

## Cardiovascular Disease Disparities in Native Hawaiians

**A**lthough Hawaii boasts relatively low rates of death from heart disease and stroke, past data suggest that Native Hawaiians bear a disproportionate burden of mortality from cardiovascular disease (CVD).<sup>1-3</sup> This article examines current data on CVD-related risk factors and mortality rates for Native Hawaiians and compares the data with statewide and national rates (where available).

Native Hawaiians are the indigenous Polynesians who settled the Hawaiian archipelago more than 1000 years ago. Today, a person is considered Native Hawaiian if he or she can trace ancestry to the Polynesians residing on the islands before Western contact in 1778. The 2000 US census recorded 401,162 Native Hawaiians (pure and part Hawaiians) in the country, with 60% (239,655) living in Hawaii. Native Hawaiians account for about 20% of the state's population. Other ethnic groups in the state include Japanese (25%), Caucasians (25%), Filipinos (15%), Chinese (3%), and smaller proportions of Samoans, Micronesians, Koreans, Hispanics, African Americans, and others.<sup>4</sup> Because of high intermarriage rates in Hawaii, it was estimated that only 9000 full-blooded Hawaiians were living in Hawaii in 1990.<sup>5</sup> Projections that considered intermingling rates of Native Hawaiians suggest that no full-blood Native Hawaiians will remain in 2045.<sup>6</sup>

Previous studies in Hawaii documented ethnic disparities in CVD mortality and risk factors. For example, mortality rates from heart disease were considerably higher among Native Hawaiians than for all residents every decade between 1910 and 1990.<sup>5</sup> Data from 2000 revealed that Native Hawaiians were dying at younger ages than Hawaii residents in other ethnic groups; had a higher prevalence of hypertension, diabetes, and asthma than other ethnic groups; and had

*Although Hawaii boasts relatively low rates of death from heart disease and stroke, past data suggest that Native Hawaiians bear a disproportionate burden of mortality from cardiovascular disease (CVD). This study examined 2005–2006 data on CVD mortality and risk factors to see if disparities experienced historically by Native Hawaiians have continued, increased, or been reduced. Existing data were reviewed related to CVD and risk factors for Native Hawaiians in Hawaii and compared with statewide and US rates. These data show that Native Hawaiians are experiencing continuing and perhaps growing disparities in CVD mortality rates and risk factor prevalence. Nevertheless, increased support for enlightened social policy and community-directed problem solving can help reduce CVD health disparities experienced by Native Hawaiians. Future research should be directed at better delineation of the various components of cardiometabolic risk and culturally sensitive, and educationally appropriate approaches to CVD risk reduction. (JCMS. 2007;6:250–253) ©2007 Le Jacq*

Noa Emmett Aluli, MD;<sup>1</sup> Phillip W. Reyes, MD;<sup>2</sup> JoAnn 'Umilani Tsark, MPH<sup>3</sup>  
From Moloka'i General Hospital, Kaunakakai;<sup>1</sup> Kamehameha Schools Kapalama Medical Services, Honolulu;<sup>2</sup> and Papa Ola Lōkahi, Honolulu, HI<sup>3</sup>

### Address for correspondence:

JoAnn 'Umilani Tsark, MPH, Papa Ola Lōkahi, 894 Queen Street, Honolulu, HI 96813

E-mail: itsark@papaolalokahi.org

higher rates of smoking, alcohol consumption, and overweight.<sup>7</sup>

The present study sought to examine 2005–2006 data on CVD mortality and risk factors to see if historical disparities experienced by Native Hawaiians have continued, increased, or been reduced.

### Methods

Existing data were reviewed related to CVD and risk factors for Native Hawaiians in Hawaii and compared with statewide and US rates. All data are available to the public through state and national databases and Web-based reports. Age-adjusted mortality rates are calculated by the Hawaii Department of Health from death records. This report examined 2005 rates for all major CVDs (*International Statistical Classification of Diseases, Tenth Revision [ICD-10]* codes 100–178) and then for 2 subcategories, coronary heart disease (*ICD-10* codes 111, 120–125) and stroke (*ICD-10*

codes 160–169). Comparison mortality rates for the nation also are provided in the Department of Health reports.

Risk factor data were gleaned from the Centers for Disease Control and Prevention (CDC)-sponsored Behavioral Risk Factor Surveillance System (BRFSS) and the Hawaii Health Survey, both administered by a private research firm under contract to the Hawaii Department of Health. Annually, the Hawaii BRFSS gathers data from 6500+ noninstitutionalized adults 18 years and older on health risk behaviors, preventive health practices, and health care access primarily related to chronic disease and injury. Relevant CVD risk factors collected by BRFSS include hypertension (systolic blood pressure level  $\geq 140$  mm Hg or diastolic blood pressure  $\geq 90$  mm Hg), smoking, weight status (overweight defined as a body mass index [BMI] of 25–29 and obesity defined as BMI  $\geq 30$ ), and

**Table I.** Major Cardiovascular Diseases in Hawaii, 2005: Mortality Rates (Age-Adjusted, per 100,000)

MORTALITY	NATIVE HAWAIIANS	STATE OF HAWAII	UNITED STATES <sup>a</sup>
Major cardiovascular disease (ICD-10 codes 100–178)	313.1	205.3	287.0
Coronary heart disease (ICD-10 codes 111, 120–125)	135.4	81.3	150.5
Stroke (ICD-10 codes 160–169)	57.1	43.5	50.0

From Department of Health, Office of Health Status Monitoring.<sup>1</sup> <sup>a</sup>Preliminary 2004 data, Centers for Disease Control and Prevention, National Center for Health Statistics. Abbreviation: ICD-10, *International Statistical Classification of Diseases, Tenth Revision*.

**Table II.** Mean Age at Death for the 5 Largest Ethnic Groups in Hawaii 2005 for Cardiovascular Disease (CVD), Coronary Heart Disease (CHD), and Stroke

ETHNICITY	MEAN AGE AT DEATH, Y		
	CVD	CHD	STROKE
Native Hawaiian	65.2	66.1	69.2
White	74.8	73.6	77.2
Chinese	79.8	77.0	83.9
Filipino	77.1	76.1	77.8
Japanese	78.6	77.6	78.9

From the Department of Health, Office of Health Status Monitoring.<sup>1</sup>

**Table III.** 2006 Prevalence of Cardiovascular Disease (CVD) Risk Factors Among Native Hawaiians Aged 18 Years or Older, in Hawaii, Compared With the Total State and US National (NATL)

CVD RISK FACTOR	NATIVE HAWAIIANS	WHITE	JAPANESE	FILIPINO	TOTAL STATE <sup>a</sup>	US NATL <sup>b</sup>
Hypertension <sup>c</sup>	26.7	19.4	31.8	25.2	24.2	25.5
Current smokers	27.4	16.7	16.3	15.0	17.5	20.1
Overweight (BMI 25–<30)	35.8	35.5	32.9	38.5	35.5	36.5
Obese (BMI ≥30)	39.4	19.0	11.8	16.5	20.6	25.1
Overweight/obese combined	75.2	54.5	44.7	55.0	56.1	61.6
No leisure time activity in past month	18.8	13.0	21.7	29.2	19.3	22.6
Told had high cholesterol	34.4	32.0	41.1	33.3	34.6	35.6
Told had diabetes by doctor	11.5	5.6	9.2	10.4	8.2	7.5
Average age told had diabetes, y	45	51.1	52.7	44.8	48.7	NA

Data are expressed as percentages unless otherwise noted. <sup>a</sup>Data from Hawaii State Department of Health. <sup>b</sup>Data from Centers for Disease Control and Prevention. <sup>c</sup>2005 Behavior Risk Factor Surveillance System. Abbreviations: BMI, body mass index; NA, not available.

diabetes. The 2006 data are reported by ethnic group, for the state, and for the nation, accompanied by a comparison of the 2005 prevalence with that of 2000 and 1995 to examine changes over time.

## Results

As shown in Table I, in 2005 the statewide mortality rate from CVD was lower than the rate for the United States: 205.3 per 100,000 in Hawaii compared with 287.0 per 100,000 for the nation. For Native Hawaiians, however, the rate was 313.1 per 100,000, 52.5% higher than the state rate and

9% higher than the national rate. Examining the subcategories, the mortality rate for Native Hawaiians from coronary heart disease was 66.5% higher than the statewide rate, although it was lower than the national rate. In addition, for stroke, the rate for Native Hawaiians was 31.3% higher than the statewide rate and 14.2% higher than the national rate.

Native Hawaiians have the lowest mean age at death for major CVD, coronary heart disease, and stroke, while Chinese and Japanese residents boast the highest mean age of death for CVD (Table II). Compared with other

ethnic groups, the mean age of death for Hawaiians was 9.6 to 14.6 years younger for CVD, 7.5 to 11.5 years younger for coronary heart disease, and 8.0 to 14.7 years younger for stroke.

Hawaii BRFSS data in 2006 also demonstrate persistent CVD risk factor disparities for Native Hawaiians<sup>8,9</sup> (Table III). The age-adjusted prevalence of hypertension among Native Hawaiians is 26.7%, second to the Japanese at 31.8%, and slightly higher than the statewide and national prevalence at 24.2% and 25.5%, respectively. Adult smoking prevalence is significantly higher among Native Hawaiians,

**Table IV.** Prevalence (%) of Cardiovascular Risk Factors for Native Hawaiians (NH) vs Total Hawaii State for Persons 18 Years and Older

RISK FACTOR		1995	2000	2005	10-Y CHANGE 1995-2005
Hypertension	NH	21.1	NA	26.7	+5.6
	State	21.1		24.2	+3.1
Smoking	NH	23.2	31.0	27.9	+4.7
	State	17.8	19.7	17.0	-0.8
Overweight	NH	37.1	37.4	30.0	+7.1
	State	31.2	34.5	33.3	+2.1
Obese	NH	25.8	32.1	43.1	+17.6
	State	13.0	15.7	19.7	+6.7
Overweight and obesity	NH	62.3	69.5	73.1	+10.8
	State	44.2	50.2	53.0	+8.8
Diabetes	NH	NA	5.8	12.2	+6.4 <sup>a</sup>
	State		5.2	7.3	+2.1 <sup>a</sup>

Data from Hawaii State Department of Health.<sup>8</sup> <sup>a</sup>Reflects 5-year change; no comparable data available for 1995. Abbreviation: NA, not available.

82.7% higher than Filipinos who have the lowest prevalence (15%). The rate of smoking in Native Hawaiians is 56.6% higher than the state (17.5%) and 37% higher than the nation (20.1%).

Although prevalence of overweight was similar across ethnic groups in 2006, the prevalence of obesity among Native Hawaiians (39.4%) was significantly higher than for other groups—234% higher than Japanese (11.8%), 91.3% higher than the state (20.6%), and 57% higher than the nation (25.1%). This high obesity prevalence expectantly leads to disproportionately higher rates of type 2 diabetes, a coronary heart disease risk equivalent. The 2006 prevalence for diabetes among Native Hawaiians was 11.5%. This is 73.2% higher than for whites in Hawaii (5.6%), 40.2% higher than the state (8.2%), and 53.3% higher than the nation (7.5%).

A review of BRFSS data between 1995 and 2005 demonstrates marked increases in the prevalence of CVD risk factors for Native Hawaiians in Hawaii (Table IV). With the exception of smoking, the total state population also experienced increases, but to a lesser degree. Between 1995 and 2005, Native Hawaiians experienced a 26.5% increase in hypertension, compared with a 14.7% increase for the state. For smoking, Native Hawaiians experienced a 20.3% increase, compared with a 4.5% decrease for the state. Native Hawaiians experienced a 19% increase for overweight (compared with

a 6.7% increase for the state); a 68.2% increase for obesity (compared with a 51.5% increase for the state); and a 17.3% increase for overweight and obesity combined (compared with a 19.9% increase for the state). Data show a 110% increase in diabetes prevalence for Native Hawaiians between 2000 and 2005, compared with a 40.4% increase for the state.

### Discussion

Health care disparity is defined by the National Institutes of Health as the “differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States.”<sup>10</sup> The present study confirms that Native Hawaiians are experiencing continuing and perhaps growing disparities in CVD mortality rates and risk factor prevalence.

Other ethnic groups, especially African Americans, experience health disparities in the United States, with a disproportionate burden of death and disability from CVD in minority and low-income populations.<sup>10,11</sup> Low socioeconomic status may be a partial reason for CVD disparities experienced by Native Hawaiians. Compared with Caucasians, Japanese, and Chinese in Hawaii, Native Hawaiians are less likely to have graduated from high school or attended college. For example, although 20% of Hawaii’s population is Native Hawaiian, less than 10% of students

enrolled in Hawaii colleges are of Hawaiian ancestry.<sup>12</sup> Residents of Native Hawaiian ancestry are more likely to hold lower-paying jobs than residents of other races/ethnicities in Hawaii,<sup>13,14</sup> probably because of their lower high school graduation and college enrollment rates. Although similar portions of Native Hawaiians and Caucasians were uninsured in Hawaii, more Native Hawaiians depend on Medicaid than on private insurance.<sup>15</sup> In addition, Native Hawaiian families with children have the lowest mean income and the highest poverty rates among the major ethnic groups in the state.<sup>16</sup>

Increases in obesity, heart disease, and diabetes among Native Hawaiians also have been attributed to changes in key lifestyle practices resulting from rapid “westernization”—including reduced physical activity and changes from a traditional diet that was low in fat and high in complex carbohydrates and fiber to a high-fat, low-fiber diet.<sup>17</sup> Historical scholars have attributed a broad legacy of losses following Western contact. The islands of Hawaii are the most isolated lands in the world, and they are home to diverse and unique flora and fauna. The indigenous Hawaiian people were isolated for centuries from outside contact and most infectious diseases. Following contact with the Western world in the late 18th century, the Hawaiian island landscapes were seriously degraded by sandalwood harvesting and deforestation for cash crop cultivation, ranching, and large-scale sugar

and pineapple plantations. The indigenous Hawaiians succumbed to introduced infectious diseases, including cholera, measles, whooping cough, influenza, leprosy, and tuberculosis. From an estimated population of between 300,000 to 800,000 inhabitants in 1778,<sup>18-22</sup> the 1896 census recorded fewer than 40,000 full and part Hawaiians.<sup>23</sup> Taboos set by Christian missionaries and importation of labor from Asia, the Americas, and Europe led to loss and dilution of traditional Hawaiian language and culture, and efforts to restore cultural traditions, language, and pride only began in the 1970s.<sup>24</sup>

Suggested solutions to the health disparities include guaranteeing access

to quality health care, education, and housing for all citizens. Other investigators are calling for increased engagement of disparate communities in the identification of health and social problems and in the development of solutions.<sup>25-28</sup> Enlisting Native Hawaiian lay and professional support in the development of healthy living interventions will help assure that education and programming are culturally appropriate.<sup>29-31</sup> Increasing the number of minority health professionals may help increase the sensitivity of health education and effectiveness of outreach and risk reduction efforts.<sup>25,27,28</sup> The authors believe that increased support

for enlightened social policy and community-directed problem solving can help reduce CVD health disparities experienced by Native Hawaiians. Future research should refine cardiometabolic risk and CVD in this disproportionately affected population and identify novel and effective means of morbidity and mortality reduction.

*Acknowledgments: The authors gratefully acknowledge the assistance and mentoring of Dr Keith Ferdinand and Dr Kathryn L. Braun and the ongoing commitment of the Hua Kanawao Ka Liko Council Members from the island of Moloka'i.*

## REFERENCES

- Balabis J, Pobutsky A, Kromer Baker K, et al. *The Burden of Cardiovascular Disease in Hawaii 2007*. Honolulu, HI: Hawaii State Department of Health; 2007.
- Blaisdell RK. 1995 update on kanaka kaoli (indigenous Hawaiian) health. *Asian Am Pac Isl J Health*. 1996;4(1-3):160-165.
- Curb JD, Aluli NE, Kautz JA, et al. Cardiovascular risk factor levels in ethnic Hawaiians. *Am J Public Health*. 1991;81(2):164-167.
- Kana'iaupuni SM, Melahn C. *Census 2000 Highlights: Hawaiians in the United States and Hawaii*. Honolulu, HI: Kamehameha Schools. Policy, Analysis and System Evaluation Report No. 2001-2002:06.
- Look MA, Braun KL. *A Mortality Study of the Hawaiian People 1910-1990*. Honolulu, HI: The Queen's Health System; 1995.
- Miike L. *Population Projections of Native Hawaiians Living in Hawaii*. Washington, DC: US Congress; 1987. Staff paper for the Office of Technology Assessment-Health Program.
- Johnson DB, Oyama N, Le Marchand L. Papa Ola Lōkahi Hawaiian health update: mortality, morbidity and behavioral risks. *Pac Health Dialog*. 1998;5(2):297-314.
- Salvail FR, Nguyen D. Hawaii State Department of Health, 2006 Behavior Risk Factor Surveillance System, prevalence data by demographic characteristics. <http://www.hawaii.gov/health/statistics/brfss/brfss2006/demo06.html>. Accessed June 30, 2007.
- Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention & Health Promotion. Behavioral Risk Factor Surveillance System. Prevalence data—all states 2006. <http://apps.nccd.cdc.gov/brfss/page.asp?cat=CA&yr=2006&state=All#CA>. Accessed June 30, 2007.
- National Institutes of Health. Addressing health disparities: the NIH Program of Action. What are health disparities? <http://healthdisparities.NIH.gov/whatare.html>. Accessed July 5, 2007.
- Centers for Disease Control and Prevention. Prevalence of heart disease—United States, 2005. *MMWR Morb Mortal Wkly Rep*. 2007;56(6):113-118.
- Makuakane-Drechsel T, Hagedorn L. Correlates of retention among Asian Pacific Islanders in community colleges: the case for Native Hawaiian students. *Community Coll J Res Pract*. 2000;24:639-655.
- 2005 State of Hawaii Data Book. Honolulu, HI: Hawaii Department of Business, Economic Development & Tourism. <http://www.hawaii.gov/dbedt/info/economic/databook/db2005/>. Accessed March 16, 2007.
- 2006 State of Hawaii Data Book: a Statistical Profile of the Hawaiian Population in Hawaii. Honolulu, HI: Office of Hawaiian Affairs. [http://www.oha.org/pdf/databook\\_6\\_02.pdf](http://www.oha.org/pdf/databook_6_02.pdf). Accessed March 18, 2007.
- Pobutsky AM, Pordell P, Yamashita B, et al. Community based participatory approaches to address health disparities in Hawaii: recent applications in cancer prevention, detection and treatment programs. *Pac Health Dialog*. 2004;11(2):183-190.
- Kana'iaupuni SK, Malone KN, Ishibashi K, et al. *2005 Native Hawaiian Educational Assessment*. Honolulu, HI: Kamehameha Schools, Pauahi Publications; 2005.
- Fujita R, Braun KL, Hughes CK. The traditional Hawaiian diet: a review of the literature. *Pac Health Dialog*. 2004;11(2):250-259.
- Kamakau SM. *Ka Hana O Ka po'e Kahiki—The Works of the People of Old*. Honolulu, HI: Bishop Museum Press; 1976. Special Publication 61.
- Malo D. *Hawaiian Antiquities (Mo'olelo Hawaii)*. Honolulu, HI: Bishop Museum Press; 1989, reprint 1997.
- Nordyke EC. *The Peopling of Hawaii*. 2nd ed. Honolulu, HI: University of Hawaii Press; 1989.
- Stannard DE. *Before the Horror*. Honolulu, HI: Social Science Research Institute, University of Hawaii; 1989.
- Bushnell OA. *The Gifts of Civilization*. Honolulu, HI: Social Science Research Institute, University of Hawaii; 1989.
- Spoehr H, Akau M, Akutagawa W, et al. Ke Ala Ola Pono: the Native Hawaiian community's effort to heal itself. *Pac Health Dialog*. 1998;9(2):232-238.
- McGregor DR. *Na Kua'aina Living Hawaiian Culture*. Honolulu, HI: University of Hawaii Press; 2006.
- Israel BA, Schulz AJ, Parker EA, et al. Review of community-based research: assessing partnership approaches to improve public health. *Annu Rev Public Health*. 1998;19:173-202.
- Cargo M, Lévesque L, Macaulay AC, et al, for the Kahnawake Schools Diabetes Prevention Project (KSDPP) Community Advisory Board. Community governance of the Kahnawake Schools Diabetes Prevention Project, Kahnawake Territory, Mohawk Nation, Canada. *Health Promot Int*. 2003;18(3):177-187.
- Fong M, Braun KL, Tsark JU. Improving Native Hawaiian health through community-based participatory research [special issue]. *Calif J Health Promot*. 2003;1:136-148. <http://www.csuchico.edu/cjhp/1/hawaii/136-148-fong.pdf>. Accessed July 1, 2007.
- Burhansstipanov L, Christopher S, Schumacher SA. Lessons learned from community-based participatory research in Indian Country. *Cancer Control*. 2005;12(suppl 2):70-76.
- Kotler P, Roberto EL. *Social Marketing Strategies for Changing Public Behavior*. New York, NY: Free Press; 1989.
- Andreasen AR. *Marketing Social Change: Changing Behavior to Promote Health, Social Development, and the Environment*. San Francisco, CA: Jossey-Bass; 1995.
- Maibach EW, Rothschild ML, Novelli WD. Social marketing. In: Glanz K, Rimer BK, Lewis FM, eds. *Health Behavior and Health Education: Theory, Research and Practice*. 3rd ed. San Francisco, CA: Jossey-Bass; 2002: 437-461.