

HAWAII

DIABETES
REPORT

2004

The Hawaii Department of Health is pleased to present the publication of the *2004 Hawaii Diabetes Report*. The report, produced under the direction of the Hawaii State Diabetes Prevention and Control Program, compiles surveillance information, vital statistics, and various other data sources into a comprehensive document.

The 2004 Hawaii Diabetes Report is intended to provide partners and stakeholders with information on the prevalence of diabetes and its effects on the people of Hawaii. This report is a valuable resource for use in planning programs and initiatives targeting those people most impacted by the disease.

It is estimated that approximately 100,000 people in Hawaii have diabetes and more than 900 people die every year of related complications, making it the seventh leading cause of death in the state. Diabetes is a serious, common, and costly disease, but by working together, we can create a healthier Hawaii. I invite you to join us in that effort.

Kuikahi kakou i ka puuwai
Let us work together from the heart



Chiyome Leinaala Fukino, M.D.
Director, Department of Health

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Tianzhu Huang, MSBehavioral Risk Factor Surveillance System
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HIGHLIGHTS

- It is estimated that 72,000 to 100,000 people currently have diabetes in Hawaii, of which 25,000 or more remain undiagnosed.
- Native Hawaiians, Filipinos, and Japanese have higher rates of diabetes than Whites.
- Prevalence rates of diabetes are similar across all of Hawaii's counties.
- Native Hawaiians have the highest diabetes mortality rates when compared with the other major ethnic groups. Whites have the lowest diabetes mortality rates.
- Lower educational attainment is associated with higher diabetes prevalence and mortality.
- Obesity rates are significantly higher among adults with diabetes when compared with adults without diabetes.
- Adults with diabetes are less likely to be current smokers and are more likely to be former smokers when compared with adults without diabetes.
- Adults with diabetes are more likely to eat at least 5 servings of fruits/vegetables when compared with adults without diabetes.
- Adults with diabetes are more likely to receive their immunization for flu and pneumonia when compared with adults without diabetes.
- Hawaii has a higher incidence and prevalence rate of patients with end-stage renal disease (ESRD) on kidney dialysis when compared with the national average.
- Almost 60% of patients receiving kidney dialysis for ESRD have a primary diagnosis of diabetes.

Diabetes mellitus is a group of metabolic diseases characterized by high levels of blood glucose (blood sugar). In a person with diabetes, the normal use of food for energy is disrupted because of defects in insulin production, insulin action, or both. Insulin is a hormone which assists with the uptake of glucose into the body's cells. When insulin defects are present, the normal pathway of energy production is disrupted and high blood glucose levels result.

The Centers for Disease Control and Prevention (CDC) estimates that 6.3% of the population, or 18.2 million people (all ages), have diabetes in the United States. Of these 18.2 million people, almost a third (5.2 million) do not know they have diabetes. Because uncontrolled, unmanaged diabetes is associated with the development of numerous complications, it is the 5.2 million undiagnosed individuals who are particularly at risk for experiencing these associated conditions. Given that many diabetes complications are preventable, the monies spent to treat this disease are astounding. Cost studies funded by the American Diabetes Association estimate the total direct and indirect costs of diabetes in this country to be as high as \$132 billion (\$92 billion in direct medical costs).

Risk for diabetes is determined by certain factors, including genetic, physiological, and behavioral. Certain ethnic groups have higher rates of diabetes, suggesting a genetic predisposition to the disease. Age also plays a major role in diabetes prevalence. The CDC estimates that nearly 1 in 5 adults over the age of 65 years has diabetes. Furthermore, nearly 80% of diabetes is diagnosed in overweight and obese individuals, suggesting a strong link between lifestyle behaviors and the development of diabetes. Physical inactivity and poor diet are crucial factors then in the prevention of the disease. While not all risk factors are modifiable, those that are contribute greatly to the high prevalence of diabetes and provide the key to public health efforts aimed at reducing diabetes prevalence.

Uncontrolled diabetes is associated with serious complications and premature death; however, much of this burden could be prevented with early detection, improved delivery of care, and better education on diabetes self-management. The following are examples of diabetes-related complications that could be prevented or reduced:

Cardiovascular disease. Adults with diabetes are two to four times more likely to die of heart disease and stroke, which together cause about 65% of deaths among people with diabetes. These deaths could be reduced by 30% with improved care to control blood pressure, blood glucose, and blood cholesterol levels.

Eye disease and blindness. Diabetes is the leading cause of new cases of blindness among adults aged 20 – 74. Diabetic retinopathy accounts for approximately

12,000–24,000 new cases of blindness each year. Regular eye exams and timely treatment could prevent up to 90% of diabetes-related blindness; however, only 64.2% of people with diabetes received annual dilated eye exams in 2002.

Kidney disease. Diabetes is the leading cause of end-stage renal disease (ESRD). Each year, over 40,000 people with diabetes develop kidney failure, totaling more than 100,000 people treated for this condition. Treatment to better control blood pressure and blood glucose levels could reduce diabetes-related kidney failure by about 50%.

Amputations. Between 60% and 70% of people with diabetes have mild to severe forms of nervous system damage, contributing to lower-extremity amputation risk. Vascular diseases associated with diabetes increases this risk further. In fact, about 82,000 non-traumatic lower-extremity amputations of the leg, foot, or toe are performed annually among people with diabetes. Foot care programs that include regular examinations and patient education could prevent up to 85% of these amputations.

Pregnancy complications. About 18,000 women with preexisting diabetes and about 135,000 women with gestational diabetes give birth each year. These women and their babies have an increased risk for serious complications such as stillbirths, congenital malformations, and the need for cesarean sections. Poorly controlled diabetes prior to conception and during the first trimester is associated with major birth defects in 5%-10% of diabetic pregnancies. Moreover, 15%-20% of pregnancies in mothers with poorly controlled diabetes are spontaneously aborted. Finally, poorly controlled diabetes during the second and third trimesters of pregnancy can result in excessively large babies, posing a risk to the mother and the child. Women with gestational diabetes and their babies are also at higher risk of becoming obese and developing diabetes later in life. These risks can be reduced with screenings and diabetes care before, during, and after pregnancy.

Flu- and pneumonia-related deaths. Each year, 10,000–30,000 people with diabetes die of complications from flu or pneumonia. They are roughly three times more likely to die of these complications than people without diabetes; however, only 55% of people with diabetes get an annual flu shot.

The aim of this document is straightforward: to provide insight on the burden and distribution of diabetes among Hawaii's residents, allowing local communities to focus their resources and attention where it is most needed. To that end, this report provides pertinent and current information on the prevalence of diabetes; diabetes mortality; diabetes complications (eye, foot, kidney); diabetes preventive care practices; and the relationship between diabetes and general health status, risk factors (obesity, smoking), and health/lifestyle behaviors.

The information presented in this report is based on these data sources: (1) Hawaii Behavioral Risk Factor Surveillance Survey (BRFSS) data averaged over three years (2000~2002), (2) mortality data from Hawaii vital statistics records averaged over three years (2000~2002), (3) end-stage renal disease (ESRD) data from the Transpacific Renal Network (ESRD Network 17) for 2002, and (4) the Centers for Disease Control and Prevention's (CDC) web publications.

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is the largest continuously conducted telephone health survey in the world. Hawaii has been an active participant in the BRFSS since the early 1990's. The BRFSS enables the Centers for Disease Control and Prevention (CDC), state health departments, and other health and education agencies to monitor risk behaviors related to chronic diseases, injuries, and death. State health departments use BRFSS data to create annual and periodic reports, fact sheets, press releases, or other publications, which are used to educate the public, the professional health community, and policymakers about the prevalence of modifiable behavioral risk factors and of preventive health screening practices. Data collected through the BRFSS are routinely used to capture health information on demographically defined subgroups (ethnicity, gender, age, educational level, income level, geographic location).

Tests of Statistical Significance

Confidence intervals have been provided in the BRFSS section of this report as an efficient way to look for differences among subgroups on important health issues and serve as a useful tool to look for patterns in BRFSS reports. A confidence interval is a range that contains the true population prevalence estimate with a certain degree of assurance when repeated sampling of the population is performed. The degree of assurance commonly used is 95%. For example, if we set our confidence interval at 95%, then we can expect that 5 out of 100 times the estimates coming from our samples will fall outside the range that contains the true population value. However, 95% of the time our estimates will fall within the range. This is known as a 95% confidence interval.

Confidence intervals are used to assess if there are differences in prevalence among defined subgroups. It is a quick and simple way to determine if such differences are potentially significant (statistically). For example, the analysis of diabetes prevalence by ethnicity shows that Native Hawaiians have a higher diabetes prevalence rate when compared with Whites (7.9% versus 3.4%) and the confidence intervals around these prevalence estimates do not overlap (page 10, figure 7). Based on this finding, it is reasonable to say that "likely significant differences" of diabetes prevalence does exist between Native Hawaiians and Whites in this state. However, in order to say that there are *statistically* significant differences of diabetes prevalence between these ethnic groups (Native Hawaiians, Whites), a formal test of significance would have to be conducted (e.g., t-test, chi-square test). Where feasible, formal tests of significance were also performed to more accurately assess differences between sub-groups on important diabetes-related health issues.

Mortality Data (Vital Statistics)

The Office of Health Status Monitoring (OHSM) of the Hawaii Department of Health collects, processes, analyzes and disseminates relevant, population-based data in a timely fashion in order to assess the health status of Hawaii's population and to fulfill health statistics legal requirements. OHSM also provides the Department with vital statistics and demographic and health data for use in identifying state and community health trends, identifying population groups at risk for serious health problems, and evaluating program effectiveness. Other OHSM activities include: maintaining health surveys for the purpose of collecting data on health conditions not otherwise monitored within the state yet needed to analyze health status; disseminating information through published reports and through visual presentations such as charts, graphs and maps; and coordinating the integration and linkage of departmental databases with external databases. OHSM also provides a repository for vital event records with the State such as births, deaths, and marriages and provides copies to the general public on a timely basis. OHSM issues marriage licenses as well as marriage, birth, and death certificates.

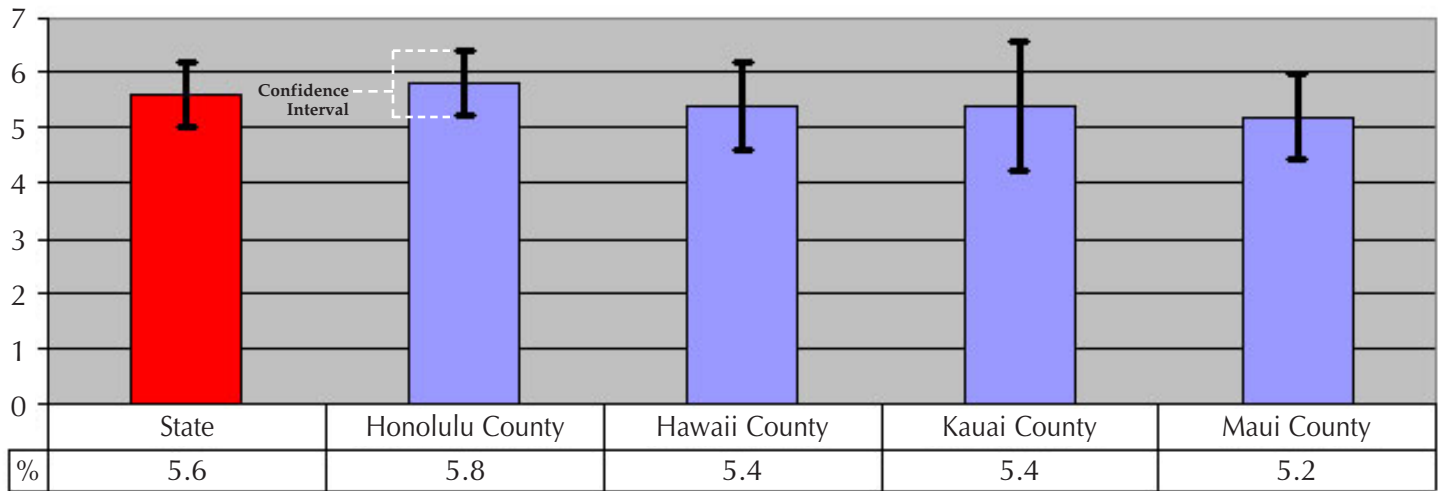
End-Stage Renal Disease

The TransPacific Renal Network (also known as ESRD Network 17) is a private nonprofit corporation, located in the state of California. It is one of 18 organizations established by the U.S. Department of Health, Education, and Welfare (DHEW) in 1977 to implement a regional system of health care for patients with end-stage renal disease (ESRD). The Renal Disease Amendments of June 3, 1976, Subpart U, Conditions of Coverage, commonly known as the ESRD Regulations, is the enabling legislation for Networks. The purpose of the TransPacific Renal Network is to provide leadership for chronic dialysis and transplantation professionals to promote delivery of the highest quality renal care to people with end-stage renal disease. This is accomplished through education of renal care professionals and consumers; data collection, validation and analysis; information development and dissemination; review, evaluation and improvement of provider performance; and acting as a liaison with federal and state policy makers.

The Network (17) consists of the 45 northernmost counties in California (roughly stretching from the Oregon border southward to Fresno), the state of Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (Saipan). The Network (17) dialysis centers serve approximately 5% of the United States dialysis population, and its transplant centers perform about 5% of kidney transplants annually. As of December 31, 2002, the Network (17) had 153 Medicare certified dialysis facilities and two Veterans Administration facilities as well as eight transplant centers. Hawaii has eighteen dialysis facilities and one transplant center. The dialysis facilities are located on six islands: nine on Oahu, three on the Big Island, two on Maui, two on Kauai, one on Molokai, and one on Lanai. In 2002, the Network served 1870 dialysis patients in the state of Hawaii. The transplant center is located on the island of Oahu.

STATE/COUNTY ADULT DIABETES PREVALENCE AND MORTALITY, 2000-2002

FIGURE 1: Prevalence (%) of adults diagnosed with diabetes statewide and by county, BRFSS, 2000-2002*

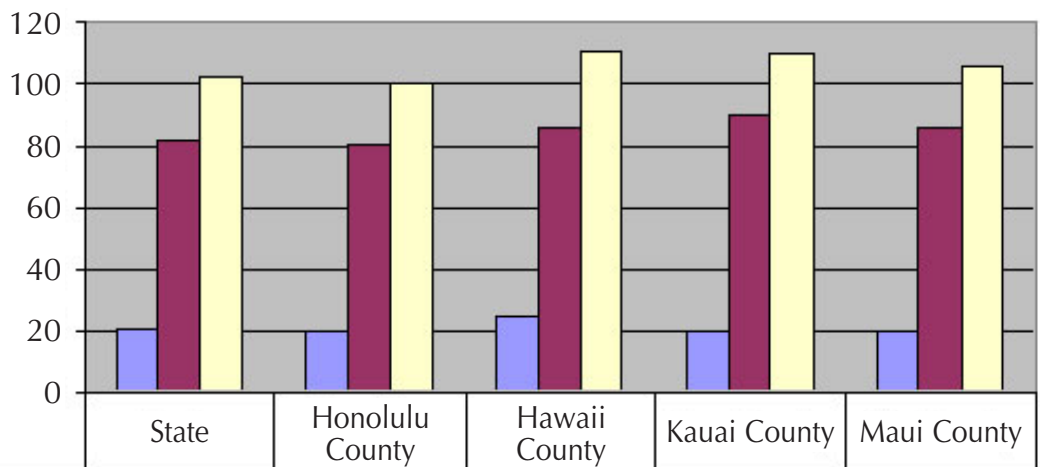


*3-year average, age-adjusted

FINDING: Using averaged data (2000-2002) from the Hawaii Behavioral Risk Factor Surveillance Survey (BRFSS), an estimated 48,000 to 57,000 adults know they have diabetes (excludes gestational diabetes). An additional 25,000 or more adults may have diabetes but remain undiagnosed.

FIGURE 2: Diabetes mortality rates per 100,000 population statewide and by county, 2000-2002*

FINDING: In Hawaii, diabetes accounts for approximately 11.6% of all deaths. The average (2000-2002) annual number of deaths due to diabetes include 191 cases as an underlying cause and 761 cases as a contributory cause.



■ Diabetes as an underlying cause of death per 100,000 population	21	20	25	20	20
■ Diabetes as a contributing cause of death per 100,000 population	82	81	86	90	86
■ Diabetes as an underlying and contributing cause of death per 100,000 population	103	101	111	110	106

*3-year average, age-adjusted

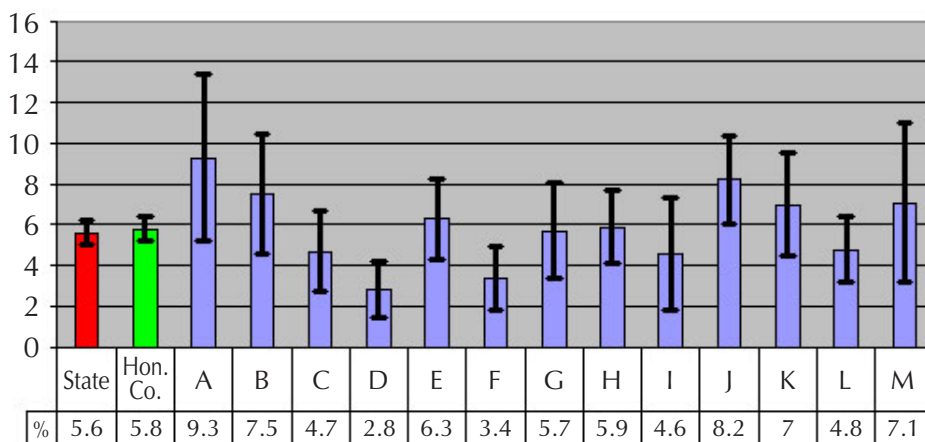
Source: OHSM
Analysis: BRFSS

COUNTY/SUB-COUNTY ADULT DIABETES PREVALENCE, 2000-2002

FIGURE 3: Prevalence (%) of adults diagnosed with diabetes — Honolulu County, BRFSS, 2000-2002*



- A North Shore/Lai'e
- B Ka'a'awa/Kahulu'u/Kane'ohe
- C Kailua/Waimanalo
- D Hawai'i Kai/Kahala/Wai'alae
- E Kaimuki/Palolo/Waikiki
- F Upper Makiki/Manoa
- G Lower Makiki/Ala Moana
- H Moanalua/Kalihi/Nu'uuanu
- I Salt Lake/Foster Village
- J 'Aiea/Pearl City
- K Mililani/Wahiawa
- L Waipahu/Waipio/Kapolei
- M Nanakuli/Wai'anae

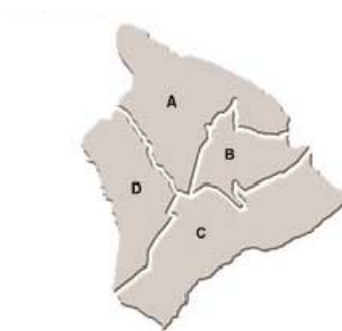


*3-year average, age-adjusted

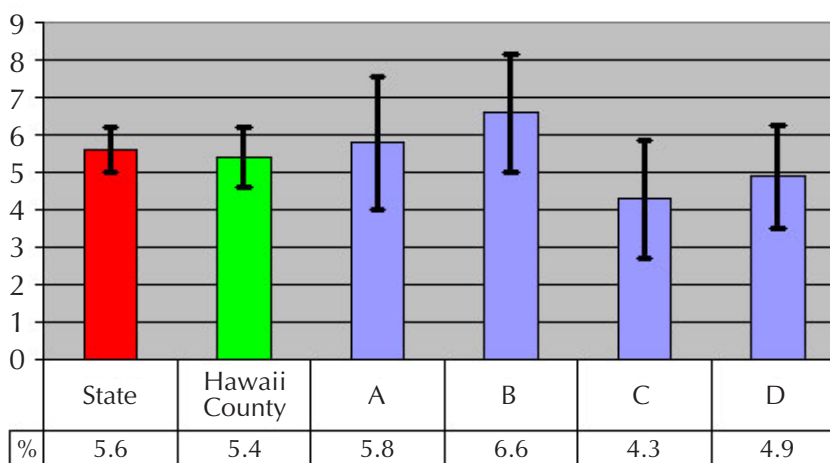
FINDING: The estimated prevalence rate of diabetes in Honolulu County using BRFSS data averaged over three years is 5.8%. This equates to approximately 39,000 adults with known diabetes residing in Honolulu County alone. An additional 21,000 adults (approximate) may also have diabetes but remain undiagnosed.

“Likely significant differences” of age-adjusted diabetes prevalence rates exist between the Hawaii Kai/Kahala/Wai'alae region (D) and communities A, B, E, H, J, K; Honolulu County; and the State.

FIGURE 4: Prevalence (%) of adults diagnosed with diabetes — Hawaii County, BRFSS, 2000-2002*



- A North Hawai'i
- B Hilo
- C Puna/Ka'u
- D Kona

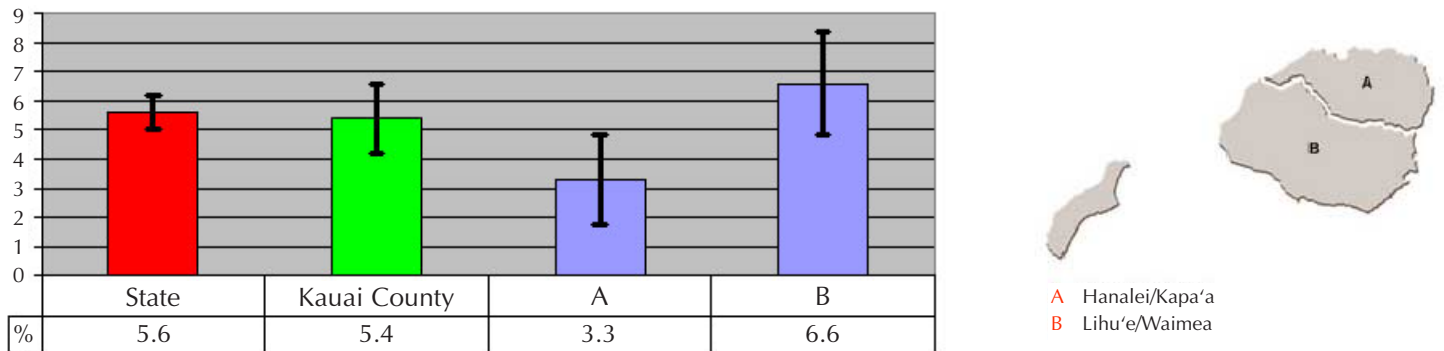


*3-year average, age-adjusted

FINDING: The estimated prevalence rate of diabetes in Hawaii County using BRFSS data averaged over three years is 5.4%. This equates to approximately 6,400 adults with known diabetes residing in Hawaii County. An additional 3,500 adults (approximate) may also have diabetes but remain undiagnosed.

COUNTY/SUB-COUNTY ADULT DIABETES PREVALENCE, 2000-2002

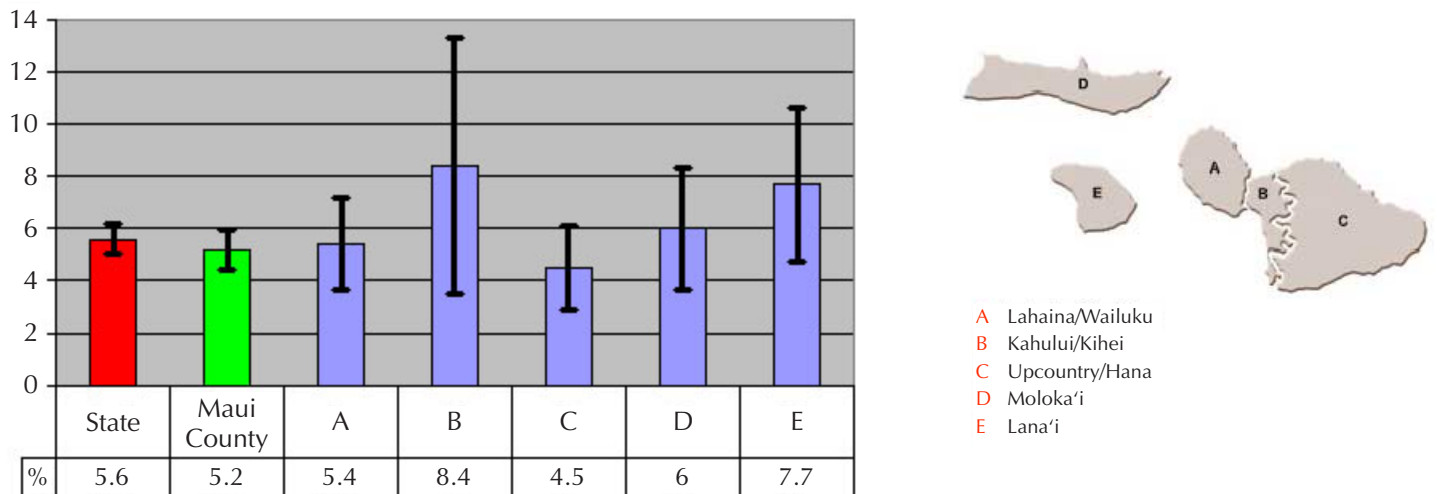
FIGURE 5: Prevalence (%) of adults diagnosed with diabetes — Kauai County, BRFSS, 2000-2002*



*3-year average, age-adjusted

FINDING: The estimated prevalence rate of diabetes in Kauai County using BRFSS data averaged over three years is 5.4%. This equates to approximately 2,500 adults with known diabetes residing in Kauai County. An additional 1,400 adults (approximate) may also have diabetes but remain undiagnosed.

FIGURE 6: Prevalence (%) of adults diagnosed with diabetes — Maui County, BRFSS, 2000-2002*



*3-year average, age-adjusted

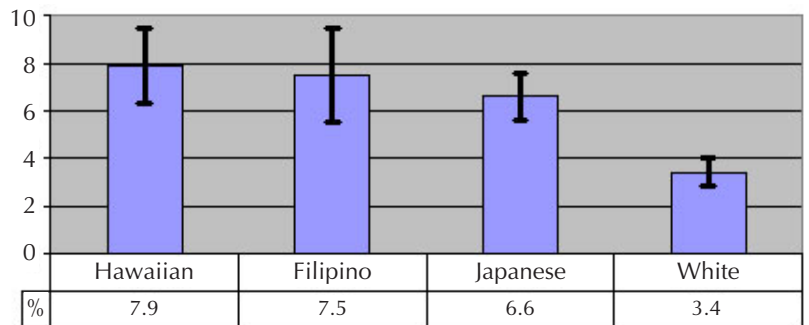
FINDING: The estimated prevalence rate of diabetes in Maui County using BRFSS data averaged over three years is 5.2%. This equates to approximately 5,100 adults with known diabetes residing in Maui County. An additional 2,800 adults (approximate) may also have diabetes but remain undiagnosed.

ADULT DIABETES PREVALENCE, MEAN AGE OF ONSET AND MORTALITY BY ETHNICITY, 2000-2002

FIGURE 7: Prevalence (%) of adults diagnosed with diabetes by ethnicity, BRFSS, 2000-2002*

FINDING: Whites have significantly[†] lower age-adjusted prevalence rates when compared with the other major groups: Native Hawaiians, Filipinos, and Japanese.

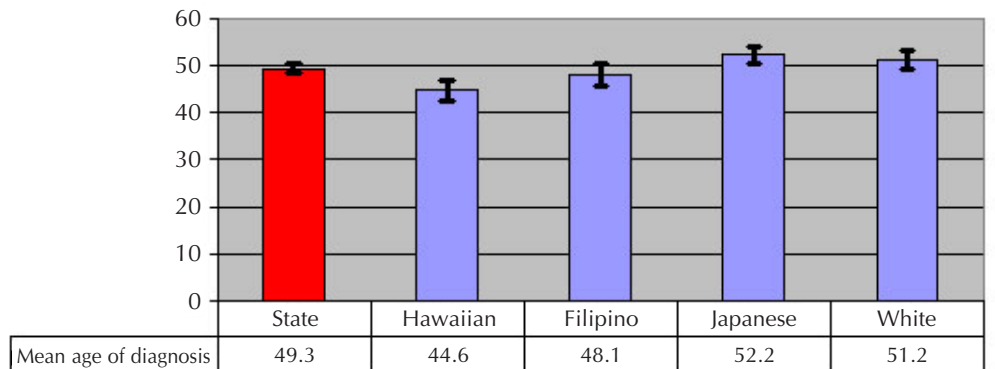
[†]p<.05



*3-year average, age-adjusted

FIGURE 8: Mean age when diagnosed with diabetes by ethnicity, BRFSS, 2000-2002*

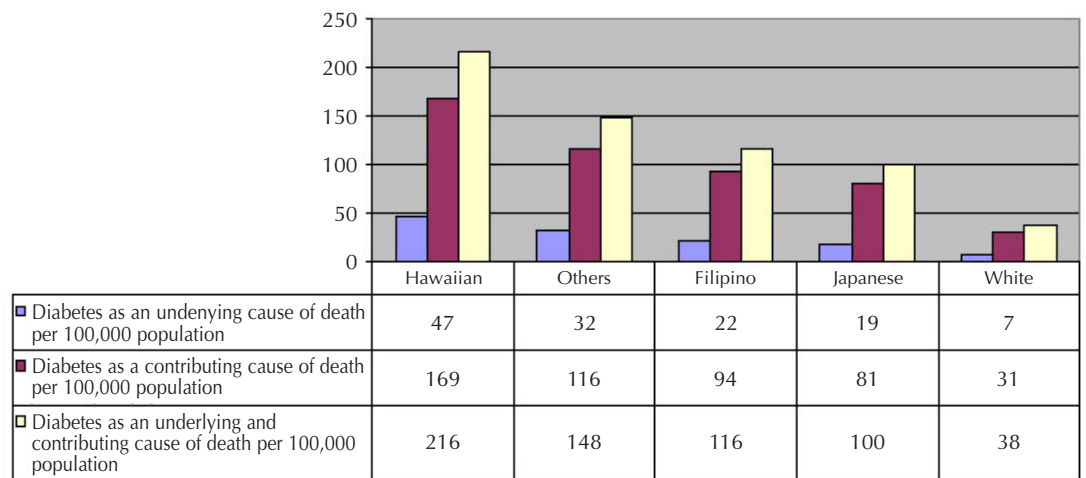
FINDING: “Likely significant differences” of mean age of diabetes diagnosis exists between Native Hawaiians and the other major ethnic groups as well as the State average. Native Hawaiians have the youngest mean age of diabetes diagnosis (44.6 years of age) among the major ethnic groups.



*3-year average

FIGURE 9: Diabetes mortality rates per 100,000 population by ethnicity, 2000-2002*

FINDING: Native Hawaiians have the highest age-adjusted diabetes mortality rates, either as an underlying cause or contributing cause when compared with the other major ethnic groups. Whites have the lowest age-adjusted diabetes mortality rates.

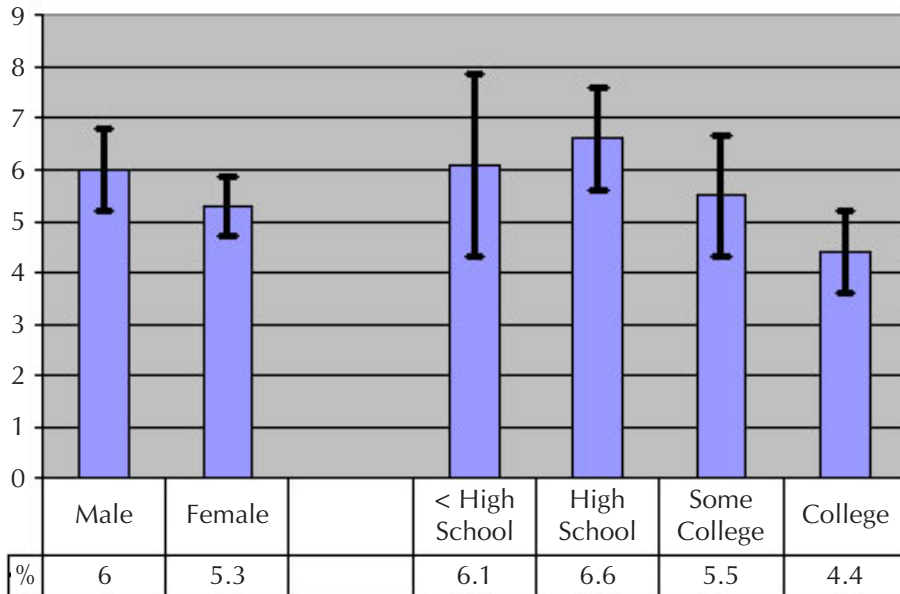


*3-year average, age-adjusted

Source: OHSM
Analysis: BRFSS

ADULT DIABETES PREVALENCE AND MORTALITY BY GENDER AND EDUCATIONAL ATTAINMENT, 2000-2002

FIGURE 10: Prevalence (%) of adults diagnosed with diabetes by gender and educational attainment, BRFSS, 2000-2002*



*3-year average, age-adjusted

FINDING: Diabetes prevalence rates are slightly higher in males than females, but this relationship is not significant.

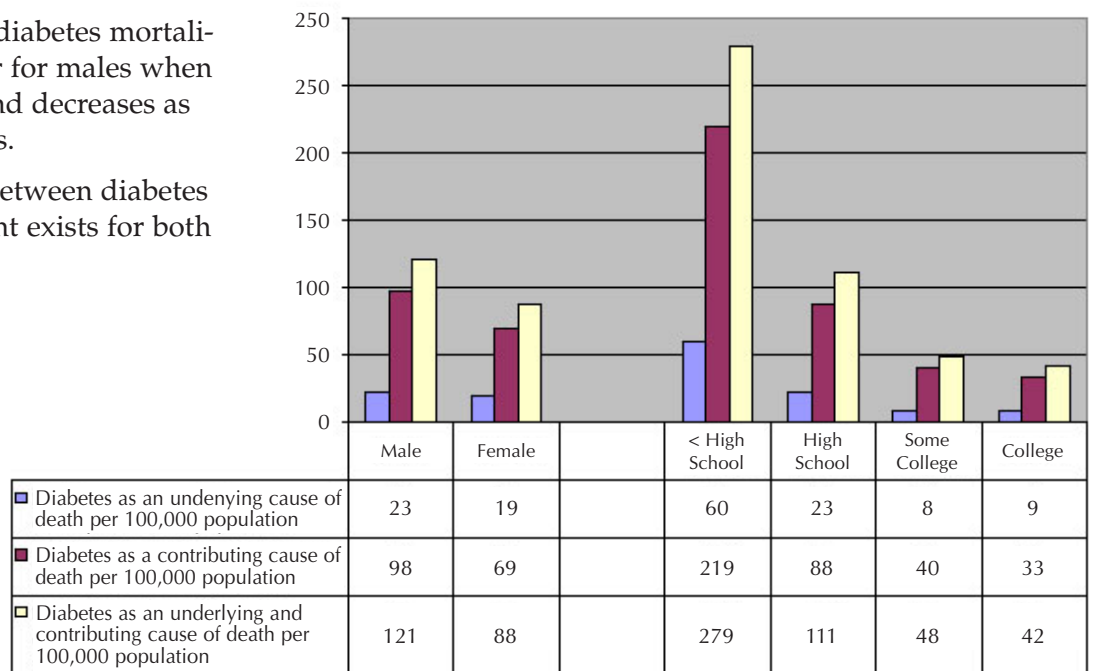
Diabetes prevalence rates are inversely associated with educational attainment. For example, adults with diabetes are significantly[†] more likely to report having a high school education as opposed to a college education.

[†]p<.05

FIGURE 11: Diabetes mortality rates per 100,000 population by gender and educational level, 2000-2002*

FINDING: Age-adjusted diabetes mortality rates are slightly higher for males when compared with females and decreases as educational level increases.

The inverse relationship between diabetes and educational attainment exists for both prevalence and mortality.



*3-year average, age-adjusted

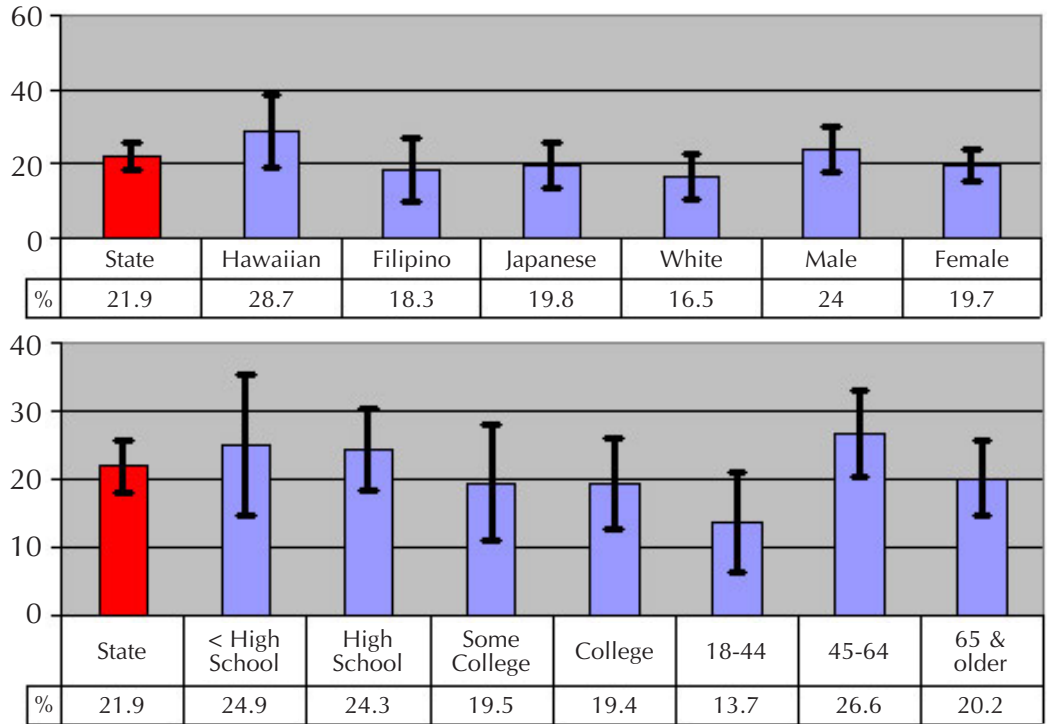
ADULT PREVALENCE OF DIABETES COMPLICATIONS BY ETHNICITY, GENDER, AND EDUCATIONAL ATTAINMENT, 2000-2002

FIGURE 12: Prevalance (%) of retinopathy among adults with diabetes by ethnicity, gender, educational level, and age, BRFSS, 2000-2002*

FINDING: The prevalence rate of retinopathy among adults with diabetes is approximately 22%.

Diabetic retinopathy is significantly[†] higher among Native Hawaiians when compared with Whites, and among those between the ages of 45 to 64 when compared to those between the ages 18 to 44.

[†]p<.05



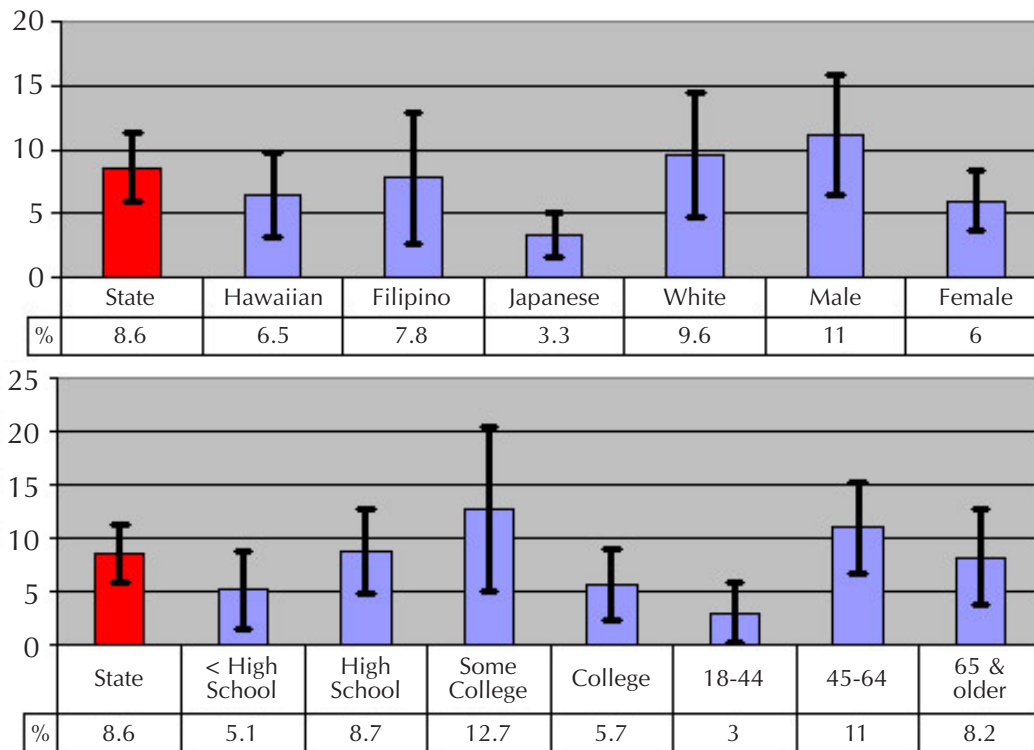
*3-year average, crude

FIGURE 13: Prevalance (%) of foot sores among adults with diabetes by ethnicity, gender, educational attainment, and age, BRFSS, 2000-2002*

FINDING: The prevalence rate of foot sores among adults with diabetes is approximately 9%.

Foot sore rates are significantly[†] lower among Japanese when compared with Whites, and among those between the ages of 18 to 44 when compared to those between the ages 45 to 64.

[†]p<.05



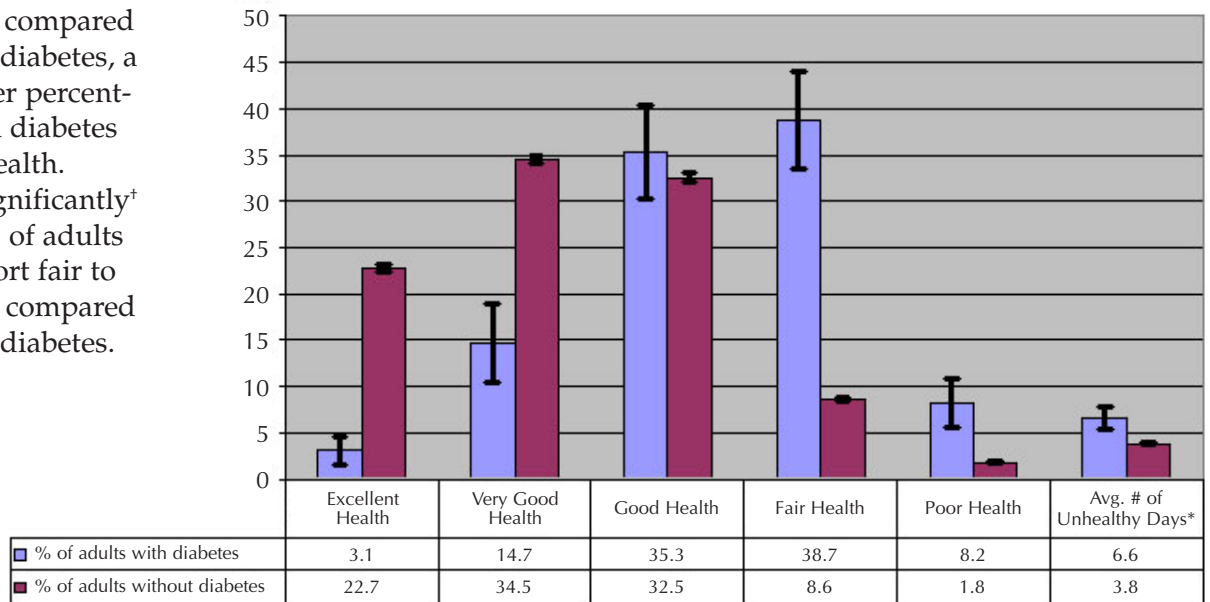
*3-year average, crude

HEALTH STATUS AND HEALTH/LIFESTYLE BEHAVIORS OF ADULTS WITH AND WITHOUT DIABETES, 2000-2002

FIGURE 14: General health status of adults with and without diabetes, BRFSS, 2000-2002**

FINDING: When compared to adults without diabetes, a significantly[†] lower percentage of adults with diabetes report excellent health. Furthermore, a significantly[†] higher percentage of adults with diabetes report fair to poor health when compared to adults without diabetes.

[†]p<.05

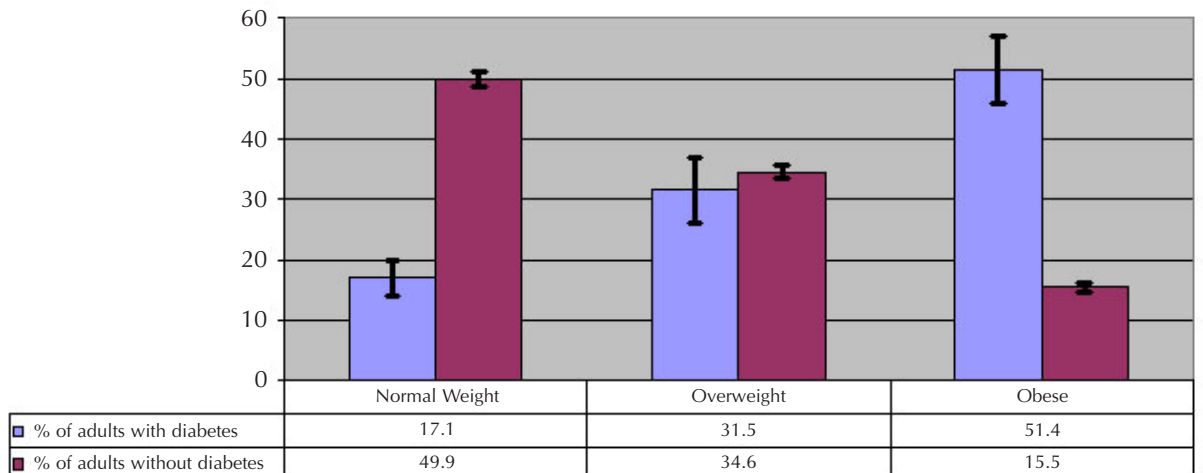


*Average Number of Unhealthy Days is number of days, not percentages. **3-year average, age-adjusted

FIGURE 15: Weight status of adults with and without diabetes, BRFSS, 2000-2002*

FINDING: The obesity rate among adults with diabetes (51%) is significantly[†] higher when compared with the obesity rate among adults without diabetes (15.5%).

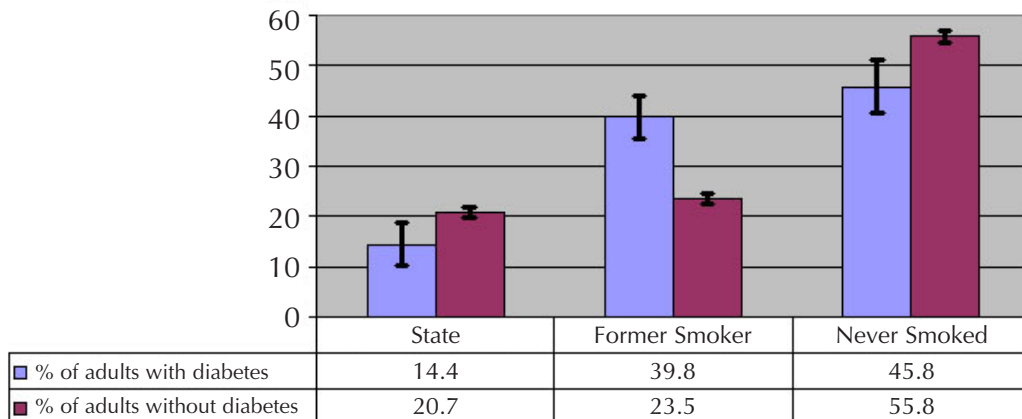
[†]p<.05



*3-year average, age-adjusted

HEALTH STATUS AND HEALTH/LIFESTYLE BEHAVIORS OF ADULTS WITH AND WITHOUT DIABETES, 2000-2002

FIGURE 16: Smoking status of adults with and without diabetes, BRFSS, 2000-2002*



*3-year average, age-adjusted

FINDING: A significantly[†] lower percentage of adults with diabetes are current smokers. A significantly[†] higher percentage of adults with diabetes are former smokers. Finally, a significantly[†] lower percentage of adults with diabetes never smoked when compared with adults without diabetes.

[†]p<.05

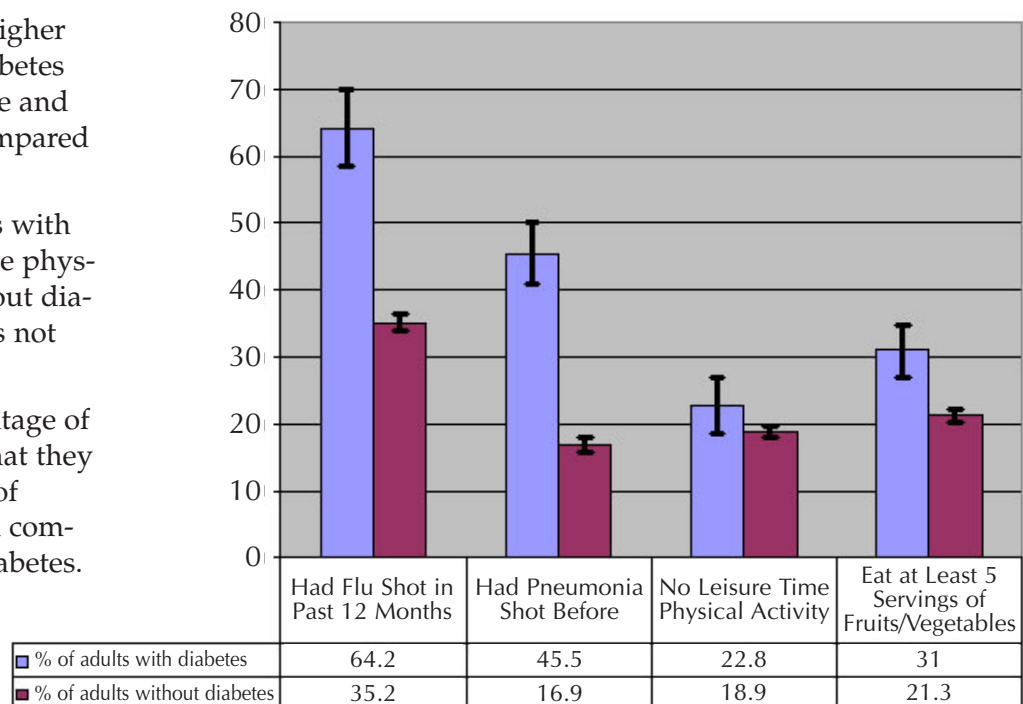
FIGURE 17: Immunization, Physical Activity, and Fruit/Vegetable consumption of adults with and without diabetes, BRFSS, 2000-2002*

FINDING: A significantly[†] higher percentage of adults with diabetes received both their flu vaccine and pneumonia vaccine when compared with adults without diabetes.

A higher percentage of adults with diabetes report no leisure time physical activity than adults without diabetes; however, this finding is not significant.

A significantly[†] higher percentage of adults with diabetes report that they are eating at least 5 servings of fruits/vegetables a day when compared with adults without diabetes.

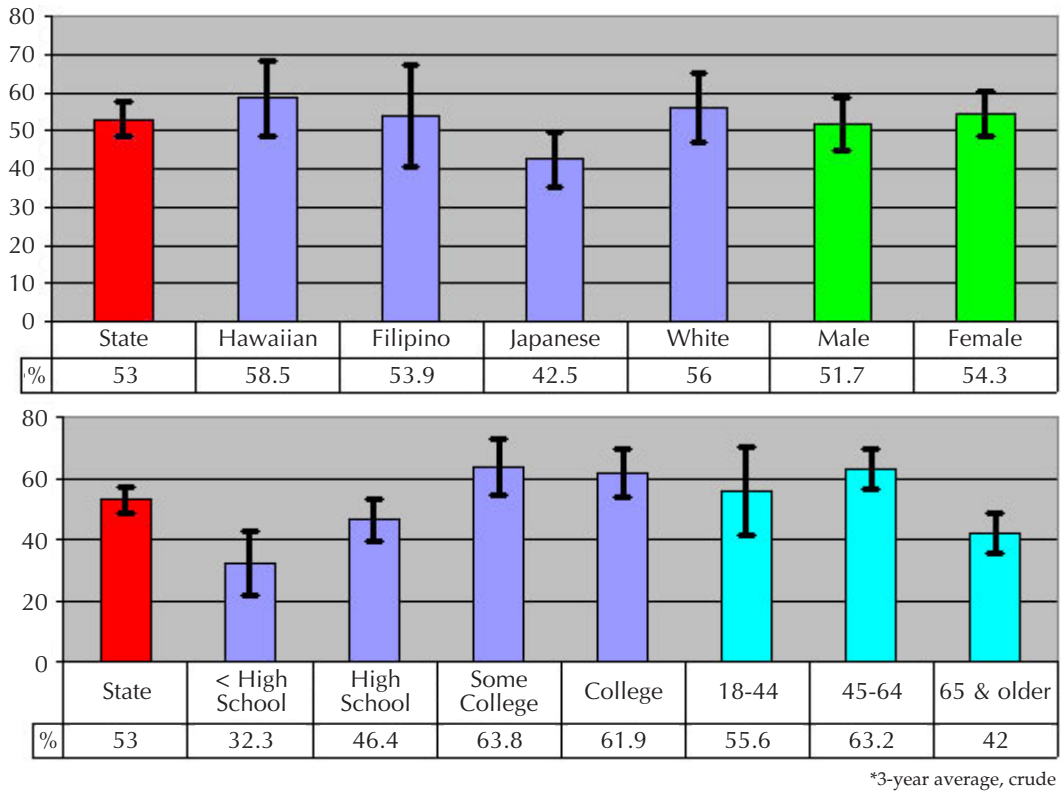
[†]p<.05



*3-year average, age-adjusted

PREVENTIVE CARE PRACTICES OF ADULTS WITH DIABETES, 2000-2002

FIGURE 18: Percentage of adults with diabetes receiving diabetes management education by ethnicity, gender, educational attainment, and age, BRFSS 2000-2002*



FINDING: Approximately 53% of adults with diabetes report that they have taken a course on how to manage their diabetes.

A significantly[†] lower percentage of Japanese report receiving diabetes management education when compared with Native Hawaiians and Whites.

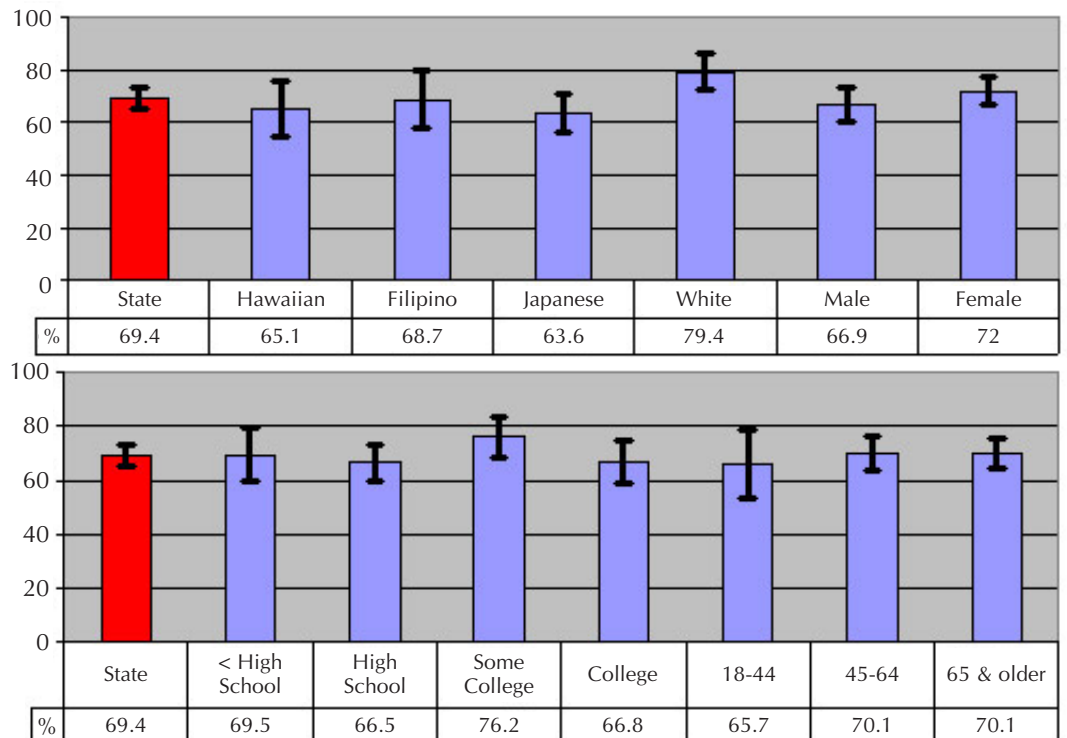
Furthermore, less educated (high school or less) or older adults (65 years and older) are significantly[†] less likely to report receiving diabetes management education when compared with college educated or younger adults (45 to 64 years).

[†]p<.05

FIGURE 19: Percentage of adults with diabetes who check their feet daily by ethnicity, gender, educational attainment, and age, BRFSS 2000-2002*

FINDING: About 69% of adults with diabetes report that they check their feet on a daily basis. This finding did not differ significantly by gender, educational level, or age group; however, a significantly[†] higher percentage of Whites report that they check their feet on a daily basis when compared with Japanese and Filipinos.

[†]p<.05

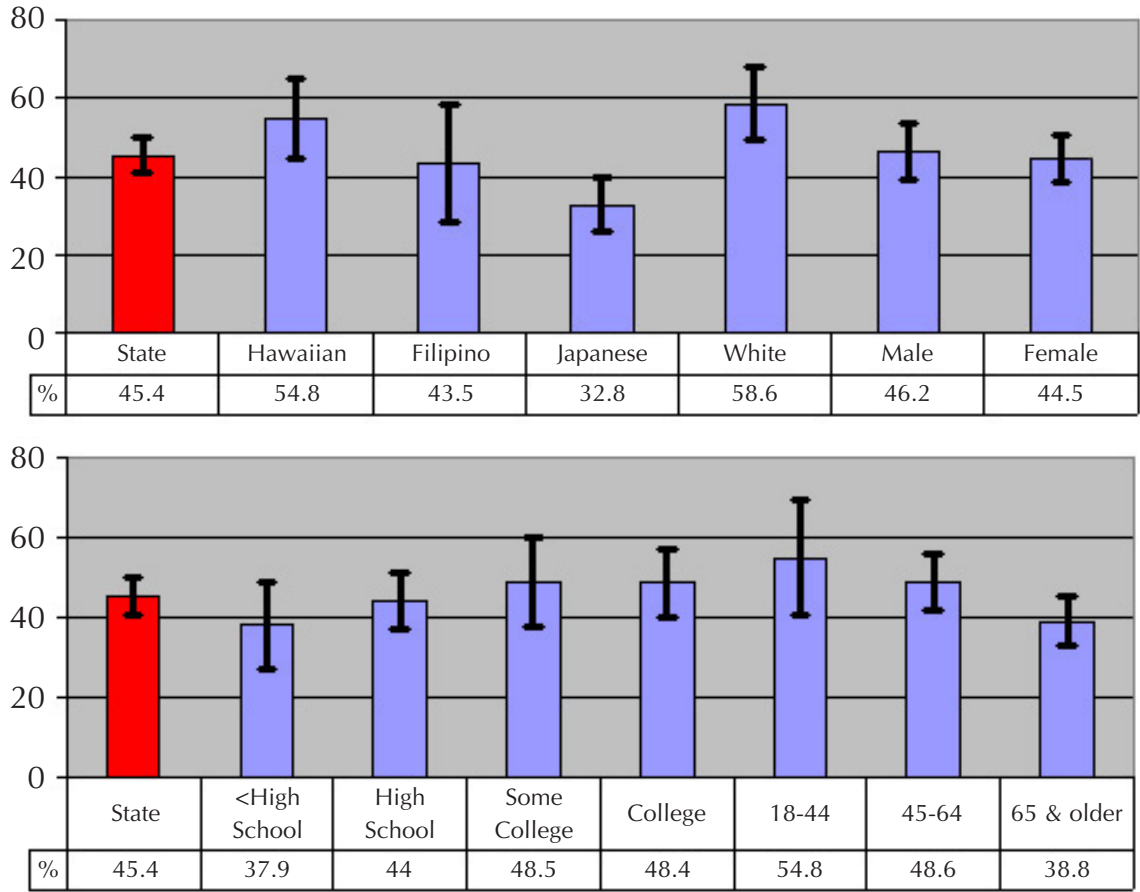


PREVENTIVE CARE PRACTICES OF ADULTS WITH DIABETES, 2000-2002

FIGURE 20: Percentage of adults with diabetes who check their blood glucose levels daily by ethnicity, gender, educational attainment, and age, BRFSS 2000-2002*

FINDING: About 45% of adults with diabetes report that they check their blood glucose levels on a daily basis. “Likely significant differences” exist when comparing Japanese (32.8%) to Native Hawaiians (54.8%) and Whites (58.6%) regarding the percentage of adults who check their blood glucose levels on a daily basis. However, a formal test of significance did not confirm this finding.

A significantly[†] lower percentage of adults 65 years and older report that they check their blood glucose levels daily when compared with adults between the ages of 45 to 64 years and when compared to adults between the ages of 18 to 44 years.



*3-year average, crude

[†]p<.05

END-STAGE RENAL DISEASE (ESRD)

FIGURE 21: Crude incidence rate of newly diagnosed ESRD patients who are receiving chronic ESRD therapy per million population by region, Transpacific Renal Network, 2002 (ESRD Network #17)

FINDING: Hawaii's incidence rate of 393.6 per million population is higher than the national average.

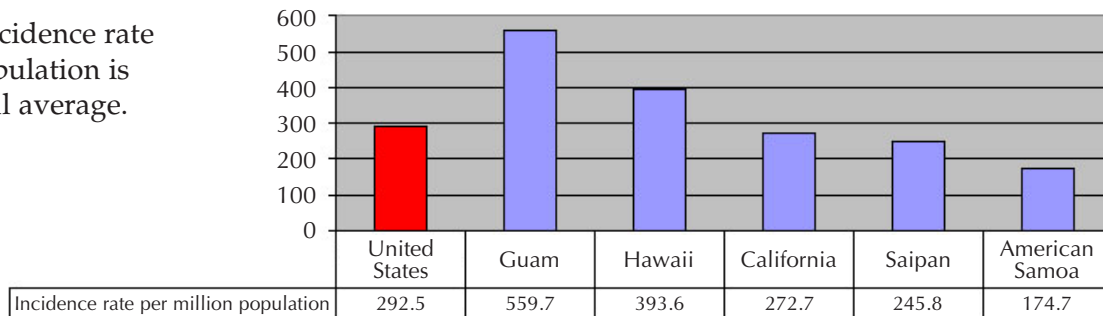


FIGURE 22: Crude ESRD dialysis prevalence rate per million population by region, Transpacific Renal Network, 2002 (ESRD Network #17)

FINDING: Hawaii's prevalence rate of 1502.1 per million population is higher than the national average of 1039.7 per million population.

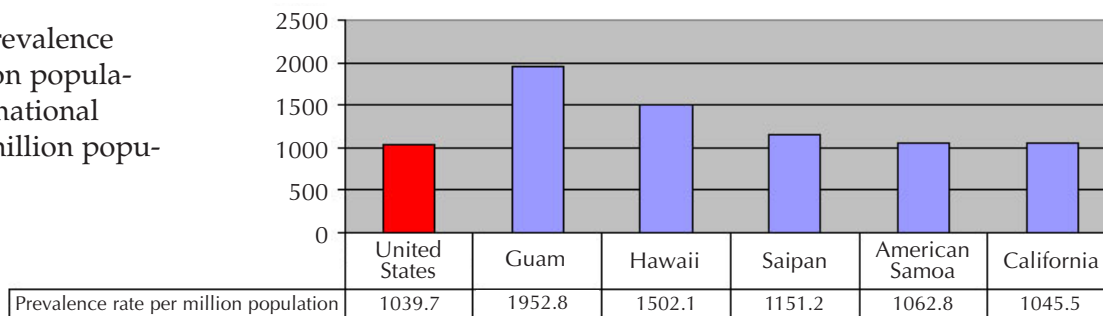
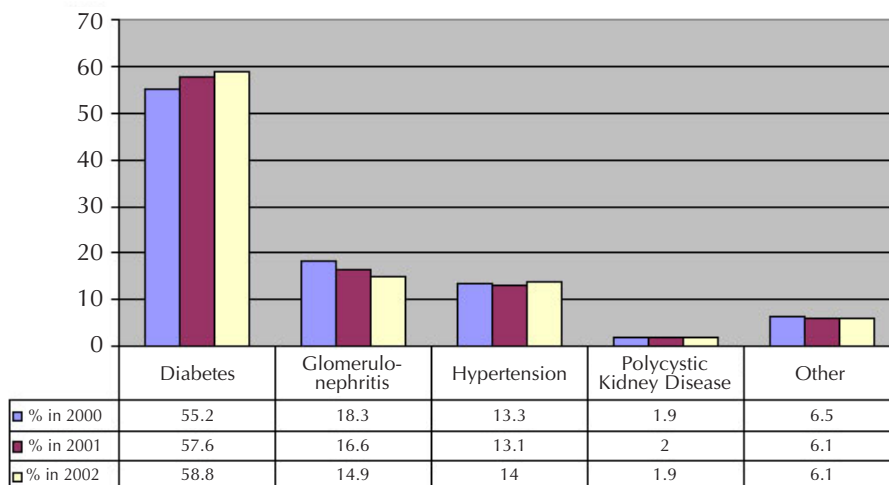


FIGURE 23: Percent contribution of primary diagnoses to ESRD dialysis prevalence, Transpacific Renal Network, 2002 (ESRD Network #17)

FINDING: Diabetes is the primary cause of the majority of ESRD dialysis cases in Hawaii.

Nearly 60% of all ESRD dialysis cases are directly attributable to diabetes as a primary cause (2002).



END-STAGE RENAL DISEASE (ESRD)

FIGURE 24: Mean age and percent contribution of primary diagnoses to ESRD dialysis prevalence by ethnicity, Transpacific Renal Network, 2002 (ESRD Network #17)

FINDING: Nearly 70% of all ESRD dialysis cases among Native Hawaiians are directly attributable to diabetes as a primary cause (2002).

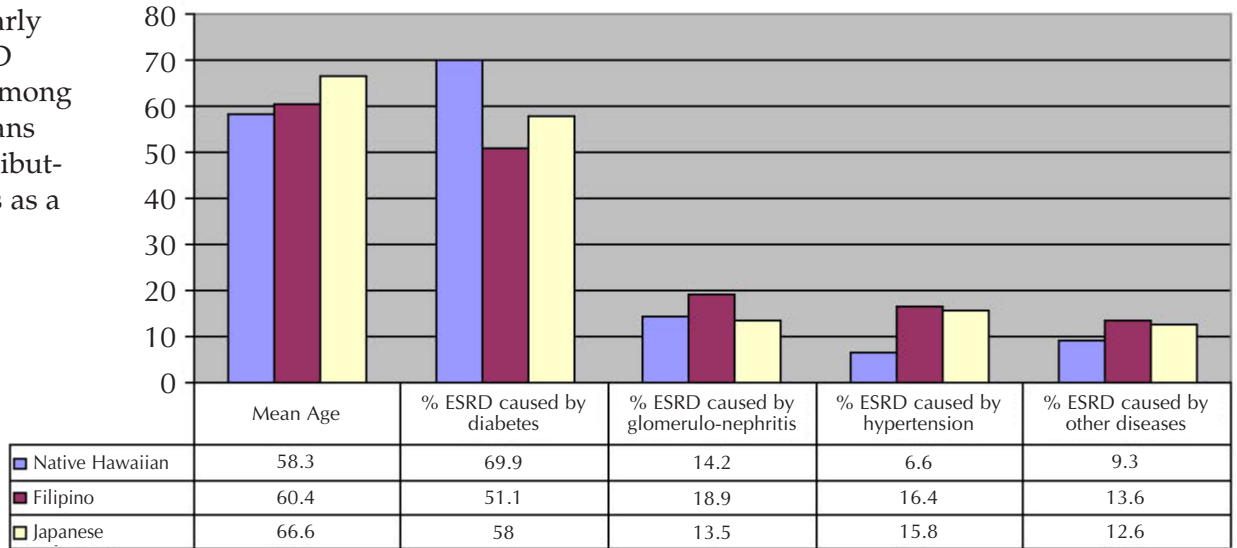
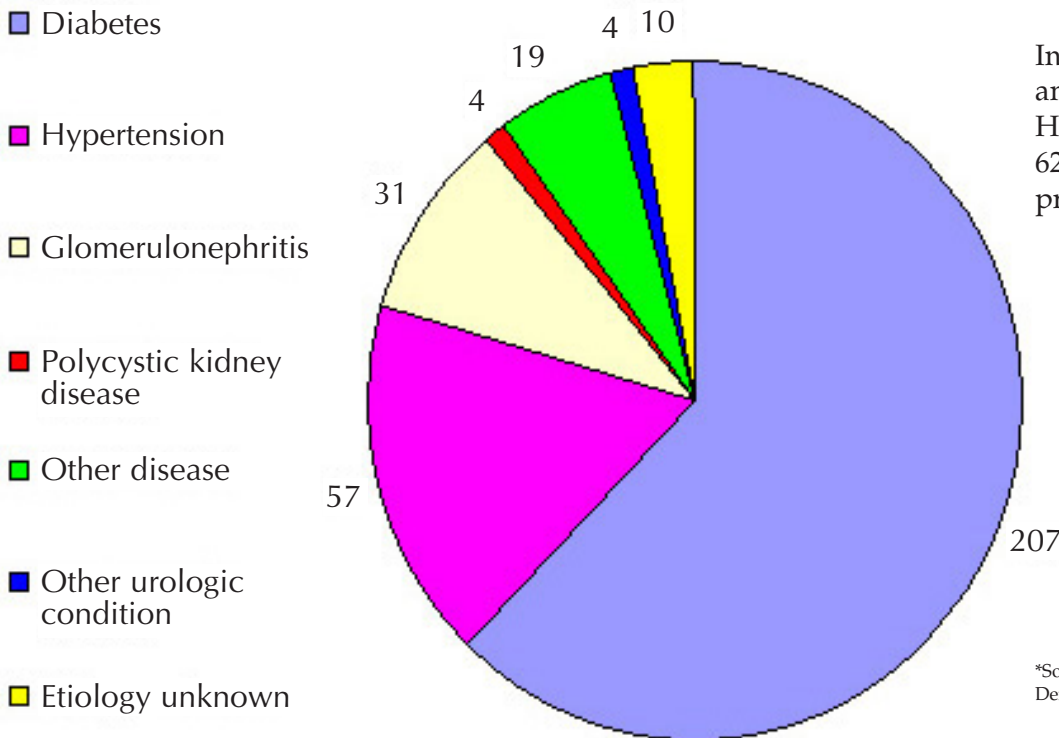


FIGURE 25: Deaths among dialysis patients by diagnoses, Transpacific Renal Network, 2002 (ESRD Network #17)*



In 2002, there were 332 deaths among patients on dialysis in Hawaii. Two hundred seven, or 62.3% of those who died had a primary diagnosis of diabetes.

*Source: Transpacific Renal Network, Selected Demographics, 2002

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is the world's largest telephone survey. The BRFSS tracks health risks throughout the entire United States. Information from the survey is used to improve the health of the American people. Hawaii's Behavioral Risk Factor Surveillance System (BRFSS) is conducted and administrated by the Hawaii Department of Health in collaboration with the Centers for Disease Control and Prevention (CDC). The results from the BRFSS are used by the state to help formulate public health policies, prevention and health promotion programs. (<http://www.hawaii.gov/health/statistics/brfss/index.html>)

Community

Communities (sub-county geographic regions) in this report are defined by the aggregation of adjacent zip codes with at least one school complex in the area. A list of community zip codes can be found at: <http://www.state.hi.us/doh/stats/surveys/2001/subarea.html>

Diabetes

Adult respondents are asked, "Have you ever been told by a doctor that you have diabetes?" If the respondent is a female and her answer to that question is "Yes", then she is further asked, "Was this only when you were pregnant?" Gestational diabetes is excluded from diabetes in this report.

Diabetes Prevalence

- *Prevalence rate*
Diabetes prevalence rate is defined as the estimated number of adults with diabetes divided by the estimated total adult population. All percentages or prevalence rates presented in all the tables except the mortality tables are weighted percentages.

- *Age-adjusted prevalence rate*

It is often necessary to compare diabetes rates of different populations and/or years. However, since diabetes rates increase with age, a higher diabetes rate in one population compared with another may simply reflect differing age distributions within the populations. Statistical techniques are used to "adjust" or "standardize" the rates in the populations to be compared, eliminating the effect of different age distributions in the different populations. Prevalence rates computed with these techniques are called age-adjusted or age-standardized prevalence rates. An age-adjusted prevalence rate is not a real measure of condition within a given population, but rather an artificial measure that is used for comparison purposes. In this report, prevalence rates with age adjustment employed the age distribution #9 of the Year 2000 Projected U.S. Population (DHHS/CDC/NCHS, 2001).

End-stage Renal Disease (ESRD)

- *Incidence rate*
The crude ESRD incidence rate is equal to the number of newly diagnosed persons receiving chronic ESRD therapy (dialysis) per million population during 2002.
- *Prevalence rate*
The crude ESRD dialysis prevalence rate is equal to the total number of persons presently on dialysis per million population during 2002.

Ethnicity

Respondents are asked to choose one race from the race list to answer the question: "What is your race?" The race list includes Caucasian, Hawaiian, Chinese, Filipino, Japanese, Korean, Samoan, Black, American Indian/Alaska native/Eskimo/Inuit, Vietnamese, Asian Indian, Portuguese, Guamanian/Chamorro, Puerto Rican,

APPENDIX 1: GLOSSARY & DATA DEFINITIONS

Mexican, Tongan, Laotian, Cambodian, Malaysian, Fijian, Micronesian, and other Asian. In addition, a respondent can specify their own ethnicity if it is not listed, or they can say they don't know, they are not sure, or they refuse to answer. For simplicity, this report re-categorizes ethnicity into White (includes Portuguese), Hawaiian, Filipino, Japanese, and "Others" (includes Chinese).

Mortality

- *Diabetes mortality rate*

The mortality rate is the frequency of occurrence of death (diabetes-related) in a defined population. Population denominators (916,580 adults) were estimated from the Hawaii Behavioral Risk Factor Surveillance System, 2000~2002.

- *Contributory cause of death (CCD)*

Contributory cause of death is defined as conditions that did not initiate the chain of events leading to death, but resulted in death directly or indirectly; or any other significant conditions that unfavorably influenced the course of the morbid process and thus contributed to the fatal outcome.

- *Underlying cause of death (UCD)*

Underlying cause of death is defined as the disease/condition that initiated the chain of events leading to death.

Survey (BRFSS) Definitions

- *Bodyweight status*

The BRFSS uses Body Mass Index (BMI) as a measure of bodyweight. Cutoffs for weight status are defined as follows: normal weight (BMI < 25), overweight (BMI \geq 25 and < 30), and obese (BMI \geq 30)

- *Diabetes management education*

The BRFSS uses the following question to define diabetes management education: "Have you ever taken a course or class in how to manage your diabetes yourself?"

- *Diabetes-related eye condition*

The BRFSS uses the following question to define diabetes-related eye complications: "Has a doctor ever told you that diabetes has affected your eyes or that you had retinopathy?"

- *Diabetes-related foot complication*

The BRFSS uses the following question to define foot complications related to diabetes: "Have you ever had any sores or irritations on your feet that took more than four weeks to heal?"

- *General health status*

The BRFSS uses the following question to define and quantify general health status: "Would you say that in general your health is: 1) Excellent, 2) Very Good, 3) Good, 4) Fair, or 5) Poor?"

- *Physical activity (leisure time activity)*

The BRFSS defines "no leisure time activity" as those responding no to the question, "During the past month, other than your regular job, did you participate in any physical activities or exercise such as running, calisthenics, golf, gardening, or walking for exercise?"

- *Smoking status*

The BRFSS defines a "current smoker" as a person who responds yes to the question "Have you smoked at least 100 cigarettes in your life time," and still smokes everyday or some days. A "former smoker" is a person who smoked a least 100 cigarettes before, but does not smoke anymore.

- *Vegetable/fruit consumption*

The BRFSS estimates the number of daily servings of fruit/vegetable by asking the following series of questions "Not counting juice, how often do you eat fruit? How often do you eat green? How often do you eat potatoes not including French fries, fried potatoes, or potato chips? How often do you eat carrots? Not counting carrots, potatoes, or salad, how many serving of vegetables do you usually eat?"

APPENDIX II: METHODOLOGY

Survey Methods

The Hawaii Behavioral Risk Factor Surveillance System (BRFSS) follows the Centers for Disease Control and Prevention's (CDC) guidelines and standards by using a Disproportionate Stratified Sample (DSS) method to randomly select land-based telephone numbers throughout the state of Hawaii. Business and nonworking numbers are excluded; residential numbers are retained. Individuals, aged 18 years and older, are randomly selected from each household called. To ensure maximum data quality, interviewers are specially trained to ask questions exactly the same way for every call. Interviewers use the Computer Assisted Telephone Interview (CATI) program to dial telephone numbers and enter data directly into their computers. Once the survey data are edited, imputed, and weighted by CDC, the processed data set is sent back to Hawaii BRFSS staff for analytical purposes.

Surveyed Population

The survey population for the Hawaii BRFSS includes all non-institutionalized residents aged 18 years or older in the state of Hawaii. Persons in households without telephones, or people who live in non-traditional homes, are not included in the telephone survey.

Data Analysis

Hawaii residents who died at age 18 years or older are included in the analysis of mortality data. SAS (Proc FREQ) was used to generate diabetes mortality frequencies for the following: 1) diabetes as the underlying cause of death (UCD); 2) diabetes as a contributory cause of death (CCD); and 3) UCD and CCD combined (UCD+CCD). Excel was used to calculate mortality rates based upon the estimated average adult populations from 2000 to 2002.

Two types of diabetes prevalence rates were gener-

ated in this report: crude prevalence rates and age-adjusted prevalence rates. Crude prevalence rates estimate the true rate, reflecting the real burden of disease in a population. Age-adjusted prevalence rates are synthetic and are used for rate comparisons between two populations or for rate comparisons within a single population over time. SUDAAN (proc descript feature) was used to calculate prevalence rates and age-adjusted prevalence rates and standard errors (SE).

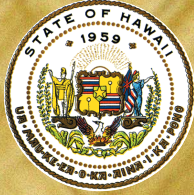
Data Sources

1. Survey data, 2000 through 2002, Hawaii Behavioral Risk Factor Surveillance System (BRFSS), Hawaii Department of Health
2. Mortality data, 2000 through 2002, Office of Health Status Monitoring (OHSM), Hawaii Department of Health
3. Transpacific Renal Network, Selected Demographics, 2002
4. Centers for Disease Control and Prevention (<http://www.cdc.gov/brfss/index.htm>)

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