7	11	7	9
<b>Cancer</b>	23	16	15	13	16	17
<b>Total</b>	51	72	57	61	55	63

[Note: Figures for Yap include 1991-1995 only; figures for Marshalls include 1994-1997. No data for Palau available. Joseph Flear, Summary of the Health Priority Seminars, 1998]

Deaths attributed to diabetes were especially high in Kosrae (24%) and in the Marshalls (18%). Heart disease accounted for one-fourth of all the recorded deaths throughout the islands during this time period. Figures were especially high for Pohnpei (30%) and Chuuk (26%), however. Stroke was responsible for between 7 and 11 percent of the recorded deaths. Cancer included many different forms, some of which may have been attributable to life style. In Yap, for instance, there were a total of 44 deaths by cancer. Head and neck cancer, possibly related to betelnut chewing, was responsible for six deaths; liver cancer, to which alcohol use may sometimes contribute, accounted for seven deaths; and lung cancer, which may have been brought on by smoking, took another 12 lives. Hence, cancer remains a borderline cause of death. Lifestyle choices may contribute to the increased mortality of the disease today, even if it is nearly impossible to measure their impact with precision.

Overall, the data for this period suggest that non-communicable diseases account for roughly half of the mortality throughout the islands today. This represents a striking reversal of early patterns of deadly disease in Micronesia, dating from the nineteenth century until after World War II, in which infectious diseases claimed the greatest death toll.

### **The Shifting Burden of Illness**

In our review of health and illness in Micronesia since early foreign contact, we have reviewed what could be regarded as three stages of in the health history of the islands. The first stage, which began with increased ship contact of the 1800's and continued through the end of the century, saw the introduction of infectious diseases that devastated several of the islands in the area. The population loss during this stage was considerable, dropping by 90 percent on Kosrae, 50 percent on Pohnpei and Palau, and over 30 percent throughout the region as a whole.

During the second stage, beginning with German rule at the turn of the century and continuing through the end of World War II, the introduction of Western medicine and health care measures like quarantine and inoculation brought under control the diseases that had ravaged the islands for decades. Even endemic diseases such as yaws and the lingering health problems like tuberculosis yielded in time to the drugs and health procedures introduced after the war. Gradually as sanitation improved, the health problems stemming from parasites, respiratory diseases and gastrointestinal disorders were reduced.

What we could call the third stage was inaugurated in the 1960s as jobs multiplied and disposable cash income grew for many Micronesians. With the change in diet that occurred as imported foods became more readily available and more affordable, compounded by the less rigorous lifestyle that modern conveniences offered people, non-communicable diseases such as diabetes and heart disease became rampant.

Although these diseases are usually attributed to lifestyle, there is almost certainly a genetic component that explains the propensity for some ethnic groups, usually ones that have modernized recently, to be more at risk than others. The so-called "thrifty gene" theory holds that some peoples processed and stored blood sugar much more efficiently-an advantage to peoples living on the margin and facing the constant threat of food scarcity, but a serious disadvantage in an age of plenty. Genetic theories aside, there are holdover attitudes from the past that put islanders at risk today. Certainly the cultural mindset urging people to finish up food today while it's here since tomorrow there may be nothing to eat did not encourage abstemious eating habits. This may be worth mentioning if only to guard against the simplistic conclusion that today's disease burden can be blamed entirely on the West, like the infectious diseases that European and American ships brought to the islands a century or two earlier.

Today Micronesia still faces the lingering effects of the older disease burden, while trying to cope with the onslaught of the new illnesses associated with a modern life style. Infant malnutrition, while on the decrease, still represents a serious problem. This is reflected in the infant mortality rates in Micronesia which, although declining, are still much higher than in the US and other Western countries. Nevertheless, efforts to immunize children against major infectious diseases (measles, hepatitis B, pertussis, polio and mumps) have met with considerable success in recent years. Nearly all children in Palau under the age of two are immunized, and the immunization rates are high in most of FSM as well.

Some of the older health problems have returned, occasionally under different appearances. Tuberculosis, long one of the major health threats in the islands, was considerably reduced during the post-war years through improved treatment and isolation. Through the post-war years the reported cases dropped from 271 in 1965, to 165 in 1966, to 121 in 1976. Yet, in more recent years the numbers of those with TB seems to be increasing; FSM had 171 registered cases in 1994, and Palau also noted a rise in its case load. Moreover, we have been witnessing a resurgence of the threat as drug-resistant strains of TB are appearing in the Marshalls and Chuuk.

Likewise, sexually transmitted diseases, which brought about widespread infertility during the nineteenth century, were also brought under control during early Trust Territory years. Hospital records show 599 individuals treated for the disease in 1956, but the number of recorded persons treated for the disease quickly declined. Gonorrhea has remained a minor problem throughout the years but has very little effect on the birth rates and can be easily cured. Yet other sexually transmitted diseases have become a growing concern today-especially HPV, cervical cancer and HIV. Hence, the threat of sexually transmitted diseases, which loomed dark and large a century and a half ago, still hangs over the islands today, although in somewhat different form.

As modernization gives, so it takes away. The dreadful epidemics of the nineteenth century are unimaginable in our day, thanks to new vaccines and other medical advances. Modern medicine has checked the damages of some of the worst of the infectious diseases, just as it has lessened the risks of childhood and reduced the infant mortality rate. The forces of modernization, in recent years, have also checked the runaway population growth of the trusteeship period-in this case, through enticing islanders away from their home to find jobs overseas. Nonetheless, these same forces of modernization, the scourge of affluence, are responsible for the hypertension and high blood sugar rates that represent the major health threat to island populations today.

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