2011 - 2016

Hawaii's Plan for the Prevention of Heart Disease and Stroke

A Voyage to Better Cardiovascular Health

Increase Control of High Blood Pressure

Increase Control of High Blood Cholesterol

Improve Knowledge of Signs and Symptoms of Heart Attack and Stroke and the Importance of Calling 9-1-1

Improve Emergency Response

Improve Quality of Heart Disease and Stroke Care

Eliminate Health Disparities

From the statewide plan development committees, content experts, and the Hawai'i State Department of Health Heart Disease and Stroke Prevention Program

November 2011

Hui Nalu Canoe Club, Hawai‘i Kai, O‘ahu. Cover Photo by Linda Green, 4 Sept 2011.

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A Voyage to Better Cardiovascular Health

Hawai'i State Department of Health

November 2011

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A Message from the Director of Health:

Aloha Kakou,

The Hawai'i State Department of Health, Chronic Disease Management and Control Branch, is pleased to present *Hawaii's Plan for the Prevention of Heart Disease and Stroke*.

Cardiovascular disease, which includes heart disease and stroke, continues to be the leading cause of death in Hawai'i. Reducing morbidity and mortality from cardiovascular disease is a task that requires the combined efforts of many organizations, partners and individuals to ensure success. This Plan is the result of a cooperative effort developed in partnership with over 70 content experts representing a broad-spectrum of organizations across Hawai'i.

Strategic planning partners, working together to develop this Plan, identified high impact objectives that will reduce disability and death related to cardiovascular disease. As you read this Plan, you will see it focuses on recommendations to change policies and systems which influence our cardiovascular health and incorporates the priorities of the Centers for Disease Control and Prevention. Priorities include prevention and control of high blood pressure and high blood cholesterol, improving emergency response and the quality of heart and stroke care, eliminating health disparities, and increasing awareness of the signs and symptoms of heart attack and stroke.

While the development of a state plan is only a beginning, it is an important step in building a statewide program to address cardiovascular disease prevention in Hawai'i. Successful implementation of the Plan will require working together to reduce the risk of heart disease and stroke for all people living, working and playing in Hawai'i.

Progress toward a heart-healthier Hawai'i is up to all of us. We look forward to working with you to make *Hawaii's Plan for the Prevention of Heart Disease and Stroke* a reality.

Sincerely,

Loretta J. Fuddy, A.C.S. W., M.P.H.
Director of Health
Hawai'i State Department of Health

Promoting Lifelong Health & Wellness

Contents

Executive Summary

As the number one and number three causes of death in Hawai'i, heart disease and stroke place a tremendous burden on our state. In 2009, over 2,300 Hawai'i residents died due to diseases of the heart and over 650 due to stroke. Rates of obesity, diabetes, high blood pressure and high cholesterol are on the rise in Hawai'i, cardiovascular disease disparities are readily apparent and cardiovascular risks are affecting residents earlier in life. Reducing these trends and the burden of heart disease and stroke requires a strategic plan and coordinated efforts from a multitude of partners across the state.

In April 2010 the Hawai'i State Department of Health Heart Disease and Stroke Prevention Program embarked upon a statewide planning process to develop a comprehensive plan for heart disease and stroke prevention. *Hawaii's Plan for the Prevention of Heart Disease and Stroke* (the Plan) is the result of the input and commitment of over 70 individuals from diverse organizations, programs and associations that have partnered to address this health issue.

Purpose of the Plan

A statewide plan was developed to provide the impetus for action. It is intended to provide overall guidance to communities, worksites, health care providers, health plans, public health leaders, legislators, and policy makers, and others interested in improving cardiovascular health in Hawaii and improving the systems to carry out that mission.

This plan integrates *Healthy People 2020* heart disease and stroke objectives for improving cardiovascular health and describes objectives and strategies to support policy and system changes in the following priority settings: 1) pre-hospital and acute care; 2) primary care; 3) post-acute care/rehabilitation; 4) community; and 5) worksite. The Plan focuses on five areas as determined by the U. S. Department of Health and Human Services Centers for Disease Control and Prevention to be priorities for cardiovascular prevention: 1) control of high blood pressure and high blood cholesterol; 2) increase the understanding of the signs and symptoms of heart attack and stroke and the importance of calling 9-1-1; 3) improve emergency response to heart attacks and stroke; 4) improve the quality of heart disease and stroke care; and 5) eliminate health disparities.

The scope of work outlined in this plan is ambitious; however, through our combined efforts, continued work on existing strategies and the implementation of new and enhanced projects we can realize our vision to improve the quality of life for all people of Hawaii through better cardiovascular health.

Acknowledgements

The Hawai'i State Department of Health would like to acknowledge and thank the many individuals who gave of their time and expertise to develop *Hawaii's Plan for the Prevention of Heart Disease and Stroke*. A special thank you goes to the Committee Chairs***** for their leadership and significant time contribution to support this effort. Committee members, content area experts, and community stakeholders who participated in the development of this plan are listed alphabetically below.

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Tonya Lowery-St. John, MPH
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Science and Research Group

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Introduction

In the United States and Hawai'i, cardiovascular disease (CVD) continues to be the leading cause of death.[1,2] More deaths are attributed to CVD than motor vehicle crashes, HIV/AIDS, homicide, suicide, alcohol and drug use combined.[2] CVD describes diseases of the heart (cardio), and diseases of the blood vessels (vascular) that impair the vital transport of blood and oxygen to the brain and body. Two of the most common and deadly forms of CVD include coronary heart disease (CHD) and stroke. CVD also causes the most deaths in the state of Hawai'i, with heart disease and stroke being the first and third leading causes of death respectively.[1]

CHD occurs when the coronary arteries become narrowed or clogged by fat and cholesterol deposits (plaques) and cannot supply enough blood to the heart. As the arteries narrow, or as the plaques rupture, the flow of blood to the heart can slow or stop, causing chest pain (angina), shortness of breath, a heart attack or other symptoms. Nationally, CHD makes up the majority of heart disease deaths.[2] In 2009, over 385,000 Americans died of coronary heart disease, 64% of all heart disease deaths in that year.[2] Heart disease is also very costly economically with estimated combined costs of $177.5 billion for healthcare services, medications and lost productivity in 2007.[3]

Another common form of CVD is cerebrovascular disease or stroke. A stroke occurs when blood flow to the brain is interrupted by a blocked or burst blood vessel, and is often referred to as a brain attack. Stroke can be subdivided into three types: ischemic, hemorrhagic, and transient ischemic attack (TIA). Ischemic strokes account for 87% of all cases, and occur when an artery that supplies blood to the brain becomes blocked.[3] Hemorrhagic strokes are more severe, and occur when an artery in the brain bursts. A TIA is sometimes called a mini-stroke. It starts just like a stroke, but clears within 24 hours often leaving no symptoms or obvious deficits. Each year in the United States, over 795,000 people suffer a stroke, of which 610,000 are first-time events.[3] Stroke leads to over 128,000 deaths each year, making it the fourth leading cause of death in the nation.[2]

CVD can further result in serious long-term disability. Overall, the population of the state of Hawai'i, when compared to other states, is viewed as healthy on indicators of risk factors, CVD morbidity and mortality. Yet very distinct socioeconomic, geographic and ethnic health disparities exist.

Plan Development

The Hawai'i State Department of Health, Heart Disease and Stroke Prevention Program (HDSPP) receives funding from the CDC to build the state's capacity to prevent heart disease and stroke. Through this funding the HDSPP convened stakeholders to develop a strategic plan for addressing cardiovascular disease. This collaborative process brought together representation from healthcare systems, academic institutions, private and non-profit groups, professional and community organizations and state and county government agencies.

Plan Committees and Content Experts

A strategic planning steering committee was convened on April 1, 2010 to provide overall leadership and to define the purpose and vision of the Plan. The Steering Committee also proposed the major goals for the plan and identified measureable long-term objectives for reducing coronary heart disease and stroke mortality rates. Sub-committees were recommended to be formed for specific settings across the continuum of care including per-hospital, acute care, primary care and post-acute care rehabilitation. Members for the committees were identified and committee meetings convened beginning September 2010. These committees were tasked with identifying objectives and strategies to improve cardiovascular health in the state. Committee member meetings and numerous individual and small group discussions with content experts were facilitated to complete the Plan.

Plan Priorities

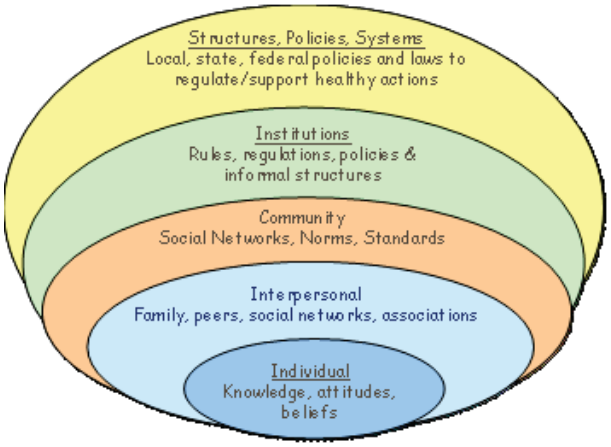
The strategic plan is aligned with the priorities set forth by the Division for Heart Disease and Stroke Prevention at the Centers for Disease Control and Prevention.

1) Control of high blood pressure
2) Control of high blood cholesterol
3) Increase understanding of the signs and symptoms of heart attack and stroke and the importance of calling 9-1-1
4) Improve emergency response to heart attacks and stroke
5) Improve the quality of heart disease and stroke care
6) Eliminate heart disease and stroke disparities

Approaches to Change in CVD Prevention

Population-Based Approach

The Plan is based on an approach that addresses individual behavior change on multiple levels of influence. The socio-ecological model recognizes the relationship that exists between individuals and their environments. This population-based approach calls for interventions to be implemented at the individual, interpersonal, organizational, community and public policy levels of influence. This framework was incorporated into the Plan, since health, in and of itself, and health outcomes are not based on any one factor. A population-based approach promotes change at all levels within all settings in society, which encourages and supports change at the individual level.



Levels of Influence in the Social Ecological Model

National Objectives

The *Healthy People* is a national initiative which began over three decades ago and identifies health improvement goals and objectives for the nation. The Department of Health and Human Services' *Healthy People 2020* includes twenty-four objectives related to heart disease and stroke. The goals, strategies and outcomes outlined in the Plan are intended to contribute to the achievement of *Healthy People 2020* goals. A cross-reference of the Plan objectives that are aligned with the *Healthy People 2020* targets are provided in the Objectives and HP 2020 Goals section.

Health Disparities

This Plan sets out to reduce death and disability among all adults in Hawai'i from heart disease and stroke. However, in the state there are groups that are disproportionally affected by cardiovascular diseases, their risk factors and social determinants. Strategies selected for

implementation will be measured by ability to reach groups at greatest risk and that make an impact in narrowing identified disparities.

Reducing disparities in the following areas will be an essential consideration when selecting plan strategies to implement. In the state of Hawai‘i, stroke mortality rates are disproportionally higher for residents living in the counties of Hawai‘i and Kaua‘i and coronary heart disease mortality rates are higher in the neighbor island counties of Hawai‘i, Maui, and Kaua‘i compared to Honolulu County.[1] Both stroke and coronary heart disease mortality rates are highest among Native Hawaiians and Filipinos.[1] High blood pressure prevalence is highest among adults with low educational attainment and low household income.[4] No ethnicity, other than “White” and “Other” meets the *Healthy People 2020* goal for high blood pressure prevalence (see Data Sources section for details on HP 2020). Those with low income or less than high school educational attainment, males and Whites are populations least likely to be taking medication for high blood pressure. The county in which one lives and household income are variables that display the greatest disparities in the prevalence of adults with hypertension changing their eating habits to lower their high blood pressure; however, household income categories do not display as great a variability for the prevalence of cutting down on salt. There is no ethnicity or county in Hawai‘i that comes close to meeting the HP 2020 goal for high blood cholesterol.[4]

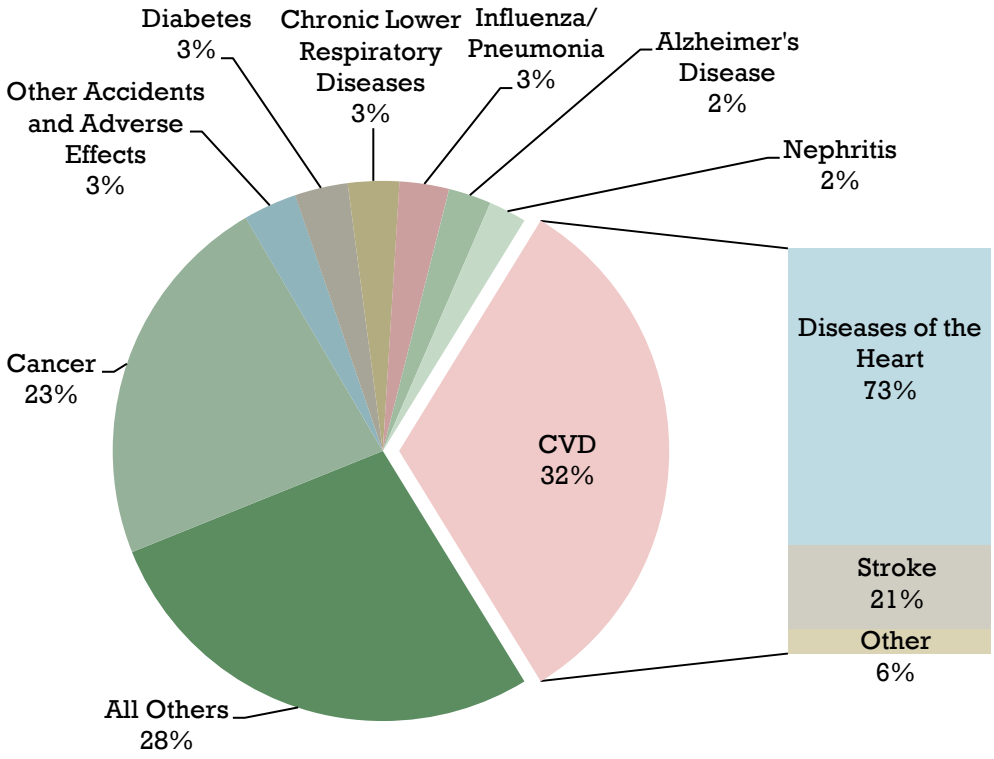
Stakeholders working to implement the Plan will strive to develop culturally competent and evidence-based interventions to ensure at-risk groups are addressed and the people of Hawai‘i receive information and care that is respectful of culture and language.

The Burden of Cardiovascular Disease

Mortality

In Hawai'i, a resident dies of CVD approximately every three hours.[i] Of the current Hawai'i population of 1.4 million[5], more than 2,900 deaths annually are attributed to some form of CVD. This leading cause of death accounted for 32% of all deaths in 2009. Heart disease and stroke accounted for 73% and 21% of all CVD deaths, respectively (Figure 1). In 2009, heart disease and stroke were the first and third leading cause of death in Hawai'i.[1]

Figure 1. Leading Causes of Death in Hawai'i, 2009

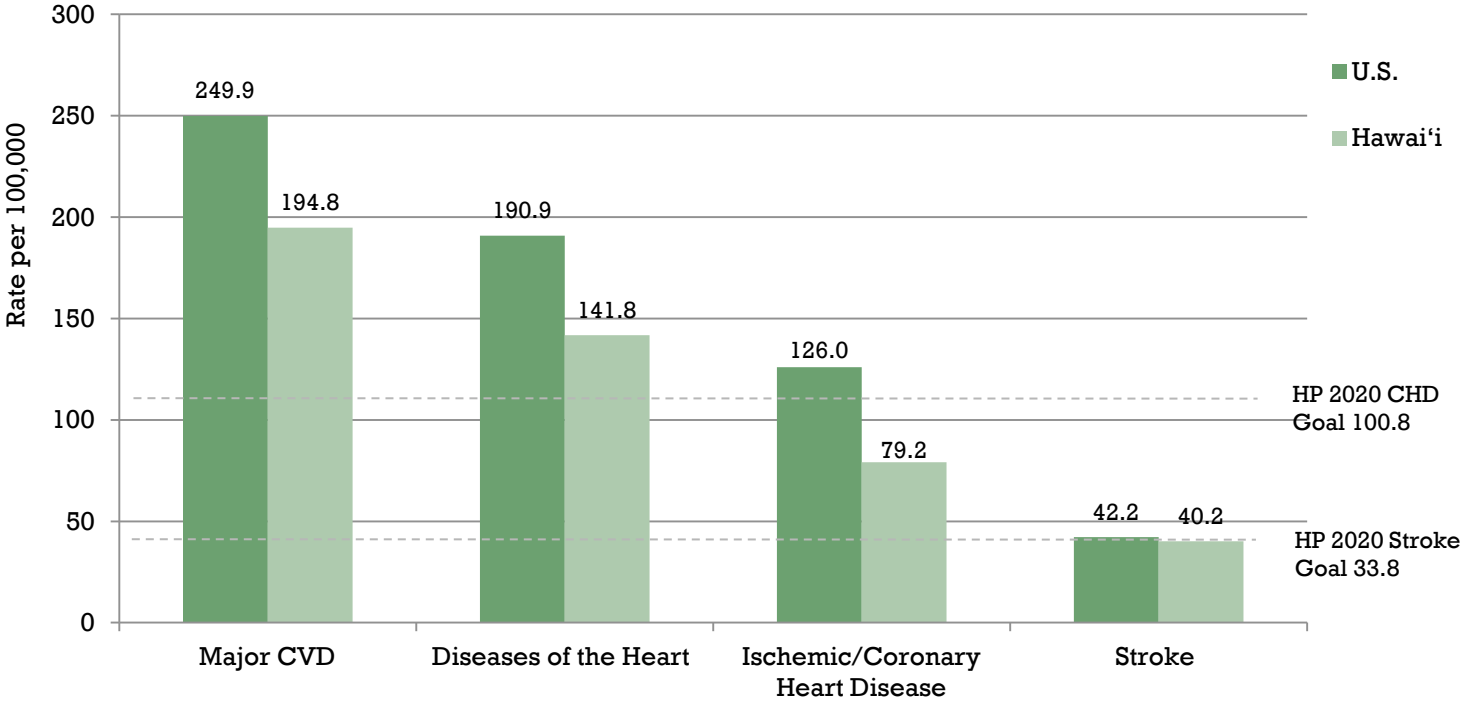


Source: Hawai'i State Department of Health, Office of Health Status Monitoring

[i] Data sources are listed on pages 64-65

Compared to the United States, Hawai'i has lower age-adjusted mortality rates for major cardiovascular disease, diseases of the heart, ischemic/coronary heart disease, and stroke (see the data sources section for more details on mortality rates and age-adjusting). Healthy People 2020 has set national goals for coronary heart disease and stroke mortality and these subcategories of cardiovascular disease are highlighted in Figure 2.

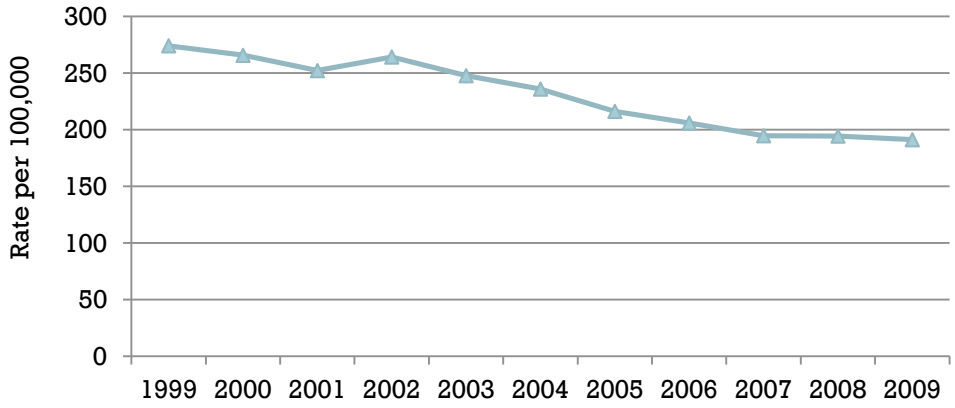
Figure 2. Age-Adjusted Mortality Rates, U.S. and Hawai'i 2007



Hawai'i Source: Hawai'i State Department of Health, Office of Health Status Monitoring
U.S. Source: Xu JQ, Kochanek KD, Murphy SL, Tejada-Vera B. Deaths: Final data for 2007. National vital statistics reports; vol 58 no 19. Hyattsville, MD: National Center for Health Statistics. 2010.
Note: Age-adjusted to the year 2000 U.S. Standard Population; the category ischemic/coronary heart disease is combined because the U.S. reports mortality rates for ischemic heart disease and Hawai'i reports mortality rates for coronary heart disease.

The lines in the next four graphs represent the age-adjusted mortality rate over time. The age-adjusted mortality rate for major CVD has been decreasing since 2002 (Figure 3). Between 1999 and 2009, the major CVD age-adjusted mortality rate per 100,000 decreased 30.2%.

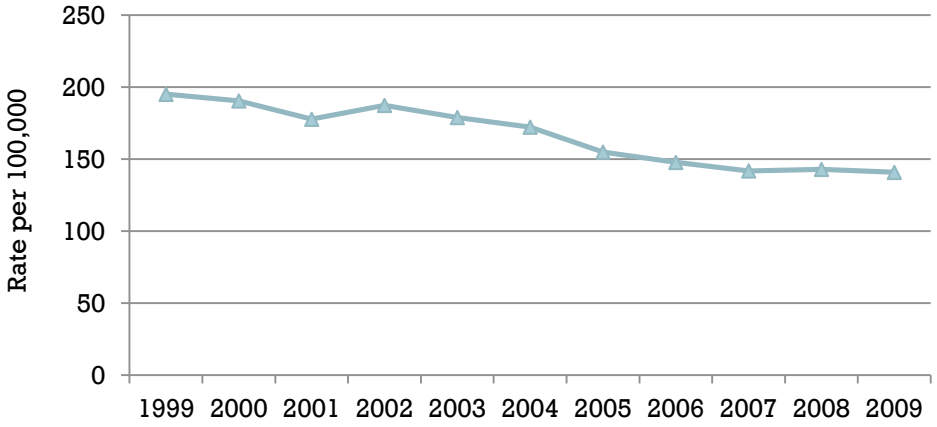
Figure 3. Age-Adjusted *Major Cardiovascular Disease* Mortality Rates per 100,000, Hawai'i 1999 - 2009



Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Rate age-adjusted to the year 2000 U.S. Standard Population

The age-adjusted mortality rate for diseases of the heart has been decreasing since 2002 (Figure 4). In this 10 year period, the age-adjusted mortality rate for diseases of the heart decreased 27.8%.

Figure 4. Age-Adjusted *Diseases of the Heart* Mortality Rates per 100,000, Hawai'i 1999 - 2009

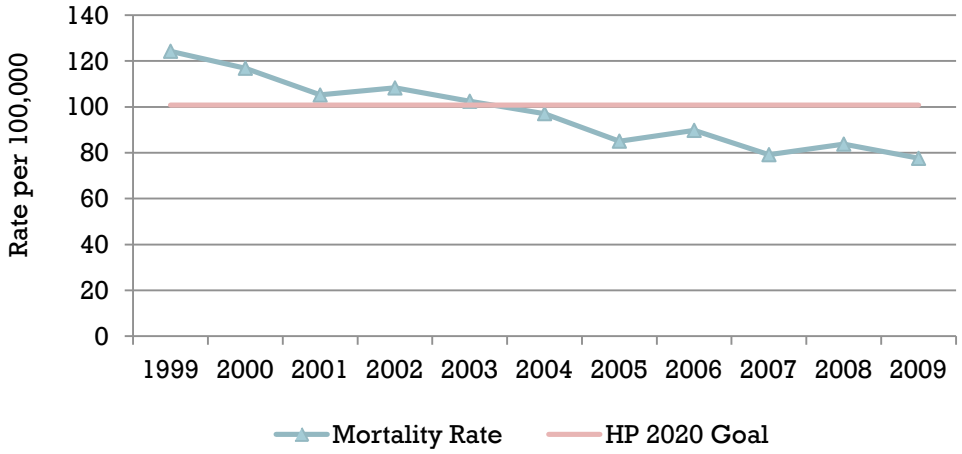


Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Rate age-adjusted to the year 2000 U.S. Standard Population

The age-adjusted coronary heart disease mortality rate has been decreasing since 1999 (Figure 5). Between 1999 and 2009, the age-adjusted CHD mortality rate decreased 37.6% and is currently below the HP 2020 goal of 100.8 CHD deaths per 100,000. Even though the state

has met the HP 2020 goal, the Plan goal is to decrease the overall CHD age-adjusted mortality rate and those in certain disparate groups by 10%.

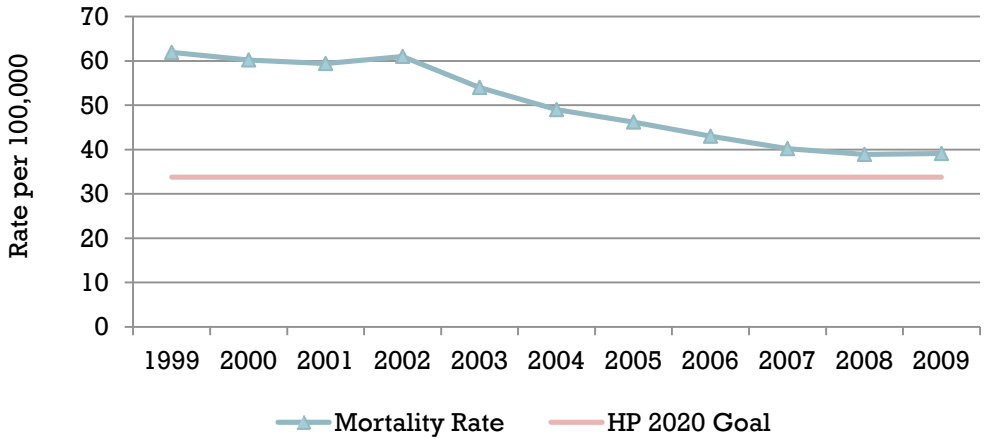
Figure 5. Age-Adjusted Coronary Heart Disease Mortality Rates per 100,000, Hawai'i 1999 - 2009



Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Rate age-adjusted to the year 2000 U.S. Standard Population

The age-adjusted stroke mortality rate in Hawai'i has been decreasing since 2002 (Figure 6). From 1999 and 2009, the age-adjusted stroke mortality rate decreased 36.8%. However, the age-adjusted mortality rate is higher than the HP 2020 goal of 33.8 deaths per 100,000.

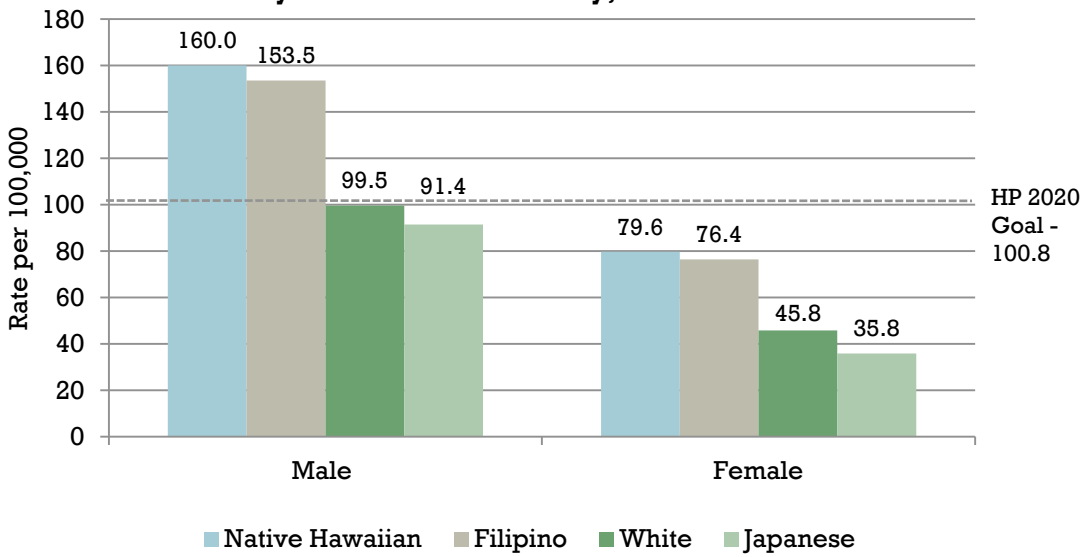
Figure 6. Age-Adjusted Stroke Mortality Rates per 100,000, Hawai'i 1999 - 2009



Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Rate age-adjusted to the year 2000 U.S. Standard Population

Males tend to have higher coronary heart disease mortality rates than females of the same ethnicity. Native Hawaiians and Filipinos of both genders have higher CHD mortality rates than Whites and Japanese (Figure 7).

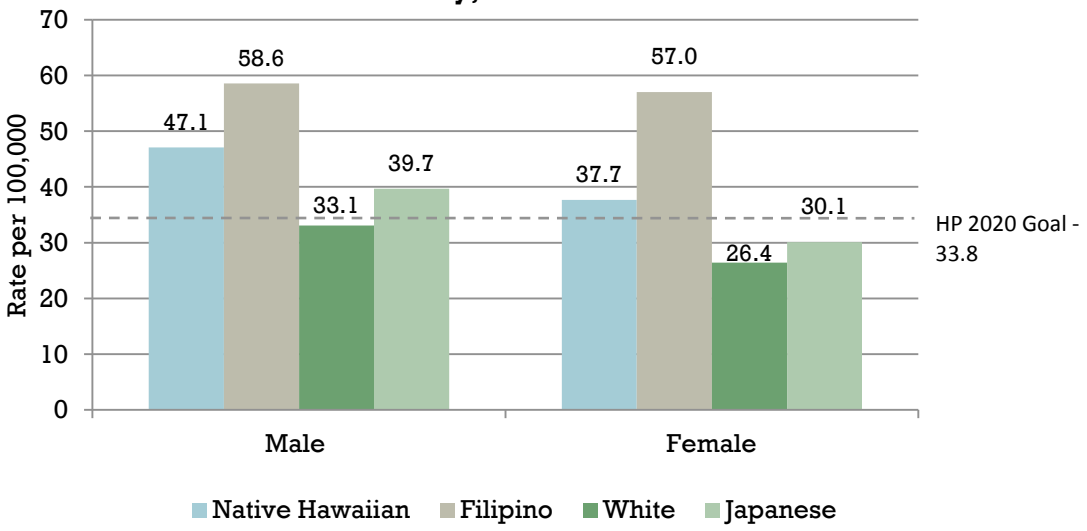
Figure 7. Coronary Heart Disease Age-adjusted Mortality Rates by Gender and Ethnicity, Hawai'i 2008 - 2009



Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Age-adjusted to the year 2000 U.S. Standard Population

Males and females of the same ethnicity have more similar stroke mortality rates (Figure 8) compared to CHD mortality rates (Figure 7). Native Hawaiians and Filipinos have higher stroke mortality rates than Whites and Japanese. Filipino females have a stroke mortality rate more than double that of Whites or Japanese (Figure 8).

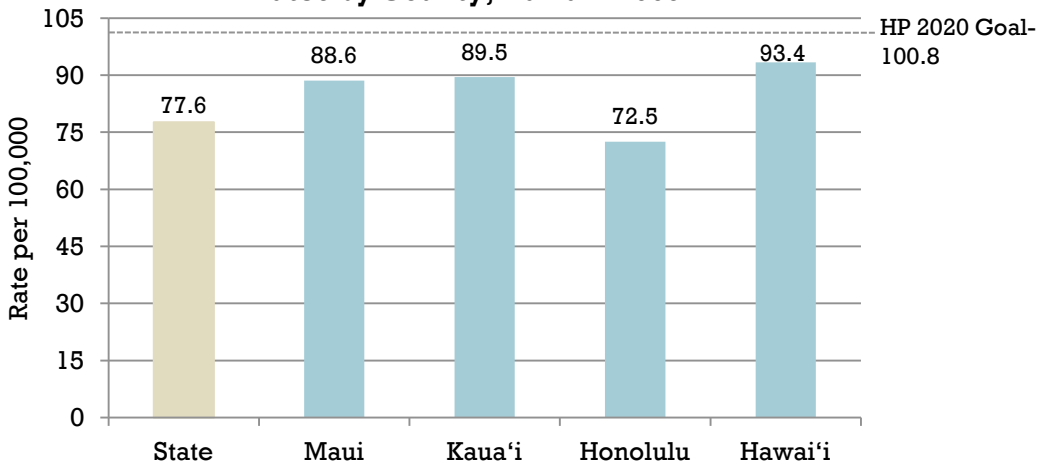
Figure 8. Stroke Age-adjusted Mortality Rates by Gender and Ethnicity, Hawai'i 2008 -2009



Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Age-adjusted to the year 2000 U.S. Standard Population

All of Hawaii's counties have a CHD mortality rate less than the HP 2020 goal of 100.8 deaths per 100,000. Honolulu County has the lowest CHD mortality rate at 72.5 deaths per 100,000 residents (Figure 9).

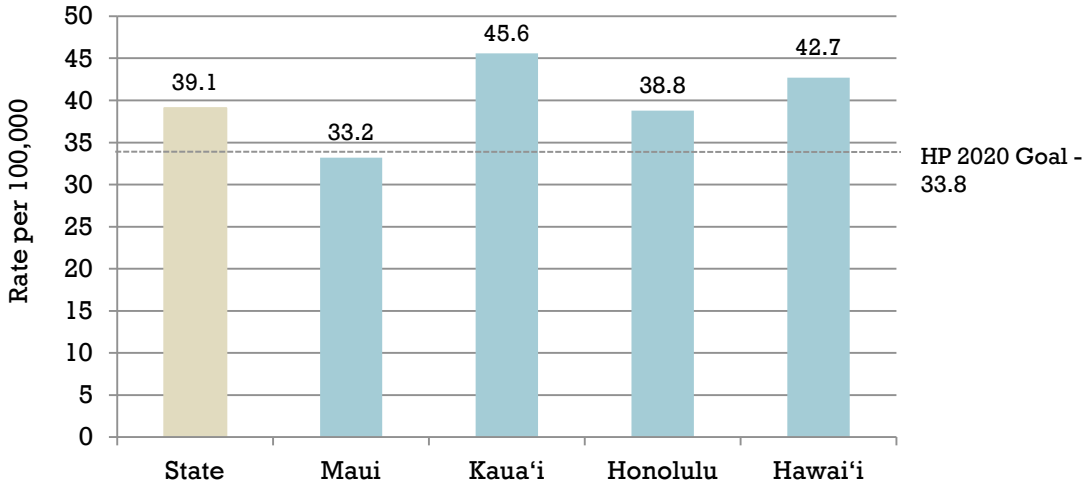
Figure 9. Coronary Heart Disease Age-adjusted Mortality Rates by County, Hawai'i 2009



Source: Hawai'i State Department of Health, Office of Health Status Monitoring
Note: Age-adjusted to the year 2000 U.S. Standard Population

Kaua‘i County has the highest stroke mortality rate at 45.6 deaths per 100,000 residents. Only Maui County has a stroke mortality rate less than the HP 2020 goal of 33.8 deaths per 100,000 (Figure 10).

Figure 10. Stroke Age-adjusted Mortality Rates by County, Hawai‘i 2009

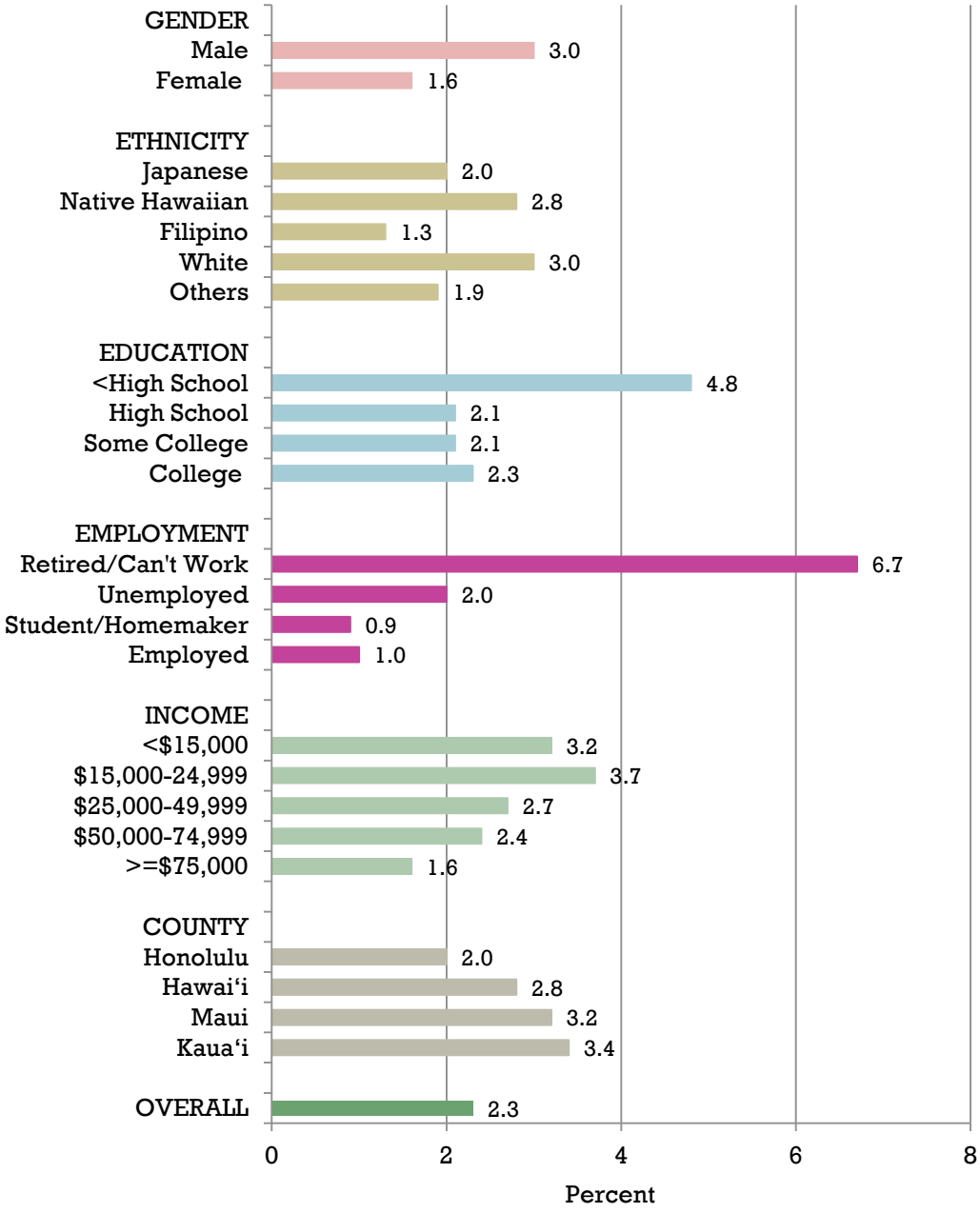


Source: Hawai‘i State Department of Health, Office of Health Status Monitoring
Note: Age-adjusted to the year 2000 U.S. Standard Population

Prevalence of Coronary Heart Disease and Stroke

In 2010, 2.3% of Hawai‘i adults reported that a health care professional told them they had angina or CHD. The prevalence of CHD was higher among Whites (3.0%) and Native Hawaiians (2.8%) compared to other ethnic groups. The prevalence of CHD is highest in Hawai‘i residents that are the most vulnerable: those with less than a high school education, those with lower household income and those who are retired or unable to work (Figure 11). The prevalence of CHD among retirees and those unable to work (6.7%) is almost three times greater than the state average (2.3%). Kaua‘i and Maui Counties had higher CHD prevalence than Hawai‘i and Honolulu Counties. Males had almost double the CHD prevalence of females (3.0% vs. 1.6%).

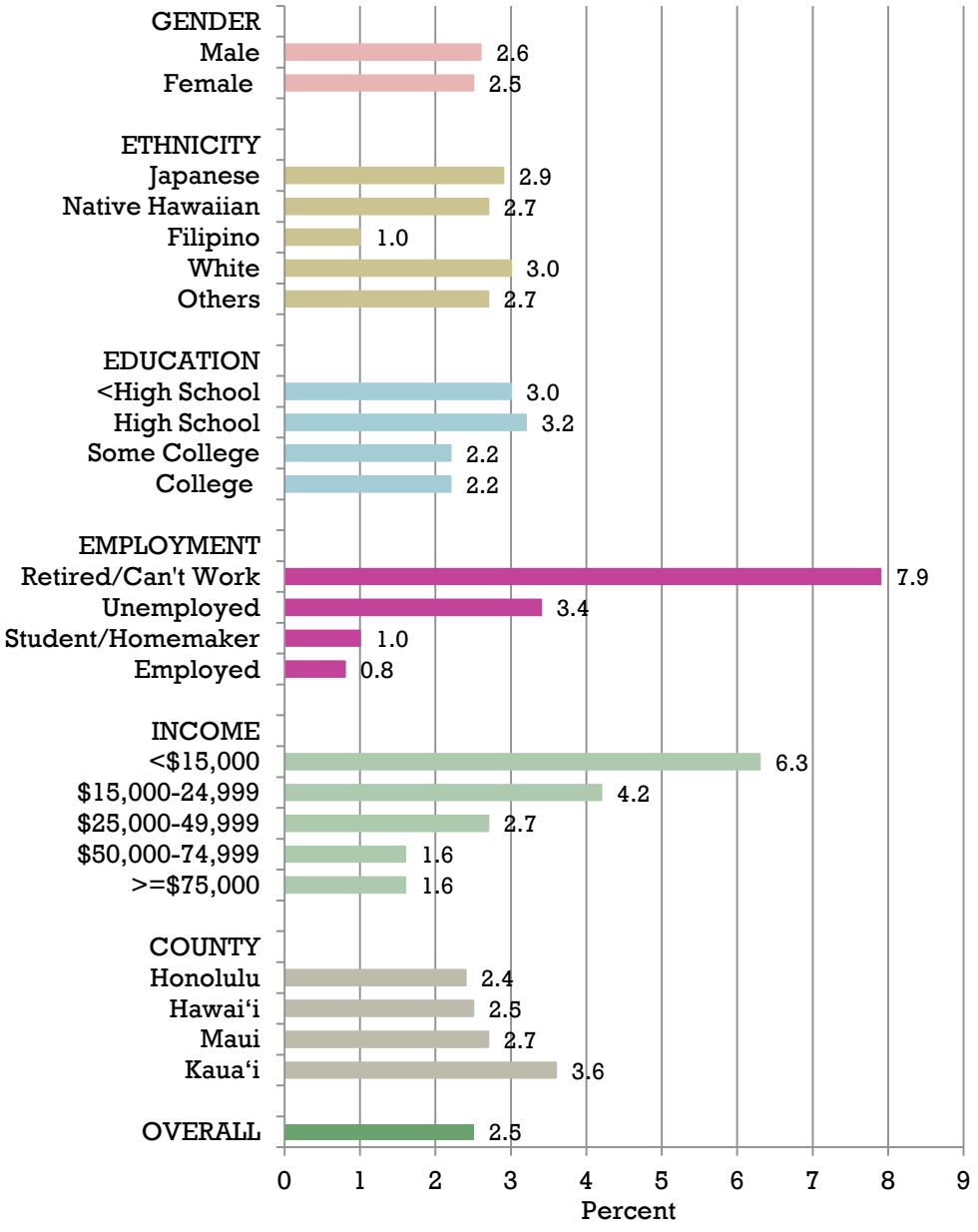
Figure 11. Prevalence of Coronary Heart Disease in Adults by Selected Demographic Characteristics, Hawai'i 2010



Source: Hawai'i BRFSS

In 2010, 2.5% of Hawai'i adults reported that a health care professional told them they had a stroke. The prevalence of stroke is similar among ethnic groups with the exception of Filipinos, who have a lower stroke prevalence. It is important to note that prevalence data reflects individuals who have survived one of these cardiovascular events. Adults who did not survive a first-time event are not captured in the data. Similar to the prevalence of CHD, the prevalence of stroke is highest in Hawai'i residents that are the most vulnerable: those with less than a high school education, those with lower household incomes and those who are retired or can't work (Figure 12).

Figure 12. Prevalence of Stroke in Adults by Selected Demographic Characteristics, Hawai'i 2010

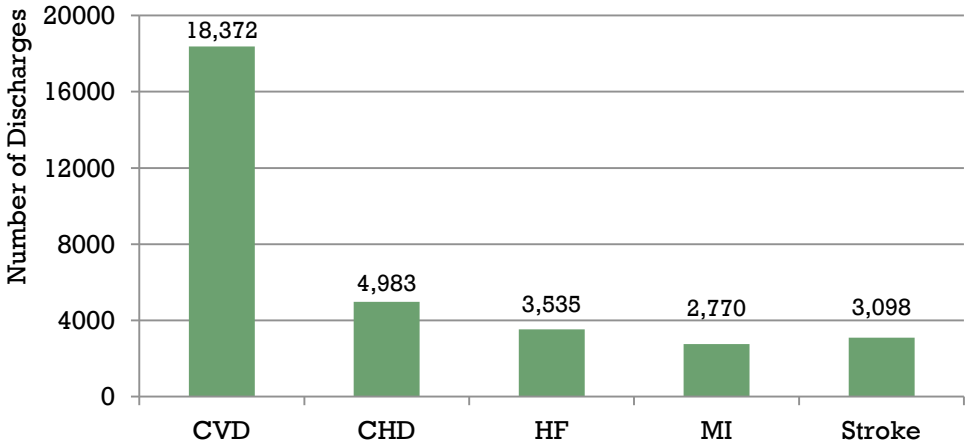


Source: Hawai'i BRFSS

Hospital Discharges

In 2010, CVD-associated hospital discharges made up 19% of all non-obstetric or neonatal hospitalizations in Hawai'i. A total of 18,372 hospital discharges with a primary diagnosis of cardiovascular disease occurred in 2010. Figure 13 shows the number of hospital discharges for the CVD sub-categories of coronary heart disease, heart failure, acute myocardial infarction and stroke.[6]

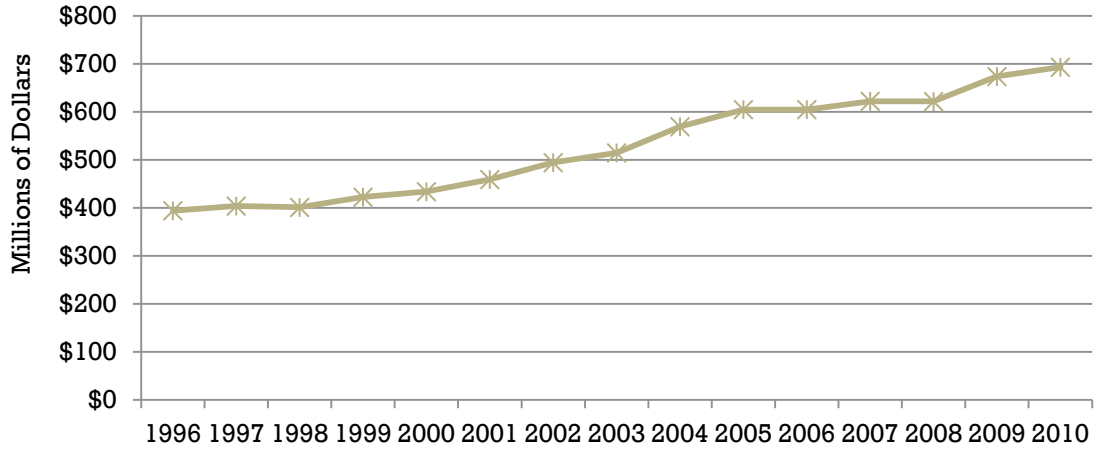
Figure 13. Number of Hospital Discharges for Cardiovascular Disease, Hawai'i 2010



Source: HHIC

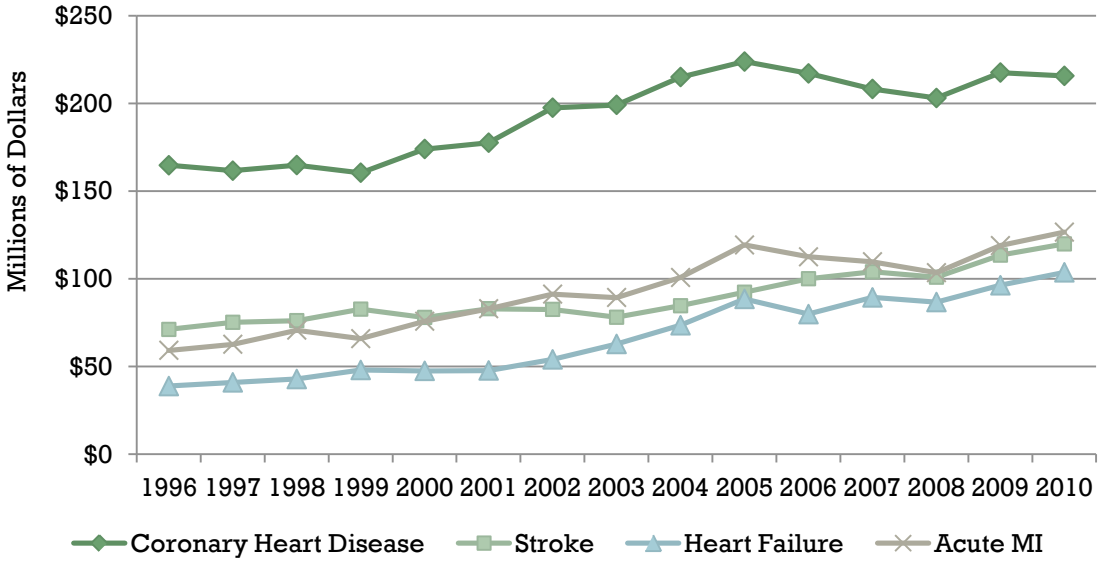
The number of hospital discharges for CVD has remained stable over the past 15 years (data not shown). However, total hospital charges for CVD-associated hospital discharges have increased 75.9% from 1996 to 2010 (Figure 14). This pattern of increasing hospital charges is also occurring with all CVD-related discharges including CHD, stroke, heart failure, and acute myocardial infarction (Figure 15). Hospital charges include charges for the hospital stay, including room and board, pharmacy, laboratory, X-ray, and hospital-based physician charges.

Figure 14. Total Hospital Charges (in Millions) for all Cardiovascular Disease-Associated Hospital Discharges, Hawai'i 1996 - 2010



Source: HHIC

Figure 15. Hospital Charges (in Millions) for Hospital Discharges Associated with Cardiovascular Disease, Hawai'i 1996 - 2010



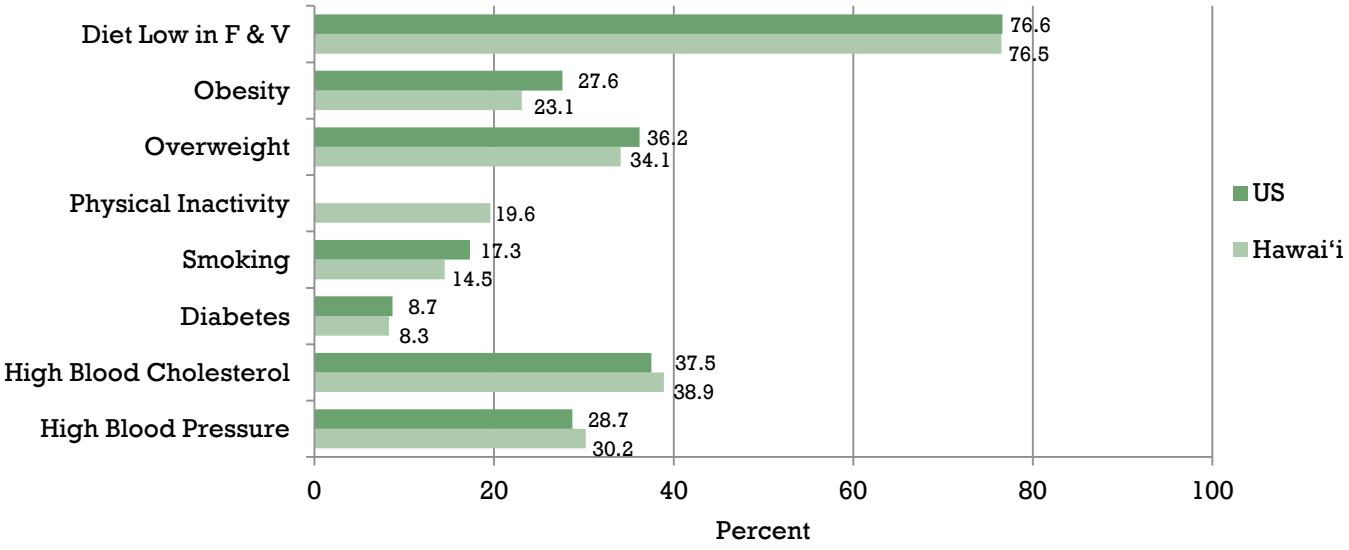
Source: HHIC

Risk Factors and Risk Markers

Several risk factors for cardiovascular disease include a diet low in fruits and vegetables (eating fruits and vegetables less than five times per day), overweight, obesity, physical inactivity (not getting any leisure time physical activity in the past 30 days) and smoking. Hawai'i has similar prevalence of these risk factors compared to the U.S. (Figure 16). The two most common risk factors in Hawai'i are a diet low in fruits and vegetables (76.5%) and high blood cholesterol (38.9%). Together, a total of 57.2% of Hawaii's adult population is either overweight or obese.

Some chronic conditions that contribute to cardiovascular disease include diabetes, high blood cholesterol, and high blood pressure. The adult prevalence of high blood cholesterol, high blood pressure, and diabetes is 38.9%, 30.2%, and 8.3%, respectively (Figure 16).

Figure 16. Adult Prevalence of Select Chronic Conditions and Risk Factors, U.S. and Hawai'i 2009/2010



Source: Hawai'i BRFSS (Prevalence estimates for diet low in F & V (fruits and vegetables), high blood pressure and high blood cholesterol are from 2009; prevalence estimates for obesity, overweight, physical inactivity, smoking, and diabetes are from 2010)
Note: Does not include pregnancy-related diabetes; a diet low in F & V is defined as not eating fruits or vegetables at least 5 times per day; physical inactivity is defined as not getting any leisure time exercise or physical activity during the past 30 days.

CVD risk factors are highest among those with lower educational attainment and lower household income (Figure 17).

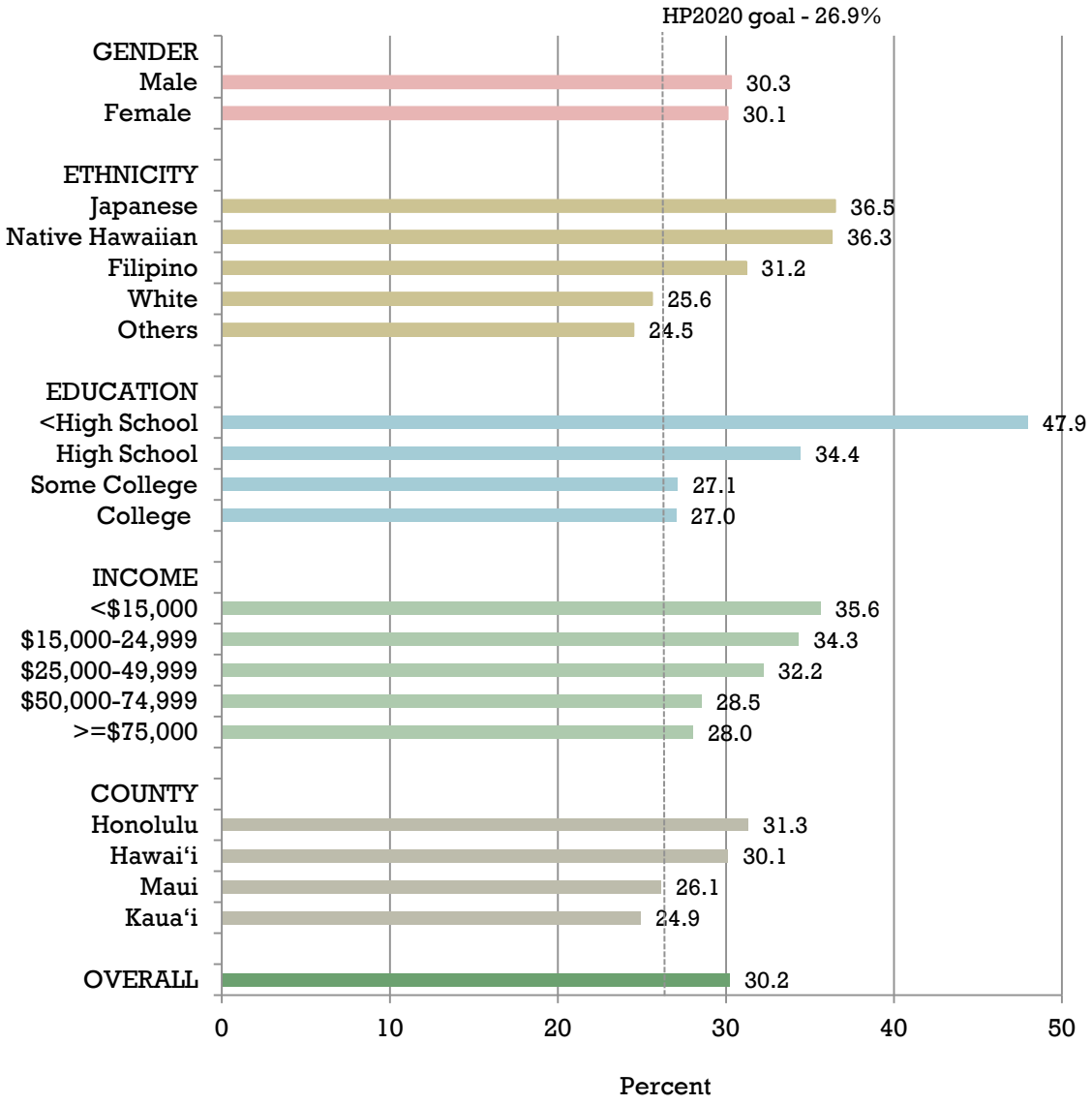
Figure 17. Adult Prevalence of Select Chronic Conditions and Risk Factors by Educational Attainment and Household Income

Risk Factors	High Blood Pressure	High Blood Cholesterol	Diet Low in F & V	Physical Inactivity	Diabetes	Over-weight	Obese	Smoking
Year	2009	2009	2009	2010	2010	2010	2010	2010
EDUCATION								
<High School	47.9	38.5	76.1	27.1	10.4	31.2	32.4	32.3
High School	34.4	40.9	79.9	24.8	9.8	32.8	27.9	20.7
Some College	27.1	40.0	75.5	19.5	7.9	34.0	24.3	15.8
College	27.0	36.9	74.7	13.5	7.1	35.6	17.2	6.1
HOUSEHOLD INCOME								
<$15,000	35.6	38.9	79.3	25.1	11.5	27.0	27.0	20.3
$15,000-24,999	34.3	39.7	76.7	22.1	10.9	29.4	27.9	20.8
$25,000-49,999	32.2	39.6	76.3	24.4	10.3	32.4	27.4	19.4
$50,000-74,999	28.5	40.9	78.2	15.8	7.5	35.5	22.5	11.4
≥$75,000	28.0	37.5	73.9	13.4	6.0	38.5	18.6	9.2

Source: Hawai‘i BRFSS

Figures 17, 18 and 19 highlight differences in CVD risk factors based on the social gradients of income and education, along with demographic characteristics (ethnicity, geography). These differences follow a social gradient, not just “high” or “low” differences in population groups. A social gradient in health runs through all societies, because all societies have social gradients. The social gradient effect focuses on where people are in relation to others on a gradient or ascending/descending slope. People that are in the lowest or poorest category generally experience the worst health, while even those in the lower-middle classes will generally have worse health outcomes than those in the upper middle classes and higher social strata.

Figure 18. Prevalence of High Blood Pressure in Adults by Selected Demographic Characteristics, Hawai'i 2009



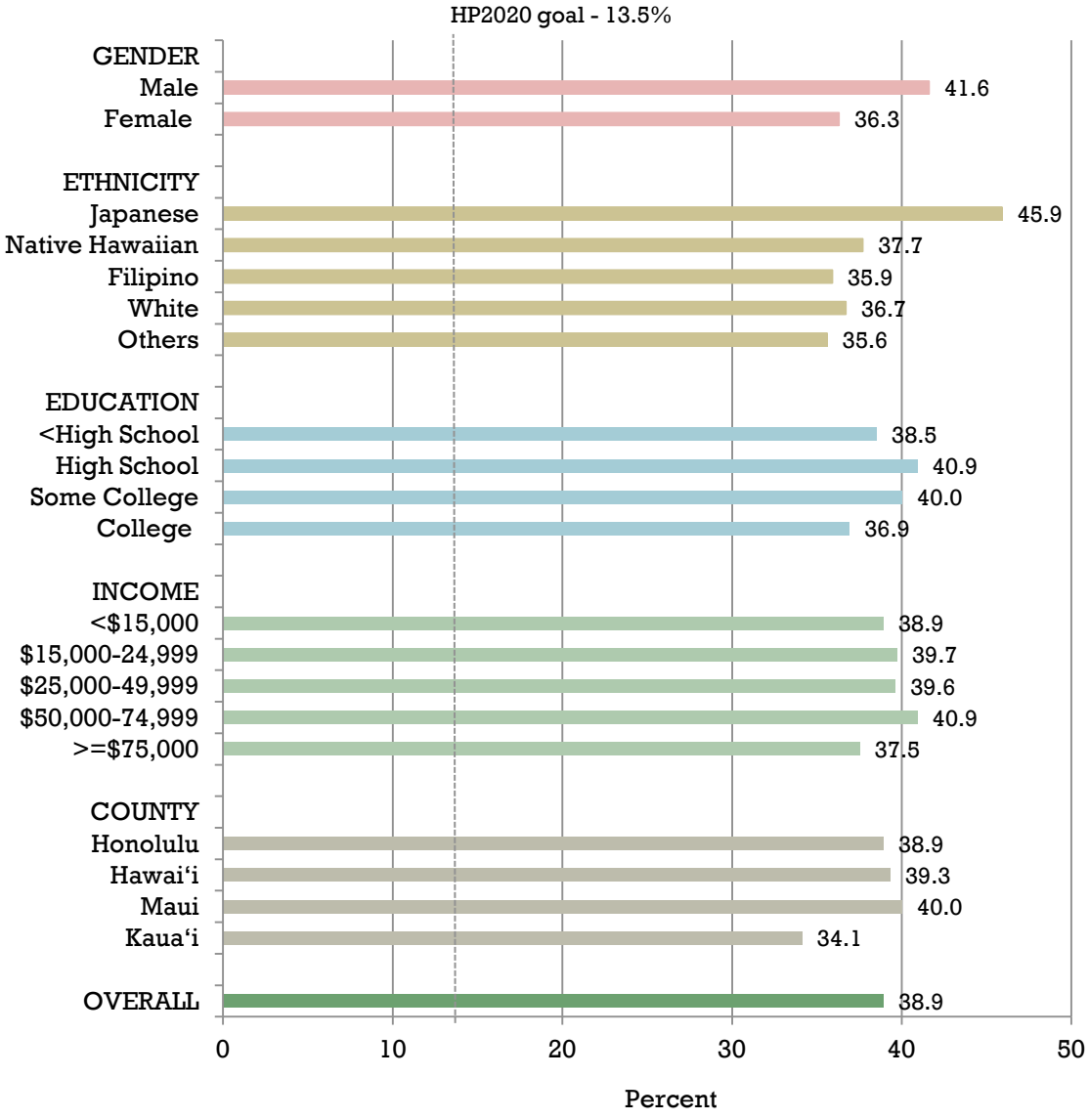
Source: Hawai'i BRFSS

The prevalence of high blood pressure and high blood cholesterol by other demographic characteristics can be seen in figures 18 and 19.

The prevalence of high blood pressure varies greatly by demographic characteristics. Prevalence is higher among those with lower household incomes and among those with lower educational attainment. Prevalence also varied by county and ethnicity, with Japanese, Native

Hawaiians and Filipinos having higher prevalence than Whites. Prevalence was also higher in Honolulu County.

Figure 19. Prevalence of High Blood Cholesterol in Adults by Selected Demographic Characteristics, Hawai'i 2009



Source: Hawai'i BRFSS

Across all ethnic groups, income levels, educational levels and geographic areas, high cholesterol is a persistent risk factor in Hawai'i. The prevalence of high blood cholesterol among Hawaii's adults is much greater than the HP 2020 goal of 13.5%. Males and Japanese have higher prevalence at 41.6% and 45.9%, respectively.

The Heart Disease and Stroke Prevention Plan

Cardiovascular Goals

Goal 1: Decrease population risk factors through culturally appropriate support for healthy lifestyles. Promote environments that support prevention of heart disease and stroke, healthy eating, daily physical activity, tobacco-free lifestyles and moderate alcohol use. This goal focuses on the need to prevent cardiovascular risk factors. Hawai‘i is fortunate to have a Physical Activity and Nutrition Program and a Tobacco Prevention and Education Program. These programs lead the state in primary prevention initiatives.

Goal 2: Improve early detection, effective treatment and management of risk factors for heart disease and stroke through use of evidence-based and culturally appropriate strategies.

Goal 3: Support development of a timely, high quality coordinated system of care for early detection, emergency response and treatment of cardiovascular disease events regardless of geographical location.

Goal 4: Prevent secondary cardiac and stroke events by promoting chronic disease self management and improving post-acute care and rehabilitation.

Goal 5: Enhance the scientific capacity to define the burden of heart disease, stroke and related risk factors.

Goal 6: Develop improved leadership, coordination and collaboration in Hawai‘i in order to identify resources and improve advocacy for heart health.

Goal 7: Improve collaboration efforts with other DOH chronic disease programs to address and monitor cardiovascular co-morbidities in the population and related risk factors. Assist in the development of a collaborative chronic disease strategic plan to optimize resources, reach and impact of implementation strategies.

Long-term Objectives

The long-term objectives identified in the Plan are used to monitor the progress of the state plan to reach or exceed HP 2020 goals and to monitor the state's progress toward closing disparity gaps among groups and geographical areas with the highest rates of mortality for heart disease and stroke.

Coronary Heart Disease:

1) By 2016, reduce the age-adjusted coronary heart disease death rate in the state of Hawai'i by 10% from 78 (2009) to 70 per 100,000.
2) By 2016, reduce levels of disparities in age-adjusted coronary heart disease death rates by 10% among groups at highest risk for coronary heart disease:
    - Native Hawaiian males from 160 (2008-2009) to 144 per 100,000.
    - Filipino males from 154 (2008-2009) to 139 per 100,000.
    - County of Hawai'i from 93 (2009) to 84 per 100,000.
    - County of Maui from 89 (2009) to 80 per 100,000.

Stroke:

3) By 2016, reduce the age-adjusted stroke death rate in the State of Hawai'i by 10% from 39 per 100,000 (2009) to 35 per 100,000.
4) By 2016, reduce levels of disparities in age-adjusted stroke death rates by 10% among groups with highest risk for stroke:
    - Native Hawaiian males from 47 (2008-2009) to 42 per 100,000 and from 38 (2008-2009) to 34 per 100,000 for Native Hawaiian females.
    - Filipino males from 59 (2008-2009) to 53 per 100,000 for males and 57 (2008-2009) to 51 per 100,000 for Filipino females.
    - County of Hawai'i from 43 (2009) to 39 per 100,000.
    - County of Kaua'i from 46 (2009) to 41 per 100,000.

Plan Objectives, Suggested Strategies and Outcome Measures

Pre-hospital and Acute Care

Interventions targeting the pre-hospital and acute care setting are intended to decrease the length of time between cardiovascular symptom onset and treatment. Decreasing the time to treatment has the potential to improve survival.[7] Strategies to improve the timeliness of treatments that favorably affect outcomes from acute cardiac and stroke events are outlined in this section. Recommendations include development of policies that increase the number of STEMI (ST-Elevation Myocardial Infarction) patients with timely access to percutaneous coronary interventions (PCI). In a STEMI event, the coronary artery is completely blocked off by the blood clot, and as a result virtually all the heart muscle being supplied by the affected artery starts to die. Other recommendations include development of new systems to identify eligible stroke patients while en-route to emergency departments, development of protocols for preferential transport to stroke-capable facilities and implementation of a statewide telemedicine system. Implementation of such systems as telemedicine will increase the state's capacity to provide timely diagnosis and treatment of stroke through formalized agreements and protocols with partner hospitals.

Ongoing coordination is essential to resolve the many technical and policy issues necessary to implement system of care changes. Therefore, heart attack system (STEMI) and stroke system collaboratives comprised of statewide stakeholders should be established and supported, such as the American Heart Association's Mission Lifeline for improving the STEMI system of care. These statewide collaborative groups provide the necessary coordination to develop an enhanced evidence-based system of care in Hawai'i.

Survival following an acute cardiovascular event increases in the "presence of a trained lay rescuer who is ready, willing, and able to act."[8] Strategies to increase the use and adoption of emergency response actions such as bystander CPR and automated external defibrillator (AED) are priority areas for development. Implementing community interventions will improve emergency response with the ultimate goal of decreasing the time between symptom onset and treatment.

Finally, it is recognized that acute heart and stroke care systems cannot succeed unless the public recognizes the signs and symptoms of heart attack and stroke and then calls 9-1-1 for immediate medical attention. Research has shown that television advertising and other mass media can increase the ability of the public to identify the signs and symptoms of stroke.[9] Strategies have therefore been identified that will focus on public education to recognize the signs and symptoms of heart attack and stroke and the importance of calling 9-1-1.

Priority 1: Strengthen and Sustain Statewide Collaboratives

Objective 1.1: By 2012, establish a stroke collaborative of representatives from organizations within the stroke care community to monitor and improve the system of care in an effort to strengthen the chain of survival for stroke patients.

Objective 1.2: By 2012, establish and maintain a STEMI (ST-Elevation Myocardial Infarction) collaborative comprised of representatives from acute heart care organizations to monitor and improve the system of care to strengthen the chain of survival for patients experiencing STEMI.

Strategies:

- Promote American Heart Association's (AHA) Mission Lifeline collaborative.
- Support stakeholders to meet regularly to share best practices, monitor and evaluate implementation strategies to improve the system of care for heart disease.
- Develop mechanisms to share operational and patient outcome data to assess system performance.

Outcome Measure:

- Collaborative formed and meetings convened at least four times per year.

Priority 2: Improve Statewide Data Collection System for Cardiac Arrest

Objective 2.1: By 2012, implement systems to measure progress in the treatment of out-of-hospital cardiac arrest.

Strategies:

- Provide information and training on Cardiac Arrest Registry to Enhance Survival (CARES) program.
- Support implementation of CARES.

Outcome Measures:

- Baseline performance measures established.
- Quality improvement plan developed based on comparison to national benchmarks.
- Number of hospitals trained.
- Barriers to implementation identified.
- Number of acute care hospitals that participate.

Priority 3: Improve Community Preparedness

Objective 3.1: By 2014, increase the proportion of acute cardiac arrests in which appropriate CPR is administered by bystander.

Strategies:

- Convene a statewide task force to increase training options.
- Collaborate with statewide partners on a coordinated media plan targeted to increase public awareness of the signs and symptoms of cardiac arrest.
- Promote 9-1-1 dispatcher pre-arrival instructions that are consistent with current AHA CPR guidelines.
- Explore including CPR training as a high school graduation requirement.
- Encourage worksites to provide training in CPR to employees.

Outcome Measures:

- Task force meetings convened on a regular basis.
- Baseline data on bystander CPR established.
- Number of individuals trained in and using AHA CPR.
- Number of CPR trainings conducted.
- Education campaign developed and implemented.
- CPR protocols for 9-1-1 dispatcher system assessed.
- Discussions with educational leaders conducted.
- Number of worksites offering CPR training to employees.

Objective 3.2: By 2014, increase the proportion of acute cardiovascular events in which bystanders use an AED to administer the first therapeutic electrical shock within best practice guidelines after collapse.

Strategies:

- Enhance capability to rapidly identify AED locations in response to 9-1-1 calls.
- Place additional units in locations with high risk populations.
- Collaborate with AHA to provide public education on by-stander liability laws.
- Encourage worksites to adopt a formal protocol for responding to a heart attack or stroke including a response team trained in CPR and AED as a bridge to emergency medical services (EMS) assistance.
- Encourage worksites to offer CPR and AED training annually.

Outcome Measures:

- Baseline data on bystander use of AED established.
- Geographical information system mapping of existing AED locations developed.
- Number of new AED placements at high risk locations.
- Public education campaign developed related to bystander liability.

- Number and reach of education campaign.
- Number of worksites that develop and train emergency response teams.

Priority 4: Improve knowledge of the signs and symptoms of heart attack and stroke and the importance of calling 9-1-1.

Objective 4.1: By 2015, increase by 5% the percentage of all adults who can correctly identify the 5 symptoms of heart attack, stroke and calling 9-1-1 as first choice for an emergency.

Strategies:

- Collaborate with statewide partners on a coordinated social marketing plan targeted to increase public awareness of the signs and symptoms of heart attack and stroke and the importance of calling 9-1-1.
- Target interventions among those in high risk groups and groups with greater knowledge disparity.
- Pilot educational campaign within select settings to evaluate the impact of the materials and messages (e.g., primary care offices and cardiology clinics).
- Develop materials for an earned media campaign, including press releases and documentation of stories from heart attack and stroke survivors.
- Work with healthcare providers to develop a system to include heart attack signs and symptoms and 9-1-1 education to high risk patients.
- Distribute heart attack and stroke signs and symptoms posters to primary care providers for display.

Outcome Measures:

- Public awareness campaign developed.
- Number and reach of awareness campaign among priority populations.
- Number of community organizations, businesses and educational institutions contacted and provided with educational resources.
- Number and type of earned media coverage.
- A 5% improvement in the proportion of adults who can correctly identify the five signs and symptoms of heart attack and stroke and the importance of calling 9-1-1 among the general population and priority populations on 2009 BRFSS data.
- A 10% increase in arrival mode by ambulance for STEMI and stroke patients (baseline TBD).

Priority 5: Enhance Adherence to Guidelines and Quality Improvement

Objective 5.1: By 2012, increase and improve hospital tracking and evaluation of quality of care.

Strategies:

- Encourage adoption and use of evidence-based performance improvement tools for the care of heart attack, congestive heart failure and stroke.
- Identify and address barriers for implementing evidence-based guidelines.
- Support training and implementation on current guidelines.

Outcome Measures:

- Number of hospitals using registries to track heart disease and stroke data.
- Number of hospitals that move to a higher level of achievement in their quality improvement program (e.g., AHA Get with the Guidelines (GWTG)).
- Number of hospitals that implement AHA-GWTG-stroke from 13 to 15 (acute care) and 0 to 2 (critical access).
- Number of acute care hospitals that participate in AHA-GWTG Action Registry for STEMI from 4 to 8.
- Number of hospitals that participate in AHA-GWTG heart failure from 10 to 15 (acute care) and 0 to 3 (critical access).
- Number of hospitals that implement an evidence-based quality improvement program for heart failure not currently participating in a program.

Priority 6: Reduce time to transport STEMI patients

Objective 6.1: By 2014, increase the number of STEMI patients transported by ambulance that proceed directly to a PCI capable facility.

Strategies:

- Promote implementation of STEMI patient transport protocol to PCI capable centers.
- Explore development of a recognition process for PCI capable hospitals.
- Identify barriers to implementing a STEMI transport protocol for PCI.
- Identify mechanism to collect baseline data to monitor system change outcomes.

Outcome Measures:

- Number of acute care hospitals that have a written plan in place with protocols for transport of STEMI patients to PCI centers.
- Development of a recognition process.

- Barriers to STEMI transport protocols identified and provided to collaborative members.
- Data source identified and collected for tracking STEMI transports.

Objective 6.2: By 2013, decrease inter-island transfer time for STEMI patients to reach destination hospital.

Strategies:

- Develop mechanisms to collect precise data to measure transfer times.
- Identify and share best practices and protocols for tracking transport and treatment.
- Develop patient transfer agreements between facilities.
- Assess capability and barriers to providing timely and dependable air transport from neighbor islands to PCI capable centers.
- Develop a protocol to improve transportation efficiency.
- Explore support for funding to airlift transport of NI patients.
- Support helicopter air transport system statewide.
- Support state funded medivac transport system.

Outcome Measures:

- All hospitals have mechanism to track transfer times.
- Twenty percent (20%) improvement in transfer times from baseline (TBD).
- Transfer agreements between hospitals are complete.
- The number of stakeholders involved in developing a plan for improving the air transportation system and identifying funding mechanisms.

Priority 7: Improve the STEMI system of care

Objective 7.1: By 2015, increase the proportion of STEMI patients given percutaneous coronary intervention (PCI) within 90 minutes of hospital arrival.

Strategies:

- Develop mechanisms to improve statewide data collection and analysis of PCI treatment indicators.
- Promote non-PCI hospitals to develop formal treatment agreements with PCI capable hospitals.
- Develop standardized EMS pre-arrival screening protocols.
- Encourage hospitals to receive wireless communication (12-lead electrocardiogram).
- Seek federal, state and local funding to provide wireless transmission and communication equipment for EMS and hospitals.

- Increase awareness of PCI capabilities of each hospital.

Outcome Measures:

- Accurate PCI indicator data collected and shared with STEMI collaborative members.
- Treatment agreements developed and distributed.
- Pre-screening protocols are written and distributed.
- Number of acute care hospitals that can accept 12-lead electrocardiogram transmission from baseline.
- Statewide inventory of PCI services at acute care hospitals.
- A 10% improvement for PCI treatment within 90 minutes of hospital arrival for all patients from baseline (TBD). For Medicare population 10% improvement from 81% (2010 U.S. Dept. HHS).

Priority 8: Improve the Stroke System of Care

Objective 8.1: By 2013, one hundred percent (100%) of EMS responders utilize an evidence-based standardized stroke assessment.

Strategies:

- Assess available stroke scales and select an evidence-based stroke assessment tool.
- Provide and evaluate stroke assessment training program.
- Evaluate the validity and sensitivity of the tool in identifying individuals who may be having a stroke.
- Integrate the stroke scale tool as part of the EMS-hospital system of care.
- Monitor the appropriate use of the tool.

Outcome Measures:

- Statewide use of a single validated pre-hospital stroke assessment tool to rapidly and accurately identify stroke patients.
- One hundred percent (100%) of stroke patients arrive at the emergency department with a stroke assessment.

Objective 8.2: By 2013, increase the proportion of stroke patients that receive tissue plasminogen activator (IV tPA) treatment within best practice.

Strategies:

- Identify mechanism to obtain baseline data, on-going data collection and sharing of information to measure progress.
- Identify stroke ready hospitals using AHA criteria that can give tPA via telemedicine.

- Promote the development of a statewide telemedicine infrastructure that will support 24/7 telestroke consultation.
- Promote hospitals to have agreements to treat patients with tPA.
- Promote professional training opportunities.

Outcome Measures:

- Hospital tPA treatment data collected, analyzed and distributed to the Stroke Coalition to improve the system of care.
- An inventory of stroke ready hospitals completed.
- Telemedicine network established to connect Hawai‘i hospitals to 24/7 access to neurology consultations.
- A 10% increase in eligible patients that receive tPA (baseline TBD).
- Door-to-needle time is decreased to within best practice (60 minutes) by 20% from baseline (TBD).
- Proportion of residents within recommended timeline to receive acute stroke care.

Priority 9: Improve Transition of Care

Objective 9.1: By 2012, increase the number of hospitals that develop a mechanism to communicate with primary care physicians (PCP's) when a patient is hospitalized for stroke or heart disease from current baseline to 100%.

Objective 9.2: By 2013, increase the number of hospitals that implement a mechanism to communicate with PCP's when a patient is hospitalized for stroke or heart disease from current baseline to 100%.

Strategies:

- Examine the communication infrastructure that currently exists between hospitals and PCP's.
- Encourage use of technology.

Outcome Measures:

- Proportion of PCPs who report communication occurred related to their patients' hospital treatment and discharge plans prior to hospital release.

Primary Care

The objectives and strategies in this section focus on the goal of controlling cardiovascular disease risk factors, mainly high blood pressure and high blood cholesterol. As noted in the *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (JNC), "The relationship between blood pressure and risk of CVD events is continuous, consistent, and independent of other risk factors; the higher the blood pressure, the greater the chance of heart attack, heart failure, stroke, and kidney disease."[10] Only 50.1% of adults with high blood pressure have it under control.[11] Interventions targeting the primary care setting can aid in the control of high blood pressure through healthcare systems changes that enhance a provider's ability to adhere to evidence-based treatment guidelines. Effective use of information and medical technology, such as electronic medical records, can improve high blood pressure management by significantly improving health information exchange between patients, providers and health systems.[12,13]

High blood cholesterol is another major risk factor for heart disease. The higher the blood cholesterol level, the greater the risks for developing heart disease or having a heart attack.[14] *The Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults* (ATP) offers clinical guidelines for care that can be used as best practice guidelines for primary care physicians.[15] Furthermore, a collaborative approach to managing high blood cholesterol in patients encourages physicians to adhere to recommended guidelines and emphasizes adherence in patients when it comes to lifestyle modification and pharmacologic therapy.[16]

The following long-term goals have been identified to achieve through the implementation of strategies outlined in this section:

By 2015, increase the proportion of adults with hypertension whose blood pressure is under control by 20 percentage points. Baseline: 46% (Hawai'i QUEST and QExA enrollees aged 18-85).

By 2015, increase the proportion of adults with heart disease whose cholesterol is under control by 20 percentage points. Baseline: 38% (Hawai'i QUEST and QExA enrollees aged 18-75).

There are many strategies that can improve the detection, treatment and control of high blood pressure and high blood cholesterol in the area of primary care including: 1) encouraging effective use of information and medical technology through the adoption of electronic health records (EHR) and the implementation of "Meaningful Use" (MU). MU refers to utilizing electronic health records in a meaningful manner, for example, by implementing functions that

allow for e-prescribing to improve the quality of health care, 2) adopting policies to use evidence-based guidelines for the detection, treatment and control of high blood pressure and high blood cholesterol, and 3) putting into practice a coordinated and multi-disciplinary approach for the management of chronic disease. These policy and system change strategies are included in the Plan and are in alignment with the recommendations from the CDC to address the "ABCS" of heart disease and stroke prevention. The ABCS include: A) Increasing low dose aspirin therapy according to recognized prevention guidelines; B) preventing and controlling high blood pressure including reduction of sodium; C) preventing and controlling high blood cholesterol; and S) increasing the number of smokers counseled to quit and referred to state quit lines.

Priority 1: Promote System Changes to Improve Quality of Care

Patient Centered Medical Home (PCMH)

Objective 1.1: By 2016, increase the proportion of primary care providers (PCPs) that are PCMHs.

Strategies:

- Establish recognition criteria for PCMH and policies to enable the transition of primary care providers to medical homes.
- Partner to support education efforts, e.g., development of core competencies and training program for positions such as care coordinators to develop statewide capacity.
- Advocate for reimbursement to non-medical providers, e.g., care coordinators, case managers and enabling services.
- Promote among payers the added value provided to patients with a medical home and support alignment of reimbursement to reflect this.

Outcome Measures:

- Criteria for PCMH established.
- Proportion of PCPs meeting local criteria for a PCMH for example:
    - Have a multi-disciplinary team.
    - Use of care coordination.
    - Use electronic health records.
    - Have computer-based clinical decision support system.
    - Be meaningful users of electronic health records.
- Reimbursement issues documented and presented to change agents.

- 75% of Community Health Centers (CHCs), 30% of Native Hawaiian Health Systems (NHHS) and 10% of private (PCPs) apply for PCMH recognition by 2013.
- 75% (CHCs), 50% (NHHS) and 10% (PCPs) are recognized PCMHs by 2016.

Multi-disciplinary Team Approach

Objective 1.2: By 2015, increase the percentage of PCPs with policies for a multi-disciplinary team approach to enhance high blood pressure control.

Strategies:

- Identify barriers to implementing a multi-disciplinary team approach.
- Research strategies and best practice for small practices to implement a multi-disciplinary team approach.
- Form partnerships with healthcare providers such as dentists to identify people at risk for CVD and pharmacists to provide expert review of patient medications.
- Encourage health plans and public payers (Medicaid, Medicare) to reimburse professionals other than physicians, e.g., care coordinators' and community health workers' services to support integration of a multi-disciplinary team approach.

Measurable Outcome:

- 50% (CHCs), 70% (NHHS) and 30% (PCPs) with a written policy to implement a multi-disciplinary team approach to enhance high blood pressure control.

Electronic Health Records (EHR)

Objective 1.3: By 2016, increase the proportion of PCPs who implement EHR technology.

Objective 1.4: By 2016, increase the proportion of PCPs who have EHR communication capability to exchange lab data and participate in e-prescribing.

Strategies:

- Identify challenges to implementing EHRs.
- Identify EHR functions currently utilized and support initial implementation of lab interface and e-prescription functionality.
- Promote use of EHR with registry function, decision support and electronic reminders.
- Encourage the use of health information through use of and coordination with (e.g., the Regional Extension Center and Beacon Project, to implement electronic health records and obtain meaningful use.
- Support training and technical assistance to develop electronic health record capacity.

- Collaborate to develop a plan to coordinate the capability of electronic health records to interface with other agencies.

Outcome Measures:

- 100% (CHCs) implement electronic health records by 2016 from 86% (2011).
- 90% (PCPs) implement electronic health records by 2016 from 2011 baseline (TBD).
- 90% (CHCs, PCPs) have capacity for electronic prescriptions and lab Interface from 2011 baseline.

Objective 1.5: By 2016, increase the proportion of PCPs who have received MU incentive payments.

Strategies:

- Support training to enhance knowledge and skills to implement MU.
- Support development of EHR "super users" to provide technical support and training.

Outcome Measures:

- Number of CHCs who have implemented 15 core and 5 menu set options by 2016.
- 50% of PCPs receive incentive payments for implementing MU by 2016.

Priority 2: Improve Adherence to Best Practice Guidelines

Blood Pressure

Objective 2.1: By 2015, increase the proportion of PCPs that adhere to current JNC guidelines.

Strategies:

- Assess current adherence, implementation, training needs and barriers related to JNC high blood pressure guidelines.
- Support distribution of current guidelines.
- Collaborate to provide continuing professional education opportunities to increase awareness of and adherence to national evidence-based guidelines for cholesterol, hypertension and aspirin therapy (e.g., blood pressure measurement).
- Support training opportunities for primary care providers to obtain certification as hypertension specialists.
- Partner with existing quality improvement groups to develop and pilot test high blood pressure practice guidelines and other quality improvement tools.
- Support JNC guidelines incorporated as decision support in EHR.

- Expand pay for performance quality improvement programs that provide incentives to PCPs with high compliance (patients who meet and maintain blood pressure goal targets) as set by evidence-based guidelines.
- Promote quality improvement programs that integrate into existing EHR platforms to collect chronic disease condition data including cardiovascular data to improve patient outcomes, e.g., AHA *The Guideline Advantage* among physician clinics.

Outcome Measures:

- 75% (CHCs) and 30% of private PCPs with written policies by 2013 to use evidence-based JNC guidelines from 2011 baseline.
- Number of physician practices/clinics that use EHR as a decision support tool to increase adherence to JNC guidelines.
- Number of physicians that complete training on the guidelines.
- Demonstrated improvement in adherence to guidelines among pilot sites for example:
    - Measure blood pressure according to JNC: 100% pass rate on annual competency.
    - Document major cardiovascular risk factors: 100%.
    - Order lipid profile: Goal 50%.
    - Blood Pressure < 140/90 for hypertension only: Goal: 50%
    - Blood Pressure < 130/80 for diabetes mellitus and hypertension: Goal 50%

Blood Cholesterol

Objective 2.2: By 2015, increase the proportion of PCPs who adhere to current ATP guidelines for blood cholesterol.

Strategies:

- Assess current guideline training needs and barriers to adherence to ATP guidelines among PCPs.
- Investigate feasibility of ATP guidelines incorporated as decision support in EHR.
- Support development of a high blood cholesterol practice guideline and pilot test effectiveness in clinic setting.
- Promote ATP guideline training (e.g., the online National Heart, Lung, and Blood Institute training program).
- Investigate certification or existing testing processes.
- Expand pay for performance quality improvement programs that provide incentives for PCPs with high compliance (patients who meet and maintain blood cholesterol goal targets) as set by evidence-based guidelines.

Outcome Measures:

- 100% of CHCs, NHHS and 80% of private PCPs have a written policy to adopt current ATP guidelines.
- Demonstrated improvement in adherence to guidelines among pilot sites, for example:
    - Number of hyperlipidemic patients who have controlled blood cholesterol according to ATP guidelines.
    - Number of hyperlipidemic patients that had a lipid profile done in the last year.
    - Number of health care providers that document in medical records the patient's body mass index, blood pressure, lipid profiles, smoking status, and lifestyle counseling (tobacco cessation, physical activity, nutrition).
    - Five percentage points increase in hyperlipidemic patients, with a cardiovascular condition, who had a lipid profile done in the last year.
    - Twenty percentage points increase in hyperlipidemic patients, with a cardiovascular condition, who have cholesterol managed (LDL <100 mg/dl).

Aspirin Therapy Guidelines

Objective 2.3: By 2012, increase aspirin use as recommended by national guidelines among adults.

Strategies:

- Identify data sources for tracking aspirin use.
- Promote and support inclusion of aspirin guideline training into existing professional education and training programs.
- Support distribution of current aspirin guidelines and best practices.
- Develop a system for health plan coupons for Acetylsalicylic acid 81 mg with PCP's name.
- Develop and distribute an educational pamphlet to place in pharmacies next to aspirin 81 mg and to distribute at healthcare screening events.
- Work with health plans to identify health plan incentives.
- Develop and distribute practice guidelines to PCPs.

Outcome Measures:

- Number of events that include guideline education (e.g., annual conferences for PCPs).
- Twenty percent of PCPs have a written policy based on current guidelines from U.S. Preventive Services Task Force regarding the use of aspirin therapy.

- Aspirin guidelines distributed to PCPs.
- Fifty percent of adults with no history of CVD report taking aspirin to reduce the chance of a heart attack or stroke (2009 BRFSS).
- Proportion of patients without clinical evidence of atherosclerotic disease who are at higher CVD risk who were advised to use aspirin.
- Coupon system developed and twenty percent utilization of aspirin coupons per year.

Priority 3: Enhance Adherence to Medication Therapy

Objective 3.1: By 2013, increase by five percentage points adults with high blood pressure who report taking prescribed medication to control high blood pressure from 78.7% (2009) to 83.7%.

Objective 3.2: By 2013, increase by five percentage points adults who report taking prescribed medication to control high blood cholesterol.

Strategies:

- Explore methods to alert PCPs when gaps in appropriate medication use are identified by pharmacist and insurance providers.
- Develop capacity for PCPs to access pharmacy utilization records for individual Medicaid patients.
- Promote establishment and resource management of on-site pharmacies at CHCs (340B).
- Explore use of pay for performance for patients to promote adherence.
- Collaborate with dentists, pharmacists and other health care systems to promote medication adherence.
- Identify effective resources to assist the patient with medication adherence (e.g., educational materials for patients with low health literacy and limited English proficiency).
- Collaborate with partners to develop a coordinated educational campaign about the importance of following treatment regimens as recommended.

Outcome Measures:

- Five percentage points increase among hypertensive adults who report taking prescribed high blood pressure medication from 78.7% (BRFSS 2009) to 83.7%.
- Increase among adults with high blood cholesterol who report taking lipid lowering medication for high blood cholesterol from baseline (HHS 2010).
- Percentage of patients aged 18 years and older with a documented LDL-C greater than or equal to 100 mg/dl and with a prior history of diabetes mellitus, peripheral

artery disease, coronary artery disease, stroke or TIA whose most recent LDL-C level is in control (less than 100 mg/dl).

Priority 4: Increase Detection of High Blood Cholesterol

Objective 4.1: By 2015 increase by five points the percentage of adults in the highest risk groups who received a cholesterol screening during the past 5 years from 74.3% (2009) to 79.3%.

Strategies:

- Encourage health plans to reimburse PCPs for lab charges for cholesterol screenings.
- Encourage health plans to reimburse and/or incentivize members to complete wellness checkups including cholesterol, full lipid panel or cholesterol with high-density lipoprotein (e.g., use of gift cards).
- Promote the reduction or elimination of co-pays or deductibles for blood cholesterol screenings for all patients.
- Develop risk factor educational materials for PCPs and pharmacies (brief, low reading level and appropriate languages).
- Encourage health plans to reimburse PCPs for providing enabling services (e.g., transportation to get to PCPs for routine and follow-up visits).

Outcome Measures:

- Increase by five percentage points among adults with less than high school education, income < $15,000, Filipinos, Native Hawaiians and adults living in Maui County the percent who have had their cholesterol monitored in the last 5 years (BRFSS 2009).

Community

Community-based programs to encourage healthy lifestyle behaviors have the potential to reach large audiences and can be incorporated into multiple settings, including the community at-large, health care organizations, worksites, schools, child care centers, and religious organizations.[17] Community interventions have the advantage of targeting a group of people at greater risk of poor health outcomes and can be tailored in response to the population's knowledge, attitudes, perceptions and socioeconomic circumstances.[18] As an important component of the socio-ecological model, community interventions are important tools in lowering high blood pressure, maintaining those changes[19] and reducing the risk of CVD.[20] With the prevalence of high blood pressure and high blood cholesterol increasing in adults throughout Hawai'i[4], it is important to establish population-based interventions to ensure early detection of CVD risk factors, encourage modification of lifestyle behaviors, and promote self-management of chronic conditions.

Lifestyle Modification

Priority 1: Enhance community resources and education to improve self management among adults at high risk for cardiovascular disease.

Objective 1.1: By 2013, increase by 20 percentage points adults reporting lifestyle changes to lower their high blood pressure and high cholesterol in one or more of the following areas. The baseline numbers below are the prevalence of Hawai'i adults with high blood pressure who report making the following lifestyle changes to lower their high blood pressure:

- changing eating habits from 70% (2009) to 90%.
- eating fruits and vegetables at least 5 times per day
- cutting down on salt from 76% (2009) to 96%.
- exercising from 70% (2009) to 90%.
- reducing alcohol from 34% (2009) to 54%.

Strategies:

Public Education

- Partner with the health care community to develop and promote a public education campaign for all individuals "to know their numbers" including blood pressure and cholesterol.

Self-Management

- Collaborate to increase community capacity to deliver evidence-based programs that supports prevention and management of cardiovascular disease and risk factors among high risk populations. Examples include: *Healthy Heart, Healthy*

Family program for Filipinos, the Partnership for Improving Lifestyle Intervention for Native Hawaiians and other Pacific Islanders and the Stanford Chronic Disease Self Management Program.

- Develop a mechanism to track short and long-term health outcomes of individuals participating in evidence-based self-management programs.
- Identify and collaborate with existing lifestyle modification programs to integrate blood pressure and cholesterol prevention and control information (e.g., Department of Health, Public Health Nursing Learning Collaborative).
- Promote inclusion of health activities (blood pressure screening and lifestyle education) annexed to regular activities at non-traditional settings (e.g., faith-based organizations).
- Utilize community resources to promote the management of high blood pressure and high blood cholesterol and other risk factors for CVD (e.g., AHA *Life's Simple 7)*.
- Identify need for and development of risk factor and lifestyle education materials in Pacific Island languages.

Policy Change

- Promote reimbursement for self-management support provided by pharmacists, community health workers and other healthcare extenders.
- Promote reimbursement of self-monitoring equipment, for example, blood pressure monitoring equipment.
- Promote reimbursement for enabling services (e.g., interpretation and transportation) to encourage patients with risk factors for heart disease and stroke to attend lifestyle intervention opportunities.
- Promote elimination of co-pays or deductibles for members who participate in lifestyle modification trainings.

Education and Training

- Promote training in accurate blood pressure measurement, assessment of CVD risk, and motivational counseling among community health workers and other health care extenders.
- Recruit and train community interpreters to provide CVD risk factor prevention and control education to reduce disparities.

Outcome Measures:

- Number of evidence-based lifestyle education opportunities offered in the state.
- Needs assessment of enabling services, costs and discussion with health plans related to reimbursement of services conducted.
- Health promotion tool kit, for non-traditional organizations (e.g., faith based) developed and disseminated.

- Adults reporting an increase in healthy behaviors to control high blood pressure by at least 20 percentage points (2009 BRFSS).
- Baseline inventory of community-based lifestyle management programs that incorporate high blood pressure and cholesterol prevention and management information.
- System in place at PCPs to screen and manage patients aged 18 years and older for unhealthy alcohol use.

Priority 2: Improve Early Detection of High Blood Pressure

Objective 2.1: By 2016, increase the proportion of adults who have had their blood pressure measured within the preceding 2 years from baseline to 90%.

Strategies:

- Develop a network of non-clinical locations in which regularly scheduled screenings with evening and weekend access is developed and maintained to reach high risk populations (e.g., Food Bank, senior citizen centers and community centers).
- Develop partnerships with health care community (e.g., dieticians, pharmacists and dentists) to develop systems to promote blood pressure screenings.
- Promote training in accurate blood pressure measurement among individuals conducting screenings in the community, such as among community health workers.
- Develop a system to link adults screened and identified with high blood pressure to a primary care provider.

Public Education

- Collaborate with statewide partners on a coordinated social marketing plan targeting high blood pressure and high blood cholesterol to address specific gaps/needs in various communities.
- Develop risk factor educational materials for PCP and pharmacy locations (brief, low literacy and appropriate languages).

Outcome Measures:

- Number of regularly scheduled, non-traditional screening locations established.
- System developed to link adults screened at non-traditional locations with a primary care provider.
- The proportion of adults who have had their blood pressure measured within the preceding 2 years increased from baseline to 90% (HHS 2011).
- A standardized blood pressure measurement program developed.
- Proportion of patients for whom blood pressure measurement is recorded at least once in the last two years increases from baseline to 90%.

Worksite

With American workers spending an average of one-third of their day at work, worksites provide an opportunity to reach large numbers of individuals for the purpose of promoting good health and preventing disease.[21] Recent research suggests that worksite programs have led to improvements in blood pressure, cholesterol, triglycerides and glucose in participants with poorer health status.[22,23] Among chronic diseases, aggregated medical, absence, short-term disability, and average loss of productivity costs per employee per year were highest for hypertension ($392) and heart disease ($368).[24] Furthermore, an estimated 21% to 58% of medical claims are associated with modifiable health risk factors such as poor nutrition, lack of exercise, excess stress and other lifestyle factors.[25] As the economic burden of cardiovascular diseases increases, worksite wellness programs can offer employers improved employee productivity, reduced absenteeism, reduced employee health risks and reduced health care costs.[18]

Priority 1: Improve cardiovascular health through worksite wellness initiatives.

Objective 1.1: By 2015, increase the number of worksites that implement programs and activities to identify, control and manage risk factors for cardiovascular disease.

Objective 1.2: By 2015, increase the number of worksites that provide incentives for employees to complete a health risk assessment (HRA).

Strategies:

- Identify worksites to participate in pilot worksite wellness programs.
- Promote the AHA *Fit Friendly* recognition program for worksites implementing programs to help reduce heart disease.
- Promote the AHA Recommended Nutrition Standards for Procurement of Foods and Beverages Offered in the Workplace.
- Promote and support capacity to deliver evidence-based programs that supports prevention and management of cardiovascular disease and risk factors among high risk populations (e.g., *Healthy Heart, Healthy Family* for Filipinos).
- Promote adoption of strategies in CDC's "Six-Step Guide for Employers" outlining steps employers can take to improve cardiovascular health and prevent heart disease and stroke at the worksite.
- Partner with Hawai'i Health Business Council and other health organizations to promote implementation of annual HRA and screening activities.
- Encourage worksites to educate their employees about their benefit package, including preventive services.

Outcome Measures:

- Number of worksites offering, at least annually, blood pressure screenings.
- Number of worksites using the "Six-Step" guide to implement one or more of the outlined promising practices to reduce the risk of heart disease and stroke.
- Number of worksites trained to provide on-site health and wellness programs (e.g., *Healthy Heart, Healthy Family)*.

Sodium

Excess sodium intake is a primary risk factor for high blood pressure and subsequently, cardiovascular events. Data from the third National Health and Examination Survey shows that high sodium intake is associated with a 20% increased risk of all-cause mortality.[26]

In the United States, consumption of sodium far exceeds recommended daily limits of 2,300 mg per day for the general population. According to the National Health and Nutrition Examination Survey, the average sodium intake for Americans is more than 3,400 mg per day.[27]

The words sodium and salt are not exactly the same, but they are often used interchangeably. Sodium chloride is the chemical name for salt. Table salt is 40 percent sodium and 60% chloride. One level teaspoon of salt is approximately 2,300 mg of sodium. For healthy adults, the current recommendation is to consume no more than 2,300 mg of sodium a day from all sources.[28] The National Heart, Lung, and Blood Institute states that for someone with high blood pressure, the doctor may advise eating less salt and sodium, as recent research has shown that diets of 1,500 mg of sodium had even better blood pressure lowering benefits. These lower-sodium diets also can keep blood pressure from rising and increase the effectiveness of blood pressure medicines.[29]

Unless or until sodium content is regulated by the federal government, the Institute of Medicine strongly recommends that "the food industry, government, professional organizations, and public health partners should work together to promote voluntary collaborations to reduce sodium in foods."[30] This public-private partnership has been established as the National Salt Reduction Initiative (NSRI), spearheaded by the New York City Department of Health and Mental Hygiene. The goal of NSRI is to prevent deaths associated with hypertension by decreasing population sodium consumption by 20% through the gradual reduction of salt in processed and restaurant foods by 25% over five years.[31] Because 77% of Americans' sodium comes from processed and restaurant foods[32], effecting change by targeting these industries has the potential to reduce sodium consumption nationwide.

Priority 1: Reduce Sodium Consumption

Objective 1.1: By 2013, increase access to lower sodium options.

Strategies:

Procurement

- Partner with the Physical Activity and Nutrition Program to promote procurement policies in state and county government agencies to reduce sodium in foods and

beverages sold in public facilities (i.e. cafeterias, vending machines, concession stands, etc.).

Promote Availability and Accessibility of Low Sodium Foods

- Establish a sodium reduction task force to coordinate sodium reduction efforts in the state.
- Partner with restaurant and food manufacturer member organizations to provide education and technical assistance to reduce sodium in prepared and packaged foods.
- Promote the National Salt Reduction Initiative goals and encourage restaurants and food manufacturers to join.
- Promote consumer information labeling on restaurant menus to promote low salt options to consumers.
- Partner with food service establishments to develop and offer low sodium food options for consumers.
- Partner with health care facilities, such as hospitals and skilled nursing facilities, to offer low sodium food options to patients.
- Partner with organizations providing food to low income individuals and families to offer low sodium food options.
- Partner with the business community to established worksite wellness programs to:
  - Assess cost and placement of fresh produce
  - Implement a sodium labeling system to encourage lower salt intake at point of sale
- Promote sodium and other nutrition information be available in all restaurants at point of purchase

Healthcare Providers

- Offer sodium-related consultation/education to patients with high blood pressure or who are at risk for high blood pressure.

Raise Awareness among Consumers, Policy Makers, and the Food Industry

- Use earned media to educate the public and decision makers about the relationships of high salt intake and high blood pressure.
- Partner with the AHA to gain legislative support for a resolution to create awareness of the benefits of reducing dietary sodium intake aimed at decreasing heart disease and stroke.
- Provide sodium awareness education to community-based food programs serving low income groups.

Outcome Measures:

- Policy adopted for procurement of vending machine food sold in public facilities.
- Number of restaurants and packaged food manufacturers who join the National Salt Reduction Initiative.
- Salt reduction resolution developed and adopted by the state legislature.
- Number of worksites that implement sodium reduction activities.
- Number of earned media opportunities.
- Development and distribution of informational packet for decision makers.

Post-acute Care and Rehabilitation

For the 45 million Americans with functional disabilities, heart disease, stroke, and hypertension are among the 15 leading causes of disabilities and stroke remains a leading cause of serious, long-term disability in the United States.[3] In 2005, a survey of stroke survivors in 21 states and the District of Columbia found that less than a third had received outpatient stroke rehabilitation after leaving the hospital.[33] Stroke rehabilitation focuses on restoring functional abilities and returning a stroke survivor to their highest level of independence.[34,35] Cardiac rehabilitation following an acute myocardial infarction is also underutilized, especially among women and the elderly.[3] The benefits of cardiac rehabilitation include reduced mortality, reduced symptoms, improved health-related quality of life, reduced hospitalization and use of medical resources and increased positive lifestyle changes. There are many barriers to post-hospital care that include high cost of services, lack of access to services, lack of social support, patient anxiety, lack of patient/caregiver education, and fragmentation of the existing health care system.[36,37] The availability and accessibility of post-hospital and rehabilitation services is critical for establishing an integrated cardiovascular system of care. The Plan proposes that resources be expanded and policies be changed to improve the post-acute care system.

Priority 1: Sustain a Statewide Collaborative

Objective 1.1: By 2012, establish a sustainable rehabilitation collaborative of representatives from organizations within the rehabilitation community to strengthen the post-acute care system of care in Hawai‘i including secondary and tertiary prevention components.

Strategies:

- Support existing planning committee and develop a mechanism to share responsibility among partners to further develop, coordinate and sustain an on-going rehabilitation collaborative to:
  - Develop data sufficient to assess post-rehabilitation outcomes and establish data sharing agreements to monitor the system of care.
  - Advocate for including International Classification of Functioning (ICF) codes for functionality, impairment and disability among the acute care community.
  - Advocate for payment reform for rehabilitation services.
  - Strengthen partnerships among acute care partners to communicate rehabilitation goals.
  - Strengthen partnerships among insurers to communicate evidence-based rehabilitation outcomes and interventions and assist in established “gold standards” for treatment.

Outcome Measures:

- Collaborative meets a minimum of four times per year.
- Consensus reached on patient outcome data for analysis and tracking.
- Number of policy statements written to improve coverage of rehabilitation services to prevent recurrence and support changes in rehabilitation coding system.
- Number of educational opportunities provided to acute care providers and payers describing rehabilitation goals, the cost and public health implications of not addressing preventable complications and not providing a timely and appropriate level of post-stroke care.

Priority 2: Improve Referral to Rehabilitation

Objective 2.1: By 2013, increase the referral of inpatients with disabling stroke conditions discharged to an appropriate provider of inpatient, outpatient, or home-based rehabilitation by 5%.

Objective 2.2: By 2013, increase the referral of inpatient disabled by congestive heart failure discharged to an appropriate provider of inpatient, outpatient, or home-based rehabilitation by 5%.

Strategies:

- Identify data sources to identify and track patient utilization patterns through different levels of care.
- Identify barriers to referral and utilization of cardiac and stroke rehabilitation services.
- Explore the development of cardiac rehabilitation within non-cardiac protocols at all levels of post-acute rehabilitation.
- Establish a Phase II out-patient cardiac rehabilitation program.
- Conduct a gap analysis of post-acute rehabilitation services.
- Research/establish evidence-based practices and critical care maps with expected outcomes specific to moderate and high risk patients for stroke and MI.
- Create a critical care map outlining the continuum of care status post stroke/MI to educate persons served how rehab services can affect an individual along the road to wellness.
- Explore the development of a cardiac rehabilitation protocol.
- Explore a classification system for rehabilitation facilities (e.g., levels of care designated to facilities, similar to hospital system).

Outcome Measures:

- Increase rehabilitation following stroke by 5% from baseline (HHIC 2009).
- Increase rehabilitation following heart failure by 5% from baseline (HHIC 2009).

Priority 3: Improve Systems for Discharge Planning and Transition of Care

Objective 3.1: By 2014, increase the number of hospitals that use a statewide standardized guideline for hospital discharge to improve the transition of care in all settings (home, SNF, other) from acute care facility from 0 to 14.

Objective 3.2: By 2012, develop a policy statement to advocate for local and national efforts to simplify the administration of prior authorization of durable medical equipment (DME) and resources.

Objective 3.3: By 2013, increase electronic health record capability to improve transitions of care.

Strategies:

- Participate in the current effort to develop a statewide guideline for a care transition intervention model from acute care to home care.
  - Promote the use of the care transition model from acute care to home care once developed.
- Collaborate with discharge planners to develop standardized care transition models for all settings (skilled nursing facility and home health) from acute care facilities:
  - Identify best practices.
  - Improve accuracy and timeliness of DME to patient.
  - Improve transmission time and quality of discharge summary to receiving health care facility.
- Collaborate with healthcare partners to improve communication at hand-off between hospitalists, nursing and discharge planners to post-acute providers.
  - Implement electronic system to support direct, secure messaging for instant communication among healthcare providers.
  - Support implementation of a health information exchange that supports timely and relevant transfer and access to discharge summaries and medical records relevant to care transition.

Outcome Measures:

- Implementation, by all hospitals, of a statewide guideline for care transitions from acute care to home setting.

- Development of statewide guideline for care transition from acute care to other care facilities including SNFs, rehabilitation hospital and others.
- System in place to communicate with post-acute providers and discharge planners at acute care facilities.
- Health information exchange developed and implemented.

Priority 4: Improve Quality of Care Resources

Objective 4.1: Establish a web-based resource for patients and health care professionals to post quality of care initiatives such as evidence-based patient centered care model and best practices.

Strategies:

- Identify collaborators to fund, develop and maintain website.
- Advertise the availability of the website to:
  - Encourage use of best practice (e.g., Minimum Data Set (MDS 3.0)) into the present patient centered care community.
- Promote use of Centers for Medicare and Medicaid Services guidelines for quality initiatives/indicators.

Measureable Outcome:

- Resources identified for the website.
- Web-based resources accessible online.

Priority 5: Improve the System to Provide Patient Education

Objective 5.1: By 2014, increase the coordination of information at discharge to cardiac and stroke patients.

Objective 5.2: By 2014, increase the availability of patient-centered self-management discharge information for stroke and heart disease patients and their caregivers.

Strategies:

- Develop "self-management" models, similar to those developed for diabetes and for caregivers (e.g., lifestyle adaptations, medication management, diet, etc.).
- Encourage use of electronic health record decision support.
  - Provide self-management tools on a website.

Outcome Measures:

- Self-management models developed collaboratively with partners.
- Self-management tools available online.

Priority 6: Enhance Systems to Provide for Professional Education

Objective 6.1: By 2012, link with acute care hospitals to integrate and improve coordination among acute and post-acute services to better understand the role of acute/post-acute care and primary care common goals.

Strategies:

- Develop a standardized Rehab presentation in multiple formats.
- Explore opportunities to engage sponsors to fund educational sessions to present Rehab presentation to professionals.
- Establish a web hub for sharing educational opportunities.

Outcome Measures:

- Presentation developed collaboratively with the rehab community.
- Funding obtained to provide educational opportunities.
- Number of acute care providers attending rehab information sessions.

Objective 6.2: By 2012, develop policy statements that encourage incorporation of medical rehab in curricula at nursing schools, medical schools and therapy schools that include an internship with a rehab focus.

Strategies:

- Collaborate with partners to:
  - Identify existing policy.
  - Expand medical and allied health education programs.
  - Establish a school of physical therapy.
  - Develop a transitional physical therapy program for assistant physical therapists.

Outcome Measures:

- Number of policy statements developed.

Surveillance, Monitoring and Evaluation

Priority 1: Enhance the scientific capacity to define the burden of heart disease, stroke and related risk factors.

Objective 1.1: By 2012, increase the capacity to evaluate the statewide cardiovascular disease burden.

Strategies:

- Develop evaluation capacity.
- Identify new data resources as needed to monitor implemented strategies.
- Support the addition of questions on a statewide surveillance survey (Hawai'i Health Survey).
- Support the addition of modules to the annual Hawai'i Behavioral Risk Factor Surveillance Survey (BRFSS).
- Identify gaps in the current surveillance system and the resources needed to gain a comprehensive understanding of the burden of heart disease, stroke, and related risk factors; prioritize needs for addressing gaps.
- Partner with healthcare payers and providers to access and utilize health care transaction and EMR data to improve the quality of the services delivered and to provide a comprehensive picture of health status and health care service delivery across the state.
- Develop an assessment of the financial burden of heart disease, stroke and related risk factors, including years of productive life lost and loss of time from work.
- Use surveillance data to identify high risk priority populations for heart attack, stroke, heart failure, and ischemic and hemorrhagic stroke.

Plan Evaluation

The state Plan promotes policy and system change approaches to heart disease and stroke prevention in an effort to influence and support healthier behaviors and practices by all parties involved. As organizations implement activities related to cardiovascular health promotion and prevention, they will be encouraged to develop program evaluations that validly assess their interventions' reach (the extent to which a program reaches its target population) and impact (the intervention's ability to affect people, organizations, and systems to influence individual health and achieve broader public health goals). This process will involve monitoring short term outcomes as well as monitoring state mortality data, risk factor data, and health care transaction data related to CVD and its outcomes.

Plan Objectives and HP 2020 Goals

Plan Goals	HP 2020 Objective	HP 2020 Target
Reduce the age-adjusted CHD death rate in the state of Hawai'i from 78 (2009) to 70 per 100,000.	HDS-2	100.8/100,000
Reduce the age-adjusted CHD death rate in Native Hawaiian males from 160 (2008-2009) to 144 per 100,000.	HDS-2	100.8/100,000
Reduce the age-adjusted CHD death rate in Filipino males from 154 (2008-2009) to 139 per 100,000.	HDS-2	100.8/100,000
Reduce the age-adjusted CHD death rate in Hawai'i County from 93 (2009) to 84 per 100,000.	HDS-2	100.8/100,000
Reduce the age-adjusted CHD death rate in Maui county from 89 (2009) to 80 per 100,000.	HDS-2	100.8/100,000
Reduce the age-adjusted stroke death rate in the state of Hawai'i from 39 (2009) to 35 per 100,000.	HDS-3	33.8/100,000
Reduce the age-adjusted stroke death rate in Native Hawaiian males from 47 (2008-2009) to 42 per 100,000.	HDS-3	33.8/100,000
Reduce the age-adjusted stroke death rate in Native Hawaiian females from 38 (2008-2009) to 34 per 100,000.	HDS-3	33.8/100,000
Reduce the age-adjusted stroke death rate in Filipino males from 59 (2008-2009) to 53 per 100,000.	HDS-3	33.8/100,000
Reduce the age-adjusted stroke death rate in Filipino females from 57 (2008-2009) to 51 per 100,000.	HDS-3	33.8/100,000
Reduce the age-adjusted stroke death rate in Hawai'i County from 43 (2008-2009) to 39 per 100,000.	HDS-3	33.8/100,000
Reduce the age-adjusted stroke death rate in Kaua'i County from 46 (2008-2009) to 41 per 100,000.	HDS-3	33.8/100,000
Increase the proportion of adults who have had their blood pressure measured within the preceding 2 years from baseline to 90%.	HDS-4	Developmental
Increase proportion of acute cardiac arrests in which appropriate CPR is administered by bystander.	HDS-18	Developmental
Increase the proportion of acute cardiovascular events in which bystanders use an AED to administer the first therapeutic electrical shock within best practice guidelines after collapse.	HDS-18	Developmental
Increase by 5% the percentage of all adults who can correctly identify the 5 symptoms of heart attack, stroke and calling 9-1-1 as first choice for an emergency.	HDS-16.1	43.1%
	HDS-16.2	46.2%
	HDS-16.3	94.9%
• Awareness of all 5 symptoms of heart attack: 30.6% (2009) to 35.6%.	HDS-17.1	Developmental
	HDS-17.2	Developmental
• Awareness of all 5 symptoms of stroke: 41.9% (2009) to 46.9%. • Would call 9-1-1 as the first choice for heart attack or stroke: 89.6% (2009) to 94.6%.	HDS-17.3	Developmental

Plan Goals	HP 2020 Objective	HP 2020 Target
Increase the proportion of STEMI patients given percutaneous coronary intervention (PCI) within 90 minutes of hospital arrival.	HDS-19.2	97.5%
Increase the proportion of stroke patients that receive tissue plasminogen activator (IV tPA) treatment within best practice.	HDS-19.3	Developmental
Increase the proportion of adults (18-85) with hypertension whose blood pressure is under control from 46% (Medicaid 2011) to 66%.	HDS-12	61.2%
Increase the proportion of adults (18-75) with heart disease whose cholesterol is under control from 38% (Medicaid 2011) to 58%.	HDS-20.1	Developmental
Increase aspirin use as recommended by national guidelines among adults.	HDS-15.1	Developmental
	HDS-15.2	Developmental
	HDS-21	Developmental
Increase proportion of adults who report taking prescribed medication to control high blood pressure from 78.7% (2009) to 83.7%.	HDS-11	77.4%
Increase proportion of adults who report taking prescribed medication to control high blood cholesterol.	HDS-14.4	Developmental
Increase the percentage of adults in the highest risk groups who received a cholesterol screening during the past 5 years from 74.3% (2009) to 79.3%.	HDS-6	82.1%
Increase the proportion of adults reporting lifestyle changes to lower their high blood pressure and high cholesterol. • changing eating habits from 70% (2009) to 90%. • eating fruits and vegetables at least 5 times per day. • cutting down on salt from 76% (2009) to 96%. • exercising from 70% (2009) to 90%. • reducing alcohol from 34% (2009) to 54%.	HDS-14.1	Developmental
	HDS-14.2	Developmental
	HDS-14.3	Developmental
Increase the proportion of adults who have had their blood pressure measured within the preceding 2 years.	HDS-4	94.9%
Increase the referral of inpatients with disabling stroke conditions discharged to an appropriate provider of inpatient, outpatient, or home-based rehabilitation by 5%.	HDS-23	Developmental

Acronyms

AED	Automated external defibrillator	HMSA	Hawai'i Medical Service Association
AHA	American Heart Association	HP	Healthy People
AIDS	Autoimmune deficiency syndrome	HRA	Health risk assessment
APR-DRG	All patient refined diagnosis related groups	ICD	International Classification of Diseases
ATP	Adult Treatment Panel, Cholesterol Guideline	ICF	International Classification of Functioning
BRFSS	Behavioral Risk Factor Surveillance System	JNC	Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
CARES	Cardiac Arrest Registry to Enhance Survival	LDL	Low-density lipoprotein
CDC	Centers for Disease Control and Prevention	LDL-C	Low-density lipoprotein cholesterol
CHC	Community health center	MDS	Minimum Data Set
CHD	Coronary heart disease	MI	Myocardial Infarction
CPR	Cardiopulmonary resuscitation	MU	Meaningful Use
CV	Cardiovascular	NHANES	National Health and Nutrition Examination Survey
CVD	Cardiovascular disease	NHHS	Native Hawaiian Health System
DME	Durable Medical Equipment	NI	Neighbor Island
DOH	Department of Health	NSRI	National Sodium Reduction Initiative
EHR	Electronic Health Records	PCI	Percutaneous coronary intervention
EMS	Emergency medical services	PCMH	Patient centered medical home
F & V	Fruits and vegetables	PCP	Primary care provider
GWTG	Get With the Guidelines	SNF	Skilled nursing facility
HDS	Heart Disease and Stroke	STEMI	ST-segment elevation myocardial infarction
HDSPP	Heart Disease and Stroke Prevention Program	TBD	To be determined
HEDIS	Healthcare Effectiveness Data and Information Set	TIA	Transient Ischemic Attack
HHIC	Hawai'i Health Information Corporation	tPA	Tissue plasminogen activator
HHS	Hawai'i Health Survey	USPSTF	United States Preventive Services Task Force
HIV	Human Immunodeficiency Virus		

Data Sources

Mortality Data

Hawai'i mortality data is collected, processed and analyzed at the Hawai'i State Department of Health Office of Health Status Monitoring. Information from death certificates is used to analyze mortality data and assesses underlying causes of death. Underlying causes of death are grouped according to the International Classification of Diseases (ICD), Version 10. Refer to the table below for detailed information on cardiovascular ICD-10 groupings:

International Classification of Diseases (ICD) Coding for Cardiovascular Diseases	
Major CVD	I00-I78
Heart Disease	I00-I09, I11, I13, I20-I51
Coronary Heart Disease	I11, I20-I25
Ischemic Heart Disease	I20-I25
Acute Myocardial Infarction	I21-I22
Heart Failure	I50
Stroke	I60-I69

The mortality rate is calculated by dividing the number of CVD deaths by the total population size in a particular year and multiplying by 100,000. The mortality rate will take into account changes in the population size. Mortality rates in this plan are age-adjusted. This is done because the risk of dying of cardiovascular disease generally increases with age. As a result, various groups within a population that tend to be older appear to possess a higher rate. Age-adjusting is a statistical technique that allows comparison of rates between populations by removing the effect of various age distributions that may exist within those populations. Age-adjustment also enables comparison of the rates in this plan to rates in other states and the nation. In this plan, mortality rates are adjusted to the 2000 U.S. standard population. Data comparisons should be limited to data adjusted to the same standard population. In some cases, age-adjusted mortality rates may be calculated using more than one year of data to increase the stability of the rate due to fluctuations in the population estimates of various age groups.

For more information on Hawai'i vital statistics data please visit http://Hawai'i.gov/health/statistics/vital-statistics/index.html or www.hhdw.org

Hospital Discharge Data

HHIC is a private, not-for-profit corporation established in 1994. It maintains one of Hawaii's largest healthcare databases, which contains over 2.2 million inpatient discharge records collected from Hawaii's 25 acute care hospitals for each year since 1994. These discharge records contain patient demographic information, hospital visit costs and duration, and patient diagnosis using the International Classification of Diseases (ICD), Version 9 (ICD-9) codes and by Diagnostic Related Codes (APR-DRG). The Department of Health (DOH) has a

subscription to view aggregated and de-identified patient data. For more information, refer to: http://hhic.org/.

International Classification of Diseases (ICD) Coding for Cardiovascular Diseases	
Major CVD	390-459
Heart Disease	390-398, 402, 404, 410-429
Coronary Heart Disease	402, 410-414, 429.2
Ischemic Heart Disease	410-414
Acute Myocardial Infarction	410
Heart Failure	428
Stroke	430-434, 436-438

Prevalence and Risk Factor Data

Data on cardiovascular disease prevalence and risk factors comes from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an annual telephone survey of non-institutionalized adults (≥ 18 years) in the United State which has been conducted in all the states and territories since 1988. The BRFSS assesses risk factors for diseases and conditions related to the leading causes of death in the U.S. population.

For more information on Hawai'i BRFSS data, please visit http://Hawai'i.gov/health/statistics/vital-statistics/index.html or www.hhdw.org

Healthy People 2020

The *Healthy People* is a national initiative which began over three decades ago and identifies health improvement goals and objectives for the nation. The Department of Health and Human Services' *Healthy People 2020* includes twenty-four objectives related to heart disease and stroke. These objectives can be found online at http://www.healthypeople.gov/2020/topicsobjectives2020/pdfs/HeartDiseaseStroke.pdf. There are some instances in which the data source for national data, such as the National Health and Nutrition Examination Survey (NHANES), will define an indicator in a slightly different way than state data sources. For example, HP 2020 indicator HDS-5.1 refers to the proportion of adults with hypertension. The national data source, NHANES, defines this indicator as the proportion of adults who have systolic blood pressure ≥ 140 mmHg, have a diastolic blood pressure ≥ 90 mmHg or report that they are taking high blood pressure medication.[38] The Hawai'i state data source, BRFSS, measures this indicator as the proportion of adults who self-reported that a doctor, nurse, or other health professional told them they have high blood pressure.[4]

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