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Health and sanitation survey of Arno Atoll

by

John D. Milhurn

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In the late 1940's, the United States Navy assigned the U.S.S. WHIDBEY (AG-141) to conduct health and sanitation surveys of the Trust Territory Islands. The WHIDBEY arrived at Arno Island, Arno Atoll, on April 30, 1950 for this survey. The following summary has been abstracted from their report:

Arno Atoll has the largest land area of any atoll in the Ratak chain of the Marshall Islands. It is composed of 25 to 30 low islands and coral reefs which seem to be the remains of a crater rim. These form a circular barrier protecting a large lagoon. Many of the islands of the Atoll are densely covered with coconut palms and pandanus trees. A coral reef which is difficult and at times hazardous to navigation protects the entrance to the lagoon.

Two major villages exert their separate spheres of influence. Arno village on Arno Atoll influences the people of the surrounding smaller islands. Ine village, on Ine Island, a long narrow coral island in juxtaposition to Arno, is more important, being the seat of the Island Trading Company for the Atoll. Natives living on smaller islands of the Atoll while making copra are listed for census purposes as belonging to either Arno or Ine village. On festive occasions such as Christmas and the Fourth of July, which the natives have adopted, the entire population of the Atoll gathers on Ine for feasting, celebration, and even baseball at the Ine ballpark.

According to the Civil Administration Government at Majuro, the 1946 census of Arno Island was 256 and of Ine Island 302. The U.S.S. WHIDBEY located only 194 persons on Arno and 206 on Ine, including three visitors from Kaven (Maloelap Atoll) who had been examined on the ship in 1948. A determined effort was made to examine every native. One of the medical officers of the WHIDBEY visited each house or hut to induce the occupants to visit the other medical officer at the town house in the municipal square. It was the opinion of these medical officers that every native in both villages and their environs was processed and examined. Time and the difficulty of locating those natives on the sparsely settled, small uncharted islands made efforts to examine the remaining population impracticable.

1. Abstracted from original report by members of the Preventive Medicine Division, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.


3. Opinions expressed herein are those of the authors and are not to be construed as official or as representing the opinions of the U. S. Navy or naval service at large.
It was noted that the Marshallese are a very itinerant people who have little hesitation in undertaking sea voyages in an outrigger canoe. One of the natives not examined was a Chief Magistrate said to be visiting Majuro. This suggested to the WHIDBEY group the importance of planning surveys for simultaneous coverage of whole island groups rather than individual islands. Despite the failure to locate and examine a portion of the Atoll population, the WHIDBEY group were of the opinion that a representative sample had been examined.

"The Marshallese on the Arno Atoll welcomed the WHIDBEY with curiosity, delight, grace and hospitality. They showered us with their homemade leis, and gave freely of their limes, papayas, bananas, coconuts and pandanus. At no time were any of the beach party thirsty, being lavishly supplied with coconut milk. For the people, especially the young and the ancient, the ride in our dukw and the visit to the ship were holiday treats. School was even called off (and this probably occurs at the slightest pretext). The authorities there freely cooperated and showed our sanitation officer everything, hiding nothing from view. Even the dogs were startled at the sight of the monstrous dukw rolling along the primitive, Japanese constructed island roads.

"The young men demonstrated their native game of jog jog (phonetic spelling). They played this game, which is reserved for the men only, with great frivolity and mirth. The game is similar to our red rover and chug-a-lug and is played with a square ball made from pandanus fibres. The men stand in a circle and the man out stands in center. One man begins by throwing the ball in the air and kicking it with the sole of his everted and flexed right or left leg. As the ball approaches another man, regardless of his position in the circle, he must kick it similarly and so on the game progresses until one man misses when they start over. At the time the ball is first kicked a single clap of the hands in unison by all starts. After the third kick the clapping is coupled. Evidently the center man merely has the duty of keeping the ball in the air should it come to him for they never assumed or changed places in the circle. The problem of scoring is a mystery.

"Arno Island is about 2 1/2 miles long and 1/2 mile wide possessing in addition to its coconut and pandanus trees, a thick underbrush of vines. There are about 3-5 acres of arable land but cultivation of cleared areas would be difficult. Ine is a long narrow island (13 miles long and 1/4 mile wide) with a topography similar to that of Arno Island.

"The government of each village is democratic in form. The Chief Magistrate is elected for an indefinite period. In the Marshall Islands the Chief Magistrate's influence over his people is directly proportional to the extent of their Americanization, being less where American influence is greatest. There are also a registrar and a scribe of Arno Atoll, who reside on Ine. Whether or not each native understood the humanitarian instincts propelling this survey and just what he expected as a result of the survey is unknown. They submitted to processing and examination without question.

"The native economy of Arno as elsewhere in the Marshalls depends directly on the sale of copra and handicraft. In dollars and cents,
there are no apparent millionaires in Arno, but in spirit and health there are many, and perhaps proportionately speaking, many more than in the U. S. A. Their diet consists of home grown coconuts, breadfruit, pandanus, bananas, papayas, fish and pork and is varied slightly with imported rice, sugar, flour and canned corned beef, milk and beef.

"There is one school on Arno Island with 30 students (6-14 years old) and a missionary school and an elementary school on Ine with 47 pupils (7-20 years old) pursuing general studies with some sanitation principles being added to the curriculum. All natives speak and write Marshallese but only 8 adults understand English. All the natives were Protestant, holding Sunday services with a native minister from Ine. The Congregational Church, U. S. A. has established a mission school at Kusaie in E. Carolines where the native ministers (usually the Magistrates) are trained. The Bible has also been translated into Marshallese along with many Protestant Hymns. Not infrequently, when you offer a cigarette to the Magistrate, the interpreter will say, 'He no smoke. He Missionary!'

"Medical facilities on Arno Atoll are scarce. A new thatched dispensary is being built in Arno village. Obstetrical cases are delivered at home with little regard to asepsis by a midwife or the native practitioner (who although trained at Majuro is little more than a medical aid). The parents and immediate families care for the young, the ancient and insane. Tuberculous and leprous cases are left free to roam the Atoll, when found. There is no understanding of the principles of contagion and no facilities for isolation. The treatment of yaws (oftentimes being misdiagnosed as yaws and actually impetigo or pyoderma), of skin diseases and minor surgery conditions is left to the practitioner. Most of the people have been vaccinated for smallpox. Other immunization procedures are not recorded. No epidemics or water-borne or milk-borne diseases have been mentioned.

"The water supply is derived from rain water and although adequate is considered contaminated. One 20-ton concrete cistern built by Germans was found on Ine. Half of the cisterns are uncovered and contain trash. All the wells are uncovered and do not exclude surface drainage. Some of the water is boiled. Each village either defecates and urinates in the available unscreened latrines or on the beaches or in the interior. Living areas are dirty and unpoliced. Garbage is disposed of, however, in sanitary fills or by burning. Housing is of thatch and although not too clean, is adequate.

"Rodents and flies are numerous. Some culicine mosquitoes were noted on Ine. There are no control measures for rodents. Flytraps and sanitary garbage fills are fly control measures. There are no known plans to cope with disasters or epidemics. DDT is in use to control mosquitoes on Ine.

"Vital statistics (births and deaths) are filed in certificate form by the practitioner at Majuro. The scribe keeps record on Ine of marriages, divorces; court records, births and deaths for Arno villages.

"For the year 1949, the death rate at both Arno and Ine was 45/ thousand, considerably higher than the all-time high in U. S. A. of 23.0
in the last two decades. The leading cause of death at Arno is reported as tuberculosis but this statement may be challenged due to the poor vital statistical record and lack of knowledge of different diagnoses by practitioner.

"The native population of Arno definitely surprised the survey team for they presented a summary picture of excellent health. While their health facilities are relatively primitive, environment and time seem to be wedded in a union to protect these people from the vicissitudes of our modern civilization. The lack of time to complete thoroughly the preponderantly detailed survey examination of these people (3 days were allotted per village) and the language difficulties do not insure accurate statistics. The figures in this report represent, however, the best efforts of the survey to formulate an accurate picture of the health and sanitation of this island."

Some of the results of the Health Survey follow:

Coccidioidomycosis and Histoplasmosis

Approximately 96 per cent of the natives were skin-tested with these two antigens, children under 1 year of age being excluded. The test consisted of intracutaneous injection of 0.1 cc of a 1:500 dilution of Histoplasmin and 1:100 Coccidioidin. Results were read at 48 hours and no positive reactors were found. It was noted that the antigens had been in refrigerator storage on the ship for five months prior to use and might have deteriorated. Judgment of the team, however, was that these two mycoses were either absent or rarely occurred since chest roentgenograms did not reveal abnormalities suggestive of old infections.

Tuberculosis

Thirty-five per cent of the natives examined had positive skin reactions to 0.0001 mgm of PPD (Purified Protein Derivative) intracutaneously. One-half of positive reactions were in persons age 40 or over.

All natives were screened with 35 mm. photofluorographs. Those with suspicious findings were further evaluated with 14 x 17 inch roentgenograms. Three cases of active tuberculosis, two men and one woman, were found. All were over age 50. Three additional cases were strongly suspicious, one a child less than 10 years of age, and two women over age 40. All six had 2+ to 4+ dermal reactions to PPD.

It thus appeared that about 1.5 per cent of natives had proven or suspicious tuberculosis. No case of extrapulmonary tuberculosis was found.

The survey group commented on the apparent lesser incidence of tuberculosis at this Atoll than in other parts of the Trust Territory and the discrepancy between their findings and the official report of deaths due to tuberculosis for the past calendar year.
Yaws

Serological tests were completed on 149 residents of Arno (76.8 per cent) and 143 of Ine Island (70 per cent). Positive results were obtained in 103 and 94 sera (or 66.2 per cent and 69 per cent), respectively.

Twenty (20) cases considered to represent primary yaws on the basis of a peculiar raspberry-like lesion of the skin were found. Scrapings from these lesions were negative on darkfield examination. Six of the 20 had positive Kahn tests. These lesions appeared to be a latent phase of the primary stage for they were crusted, and the positive serologies explainable because of the lateness.

Seventy-nine (79) others were considered to have secondary yaws on the basis of peculiar annular, mottled, prickeled, indented scars of the skin. Such scars had to be differentiated from those due to burns resulting from the native practice of night fishing by torch light. Seventy-four (74) of the 79 had positive Kahns, the remaining 5 being too young for an adequate blood sample.

The remaining 116 natives with positive serologies showed no evidence of primary, secondary, or tertiary yaws. Neither was there any history or other evidence of syphilis, infectious mononucleosis, influenza, yellow fever, or malaria. These cases were, therefore, considered to have inactive yaws with a negative history.

Two women over age 50 had bilateral swelling about the bridge of the nose and gave questionable histories of yaws at an early age. Both had negative serologies. These were suggestive of N'Gondou, supposedly a tertiary manifestation of yaws.

Four men and women over age 50 had positive serology and a dilated tortuous aorta. All had either an accentuated aortic second sound or a low blowing systolic murmur at the base of the heart. None had diastolic murmurs or wide pulse pressures. None had a history suggestive of syphilis. These may have represented arteriosclerotic heart disease or syphilitic aortitis. Because of the endemicity of yaws and infrequency of syphilis, however, the Survey Team raised the possible connection with tertiary yaws since similar findings had been made on other islands.

One case with bone involvement considered to be tertiary yaws was found. No cases with juxta-articular nodes or gangosa were encountered.

The overall incidence of active and inactive yaws among natives was estimated to be 53 per cent.

Syphilis

The Germans and Japanese had reported the prevalence of syphilis in the Marshall Islands. The survey found four cases of clinically suspicious primary lesions, all of which had negative darkfields. One other case was thought to have congenital syphilis on the basis of history.
The diagnostic difficulties between yaws and syphilis were recognized. The possibility existed that some cases considered to have yaws might be syphilis. Further diagnostic difficulties in regard to active lesions were posed by skin lesions of pyogenic or other origin.

Leprosy

No cases were found despite a careful examination. A number of natives were found with lesions on the face or trunk which might have been suspicious but lacked any sensory nerve changes. Acid-fast stains on scrapings from a number of these lesions did not reveal M. leprae. Five elderly people had ulnar nerve thickening but no sensory changes. All gave a history of phalangeal fractures or traumatic laceration of the palms.

Parasitic Infestation

Stool examinations were made on 253 natives. Since these were not fresh, accurate data on the prevalence of Endamoeba histolytica or E. coli could not be obtained. Sugar flotation and direct smear examinations were made in each case. Intestinal parasites were identified in 53 or 18.2 per cent of specimens, these consisting of hookworm, Trichuris trichiura, and Giardia lamblia. Infestation in specimens from people over age 15 was twice that of specimens from people under this age. Hookworm was found in 7 per cent of specimens from Arno and two per cent from Ine. The respective percentages for T. trichiura was 5 and 9 and for Giardia lamblia 1.2 and 7.2.

Ascaris lumbricoides was not found.

Mycosis

Approximately 26 per cent had clinical evidences of mycotic infections, mostly, Tinea versicolor. The incidence was five times greater in adults than in children under age 15 and ten times greater in males than in females. Two cases of Tinea imbricata were seen on Ine.

Other

Approximately 4 per cent appeared malnourished and some, in addition, to be dehydrated. All were over age 40.

About 3 per cent were clinically obese, apparently on the basis of simple caloric excess, and all of these were between age 20 and 40.

One suspicious case of ichthyosis and one of rickets were seen but in general there was no evidence of vitamin deficiency.

Twelve cases (3 per cent) had clinical evidence suggestive of iron deficiency anemia. Three were pregnant women, the other 9 children under age 10. Two of the 9 children had positive stools for hookworm, one for Trichuris trichiura and one for Giardia lamblia.

Several suspicious cases of venereal disease were seen but only one proven, this being a case of gonorrhea.
Several benign neoplasms, including two cases each of pigmented and nonpigmented nevi were found but no malignant tumors. Leukoplakia buccalis was found in 14 natives, this lower incidence as compared to some other islands apparently being related to the fact that betel nut chewing is not a habit.

Two cases of Mongoloid idiocy were discovered on Arno in brothers aged 8 and 24 years. No information could be obtained about the parents or other relatives.

Eye, ear, nose and throat abnormalities were common. Pterygia were found in 71 persons (probably because of conjunctival irritation from coral) and chronic tonsillitis in 130 natives.

Three cases of bronchial asthma constituted the only allergic disorders encountered.

Nine natives were suspected of having hypertension on the basis of blood pressures above the level of 140/90 on the single examination. No evidence of cerebral, cardiac, or renal abnormality was noted in conjunction with these elevations.

Eleven had external hemorrhoids and there were 7 natives with indirect inguinal hernia, two with umbilical hernias, and two with pilonidal cysts. Seven women had uncomplicated pregnancies. One woman age 60, a nullipara, had a complete uterine prolapse.

Three cases with talipes equinovarus and one with polydactylitis constituted the major congenital orthopedic abnormalities.

Summary

The inhabitants of Arno Atoll appeared to be generally in excellent health and a state of good nutrition. Tuberculosis appeared to be the single major disease threatening health.