

Micronesian Migrant Health Issues in Hawaii: Part 1: Background, Home Island Data, and Clinical Evidence

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Abstract

Increasing numbers of people from the Federated States of Micronesia and the Republic of the Marshall Islands are presenting for clinical and public health services across the U.S., especially in Hawaii. We review the impact of historical and contemporary relationships between the U.S. and these Freely Associated States on the health status and health care access of these migrants. We draw upon both epidemiological evidence and clinical experience to suggest measures to assure health care access and appropriate clinical care for these populations. We also point to potential public health measures, and indicate directions for future research.

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Keywords: Micronesia, Hawaii, Historical Aspects, Emigrants and Immigrants, Disease, Epidemiology

Background

Following World War II, most of the small islands in the geographic area known as Micronesia - the Northern Marianas, Palau, Yap, Chuuk, Pohnpei, Kosrae, and the Marshall Islands - were held in trust by the US through a 1947 United Nations Mandate as the "Trust Territory of the Pacific Islands" (TTPI). From 1946 to 1957, the U.S. tested the vast majority of the megatonnage of its nuclear weapons in the Marshall Islands. Subsequently the Marshall Islands have been used to test ballistic missiles. During the early post-war period, the rest of the islands received little attention, as the U.S. failed to fulfill its mandate to develop their health and educational infrastructure. Beginning in the 1960s, U.S. aid for the Trust Territory increased: many islanders were employed by the government, and the cash economy expanded. In the late 1980s, the former Trust Territory split into the Commonwealth of the Northern Marianas Islands (CNMI) and the three Freely Associated States (FAS) through separate

Compacts of Free Association (COFA): (1) the Republic of Palau (ROP), (2) the Republic of the Marshall Islands (RMI), and (3) the Federated States of Micronesia (FSM). The FSM consists of four states: Yap, Chuuk, Pohnpei, and Kosrae.

Recognizing that the individual states have different languages, dialects, cultures, and subcultures - we will refer to the people who trace their lineage to the islands which constitute the present-day Federated States of Micronesia (FSM) as "Micronesian." Likewise, we will refer to people who trace their lineage to the present-day Republic of the Marshall Islands (RMI) as "Marshallese." We will refer to the geographic area which encompasses the former Trust Territory of the Pacific (which also includes the Northern Marianas and Palau) as well as Guam as "greater Micronesia." We focus on Micronesians and Marshallese because of the recent increases in their numbers in the U.S. and their special health needs. (There are fewer migrants from Palau.) Historically the CNMI and Guam have been tied more closely to the

U.S., and migrants from these jurisdictions have a different political status from that of migrants from the FAS. Because the COFAs allow free entry into the U.S. without involvement of the Immigration and Naturalization Service, we utilize the term “migrant” instead of “immigrant.”

Geography, Population, and Culture

The most populous state of the Federated States of Micronesia, and the state from which the largest number of migrants originate, Chuuk State, is made up of 11 islands within Chuuk Lagoon and 14 atolls and low islands surrounding the lagoon. The total land area is 127 sq km (FSM Division of Statistics, 2009a). The outer island groups have distinct dialects of the Chuukese language. The total population was estimated at 53,300 in 2008 (FSM Division of Statistics, 2009b). Traditionally, land inheritance is matrilineal, and siblings share in the stewardship of land. Traditional culture depended on the gathering of ocean resources and cultivation, but presently most households in the lagoon are dependent on imported food (Lowe, 2003).

The Marshall Islands are made up of 29 atolls and 5 islands west of the International Date Line. The total land area is 181 sq km. The Marshalls are inhabited by a single people who speak a single language. The total population was estimated at 59,071 in 2005. The kinship system can be classified as matrilineal. Land is inherited through the mother, but chiefs traditionally have authority over land ownership (Embassy of the RMI, 2009). The natural environment is an essential element in traditional Marshallese culture, and the people identify very closely with the land and water. Traditional Marshallese culture depended on the gathering of reef and open water resources. Taro, coconut, arrowroot, and pandanus were cultivated, utilizing the fresh water lenses beneath the surfaces of many of the small islets in the Marshall Islands. In the population centers of Majuro and Ebeye, most households are dependent on imported food.

Methods

We review here the health status of Micronesian and Marshallese migrants to the U.S., drawing upon our own experience in research, clinical care, teaching, and public health work with Micronesian and Marshallese people. On an ongoing basis, we monitor and draw upon the existing literature in our daily work. For this paper, we performed Medline searches using the terms “Micronesia” and “Marshall Islands” from the time of the last review (Pobutsky, Buenconsejo-Lum, Chow, Palafox, & Maskarinec, 2005). We drew upon discussions with clinical and public health colleagues in the Pacific Island districts and in Hawaii. Where epidemiological data is not available, we rely on anecdotal reports of the common experiences of those who care for these individuals.

The People

In the last decade, migration from the FSM and the RMI to the U.S. has burgeoned, with many migrants having first relocated to the more economically developed jurisdictions of the CNMI and Guam. The Compacts of Free Association allow citizens of the ROP, the FSM, and the RMI free entry into the U.S., without a visa and without requirements for health screening. Thus, requirements for immigrants, such as screening for tuberculosis, do not apply. Migrants report a number of motives for moving: employment, as dependents of job-seekers, and for medical reasons (Hammond & Filibert, 2007).

Many travel back and forth between the islands and the U.S. The U.S. Census Bureau estimates that 12,215 people from the FAS residing in Hawaii in 2008 (U.S. Census Bureau, 2009), though many consider this an undercount. Some estimate that as many as 60,000 people from the FAS (one in four who trace their origins to the FAS) live in the U.S. proper, Guam, and the CNMI (LaFrance, 2009).

As noted by long-time Micronesia resident Father Francis Xavier Hezel, head of the

Micronesian Seminar, many of the Micronesians who migrate have had limited preparation for participation in the workforce.

The crowded airports in Pohnpei on Sunday evenings, with thirty or forty garlanded young men and women standing around bidding goodbye to their families, suggests that an ever larger number of people feel they must leave for Orlando or Kansas City for employment. These waves of emigrants, however, are made up not just of degree holders but of high school and even elementary school dropouts. Surveys of migrants in Guam and Saipan during the 1990s have shown that the migrant communities in these places have only one-third the percentage of college degree holders that the FSM has (Hezel, 2000, p.8).

In 1998 less than half of adult Marshallese migrants to Hawaii had a high school degree. One-third of adults of working age were employed (Greico et al., 2003).

Human Resources for Health and Conditions of the Health Care Systems in the Island Districts

The island education systems are unable to adequately develop the human resources to staff district health services. Many who go abroad for higher education do not return home to work. Small, resource-poor island economies must focus on public health and primary care and cannot support robust secondary or tertiary services. Health care workers nevertheless do the best they can within the resource limitations. The health services in the districts generally have one hospital per state or jurisdiction on the capital island. Chuuk State Hospital is located on the capital island of Weno, and the outer islands State have dispensaries. The Republic of the Marshall Islands has hospitals on its two population centers, Majuro (Majuro Hospital) and Ebeye (Leroij Kitlang Hospital). The outer islands or atolls have dispensaries if they have any health services at all. Many of these are located in the home of a designated health assistant, and many are not actually in operation (Micronesian Seminar, 2004). The most sophisticated health services that most people have accessed, prior to relocating, is one of the

hospitals above - where all services (e.g. x-ray, pharmacy) are available at the hospital itself. Most services available are subsidized by the government, at a nominal cost to the patient.

Because of the lack of secondary and tertiary services, it is estimated that one-third of the budget for health care in the Republic of the Marshall Islands in 1996 was used for off-island health care (Tokuda, Cernada and Kurahara, 2001) and this remains a significant source of health expenditures in the FSM as well (UNFPA, 2009). Off-island referrals are made to Hawaii (or to Guam or the Philippines, where health care is less expensive) for advanced cases of cancer, heart or kidney disease. However, the majority of people from the Marshall Islands or Chuuk who receive health care in Hawaii are not formally referred by their government health services. Rather, they seek care on their own and obtain public health insurance (i.e. Medicaid) in Hawaii to fund their care.

The Social and Economic Situation of Migrants from the Freely Associated States in Hawaii

On their visits to diaspora communities across the U.S., Hezel and Samuel (2006) found Micronesians working, raising families, and creating social networks. Media reports in Guam and Hawaii have reported on the social problems of migrants from the FAS. In Guam, there have been reports of sexual trafficking (Aguon, 2008). Hawaii's high cost of living (necessitating an annual income of \$54,161 per year for a single mother with two children) makes it difficult for many to survive economically (Vorsino, 2007a). Lacking in job skills, and with low levels of proficiency in English, recent migrants face limited opportunities in the job market. In Hawaii's tight housing market, a number of wage-earners must pool their resources for rent, leading to large households. According to the Hawaii Department of Health's Easy Access Project (EAP), Micronesians report the lowest ratio of rooms per number of persons in their residence (averaging 5 rooms for 8-10 people), and were more likely to report unsatisfactory housing arrangements than other immigrants and migrants. Landlords also commonly refuse to

rent to Micronesians (Vorsino, 2007b). Many become homeless. A newspaper report on the overrepresentation of Micronesians in Hawaii's homeless shelters (Hoover, 2007) drew the ire of people from the FAS (Pang, 2007).

Health Literacy and Health-Seeking Behavior

Navigating the U.S. health system can be confusing for the American. It can be daunting for migrants from small island districts to find their way in the U.S. health system – with its complexities of health care financing, assignment to insurance plans, assignment to primary care providers, or the need to make and keep appointments with an array of health care providers (emergency departments, hospitals, private practitioners, community health centers, consulting specialists, and a separate public health system). Choi (2008) found that many Marshallese in Hawaii do not seek medical care until they suffer from unbearable pain. Once such pain is relieved, many do not seek follow-up care or continue with medications for chronic conditions. Marshallese with limited English skills often depend on networks of family or friends to take them to appointments – such that the schedules of others is often a limiting factor. In our clinical experience, many Micronesian and Marshallese patients present late in the course of their illnesses. Many fail to fill their prescriptions and make it to appointments, citing lack of transportation or lack of interpreters.

Many patients go straight from Honolulu's airport to one of the hospitals. Such uninsured patients pose financial burdens for hospitals which are obligated to stabilize patients under federal regulations. Upon discharge from the emergency department or the hospital, such patients are often referred to community health centers.

Like many Micronesians before her, Miyoko Samuels had come to Honolulu in search of the medical care that she could not obtain at home. As a physician, Dr. Samuels had a sense of what she needed and what might be potentially harmful. Her own colleagues had been

restricting her fluid intake. She was therefore somewhat apprehensive when the flow of her IV fluids was increased at the emergency department of a major Honolulu hospital. However, she did not feel it was her place to question her care. Her sister, a nurse who had accompanied her, was also concerned. But the liter bag of IV fluids was soon empty, and they quickly found themselves discharged. The next morning, Dr. Samuels found that her feet and abdomen were swollen. They went to a different Honolulu hospital and were again discharged with some medications. On the next day, they went to yet another Honolulu hospital, where she was finally admitted. By that night she died. (Miyoko Samuels is a pseudonym. This story was related to author SY by a family member.)

Climate Change and the Future of Migration from the Freely Associated States

Although natural disasters have occurred throughout the history of the Pacific Islands, the low-lying atolls of greater Micronesia are particularly vulnerable to sea level rise and severe weather. In July 2002, Tropical Storm Chata'an caused 47 deaths from mudslides. In April 2004, Typhoon Sudal damaged 90% of homes in Yap and caused major damage to the hospital. In May 2007 high tides and waves destroyed taro patches in low-lying Pullap atoll of Chuuk (Altonn, 2007; Chapman, 2007). Wave surges and high tides from December 2007 through March 2008 and then in December 2008 led to the salt water damage to up to 90% of the taro crops in the outer islands of the FSM. As it takes five years of better water conditions (no saltwater intrusion and normal rainfall) for taro to recover, people of the island districts must reconsider if life on remote atolls remains viable (Hezel, 2009). In December 2008 swells also washed over the Majuro, the capital of the Marshall Islands, damaging homes and forcing 300 people into shelters (Johnson, 2008). As Father Hezel notes, "Perhaps the larger issue is whether life in the remote atolls remains viable in today's world" (Hezel, 2009, p. 15). Discrete, episodic disasters and gradual ecological change

making human habitation unsustainable will likely lead to increasing numbers of people migrating from the Pacific Islands.

Access to Health Care: Eligibility for Public Assistance

Citizens of the Freely Associated States who come to Hawaii are in a unique legal situation. Although migrants from the FAS have the right of free entry into the US, the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 disallows federal funds from being expended for their participation in Medicaid (State of Hawaii, 2009). Thus, Micronesian and Marshallese migrants are not eligible for federally funded Medicaid for five years following their entry into the U.S. (Legal Aid Society of Hawaii and the National Immigration Law Center, unpublished table, 1998, 2006). However, according to State of Hawaii rules, they are eligible for health insurance under Hawaii's managed care Medicaid programs, Med-QUEST and/ or QUEST-NET, if they meet the eligibility requirements for federal poverty levels. Thus, participation by citizens of the FAS in Hawaii state Medicaid programs has been funded entirely by the state. "Compact impact" funding from the federal government to the State of Hawaii to offset health and educational costs have been inadequate (State of Hawaii, 2009).

Those who enter the U.S. under the Compacts of Free Association are not eligible for food stamps unless they become naturalized U.S. citizens or lawful permanent residents, or they are veterans, active duty military, or dependents. Families with dependent children under age nineteen are eligible for financial assistance under state funded programs such as TANOF (Temporary Assistance to Needy Other Families) if they meet eligibility requirements. COFA migrants are not eligible for Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI) unless they qualify by having worked for 40 quarters, but they may be eligible for General Assistance or Aid to the Aged Blind and Disabled due to blindness or disability (Legal Aid Society of Hawaii and the National Immigration Law Center, unpublished table).

With the State of Hawaii facing a budget crisis, in July 2009, the Hawaii Department of Human Services announced that COFA migrants would be excluded from Med-QUEST as of September 2009, and enrolled in a program with fewer benefits, to be called Basic Health Hawaii. Concerned that patients on hemodialysis and chemotherapy would be denied services, the Micronesian and Marshallese community in Hawaii organized against the change. Although a federal judge's temporary restraining order (citing procedural rules) preempted the changeover in September 2009 - as of this writing, the state intends to institute Basic Health Hawaii eventually, with provisions for dialysis and chemotherapy.

Services of the Hawaii Department of Health

Within the Hawaii State Department of Health, numerous programs serve immigrants and migrants including the Public Health Nursing Branch, the Tuberculosis Control Branch, the STD/AIDS Prevention Branch, the Hansen's Disease Branch, the Maternal and Child Branch, the Immunization Branch, the Chronic Disease Prevention and Control Branch, and Bilingual Health Services. Programmatic statistics in recent years have shown that recent COFA migrants are provided services at higher rates out of proportion to their numbers - with language access being a common need.

As an illustration of the on-going complexity of health issues for Micronesian migrants in Hawaii, it is helpful to look at the Department of Health's Easy Access Project (EAP) statistics. The EAP provides services and referrals for immigrants and migrants identified for potential health problems and works in conjunction with the Bilingual Health Services Program to provide language translation services. EAP program statistics for calendar years 1999-2008 illustrate that Micronesians comprised fully 12.8% of the EAP service population, yet they comprise less than 1% of Hawaii's total population. In 2008, (in the absence of a full calendar year worth of data) there was a substantial increase in the numbers of Micronesians in the EAP from 12.8% to 15.5% of the service population.

Health Status of Micronesian and Marshallese People in their Home Islands

Throughout much of the FAS, the burden of disease is significant. As in many developing countries, infectious diseases coexist with diseases secondary to marginal nutrition. Thus, infectious diseases such as tuberculosis, sexually transmitted diseases, Hansen's disease, and hepatitis B persist, and outbreaks of dengue fever and measles continue to occur. Malnutrition, particularly in children, is evidenced by the prevalence of Vitamin A deficiency, iron deficiency, and anemia.

A rapid and unfinished health transition in the FAS is associated with U.S. military activities, monetary aid and Americanization, and 'development.' It has resulted in demographic changes such as high fertility and out-migration, along with an explosion of chronic diseases, including obesity and type 2 diabetes, hypertension, high cholesterol and heart disease, asthma, and arthritis, along with both radiation-induced and lifestyle-associated cancers.

The five leading causes of death in the Republic of the Marshall Islands are sepsis, cancer (all types), myocardial infarction, pneumonia and suicide (World Health Organization, 2004). Risk factors for cancer, the second leading cause of death in the Marshall Islands, include the history of nuclear weapons testing, the prevalence of smoking and alcohol use, and sexually transmitted infections (Kroon et al, 2004). Children in the RMI are at high risk for vitamin A deficiency, iron deficiency and anemia (Palafox et al, 2003), while at the same time obesity is highly prevalent among adults, especially adult women (McMurray & Smith, 2001). Facilities for safe water and sanitation have been outstripped by population growth. An outbreak of cholera in Ebeye in December 2000 was a consequence of this situation (Beatty et al, 2004, Yamada & Palmer, 2007). Other diseases prevalent in the RMI include tuberculosis, Hansen's disease and syphilis (World Health Organization, 2004).

In the Federated States of Micronesia the majority of deaths and hospitalizations are due to non-communicable diseases (heart diseases,

diabetes, chronic lung diseases, cancer, malnutrition and obesity) (World Health Organization, 2004). Moreover, high fertility along with pregnancy complications, high infant mortality rates and low immunization rates are apparent. The age structure of the population is young, with 44% below age 15. These health trends are linked to increasing use of hospital services, while at the same time, rural village dispensaries close down due to lack of funding and supplies (Hezel, 2004).

The Health Status of Micronesians and Marshallese in Hawaii

The following discussion draws upon what is known about the health status of Micronesians and Marshallese in their home islands – as chronic health conditions, including a subset of infectious diseases, persist after migration. Some conditions, such as obesity, diabetes, and heart disease, are exacerbated by forsaking subsistence lifestyles and adopting sedentary habits such as dependence upon automobiles.

Moving from traditional societies, which themselves have been undergoing change, to a modern cosmopolitan society has its attendant social consequences. The effect of migration on problems such as substance abuse, child abuse, sexual promiscuity, intimate partner violence, and the suicide epidemic remains to be determined.

Some Specific Health Conditions

Infectious diseases

Migrants are more likely to present with chronic infectious diseases (e.g. tuberculosis or hepatitis B) than with acute conditions such as dengue. However, many travel frequently to their homes, and patients may travel while ill or during the incubation period.

Vaccination practices

Many of the FAS districts do not routinely administer some vaccines which have become available recently in the U.S. such as hepatitis A, human papillomavirus, or meningococcal vaccines. It is prudent to review vaccination records thoroughly for both children and adults from the FAS.

Tuberculosis

In an outbreak of multidrug-resistant tuberculosis (MDR-TB) in Chuuk state during the period December 2007 – March 2009, 21 cases were identified, and five deaths occurred (Centers for Disease Control & Prevention, 2009c). Free tuberculosis screening was offered for Chuukese by the Hawaii Department of Health during 2008, but no MDR-TB cases were identified through this screening.

With approximately ten confirmed or suspected cases of MDR-TB identified in the Marshall Islands since 2004 (“CDC: Here since 2004,” 2009), in December 2009 the Marshall Islands government banned tuberculosis patients and their contacts from traveling outside the Marshall Islands without the permission of the Director of Public Health (Johnson, 2009). Prior to these regulations, one of these MDR-TB patients had traveled to Hawaii and had failed to tell medical providers in Hawaii (including author SY) about her condition. The Marshall Islands is the jurisdiction with the highest incidence of tuberculosis at 189.3/100,000 for 2007, while the FSM rate was 61.2, and the U.S. rate was 4.4 (Centers for Disease Control & Prevention, 2009b).

Syphilis

In 2003, Marshall Island authorities reported that 10% of the 1500 infants born in the Marshall Islands every year were infected with syphilis (Pacific Islands Broadcasting Association, 2003). In 2007 in Guam, of 38 total reported cases of syphilis in all stages, 33 were of Micronesian descent. In comparison, Hawaii reported only nine total cases of syphilis in 2007 (CDC, 2009a).

Rheumatic fever/rheumatic heart disease

There is good documentation for Polynesians having high risk for developing rheumatic fever (Erdem, Dodd and Tuua, 2007; Kurahara, Grandnetti and Galario, 2006) and rheumatic heart disease. In contrast, there is relatively little documentation about rheumatic fever and rheumatic heart disease among Micronesians (Abbas & Person, 2008), but clinicians working with patients from Micronesian districts are

well-aware that these conditions occur commonly.

Skin/soft tissue/bone infections

Clinicians note that Pacific Island peoples have difficulty with skin infections, which often progress to cellulitis and osteomyelitis. Possible contributors could include relative immune system deficiencies, possibly related to diet, as well as climactic, sanitary, and other environmental conditions. This is an area which needs epidemiologic and basic science attention.

Hansen’s disease

Hansen’s disease continues to be endemic in the Pacific Islands (World Health Organization Regional Office for the Western Pacific, 2007). In Hawaii, for the period 2000-2007, of the 134 new cases of Hansen’s disease diagnosed, Micronesians and Marshallese comprised 41% and 37% respectively (personal communication, Barbara Tom April 27, 2009). Hansen’s disease often presents as hypopigmented patches that are frequently misdiagnosed as tinea. Testing skin lesions for hypoesthesia is important for diagnosis.

“Spam” rash

People from some of the outer islands of Chuuk state had been vexed for years by a skin condition occurring on the extremities, characterized by thick, verrucous plaques that often had a mottled red and white appearance (therefore “Spam”). Recently, the offending agent has been identified as *Mycobacterium marinum*, and prolonged courses of doxycycline have been shown to be effective against it. Japanese medaka fish, introduced to control mosquitoes in Pacific War bomb craters and taro patches, are thought to be an intermediate host (Lillis, Winthrop, White, and Simpson, 2008; Lillis, Ansdell, Ruben, et al, 2009).

Dengue

Since the 1970s, six major regional outbreaks of dengue have occurred in the Pacific Islands, mostly in Polynesia, but some outbreaks have occurred in Micronesia (Singh, Kiedrzyński, Lepers, & Benyon, 2005). In the patient with recent travel a syndrome of high fever, retro-

orbital pain, arthralgias, myalgias, thrombocytopenia, disturbances of taste and sensation, and no other infectious etiology (e.g. respiratory) should raise suspicion for dengue.

Zika

Zika virus is a flavivirus related to dengue and spread by mosquitoes. Prior to 2007, it had been described only in Africa and Asia. In April to July 2007, an outbreak of Zika occurred in Yap State in the FSM. Forty-nine confirmed cases and 59 probable cases were identified. Characterized by fever, rash, arthralgia, and conjunctivitis, the syndrome is milder than dengue. No hospitalizations or deaths occurred in the Yap outbreak (Duffy, Chen, Hancock, et al, 2009).

Scrub typhus

Scrub typhus is a rickettsial disease caused by *Orientia tsutsugamushi*. The larval trombiculid mite serves as a vector. An eschar can occur at the site of inoculation by the mite. The non-specific febrile illness can be accompanied by gastrointestinal, respiratory, or neurologic symptoms. From October 2001 to October 2003, fifteen cases of scrub typhus were identified in the southwest islands of Palau (Durand, Kuartei, Togamae, et al, 2004).

Parasites

A large percentage of patients from Chuuk are found to have elevated eosinophil levels when complete blood counts are performed. Gerald Koman, a general surgeon who worked on Chuuk in the 1980s, used to relate how when he performed laparotomies on patients, he could feel the roundworms in their intestines. At least some of the eosinophilia in Chuukese patients may be related to *Ascaris*, but this hypothesis has not been studied.

Filariasis, which causes obstruction of the lymphatic glands, can also cause eosinophilia. A 2002 study on the outer island of Satawal found a prevalence of filariasis of 34.4% by rapid card tests and 18.7% of microfilaremia. In contrast, the central Chuuk lagoon islands and Yap State had prevalence of 0.2% and 0.5% respectively (Federated States of Micronesia Department of

Health/WHO Collaborative Centre for the Control of Lymphatic Filariasis, 2003).

Hepatitis B

In a Hepatitis B serosurvey conducted during 2000 to 2007 among women born before the implementation of routine infant hepatitis B vaccination in the late 1980s, chronic hepatitis B (defined as surface antigen positivity) was 9.2% in Chuuk, 4.4% in Pohnpei, and 9.5% in the RMI. Prevalence among their children (born after the implementation of routine vaccination) had much lower prevalence: 2.5% in Chuuk, 1.5% in Pohnpei, and 1.8% in the RMI (Bialek, Helgenberger, Fischer, 2009).

A convenience sample of patients screened for hepatitis B at health fairs and clinic settings in Hawaii found that 10.7% of Pacific Islanders were seropositive for Hepatitis B (Tsai, Holck, Wong, and Ricalde, 2008).

Cancer

Studies of cancer epidemiology in the Pacific Island districts are limited by the capacity of the district health services to obtain tissue diagnosis of cancer, historically and in the present. Given the limitations of the district health services, significant morbidity and mortality go unrecognized and unreported (Katz, Palafox, Johnson, et al, 2004). Also, patients diagnosed with cancer where they are referred (Guam, Hawaii, or the Philippines) may end up not being enumerated in their home districts. Compared to the Micronesian districts, more reliable statistics are collected in Guam, where health services are more available and where Micronesians have resided in significant numbers longer than in Hawaii. In Guam, Micronesians have the highest incidence rates for cancers of the lung and bronchus, liver, and cervix. They have the lowest incidence rates for cancers of the colon-rectum-anus, breast, prostate, leukemia, and non-Hodgkin's lymphoma (Haddock, Whippy, Talon, Montano, 2009).

Hepatoma

The high prevalence of hepatitis B, as noted above, contributes to the incidence of hepatoma.

Noting the caveats above about relying on clinical diagnoses, a comparative study of island districts conducted in 1998-1999 found that Yap state in the FSM was the district with the highest period prevalence of liver cancer (Palafox, Yamada, Ou, et al., 2004). Using Hawaii cancer registry data from 1993 to 2008, a retrospective analysis comparing 72 Pacific Islander (which includes Hawaiians and other Polynesians, as well as people from the FAS) and 85 Caucasian patients with hepatomas showed that Pacific Islander patients were more likely to be infected with hepatitis B, to present with symptoms, and to present with larger tumors. Although not statistically significant, there was a trend toward shorter survival times among Pacific Islander patients. Pacific Islanders survived 10.9 months, and Caucasian patients survived 43.3 months (Ochner, 2009).

Cervix

The comparative study of island districts found that the Marshall Islands was the district with the highest period prevalence of cervical cancer (possibly reflective of a relatively robust case-finding) and that Chuuk was a district with one of the lowest period prevalences (Palafox, Yamada, Ou, et al., 2004). Yet, in Hawaii we clinically see a significant number of Chuukese women with advanced cervical cancer.

Radiation-associated cancers

Nuclear weapons testing in the Marshall Islands between 1946 and 1957, and particularly the Bravo test of March 1, 1954 - in which radioactive fallout was deposited on populated islands - has led to and will lead to further cancers among Marshallese people. A National Institute of Cancer study noted that more than half of cancers have yet to develop. Thus, thyroid cancer, which is induced by exposure to radiation, was noted in higher numbers among the Marshallese (though the Marshalls have also been subjected to enhanced case-finding) (National Cancer Institute, 2004). Of note, thyroid cancer is found among people living on islands other than those most heavily irradiated,

as well as people born after 1954. An unanswered question is whether cancers in other areas of Micronesia, toward which fallout went in the vast majority of the tests, have thereby experienced an increased cancer burden (Yamada, 2004).

Oral cancer

Besides alcohol and tobacco (smoked and chewed), another contributory factor for oral cancer is betel nut (*Areca catechu*), which is chewed widely throughout Micronesia (Bhandary & Bhandary, 2003).

Metabolic/cardiovascular

Obesity

Obesity and its attendant diseases are well documented in Micronesians and Marshallese (Gittelsohn, Maas, Gammino, and Palafox 1998; Shell, 2001). Hawaii does not disaggregate its health statistics to enumerate migrants from the FAS. In a sample of 29 pediatric patients older than 2 years at the Kalihi-Palama Health Center, 52% were overweight (BMI higher than the 95th percentile for gender and age), and Samoan and Micronesian children were found to be primarily impacted (Noy, Walter, Matsunaga and Maddock, 2006).

Diabetes

The prevalence of impaired fasting glucose (fasting glucose > 110mg/dL) has been estimated to be 24.4% for adults 25-64 years of age in Pohnpei in the FSM (FSM Department of Health and Social Affairs, 2008); 38.9% for all ages in Palau (Republic of Palau Ministry of Health, 2006); and 29.8% for those 15 or more years of age in the Marshall Islands (RMI Ministry of Health, 2002). A medical record review of Ebeye Island Marshallese adult outpatients 30 or more years of age revealed a crude prevalence of diabetes of 20%. Adjustment to a standard world population gave an age-adjusted prevalence of diabetes in adults 30 or more years of age of 27% (Yamada, Dodd, Soe, Chen, and Bauman, 2004). Over a one year

period (2002-2003), the rate of major lower limb amputations for the Marshall Islands was 79.5/100,000, with amputations being performed on patients as young as 30 (Harding, 2005).

Selected Behavioral Health Issues

Suicide

From the late 1960s until the 1980s, suicide rates in Micronesia rose to become one of highest in the world. Suicide occurs more frequently among young men in the periurban (rather than in the district center or the rural) setting (Ran, 2007). For young men 15 to 25 years of age in the FSM, suicide is the leading cause of death (Hezel, 2004). Few of the suicides are associated with a history or mental illness or delinquency. The most frequent method of suicide has been hanging, in which victims lean into a noose from sitting or standing positions. The precipitant for suicide is commonly intergenerational conflict, in which the quarrels are often over seemingly trivial matters (Ran, 2007). In Chuuk, the most common cause of emotional crises among young people is anger over challenges to their status in the community or their peer group (Lowe, 2003). Hezel (1995) hypothesizes that a major contributor is the breakdown of traditional family structures, within which members of the extended family had authority over young men. In the modern, nuclear family, responsibility for socialization has been concentrated in the biological parents, leading to fewer modes of recourse for the young man in the course of maturing. In some respects, the decision to commit suicide is evidence of commitment to traditional values, as the young man follows the traditional proscription against expressing negative emotions towards his elders.

Intimate partner violence

Samuel (2003) notes that wife-beating is becoming more widespread throughout Micronesia. Though alcohol is often identified as the proximate reason, Samuel identifies contemporary marriage patterns as a more fundamental cause. Traditional marriage and family customs, in which husbands moved in with their wives' families of origin, allowed the

family of the wife to protect her. However, in contemporary marriages - often not arranged by families, and with couples often living far away from their families of origin - wives are no longer protected. A focus group conducted among Chuukese women in Hawaii (Schoultz, Magnussen, Hansen, Selifis, & Ifenuk, 2007) found that violence is often a consequence of the man conducting an extramarital affair. Women are expected to maintain family peace and bear their suffering in silence.

Other

Toxic exposures

Tanapag village in Saipan was contaminated by polychlorinated biphenyls leaking from transformers. The importation of pesticides from Asia, and their poorly regulated use has led to toxic exposures in Saipan.

Practitioners in Chuuk are concerned about the possibility that sunken Japanese Imperial warships might be leaking toxic substances into Chuuk Lagoon.

Women's health issues

In our recent experience, only about 20% of our patients present for prenatal care in the first trimester. A significant barrier to early entry into prenatal care is that a significant proportion of prenatal patients do not arrive in Hawaii until late in their pregnancy. The effect of obesity on the female endocrine system is to disrupt the menstrual cycle, leading to amenorrhea or menometrorrhagia and anemia. Other causes of anemia include thalassemia and presumed inadequate iron intake.

Ossification of the Posterior Longitudinal Ligament (OPLL)

Our neurosurgical colleagues note a high prevalence of spinal stenosis secondary to OPLL among patients from the FAS. OPLL can present with radiculopathy or myelopathy (Epstein, 2002) and was initially described among Japanese and therefore formerly known as "the Japanese disease" (Lee, 1991). It is prudent to maintain a high index of suspicion for OPLL

among patients complaining of back pain or lower extremity neurological symptoms.

Discussion

Many of the health problems discussed above require analysis and intervention at multiple levels. Among the conditions that deserve further epidemiological investigations are skin/soft tissue/bone infections, eosinophilia, cancer, recent trends in suicide and intimate partner violence, anovulation and anemia in women, and OPLL. As noted with regards to cancer, some conditions are difficult to study in island districts where health services do not have the capacity to make definitive diagnoses.

For other conditions, the problems are clear, but solutions are not easy. As an example, the related problems of nutrition, obesity, diabetes, and cardiovascular disease illustrate the need for analysis at large-scale levels. As noted above, traditional food production in the islands is threatened by large-scale processes, not the least of which are those affecting climate. The social determinants of health include historical and political economic conditions (Cassels, 2006) such as ongoing weapons testing in the Marshall Islands (Yamada & Palafox, 2001).

Obesity requires primary and secondary prevention as well as clinical care. Cultural norms regarding food consumption, physical activity, and ideal body physiques impact population body size. Primary prevention of obesity needs to take place among children. The effect of migration on body size deserves further study. Weight gain in migrants when they arrive in the U.S. also requires primary prevention. Such prevention includes changes in attitudes about diet and physical activity in the general population.

Among the overweight and obese, secondary prevention of consequences such as diabetes and cardiovascular disease would be specific intervention programs of dietary and physical activity. Among patients with diabetes or cardiovascular disease, evidence-based clinical care to prevent complications also constitute secondary prevention. As Micronesians and

Marshallese travel back and forth between the island districts and their adopted homes, collaboration between providers on evidence-based practice as well as on specific patients would improve clinical care all around.

A problem such as the numbers of Chuukese women seen with advanced cervical cancer is reflective of the lack of an effective Pap screening program in Chuuk. Although instituting such a secondary prevention program is the first priority, vaccination for HPV is a primary prevention measure that would decrease morbidity and mortality in the future.

Clinicians and public health practitioners need to maintain a high index of suspicion for infectious diseases such as tuberculosis, Hansen's disease, and hepatitis B. While specific treatment for hepatitis B is an area of medicine in flux, there is a clear need to screen Micronesians and Marshallese who present for health services, to vaccinate and counsel those who are seronegative, and to follow seropositive patients for sequelae such as cirrhosis and hepatoma. Identifying hepatomas at earlier stages will improve survival times.

Conclusion

As larger numbers of Micronesian and Marshallese peoples arrive in the U.S., clinical and public health services need to prepare to serve their special needs. Key to understanding their needs is a familiarity with the recent history of greater Micronesia, the political relationships between the island jurisdictions and the U.S., and rights and benefits which COFA migrants are entitled. Their social and economic status, as well as their health literacy, affects their interaction with the health system. The potential for changes in insurance eligibility illustrates the manner in which the political status of migrants can affect their care.

Although this review of the common health conditions of Micronesian and Marshallese patients has necessarily relied on anecdotal but common experiences of those who care for these individuals, it is hoped that further, more rigorous epidemiological study of their

conditions will thereby be pursued. In addition, it is hoped that the clinicians who maintain vigilance for the conditions listed here and others yet to be described will help to relieve the suffering of the afflicted.

Acknowledgments

The authors would like to thank their public health and clinical colleagues who provided source material and who reviewed previous drafts of this paper. The authors would like to thank the three anonymous reviewers and the editors for their helpful suggestions.

List of Abbreviations

BMI – body mass index
CDC – Centers for Disease Control and Prevention
CNMI – Commonwealth of the Northern Marianas Islands
COFA – Compact of Free Association
EAP – Easy Access Project
FAS – Freely Associated States
FSM – Federated States of Micronesia
MDR – TB - multidrug-resistant tuberculosis
Med-QUEST – Quality care, ensuring Universal access, encouraging efficient utilization, Stabilizing costs, and Transforming the way health care is provided. Hawaii’s managed care Medicaid program for the non-elderly, non-disabled.
OPLL – Ossification of the Posterior Longitudinal Ligament
QUEST-NET – Hawaii’s program for those who no longer qualify for QUEST
RMI – Republic of the Marshall Islands
ROP – Republic of Palau
SSDI – Social Security Disability Insurance
SSI – Supplemental Security Income
STD/AIDS – Sexually Transmitted Disease/Acquired Immune Deficiency Syndrome
TANOF – Temporary Assistance to Needy Other Families
TTPI – Trust Territory of the Pacific Islands
UNFPA – United Nations Population Fund
WHO – World Health Organization

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