

Cancer in Native Hawaiian Women

INTRODUCTION

This chapter describes the historical and cultural experiences of Native Hawaiian women and their current demographic, socioeconomic, and overall health status. It also presents information on cancer incidence, mortality, and survival among Native Hawaiian women. Cancer incidence rates among Native Hawaiian women are among the highest for any ethnic group in the United States. The most prevalent cancers are breast, lung, colorectal, and uterine. Native Hawaiian women have high rates of obesity and diabetes, and smoke at higher rates than most other ethnic groups. However, even taking their tobacco use into account, they are disproportionately susceptible to lung cancer.

Age-adjusted mortality for cancer also is very high for Native Hawaiian women, compared with other ethnic groups residing in Hawaii and throughout the United States. Survival has improved in recent years, but there continue to be disparities between Native Hawaiians and Whites and Asians. While some of the mortality and survival differential can be explained by later stage at diagnosis, there remain other sources of variation that are unexplained to date.

There are important issues to consider in efforts to further improve the overall cancer profile of Native Hawaiian women. These include reducing behavioral risk factors, improving access to and acceptability of health services, and paying attention to cultural factors and the revitalization of positive Native Hawaiian cultural values. Some recent intervention studies have demonstrated that culturally appropriate health promotion and cancer detection strategies that involve community participants can effectively reduce cancer risks and increase early detection practices. The existence of a well-established population-based Surveillance, Epidemiology, and End Results (SEER) Program registry in Hawaii is an important asset that can assist with future improvements. Nevertheless, limitations in various sources of data continue to pose a challenge for better understanding of cancer in Native Hawaiian women.

NATIVE HAWAIIAN HISTORY AND CULTURE

Hawaii, which became the 50th U.S. state in 1959, consists of a series of volcanic islands in the low latitudes of the North Pacific that form an isolated archipelago. Despite being more than 4,000 kilometers from the nearest land mass, through a remarkable act of colonization, Hawaii was discovered and settled no later than the fourth or fifth century A.D. by Polynesian seafarers who navigated by the stars and ocean currents.

By the time of first European contact, Hawaii had the largest and most densely settled population of any Polynesian island group (Kirch, 1985), with a thriving economy, stable society, and complex culture. Although the officers of Captain James Cook's expedition estimated the population in 1778 at between 242,000 and 400,000, archaeological evidence indicates that those figures are conservative, with some estimates of the precontact population as high as 800,000 (Stannard, 1989). Whatever the exact figures, diseases resulting from contact with Westerners, for which the Native Hawaiians had no immunity, decimated the population. Despite efforts by Cook to prevent it, members of his crew introduced the devastating effects of venereal diseases to the islands; this was soon followed by epidemics of other infectious diseases, including smallpox, measles, mumps, cholera, tuberculosis, and influenza. Leprosy, plague, scarlet fever, diphtheria, and rheumatic fever were also introduced through Western contact (Blaisdell, 1989).

The population reached a low of 53,900 in 1876 (Schmitt, 1968), less than one tenth of what it had been 100 years earlier. Since then, the number of ethnically pure Hawaiians has continued to decline and is now approximately 8,000 (Office of Hawaiian Affairs, 1995), although immigration by other ethnic groups has caused the state's population to exceed 1 million. A census in 1853 showed that pure Hawaiians made up 96 percent of the population; in 1960, the last year that they were counted as a separate ethnic group in the U.S. Census, they had declined to only 1.7 percent (Nordyke, 1977). As a result of intermarriage with members of other ethnic groups, there are now approximately 242,100 Hawaiians or part-Hawaiians on the islands (U.S. Census Bureau, 2001), making them the second fastest growing ethnic group in Hawaii (after American Indians). There are also many Native Hawaiians in other parts of the United States (U.S. Census Bureau, 2001).

Not only did Hawaiians suffer the ravages of introduced diseases, but their culture, religion, land tenure practices, political system, and social institutions also were systematically destroyed and the fragile island ecosystems seriously damaged. This process of destruction culminated in the armed overthrow of the Hawaiian monarchy in 1893 by American businessmen and formal annexation by the United States in 1898, by which time even speaking the Hawaiian language or performing traditional dances had been prohibited (Kimura, 1983). In 1993, the U.S. Congress passed legislation officially apologizing for the historical injustice of the illegal overthrow of the Hawaiian monarchy (U.S. Public Law 103-150).

In recent years, a "Hawaiian Renaissance" has begun, as Native Hawaiians struggle to preserve and enhance their cultural heritage and to overcome the displacement they have suffered for the past 200 years. Although this revival is still in its early stages, it may eventually contribute concrete beneficial effects to help alleviate some of the social imbalances described in the next section. Traditional Hawaiian culture placed strong emphasis on social harmony, well-ordered social relationships, interdependence, and family (Mokuau and Browne, 1994; McLaughlin and Braun, 1998). Linnekin (1990) portrays Native Hawaiian women, even in the traditional context of the precontact era, as "powerful actors and decision makers with great temporal and symbolic importance." Like people in other Polynesian societies, Hawaiians had a holistic and preventive health system that integrated society

with nature (Blaisdell, 1989; Clark, 1991). By re-emphasizing traditional values such as *'ohana* (family), *kokua* (cooperation), *mana* (oneness with all things), *lokahi* (harmony and unity), and *ho'oponopono* (group-based problem solving), Native Hawaiians may yet find the cultural resources necessary to redirect and redefine their currently perilous situation (Braun et al., 1995; McLaughlin and Braun, 1998).

For the rest of this chapter, the two groups, pure Hawaiians and part-Hawaiians, are discussed together under the term "Native Hawaiians," as defined by the 1975 Title VIII Native American Programs Act as "any individual, any of whose ancestors were natives of the area which consists of the Hawaiian Islands prior to 1778." Also, some recent data aggregate Native Hawaiians along with Pacific Islanders, and this is noted in relevant sections of this chapter. (The chapter on cancer in American Samoan women provides more detail on this large segment of the Pacific Islander population in the United States.)

DEMOGRAPHICS

Background

The population of Hawaii resides on several islands, with 72.3 percent of the population living on O'ahu (U.S. Census Bureau, 2001). Most Native Hawaiians live in an urban environment, with nearly two thirds of the Native Hawaiian population residing in the city and county of Honolulu. However, Native Hawaiians comprise a higher proportion of residents of the neighbor or outer islands, and of Hawaii's in rural areas.

Profiles of the current ethnic composition of the population in Hawaii differ by data source. Census data reflect self-identification, whereas the state's Health Surveillance Program (HSP) examines the ancestry of the parents of each individual as provided by that individual. Moreover, the 2000 Census included expanded race categories that allowed respondents to select one or more race categories to indicate their racial identities. The category for Native Hawaiians in the 2000 Census was "Native Hawaiian and Other Pacific Islanders" (NH/PI), referring to people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands, and including people who indicated their race as Native Hawaiian, Guamanian or Chamorro, Samoan, or Other Pacific Islander, or who wrote in entries such as Tahitian, Mariana Islander, or Chuukese (U.S. Census Bureau, 2001). The NH/PI category includes all these groups, and currently available data aggregates them in available reports. (More detailed information is expected to be reported in the future.)

The 1990 Census reported 115,500 Native Hawaiians, considerably lower than the 205,078 estimated by the HSP (Hawaii Department of Business, Economic Development, and Tourism, 1994). Of these, 4 percent were classified as pure Hawaiians, 35 percent as mixtures with 50 to 99 percent Hawaiian blood, and 61 percent as mixtures with less than 50 percent Hawaiian blood (Office of Hawaiian Affairs, 1995). For the same year, the National Cancer Institute's (NCI) SEER Program used a denominator of 209,546 Native Hawaiians, with 104,773 females (Miller et al., 1996), while Johnson and Oyama (1996) used a slightly lower estimate of 95,903 Native

Hawaiian women to calculate mortality rates. Because of these uncertain population numbers, all disease rates have to be considered estimates with a wide margin of error.

The 2000 Census data suggest a larger Native Hawaiian population, although, as noted above, the current figures include other Pacific Islanders in the same racial category. There are 398,835 persons, or 0.1 percent of the U.S. population, who selected the category of NH/PI alone, and 874,414 (0.3 percent of total) who indicated being NH/PI alone or in combination with one or more races (U.S. Census Bureau, 2001). States outside Hawaii had more than two thirds of the NH/PI alone population, though it is believed that the majority of other states' NH/PI residents are Pacific Islander groups such as Samoans and Tongans, and not Native Hawaiians. Nevertheless, many Native Hawaiians have moved to other states in recent years, which will make identifying the total Native Hawaiian population increasingly complicated. Most of the information available, and thus reported in this chapter, concerns Native Hawaiian residents of Hawaii.

In the state of Hawaii, the 2000 Census reported 113,539 people indicating NH/PI alone (9.4 percent), and 282,667 indicating NH/PI alone or in combination (23.3 percent) (U.S. Census Bureau, 2001). Hawaii has the largest proportion of multiracial respondents of all states, with 21.4 percent of respondents reporting two or more races. The population trends for Native Hawaiians are dramatically different when part-Hawaiians are included in the count. If only those people reporting NH/PI alone in 2000 are included, there is a 30 percent decrease in the NH/PI population since 1990; by contrast, if those reporting NH/PI alone or in combination are included, there is a 74.2 percent increase in this racial category (U.S. Census Bureau, 2001).

The Native Hawaiian population is young—approximately 33 percent are persons younger than 18 years of age, 46 percent are between the ages of 18 and 44, 15 percent are between 45 and 64, and 6 percent are 65 and older. Using 2000 Census figures, there are anywhere from 75,840 adults (NH/PI only) to 188,811 adults (NH/PI alone or in combination) in the state of Hawaii (U.S. Census Bureau, 2001). Thus, there are an estimated 38,000 to 94,000 Native Hawaiian women living in Hawaii. Based on the often-cited estimate that 78 percent of Native Hawaiians live in the state of Hawaii, there are about 242,100 total Native Hawaiian adults (Hawaiian or part-Hawaiian) and 120,500 Native Hawaiian adult women living in the United States.

In 1990, the birth rate for Native Hawaiians was 21.8 births per 1,000 residents, compared with 16.7 for the state overall and 15.9 for the United States overall. Of Native Hawaiians in the age group 22 to 24 years old, 9 percent were enrolled in college, versus 18 percent for the overall state population, in the 1993-94 school year. Among Native Hawaiians older than 24, 8 percent completed 4 or more years of college compared with 21 percent for the overall State population. It was estimated that 30 percent of Native Hawaiian adults were functionally illiterate, based on a standard test of adult literacy (Office of Hawaiian Affairs, 1995).

Socioeconomic Status

In 1989, the mean annual income was \$43,664 for Native Hawaiian households compared with the state average of \$52,367 (Office of Hawaiian Affairs, 1995). Whereas 6 percent of the state's overall population had incomes below the poverty level, 14 percent of Native Hawaiians did. At the same time, 15 percent of Native Hawaiians received some kind of public assistance compared with 6.8 percent among other ethnic groups. Although these are the most recent household income data available, new maps released with the 2000 Census findings show that most Native Hawaiians' residences are clustered in the poorest areas of the state, with a small proportion of middle-class and more affluent Hawaiians living in more affluent, mixed-race neighborhoods.

Unfortunately, no detailed numbers on employment for women are available, but Native Hawaiians as a group have tended to be overrepresented in occupations related to construction, transportation, and entertainment services. They have had low representation in managerial and professional services, agriculture, retail trade, and manufacturing. Unemployment was also more common among Native Hawaiians than among the rest of the state's population. In 1991, 17 percent of all unemployed persons in the state were Native Hawaiian; only 11 percent of the civilian labor force were Native Hawaiian (Office of Hawaiian Affairs, 1995).

By most indicators of social and economic well-being, Native Hawaiians as a group are a severely disadvantaged population. However, care should be taken to recognize the unique historical factors that have produced these circumstances. Because control of land has been central to power in Hawaii, loss of land has contributed to the disadvantaged status of Native Hawaiians. Even though Hawaiian homestead lands have been set aside for the benefit of Native Hawaiians, few persons have obtained leases or control over land areas (Office of Hawaiian Affairs, 1995).

Nearly 95 percent of the population in Hawaii is covered by some type of health insurance (Hawaii Medical Service Association Foundation, 1995). Many Native Hawaiians have health insurance coverage through the major carriers as a benefit of their employment for themselves and their families. A 1974 law mandating prepaid health care requires employers to offer health insurance to employees who work at least 20 hours per week. The law is thought to have provided access to health care for most employed persons and their families (Lewin and Sybinsky, 1993), particularly because unemployment has been lower in Hawaii than in the rest of the United States.

The Native Hawaiian health care system is comprised of 10 agencies that provide primary health care to many Native Hawaiians. The health centers serve all islands, especially areas with large concentrations of Native Hawaiian residents, and strive to provide services that are culturally appropriate and responsive to community needs. Papa Ola Lokahi is the organization that serves as an umbrella for Native Hawaiian health care planning activities. The state's Medicaid initiative, Hawaii Health QUEST, has further increased universal access by offering managed care plans to persons who are above the poverty level but cannot afford a health plan (Loos et al., 1994). Because of unemployment rates that are higher than those for other ethnic groups, Native Hawaiians

tend to receive less insurance and are overrepresented among Medicaid recipients. In 1990, one fourth of all persons covered by Medicaid were Native Hawaiians, mostly families with dependent children.

Health Status Indicators

Native Hawaiians have one of the worst health profiles of any ethnic group in the Hawaiian Islands—their life expectancy ranks among the shortest and their mortality rates for most chronic diseases among the highest (Blaisdell, 1993). Nevertheless, life expectancy for Native Hawaiian women has increased considerably since the beginning of the century; life expectancy went from 32 years in 1910 to 64 years in 1950 and to 77 years in 1990 (Park et al., 1979; Braun et al., 1997; Yang et al., 1996). The gap among ethnic groups has been diminishing. Whereas in 1970 there was a 6-year difference in the life expectancy of Native Hawaiian women compared to White women, in 1990 the difference had decreased to 1.5 years (Anderson, 1998). Another important health indicator, the infant mortality rate, was 11 per 1,000 live births for Native Hawaiians, compared with 3.8 per 1,000 for White and 5.1 per 1,000 for Japanese residents from 1990 to 1993 (Hawaii Medical Service Association Foundation, 1995).

The overall age-adjusted mortality rate for Native Hawaiians is higher (5.8 per 1,000) than that of other racial groups (5.6 per 1,000 for Whites and 3.0 per 1,000 for Japanese) (Hawaii Medical Service Association Foundation, 1995; Braun et al., 1996a,b). The five leading causes of death among Native Hawaiian women in Hawaii are heart disease, cancer, cerebrovascular diseases, diabetes, and unintentional injuries (Johnson and Oyama, 1996). The only conditions for which Native Hawaiian women experience a lower mortality than the rest of the female population in Hawaii are suicide and influenza/pneumonia. The high mortality rates for heart disease among Native Hawaiians, particularly pure Hawaiians, have been documented since the early part of the century (Look, 1982; Braun et al., 1995). The HSP also found high morbidity rates for the same conditions (Xia et al., 1996). Since 1980, mortality rates for diabetes, hypertension, suicide, perinatal conditions, and congenital anomalies have decreased, whereas mortality rates for most other conditions have increased (Johnson and Oyama, 1996).

In terms of chronic disease morbidity, the problems of obesity, diabetes, hypertension, and heart disease are most prominent, and they often occur in combination. In a study conducted in the late 1980s, hypertension, elevated cholesterol levels, and other cardiovascular risk factors were commonly found among the Native Hawaiian population on Moloka'i (Curb et al., 1991), although individuals with significant health risk factors often were unaware of them and were not under treatment.

Native Hawaiians suffer from the highest prevalence of being overweight of any ethnic group in Hawaii. A cardiovascular risk factor survey of 257 Native Hawaiians living on the island of Moloka'i found that more than 60 percent of those of both sexes were overweight (Curb et al., 1991; Aluli, 1991). Self-reports in a statewide behavioral risk factor survey (Hawaii State Department of Health, 1995; Chung et al., 1990) indicate that in 1993,

45 percent of Native Hawaiians were overweight, compared with 26 percent of the total State population. ("Overweight" was defined as being 20 percent or more above "ideal weight," based on the average of a medium-frame person as listed in the 1959 Metropolitan Life Insurance Company height/weight tables.) Among 7,851 Native Hawaiian women responding to the baseline survey for a multiethnic cohort study of adults from 45 to 75 years of age, 34.5 percent were classified as obese, the highest of all ethnic groups except Blacks (Kolonel et al., 2000).

The Native Hawaiian Health Research Project included examinations of 574 Native Hawaiian adults in two rural communities, and used clinical measurements rather than self-reporting to assess risk factors, including obesity. This study found that 29.3 percent of the women were overweight and another 51 percent were obese, for a total of 80.3 percent obese or overweight. The percentage of Hawaiian ancestry was significantly associated with increased body mass index and waist-to-hip ratio, even after controlling for possible confounding factors (Grandinetti et al., 1999).

Diabetes mellitus is one of the major causes of morbidity and mortality among the Native Hawaiian population. From 1990 to 1994, the mortality rate attributed to diabetes was nearly 2.5 times higher for Native Hawaiians than for Whites (31 deaths per 100,000 versus 12 deaths per 100,000), with particularly high rates among persons 45 to 64 years old (Maskarinec, 1997). An early prevalence study (Sloan, 1963) using postprandial glucose levels found that pure Hawaiians were approximately six times and part-Hawaiians nearly four times more likely to suffer from diabetes than Whites. In the same study, 3 out of 5 of those diagnosed with diabetes were unaware of their condition. In other health surveys, Native Hawaiians reported a prevalence of diabetes that was three times higher, and a higher degree of disabilities related to diabetes (Johnson and Oyama, 1996; Johnson, 1989). In a study from Moloka'i (Curb et al., 1991) Native Hawaiians were six times more likely to be diabetic than Whites in the National Health and Nutrition Examination Survey (National Center for Health Statistics, 1986). In the Native Hawaiian Health Research Project, examinations of 574 Native Hawaiians living in rural areas showed that the crude prevalence of impaired glucose tolerance was 15.5 percent, that the prevalence of type 2 diabetes was 20.4 percent (Grandinetti et al., 1998), and that insulin resistance syndrome is very common in Native Hawaiians (Mau et al., 1997).

CANCER STATISTICS

Information on cancer incidence is available from the Hawaii Tumor Registry (HTR) (part of the SEER program since 1973), which has recorded newly diagnosed cancer cases and subsequent follow-up status for all Hawaii residents since 1960. Quality control reviews have shown that more than 95 percent of cancer cases diagnosed in Hawaii have been registered by the HTR (Goodman et al., 1988). Currently, state law regards cancer as a reportable disease and requires that treating health care providers give information to the HTR.

The tumor stage at diagnosis is based on tumor size and the presence of affected lymph nodes and metastases. The incidence rates for invasive cancer include all cases except in situ (cancer confined to the initial site) cases. Ethnicity information is obtained from hospital records, although misclassification may occur, especially for patients with mixed ancestries. However, an unpublished report from the Cancer Research Center of Hawaii found the ethnic classification quite accurate when compared with more detailed descriptions from etiological studies. Vital records data collected through the Hawaii State Department of Health provide mortality information.

The incidence and mortality rates presented here are from two publications prepared by the NCI, for the time periods 1973-81 (NCI, 1984) and 1988-92 (Miller et al., 1996). The rates for Native Hawaiian women are based only on residents of Hawaii, whereas the comparative rates for other ethnic groups include information from all SEER registries that collect data for a particular ethnic group. For some cancer sites, incidence rates tend to be higher for White women in Hawaii than for White women in the continental United States; at the same time, cancer mortality rates for White women tend to be lower in Hawaii than in the continental United States.

As explained in the "Demographics" section of this chapter, census data are inadequate to calculate ethnicity-specific rates. Therefore, a set of population estimates by sex, age, and ethnicity was developed by researchers at the Cancer Research Center of Hawaii (Miller et al., 1996). The ethnic distribution in this data set is based on the Hawaii HSP household survey (Oyama and Johnson, 1986), and the distribution by age and gender is based on census data. The estimated ethnic denominators are subject to a variety of errors that cannot easily be assessed. Thus, published incidence and mortality rates vary according to the denominator used. Using census data through the 1990 Census as a denominator leads to rates for Native Hawaiians that are 50 percent greater than rates calculated with the HSP denominator. All rates in this chapter are based on HSP estimates and were age-adjusted to the 1970 U.S. standard population. Given the uncertainty in estimating the number of Native Hawaiians, small differences in rates should be interpreted with caution. No statistical tests were performed to assess the statistical significance of differences in rates.

Cancer survival curves and the distribution by stage at diagnosis were calculated at the Cancer Research Center of Hawaii using only data from the HTR. Some loss to follow-up occurs for cancers registered in the HTR, especially for early-stage disease. All ethnic comparisons for these analyses were restricted to women of the major ethnic groups living in Hawaii (i.e., Native Hawaiian, White, Japanese, Filipino, and Chinese). Even over a 5-year period, the number of cases or deaths among Native Hawaiian women is small for many cancer sites. Only data for cancer sites with a sufficient number of cases to provide stable rates are presented.

SEER data on cancer cases from 1992 to 1997 recently became available on a CD-ROM (NCI/SEER, 2000). These data include reports from all SEER sites, not only for Hawaii residents. For Native Hawaiians, the available information provides only counts of cases by age, cancer site, and stage at diagnosis; no age-adjusted incidence or mortality data can be computed.

Incidence

Cancer incidence rates among Native Hawaiians are among the highest in the world (Parkin et al., 1992). In particular, rates for pure Hawaiians have been reported to be much higher than for any other ethnic group in Hawaii (Johnson and Oyama, 1996; Look, 1982; Burch, 1984). Native Hawaiian women have an age-adjusted cancer incidence rate for all cancer sites combined of 321 per 100,000 women, just below the rate for White women (346 per 100,000), and all Asian American ethnic groups have incidence rates that are significantly lower than those for White and Native Hawaiian women (see Table 1). The only other ethnic groups in which women have higher total cancer incidence rates than Native Hawaiians are Black women (326 per 100,000) and Alaska Natives (348 per 100,000) (Miller et al., 1996).

The most common cancer among Native Hawaiian women is breast cancer, with an age-adjusted rate just below that for White women (106 versus 112 per 100,000). The age-specific rates for Native Hawaiian women younger than 70 years old are comparable with rates for Whites, whereas the rate for women 70 years and older is somewhat lower for Native Hawaiian women than for White women. All Asian American groups have lower—and in two age categories significantly lower—breast cancer risks. (Maskarinec et al., 2001).

Lung cancer shows the most serious discrepancies among ethnicities for all cancers. The age-adjusted lung cancer incidence rate is higher for Native Hawaiian women than for most other ethnic groups in the United States—43 cases per 100,000 women, compared with 42 per 100,000 for White women, 25 per 100,000 for Chinese women, 18 per 100,000 for Filipino women, and 15 per 100,000 for Japanese women. Only the lung cancer rates for Alaska Native (51 per 100,000) and Black women (44 per 100,000) are higher than those for Native Hawaiian women (Miller et al., 1996). Significantly, lung cancer affects Native Hawaiian women at a younger age. During the periods 1973 to 1977 and 1983 to 1986, the annual lung cancer incidence rate for Native Hawaiian women 65 years old and older increased from 130 to 188 per 100,000 (Nomura et al., 1994).

The only cancer site for which Native Hawaiian women have a lower risk than most other ethnic groups is cancer of the colon and rectum (see Table 1). Their age-adjusted rate is 31 cases per 100,000 women compared with 38 for White women, 40 for Japanese women, 34 for Chinese women, and 21 for Filipino women. The difference is explained primarily by a low incidence of colorectal cancer among Native Hawaiian women aged 70 and older. For colorectal cancer, Black women and Alaska Native women also have higher incidence rates than Native Hawaiians (46 per 100,000 for Blacks, 67 per 100,000 for Alaska Natives)(Miller et al., 1996).

Native Hawaiian women's risk for cervical and uterine cancer is comparable with the risk for White women, whereas the incidence for ovarian cancer is relatively low. Cancer of the uterus is the fourth most common cancer in Native Hawaiians, followed by cancer of the stomach. For stomach cancer, the incidence (13.0 per 100,000) is nearly as high as that for Japanese women (15.3 per 100,000) and much higher than that for White women (4.4

per 100,000). Incidence rates also are relatively high for pancreatic and thyroid cancer, although Filipino women experience a much higher thyroid cancer incidence than all other groups. The leukemia incidence rate in Hawaiian women is comparable with the rates for White and Filipino women and higher than those for Japanese and Chinese women. Incidence rates for all other types of cancer could not be calculated because the number of cases was too small to produce a reliable measure.

A comparison of cancer incidence rates among Native Hawaiian women for the period 1978 to 1981 (NCI, 1984) to rates for 1988 to 1992 (Miller et al., 1996) reveals a small decline in incidence rates for all sites combined (from 337 to 321 cases per 100,000 women). In particular, the incidence rate for stomach cancer was greatly reduced, from 21 to 13 cases per 100,000 women, possibly as a result of a decrease in intake of salted and other preserved foods. The substantial reduction in cervical cancer incidence is thought to be the result of screening and treatment of precancerous lesions. Smaller decreases in rates were observed for cancers of the thyroid, pancreas, ovary, uterus, and breast. On the other hand, incidence rates for leukemia and for cancers of the lung/bronchus and colon/rectum increased significantly. The increase in lung cancer most likely reflects an increase in cigarette smoking during the past 20 years, combined with the time lag from onset of smoking to development of clinical lung cancer.

Table 2 shows the number of cancer cases and their relative frequency for Native Hawaiian and White women from 1992 to 1998 (NCI/SEER, 2000). The most common cancer sites for Native Hawaiian women were breast (34.9 percent), lung (12.0 percent), and female reproductive system (8.5 percent for uterine, 4.2 percent for ovarian, and 3.1 percent for cervical). Thus, the pattern of relative frequency of cancer cases did not appear to have changed significantly relative to the earlier reporting period.

The age distribution of cancers among Hawaiian women shows that 18.2 percent of Hawaiian women's cancers from 1992 to 1997 were diagnosed at age 44 or younger, compared to 12.1 percent of cancers in White women (see Table 3). The reverse is observed at older ages: 56.9 percent of White women's cancer cases are diagnosed at age 65 or older, compared with 37.2 percent of Native Hawaiian women's cancers. (NCI/SEER, 2000).

Mortality

Age-adjusted mortality for all cancer sites is higher for Native Hawaiian women than for any other ethnic group residing in Hawaii (see Table 4). From 1988 to 1992, an average of 168 cancer deaths per 100,000 Native Hawaiian women were recorded, compared with 140 for White women and fewer than 100 for women of Asian ancestry. The cancer mortality rate for the same period was the same for Black women (168 per 100,000) and higher for Alaska Natives (179 per 100,000) (Miller et al., 1996).

The death rate associated with cancer was particularly high for women 70 years and older. At 44 deaths per 100,000, lung cancer was the major cause of cancer-related mortality for Native Hawaiian women, a proportion

higher than that for any other ethnic group. Lung cancer mortality also was disproportionately high among Native Hawaiian women of all ages; the age-adjusted mortality rate was one-third higher than that for White women and nearly four times higher than those for Filipino and Japanese women. Breast cancer mortality for Native Hawaiian women also was high, although the rate for White women was even higher. There were 25 deaths due to breast cancer per 100,000 Native Hawaiian women compared with 27 per 100,000 for White women, and only about half as many deaths for women of Asian ancestry (see Table 4). The rate for Black women, at 31 per 100,000, was still higher (Miller et al., 1996). Whereas mortality rates related to cancers of the stomach, pancreas, and uterus were highest among Native Hawaiian women (see Table 4), the mortality rate for cancer of the colon/rectum was lower than it was for White or Japanese women. Mortality related to ovarian cancer was slightly lower for Native Hawaiian than White women.

From 1980 to 1990, cancer mortality for women in Hawaii, for all sites combined, increased from 158 to 168 per 100,000, despite a 24 percent decline in breast cancer mortality (Miller et al., 1996; NCI, 1984). The overall increase was caused by a 40 percent increase in the lung cancer mortality rate. Mortality related to cancers of the stomach, colon/rectum, and pancreas decreased slightly. The high cancer mortality rates among Native Hawaiians have been documented since 1910 (Burch, 1975), especially the high mortality from cancers of the lung, breast, and stomach, which have shown less improvement for Native Hawaiian women than for women of other ethnic groups in Hawaii.

Survival

Survival data presented in this chapter are for women living in Hawaii who were diagnosed with cancer between 1980 and 1988 and were followed for 5 years. Without adjustment for stage at diagnosis, approximately 60 percent of Native Hawaiian women were alive after 5 years, whereas survival among other ethnic groups averaged 70 percent. After taking stage at diagnosis into account, the difference was reduced to 6 percentage points, indicating that the unfavorable survival pattern among Native Hawaiian women was partially attributable to late-stage diagnosis. This gap in survival was similar for breast cancer, even though 5-year breast cancer survival in general was much higher for all ethnic groups. In general, breast cancer survival has improved greatly among all ethnic groups in Hawaii (Le Marchand et al., 1984) and in the Nation since the 1970s (NCI/SEER, 2000). However, within the State of Hawaii, only 78 percent of Native Hawaiian women with invasive breast cancer were alive after 5 years, whereas 88 percent of Japanese women and approximately 85 percent of White women survived 5 years or more. Although lung cancer results in poor survival for all ethnic groups, Native Hawaiian women were the least likely to survive 5 years. Colorectal cancer survival was approximately 60 percent for Native Hawaiian women compared with at least 70 percent for Filipino, Chinese, and Japanese women. For cervical cancer, Native Hawaiian and Filipino women were more likely than Japanese, Chinese, or White women to die within the first 5 years after diagnosis.

In statistical models based on data from the 1970s, ethnic differences in survival for cancers of the breast, colon/rectum, and lung were partly attributable to socioeconomic status, even after adjusting for stage at diagnosis (Le Marchand et al., 1984; Wegner et al., 1982; Nomura et al., 1981). More recent analyses have revealed that, although ethnic disparities in breast cancer survival still exist, stage at diagnosis is the most important prognostic factor (Meng et al., 1997b). Although Native Hawaiian women still have a higher risk of dying from breast cancer than other ethnic groups, the ethnic survival differences decreased from 17 to 4 percent over the period 1960 to 1983 (Meng et al., 1997a).

Three possible hypotheses have been suggested to explain why Native Hawaiian women show poorer survival for all major cancer sites, even after taking into account that they are often diagnosed at a later stage with a poorer prognosis. One suggestion is that Native Hawaiian women do not receive the appropriate treatment. A second hypothesis is that Native Hawaiian women cannot tolerate modern cancer treatment as well as women from other ethnic groups because of comorbidities, such as hypertension and diabetes. The third hypothesis is that ethnicity-based genetic susceptibility factors may help explain the interaction of biology and environmental exposures (Maskarinec, 2000).

Stage at Diagnosis

Stage at diagnosis is a major determinant of survival. For example, 5-year breast cancer survival rates for cases diagnosed in Hawaii from 1980 to 1988 were 94 percent for localized stage at diagnosis (cancer confined to a limited region), 77 percent for regional stage at diagnosis (growth to adjacent organs or tissues or to regional lymph nodes), and 24 percent for distant (metastatic) stage at diagnosis (HTR). Because screening and early diagnosis have led to a shift in the distribution of cancer stage at diagnosis, stage at diagnosis is an important indicator of access and utilization of screening services. Currently, early detection through screening leads to the diagnosis of smaller cancers that are more likely to be cured.

In comparison to the four other ethnic groups, Native Hawaiian women experienced a higher proportion of breast cancer diagnosed beyond a localized stage. However, a noticeable improvement in early diagnosis has been observed since 1980. From 1980 to 1993, early-stage diagnosis (in situ and localized) of breast cancer increased from 51 to 66 percent. From 1965 to 1969, only 46 percent of breast cancer cases were diagnosed early (Rellahan, 1981).

Invasive cervical cancer has declined in most populations, largely due to Pap tests (Ries et al., 1994). Native Hawaiian women had a proportion of in situ diagnoses similar to those of Japanese and Chinese women. Only 9 percent of cases were diagnosed at a regional or distant stage, which is not significantly different from the rate for most other ethnic groups. From 1980 to 1993, the proportion of early-stage diagnosis of cervical cancer among Native Hawaiian women increased from 73 to 88 percent.

Based on 1991-93 data, the stage distribution for colorectal cancer in Native Hawaiian women looked unfavorable.

This is in contrast to a much higher proportion of early-stage diagnosis during the 1980s, but the reason for the dramatic change is unclear. Early-stage diagnosis for cancer of the uterus improved from 74 to 84 percent from the 1980s to 1991-93.

Even for lung and stomach cancers, for which there are no established screening strategies, Native Hawaiian women were more likely to be diagnosed at a later stage. Thirty percent of stomach cancer cases and 52 percent of lung cancer cases were found when the cancers had already metastasized. This suggests that Native Hawaiian women experience long intervals between onset of symptoms and diagnosis, perhaps due to fewer medical visits or to differential reporting of symptoms.

Major Risk Factors and Exposures

Obesity. As mentioned above, obesity is a major concern among the Native Hawaiian population. Obesity may increase cancer risk for Native Hawaiian women, especially for cancers of the uterus and breast. The diet of Hawaiians before Captain Cook's arrival in 1778 consisted primarily of taro (a starchy root), poi (a mashed form of taro), sweet potatoes, yams, breadfruit, greens, fruit, seaweed, fish, pigs, and chickens (Blaisdell, 1993; Shintani et al., 1991). In contrast, the current Native Hawaiian diet tends to be high in fat and low in fiber (Hawaii State Department of Health, 1993), although relatively high in fruits and vegetables. The mean number of daily servings of fruits and vegetables is 4.3; 29 percent of participants reported that they consumed at least 5 servings of fruit and vegetables per day. In the baseline survey for the Multiethnic Cohort Study, Native Hawaiian women had the highest caloric intake, among the highest intakes of total fat, and high intakes of red meat, fruit, and vegetables (Kolonel et al., 2000). An ecologic study of diet and lung cancer in the South Pacific suggested, after accounting for the effect of smoking, that the low intake of lutein and vitamin E and the high intake of cholesterol explained the 24 percent lung cancer risk among the populations of the islands of the South Pacific (Le Marchand et al., 1995).

Extent of Physical Activity. Lack of physical activity may increase the risk of colon cancer, and physical activity has been found to lower overall cancer incidence and mortality rates (Thune and Furberg, 2001). There are no gender-specific prevalence estimates for Native Hawaiians. In general, Native Hawaiians report higher levels than Whites of lack of any leisure-time physical activity (41 percent for Native Hawaiians versus 38 percent for Whites) (U.S. Department of Health and Human Services [USDHHS], 2000). The percentage of Native Hawaiians who accumulate at least 30 minutes of moderate-intensity physical activity at least 5 days of the week is lower than for Whites (11 percent for Native Hawaiians versus 15 percent for Whites). Similarly, the percentage of Native Hawaiians who do 20 minutes of moderate to vigorous physical activity at least 3 days of the week is lower than the percentage of Whites (31 percent versus 32 percent). Twenty-four percent of both Native Hawaiians and Whites engage in vigorous physical activity (U.S. DHHS, 2000).

Tobacco Use. Tobacco use among Native Hawaiian women appears to be disproportionately high compared with that of the state's total population. According to self-reports in the Behavioral Risk Factor Surveillance System (BRFSS) for the early 1990s (Hawaii State Department of Health, 1995), 30 percent of Native Hawaiian women were current smokers compared with 19 percent of White women and 13 percent of women of Asian ancestry living in Hawaii. On the island of Moloka'i, 34 percent of Native Hawaiian women said they were current smokers, and 15 percent said they were past smokers (Curb et al., 1991). Native Hawaiian women in the Multiethnic Cohort Study reported a smoking rate of 21.2 percent in the late 1990s, the highest among all ethnic groups participating in this study for Los Angeles and Hawaii (Kolonel et al., 2000).

Recent research provides some evidence that Native Hawaiians experience a disproportionate increase in lung cancer risk at the same level of smoking when compared with other ethnic groups (Le Marchand et al., 1992). Compared with Japanese women, Native Hawaiian women had a 67 percent higher risk of developing lung cancer when smoking the same number of cigarettes. Genetic susceptibility or dietary practices, such as a low intake of foods rich in carotenoids, may explain these differences (Le Marchand et al., 1989a, 1993).

Alcohol Consumption. Alcohol consumption is thought to be related to cancers of the mouth, pharynx, esophagus, and possibly breast, but according to a survey performed from 1975 to 1980, alcohol use does not appear to be a major problem among Native Hawaiian women. In studies conducted in the late 1980s, 13 percent of Native Hawaiian women were reported to drink alcohol compared with 30 percent of White women and 4 to 7 percent of Asian American women (Le Marchand et al., 1989b). In the Multiethnic Cohort Study, 16.2 percent of Native Hawaiian women reported that they were current drinkers (Kolonel et al., 2000).

Sexual Practices. There are few data on sexual practices among Native Hawaiian women. A reproductive health survey profiling four ethnic groups in Hawaii conducted in 1992 (University of Hawaii School of Public Health, 1992) found that the mean number of pregnancies for Native Hawaiian women aged 15 to 44 was 2.7, compared with 2.2 for all women in this survey. The mean number of live births was 2.0, compared with 1.6 overall. Thirty-one percent of Native Hawaiian women reported that their previous pregnancies were unintended, compared with 27 percent in the state overall. Only 68 percent reported using a contraceptive method, compared with 72 percent overall. Of Native Hawaiian women who used contraceptives, 38 percent used sterilization, 33 percent tubal ligation, 14 percent an oral pill, 11 percent condoms, and 5 percent relied on their partner's vasectomy. Of the four ethnic groups studied, Native Hawaiian women reported the lowest percentage of those who had sex education before first intercourse—50 percent, compared with 59 percent overall. In 1994, 52 percent of Native Hawaiian babies were born to unmarried mothers compared with 28 percent for the state overall (Hawaii State Department of Health, 1996).

Occupational Exposures. Even less information has been collected on occupational exposures to possible carcinogens among Native Hawaiians, either in general or in women. The major industries in Hawaii are tourism

and agriculture (primarily production of sugar cane and pineapples). Traditionally, Native Hawaiians were not strongly represented among plantation workers. However, women who do work in agriculture or construction may experience significant adverse exposures that lead to an increased cancer risk.

Cancer Screening

The high proportion of late diagnosis for breast cancer among Native Hawaiian women suggests that mammography use is lower than among other ethnic groups (Serxner and Chung, 1992). Trends in screening behavior for Pap testing and mammography were obtained from the BRFSS, an annual survey that assesses health-related behaviors through a statewide telephone survey (Hawaii State Department of Health, 1995). Significant differences in self-reported mammography rates by ethnicity were found during the years 1990-93. Whereas 73 percent of White women reported having had a mammogram during the previous 2 years, only 69 percent of Japanese women, 63 percent of Native Hawaiian women, and 49 percent of Filipino women did. Similar differences were shown among respondents who were asked whether they had ever had a mammogram, although in each case the percentage was higher. Eighty percent of White women, 79 percent of Japanese women, 73 percent of Native Hawaiian women, and 59 percent of Filipino women reported ever having had a mammogram. However, these differences among ethnic groups were not large enough to explain the discrepancy in breast cancer mortality rates.

With the exception of Filipino women, from 1992 to 1993 all ethnic groups reported Pap test rates of 83 percent during the previous 2 years (Hawaii State Department of Health, 1995). Even though self-reported participation in Pap tests was high in Hawaii, some Native Hawaiian women, especially those aged 65 and older, had not received adequate cervical cancer screening.

Access to Preventive Health Care and Cancer Control Services

Late diagnosis and delays in treatment lead to a more serious stage of disease at diagnosis, shorter survival time, and higher mortality for cancers and other chronic conditions. Important studies conducted in the late 1980s revealed that Native Hawaiians receive little treatment for heart disease, uncontrolled diabetes, or hypertension (Curb et al., 1991). Many affected persons are unaware of their conditions and do not receive adequate attention to prevent more serious problems or even death (Aluli, 1991). In 1993, 10 percent of Native Hawaiians reported that they had needed to see a doctor during the previous year but did not because of cost, compared with 8 percent of Whites and 3 percent of Japanese (Hawaii State Department of Health, 1995).

A 1985 report on the health needs of the Native Hawaiian population (Alu Like, Inc., 1985) summarized the barriers to appropriate health care as falling into three areas: availability, accessibility, and acceptability. Geographic isolation, particularly in remote rural areas or on the smaller islands, often makes cancer screening services unavailable to Native Hawaiians. Lack of health insurance and low income among some Native Hawaiians further restrict access to available services.

Over the past 20 years, access to health services has increased in areas with a high proportion of Native Hawaiians. For example, mammography facilities have been opened on the Wai'anae Coast of O'ahu and on the island of Moloka'i. Mandated insurance coverage of mammography screening passed by the legislature in 1991 removed some financial barriers. The Native Hawaiian Health Care System has established clinics in key locations.

Despite great efforts toward removing physical and economic barriers to health care, acceptability (the provision of culturally appropriate services) has remained a problem. Many services and programs are not sensitive to Native Hawaiian values, communication styles, and problem solving methods (Blaisdell, 1993; Banner et al., 1995; McLaughlin and Braun, 1998). Native Hawaiian women are more likely to respond to personal interaction among family and friends than to written information campaigns (Wegner, 1989). The problem of cultural barriers to health care is compounded by the fact that only 2.5 percent of all licensed physicians in Hawaii are Native Hawaiians (Blaisdell, 1993), which makes it difficult for the population to consult with a physician of their own ethnicity.

Anecdotal evidence suggests that Native Hawaiian women are dissatisfied with the overall attitudes of medical professionals, which would explain why some Native Hawaiian women continue to use traditional healers (Hussey et al., 1993). Little is known about how often traditional Hawaiian healers are consulted. Banner and colleagues (1995) reported that 28 percent of the women interviewed had used Native Hawaiian remedies during the previous year, suggesting that the role of traditional healing methods needs to be considered in future research. The few remaining traditional healers have become better organized to preserve their unique knowledge and skills (Judd, 1994), but their impact on the community is unclear. Efforts have been undertaken to increase the ability of health care professionals to interact with minority populations by teaching them major cultural concepts (Judd, 1994; Palafox and Warren, 1980), but the effectiveness of such programs has been difficult to ascertain.

Because many Native Hawaiians live in rural areas where there are few medical services, the Native Hawaiian Health Consortium (Alu Like, Inc., 1985) proposed an integrated system for health service delivery to Native Hawaiians with six components. These are health planning and monitoring, traditional Native Hawaiian health practice, health research and surveillance, professional health training, health promotion, and primary health care. Each component attempts to integrate Native Hawaiian cultural beliefs and practices with Westernized health care to increase acceptability by the Native Hawaiian population. In 1988, Papa Ola Lokahi was founded as a Native Hawaiian nonprofit consortium with the responsibility for promoting and improving Native Hawaiian health (Papa Ola Lokahi, 1995). One of its first accomplishments was to establish the Native Hawaiian Health Care System, composed of five organizations that provide health services to Native Hawaiians throughout the state, and five other member agencies. However, the economic and cultural barriers to an effective program in an underserved

community are often compounded by complex sociopolitical factors (Goodman, 1989), which continue to pose challenges to providing consistent, accessible, and responsive health care services for Native Hawaiians.

Cultural Factors

Although availability, accessibility, and acceptability explain important aspects of health care, the situation likely is more complex. According to a limited but in-depth case study conducted in 1974 (Ito, 1982), Native Hawaiians believe that illness has, in addition to physical causes, underlying moral and social causes. Medical treatment must be accompanied by self-diagnosis of these imbalances, which must be identified and corrected before any satisfactory cure for the physical condition can be found. The cultural loss/stress hypothesis (Clark, 1991; Alu Like, Inc., 1985) seeks a refined explanation by suggesting that the loss of Hawaiian culture after Western contact led to overwhelmingly negative social outcomes and severe stress on families, and subsequently to poor physical health, depression, alienation, low academic performance, and related problems. These rapid and drastic changes resulted in a situation in which health, culture, socioeconomic status, and education are so closely related that only a comprehensive effort can improve the current situation (Hammond, 1988) and enable Native Hawaiians to return to a state of good health. Native Hawaiians express this state as *ola* (a dynamic balance among culture, consciousness, and nature), which is achieved and maintained by day-to-day prevention strategies (Clark, 1991).

CURRENT DATA AND CANCER RESEARCH

Advances in cancer prevention and control for Native Hawaiian women depend in part on having a strong foundation of data, and on the ability to evaluate new programs and interventions once they are introduced. As has been discussed, the HTR collects and analyzes high-quality data on cancer cases and outcomes among Native Hawaiians living in the state of Hawaii. These data are limited by geographical location (as many Hawaiians have moved out of the state) and by the quality and reliability of census data and hospital records. SEER covers an estimated 78 percent of the Native Hawaiian population, which is better coverage than for several Asian American groups (Shinagawa et al., 1999). It is important not to consider as one population the various Asian and Pacific Islander subgroups, as this is sure to result in misleading cancer data (Chu, 1998; Shinagawa et al., 1999).

A review of systematic studies of cancer incidence and mortality among NH/PI peoples reported that Native Hawaiians represent 0.5 percent of subjects in large cancer prevention trials, and stressed the importance of increased attention to these indigenous populations to improve quality of cancer care in the NH/PI communities (Hughes et al., 2000). Clearly, there are significant remaining needs in this area. In addition to the work mentioned in this report, there is a long and consistent record of including Native Hawaiians in the many epidemiologic studies among ethnic groups in the state of Hawaii (Nomura et al., 1981, 1994; Le Marchand and Kolonel, 1989; Le Marchand et al., 1989a, 1992; Kolonel et al., 2000; Goodman et al., 1988). The Native Hawaiian Health Research project, begun in the mid-1990s, is another important study that contributes to

understanding cancer risks and clinical prevalence of obesity, diabetes, and related risks (Grandinetti et al., 1999; Mau et al., 1997).

Native Hawaiians also have been participating in multiethnic psychosocial, behavioral, and preventive intervention studies related to skin cancer (Glanz et al., 1999c, 2000), colorectal cancer (Glanz et al., 1999a,b), complementary and alternative medicine (Maskarinec et al., 2000), and providers' perspectives on cancer patients' quality of life (Tanaka and Gotay, 1998). There also are many Native Hawaiian women participating in the multicenter Women's Health Initiative, which addresses prevention of cancer, heart disease, and osteoporosis. A new Native Hawaiian Cancer Control Network recently funded by NCI is accelerating the expansion of cancer prevention and control research on health issues of special concern to Native Hawaiians (Imi Hale, 2001).

CANCER PREVENTION AND CONTROL INTERVENTIONS

During the past decade, cancer prevention and control intervention programs and studies have helped identify important opportunities to improve Native Hawaiian women's cancer profiles. Some interventions, such as the Breast and Cervical Cancer Detection Program (BCCDP), supported by the Centers for Disease Control and Prevention, have been focused primarily on service delivery to high-need populations. While the BCCDP has not released a report on its efforts, anecdotal evidence suggests that more women are obtaining mammograms and Pap testing since it began. In 2001, the Hawaii State Legislature passed important legislation to fund cancer treatment services for uninsured women who are diagnosed with breast or cervical cancer through the BCCDP.

Breast and Cervical Cancer Detection Intervention. The innovative Wai'anae Cancer Research Project, a breast and cervical cancer control demonstration project in a rural Native Hawaiian community (Banner et al., 1995), was initiated in response to high breast and cervical cancer mortality among Native Hawaiian women. The study aimed to increase participation in screening through an intervention that involved the Native Hawaiian community (DeCambra et al., 1992) at all levels and stages of research. The key ingredients to this successful project were community involvement and the use of lay facilitators (Matsunaga et al., 1996). This project involved a community advisory committee, a principal investigator from the local health center, and scientific consultants. The Native Hawaiian community participated in every stage of planning, implementation, and evaluation, with the goal of creating a model for future intervention studies that can have genuinely positive effects on the Native Hawaiian community.

The intervention strategy enlisted lay health advisors to reach out to others in their social networks who were not currently receiving cancer screening. The concept of *kokua* groups, or health-related support groups within existing Hawaiian social networks (Banner et al., 1995), was used to provide an opportunity to learn from each other in an informal atmosphere utilizing peer leaders. A system of giving vouchers for breast and cervical cancer screening was used to eliminate financial barriers. The project reached 500 women in the target area during the

course of the study. The final survey showed that in the intervention community, compliance with Pap test guidelines increased by 8 percentage points compared with a 1 percent increase in the control community. Participation in clinical breast examinations in the intervention community increased by 6 percentage points, whereas it decreased by 1 point in the control community. Mammography compliance increased by 1 percent in both the intervention and control communities (Gotay et al., 2000). Social support for screening also increased significantly in the intervention community; an additional 8 percent of respondents reported having encouraged other women to participate in screening, compared with 2 percent in the control community.

The cancer intervention program described above contributed to beneficial effects in other areas as well (Matsunaga et al., 1996; Banner et al., 1999). The project provided direct economic benefits to the community in the form of job and training opportunities. Improved health services are now available to the population through a women's clinic, a cancer support group, and a women's health network established as part of the project. Banner and colleagues (1999) found that women's confidence in using the health care system was improved. In accordance with the principle of community "ownership," local residents participated in data interpretation, preparation of publications, and dissemination of findings. The knowledge, skills, and experience that members of the community acquired during the course of this innovative project should be useful for future research and intervention programs.

Dietary Intervention. A primary disease prevention strategy used by some Native Hawaiians is the Wai'anae diet, a traditional Hawaiian diet (Shintani et al., 1991, 1994). It came out of the historic notion that Native Hawaiians suffered only rarely from obesity before Western contact and exposure to a Western diet. The Wai'anae diet emphasizes consumption of foods made up of less than 10 percent fat and at least 75 percent complex carbohydrates. Taro, sweet potatoes, yams, greens, seaweed, fish, and chicken are served either raw or steamed, in the style of ancient cooking. The aim is to achieve weight loss through a change in eating patterns rather than a restriction in calories. Participants in the formal program are encouraged to be role models for their families and friends. Intervention strategies include the teaching of cultural concepts, spiritual aspects, group support, and a community education component. In one study involving 20 people in a 3-week intervention (Shintani et al., 1991), a mean weight loss of 7.8 kg (6.5 percent) was reported. At the same time, serum cholesterol decreased by 31.2 mg/dL (14.1 percent), glucose by 38.5 mg/dL (23.8 percent), systolic blood pressure by 11.5 mmHg (8.6 percent), and diastolic blood pressure by 8.9 mmHg (10.6 percent).

Interventions such as the Wai'anae diet use various elements of culture to reflect the inherent strengths of Native Hawaiian traditions, and thus are important elements of health-promoting intervention strategies. There also is much to be learned from studies aimed at reducing other highly prevalent chronic diseases, such as diabetes. The Native Hawaiian Diabetes Intervention Project compared a "standard" community, member-led intervention to improve diet and physical activity with an intervention model that relied heavily on the principle of *'ohana*, or the extended family, to provide support. Findings suggest that stage of change is associated with positive dietary and

exercise behaviors, and that Native Hawaiians in the *'ohana* support (experimental) condition showed more advancement in the motivational stage for fat intake and physical activity than those who received the standard intervention (Mau et al., 2001).

FUTURE DIRECTIONS

Any future cancer prevention and control programs need to be undertaken in the context of the totality of life situations and problems faced by Native Hawaiians. Because a single-disease approach is unlikely to be successful in situations where so many different health problems exist, cancer control programs must consider a variety of risk factors and chronic conditions. Two major areas of future activities are important for decreasing incidence and mortality from cancer among Native Hawaiian women.

The first is to implement prevention strategies that are known to be effective, such as smoking cessation, weight loss, exercise, and early detection through mammography screening and Pap tests. It is a challenge in any population to achieve behavioral changes, but the problems are compounded in a disadvantaged population with economic and educational difficulties. Interventions should incorporate cultural beliefs and traditions that reach their target populations. As the Wai'anae Cancer Research Project (1996) has demonstrated, trained volunteers from the community are effective in reaching women who can benefit from cancer control interventions. A model led by lay persons has the advantage of encouraging cancer screening among individuals who might hesitate to contact a health care facility.

The second area for future research should address unanswered biological questions. Genetic susceptibility may help explain the apparent greater susceptibility to lung cancer and diabetes among Native Hawaiians. There is much to learn about patterns of cancer care and the effects of cancer treatment. Because Native Hawaiian women experience lower survival rates than other ethnic groups given the same stage at diagnosis, research is needed to determine whether they receive appropriate treatment and whether they suffer from more aggressive forms of diseases.

CONCLUSION

Despite the devastating effects on Native Hawaiian health from contact with the outside world, some improvements have been achieved during the past 20 years. Life expectancy for Native Hawaiian women has increased, mortality has declined, and survival has increased for some cancer sites. Also, more Native Hawaiian women have been reached by early detection and other prevention programs. However, the discrepancies in cancer morbidity and mortality rates in comparison with other ethnic groups living in Hawaii remain overwhelming. The Wai'anae Cancer Research Project, which has achieved considerable success using lay educators, offers a model for reaching Native Hawaiian women through culturally appropriate interventions. A participatory research

approach that combines the involvement of a Native Hawaiian community with research expertise has the potential to result in effective strategies that integrate education, social reform, and improvements in health care for Native Hawaiians.