

# An Assessment of Non-Communicable Diseases, Diabetes, and Related Risk Factors in the Territory of American Samoa: A Systems Perspective

Henry M. Ichiho MD, MPH; Faiese T. Roby DCHMS, MBBS; Elisapeta S. Ponausua MPA; and Nia Aitaoto MPH, MS

## Abstract

*Non-communicable diseases (NCD) have been identified as a health emergency in the US-affiliated Pacific Islands (USAPI).<sup>1</sup> This assessment, funded by the National Institutes of Health, was conducted in American Samoa and describes the burden of selected NCDs (ie, diabetes, heart disease, hypertension, stroke, and chronic kidney disease); and assesses the system of service capacity and activities regarding service delivery, data collection and reporting as well as identifies the issues needing to be addressed. Findings reveal that nutrient-poor diet, lack of physical activity, and other lifestyle behaviors are associated with overweight and obesity and subsequent NCDs that impact the morbidity and mortality of the population. The leading causes of death include heart disease, diabetes, cancer and stroke. Population surveys show that 93% of the adults are overweight or obese and 47% have diabetes. Among public school children, 44.6% are overweight or obese. Other data show that between 2006 and 2010, there was a 33% increase in the number of patients receiving hemodialysis. Other findings show significant gaps in the system of administrative, clinical, data, and support services to address these NCDs. There is a paucity of health plans, policy and procedure manuals, coordination among providers, and lack of common standards of care. The combined administrative and clinical system of service needs were identified and prioritized. They include the need for a Territory-wide health strategy and plan, need for standards of care, and a need for collaborative team approach for the treatment and management of patients with diabetes and other chronic diseases.*

## Introduction

This paper presents findings from an assessment of the capacity of the administrative, clinical, support, and data systems to address the problems of NCDs, including diabetes and its risk factors, in the Territory of American Samoa during January 24–28, 2011. Data and information were obtained through review of existing plans, reports, and documents; interviews were conducted with selected key informants; issues and needs were identified and groups of clinicians and administrators were used to define the priorities. (See article in this issue: *Assessing the System of Services for Chronic Diseases Prevention and Control in the US-affiliated Pacific Islands: Introduction and Methods*).<sup>2</sup> This work was funded by the National Institutes of Health, National Institute on Minority Health and Health Disparities.

## Geography of the Territory of American Samoa

American Samoa is a territory of the United States and consists of a group of seven islands in the southern Pacific Ocean located 2,600 miles southeast of Hawai'i and 1,800 miles northeast of New Zealand. The total land area of American Samoa is approximately 76 square miles (200 square km). Tutuila, the largest island of the group, covers an area of 55 square miles (143 square km) and is home to Pago Pago, the political and commercial center of the Territory of American Samoa. Aunu'u

Island is one mile off the southeast tip of Tutuila (a 15-minute ferry ride), with a land mass of 0.6 square miles and one village with a population of 476 residents. Sixty miles east of Tutuila is the Manu'a Island group (a 30-minute airplane ride) that includes the volcanic islands of Ofu and Olosega, connected by a bridge, and the Island of Ta'u. These islands are sparsely populated, with a population of 1,378 residents, and each village having a few hundred residents. The Swains Island is a privately-owned coral atoll located 214 miles north of Tutuila with approximately 1.25 square miles of land mass and a population of 37 residents. Swains Islanders raise coconuts and grow bananas, taro, breadfruit and papaya, and supplement their diet with fish from outside of Swains' reef. Rose Island (coral atoll) lies 78 miles east of Ta'u with a land mass of 0.1 square miles, is uninhabited and is named a US national monument.<sup>3-5</sup>

## Population Characteristics

Based on the analysis of the 2000 Population Census and the 2010 Preliminary Census, there has been a decline of 1,824 residents (3.2%) in the total population of American Samoa between the two census enumerations.<sup>6,7</sup> The data for specific age groups reveal that the largest proportion of the decline is among those under 15 years of age and those between 25–34 years of age. A possible reason for the decline in these age groups is that families with young children are emigrating out of American Samoa to other locations for military service, education, and employment opportunities. Of the total 2010 population, there were 27,891 males (50.2%) and 27,576 females (49.7%). Overall, the population of American Samoa is relatively young with over one-half (53%) being less than 20 years of age.<sup>7</sup> American Samoa is divided into four geo-political districts: Western District, Eastern District, Manu'a District, and Swains Island District. The 2000 census population distribution for these districts showed that there were 32,435 residents (56.6%) in the Western District, 23,441 residents (40.9%) in the Eastern District, 1,378 (2.4%) in the Manu'a District, and 37 residents (0.06%) in the Swains Island District.<sup>6</sup>

The number of American Samoan residents in poverty is high based on US standards with a primary factor being the lower minimum wages when compared to the United States. In examining the 1999 poverty status of residents, 61% of all individuals in American Samoa live in poverty; with 47.9% of residents 65 years and older and 66.5% of all the related children 0–17 years of age living in poverty.<sup>7</sup> Additionally, 58.3% of the families are below the poverty level; including, 62.2% of families with related children under 18 years of age and 67.3% of families with related children under 5 years.<sup>8</sup>

Age	2000	2010	Difference	Percent
<5	7820	5486	-2334	-29.8
5-9	7788	4670	-3118	-40.0
10-14	6604	5279	-1325	-20.1
15-19	5223	6982	1759	33.7
20-24	4476	4444	-32	-0.7
25-34	8707	7694	-1013	-11.6
35-44	7361	8050	689	9.4
45-54	4733	6914	2181	46.1
55-64	2678	3652	974	36.4
65-74	1345	1643	298	22.2
75-84	465	522	57	12.3
85+	91	131	40	44.0
Total	57291	55467	-1824	-3.2

Data source: US Census Bureau, 2000 Census of Population and Housing, American Samoa<sup>6</sup> and US Census Bureau, Mid-Year Population, American Samoa<sup>7</sup>

### Mortality and Morbidity Data

The 2008 American Samoa Statistical Yearbook shows that there were 267 total deaths in 2006, 251 deaths in 2007, and 240 deaths in 2008. These mortality data were aggregated for 2006-2008 and crude mortality rates per 100,000 population were calculated based on the American Samoa 2000 census of 57,291 residents. The overall crude mortality rate for 2006-2008 was 1,323.1/100,000 population. The leading causes of death were malignancy (190.3), followed by diabetes (172.8), heart disease (160.6), cerebrovascular accident (141.4), and influenza/pneumonia (92.5). When the proportions of the deaths due chronic diseases or related conditions (heart disease, diabetes, cancer, CVA, hypertension) are aggregated for each year, these conditions accounted for 51.3% of all deaths in 2006, 53.4% in 2007, and 57.5% of the deaths in 2008 (data not shown). These data punctuate the deleterious effect that NCDs, diabetes and its related chronic conditions have on death rates in American Samoa.

### Population-Based Surveillance Data

*NCD Risk Factors STEPS Report.*<sup>9</sup> The American Samoa NCD STEPS survey, conducted between June and August 2004, was a population-based, territory-wide, cross-sectional assessment of key chronic diseases and their risk factors in adults aged 25 - 64 years. The sample was 2,072 adults representing five large villages (Leone, Malaemimi, Pagopago, Malaeloa, Pavaiai) and five small villages (Utulei, Olosega, Faganeanea, Fagasa, Asili). Of these respondents, 966 (46.6%) were men and 1,106 (53.4%) were women.

The data on smoking, alcohol use, diet and physical activity show that the proportion of respondents who report current smoking was 39.4% with 29.9% reporting daily smoking. Almost two-thirds (63.5%) of adults drank alcohol in the past 12 months with a higher proportion of men (72.7%) reporting alcohol use compared with women (41.3%). Among current alcohol consum-

Cause of Death	2006	2007	2008	2006-2008	Rate <sup>a</sup>
Malignancy	33	35	41	109	190.3
Diabetes	35	32	32	99	172.8
Heart Disease	44	31	17	92	160.6
Cerebrovascular	13	26	42	81	141.4
Flu/pneumonia	20	20	13	53	92.5
Septicemia	0	8	25	33	57.6
Hypertension	12	10	6	28	48.9
COPD <sup>b</sup> /pulmonary	8	11	4	23	40.1
Accident	12	11	0	23	40.1
Ill defined/other	90	67	60	217	378.8
Total	267	251	240	758	1323.1

<sup>a</sup>Crude mortality rate/100,000 population. <sup>b</sup>COPD – Chronic obstructive pulmonary disease. Data Source: American Samoa Statistical Yearbook 2008<sup>8</sup>

Risk Factor	% Total	% Male	% Female
Current smoker	39.4	49.0	29.7
Daily smoker	29.9	38.1	21.6
Current alcohol use	63.5	72.7	41.3
Binge drinking	-	49.6	33.9
Consume <5 servings fruit/veg	86.7	87.9	85.6
Low activity	62.2	58.6	66.0
Overweight (BMI 25-29.9)	18.9	23.5	14.2
Obese (BMI ≥30)	74.6	69.3	80.2
Overweight + Obese	93.5	92.7	94.4
Hypertension (≥140/90 or meds)	34.2	40.9	27.5
Elevated cholesterol (≥200mg/dl)	23.4	23.1	23.7
Diabetes (≥110mg/dl)	47.3	52.3	42.4

Data Source: WHO and American Samoa Government, NCD Risk Factors STEPS Report<sup>9</sup>

ers, 49.6% of men and 33.9% of women reported binge drinking. Overall, 86.7% of the survey respondents reported consuming fewer than 5 servings of fruits and vegetables per day. Physical activity was measured based on respondents' reports of the frequency and amount of different types of activities as part of work, travel, and leisure on a typical day. These measurements were then categorized into high, moderate, and low activity. Overall 62.2% of the respondents had low physical activity with men being less likely to have low physical activity than women, 58.6% and 66.0%, respectively. Additionally, 35.4% of the respondents engaged in moderate-intensity physical activity, while only 2.4% engaged in high-intensity physical activity.

The physical measures included weight and height to determine the body mass index (BMI) and blood pressure. Overall, 93.5% of the survey population was overweight or obese, with no significant difference by gender. The prevalence of hypertension was 34.2% of the total population with a significant gender difference, 40.9% among men and 27.5% among women.

The overall prevalence of diabetes, based on measurements of capillary blood, among 25-64 year old adults in American Samoa is 47.3% with a slightly higher prevalence in men (52.3%) than women (42.4%).

The risk factors of daily smoking, being overweight or obese, high blood pressure, consuming fewer than 5 servings of fruits and vegetables, and low level of physical activity were identified for each participant to classify them into NCD risk categories high (3-5 risk factors), moderate (1-2 risk factors), and low (no risk factors). Using these five critical risk factors, 71.8% of the study population was at high risk, 27.8% at moderate risk and only 0.4% at low risk for developing a chronic disease. Men were more likely than women to be classified as high risk, 76.6% and 67.2%, respectively.

### Data on Risk Factors for NCDs Prevalence of Overweight in American Samoan Schoolchildren

In May 2009, the American Samoa Obesity Study Committee, under the direction of staff from the American Samoa Community College, Community and Natural Resources completed

a report to the Directors of the Department of Health and the Department of Education, *Prevalence of Obesity in American Samoan Schoolchildren, 2008/2009 School Year*. This report revealed that the prevalence of overweight and obese children and adolescents in American Samoa is much higher than in the United States. Overall, 55.6% of all the students in public schools in American Samoa were either overweight or obese; although the prevalence was lower for young students, it increased considerably with age.<sup>10</sup>

The data on the weight measurements of students by gender and grade level show that roughly 44% of the children in Kindergarten and 2nd and 3rd grade were overweight or obese. The data also reveal that the proportion of overweight and obese children increased so that by the 11th grade, 71.3% of the children were overweight or obese. By gender, the proportion of boys in the overweight or obese category is slightly higher as compared to the girls from Kindergarten through the 3rd grade; however, in the 5th to 11th grade, the proportion of girls in the overweight or obese categories is higher as compared to the boys in the same grade.<sup>10</sup>

Combined Risk	% Total	% Male	% Female
High Risk (3-5 factors)	71.8	76.6	67.2
Moderate Risk (1-2 factors)	27.8	22.9	32.4
No risk (0 factors)	0.4	0.5	0.4

<sup>a</sup>NCD Risk Factors - Daily smoking, being overweight or obese, high blood pressure, consuming fewer than 5 servings of fruits and vegetables, and low level of physical activity. Data Source: WHO and American Samoa Government, NCD Risk Factors STEPS Report<sup>9</sup>

Grade	K	2	3	5	6	8	9	11
Boys	43.8	43.5	44.2	49.7	54.4	56.3	59.6	68.1
Girls	43.1	39.1	43.5	51.2	56.8	65.5	69.6	74.5
Total	43.5	41.3	43.9	50.0	55.6	60.9	64.6	71.3

Data source: Vargo D.<sup>10</sup>

Gender	Age	Underweight	Healthy Weight	Overweight	Obese	Total
Female	2	13 (2.2%)	390 (66.1%)	123 (20.8%)	64 (10.8%)	590
	3	9 (1.4%)	391 (62.8%)	140 (22.5%)	83 (13.3%)	623
	4	14 (1.6%)	569 (63.8%)	172 (19.3%)	137 (15.4%)	892
	5	1 (2.7%)	23 (62.2%)	3 (8.1%)	10 (27.0%)	37
	Total	37 (1.7%)	1,373 (64.1%)	438 (20.4%)	294 (13.7%)	2,142
Male	2	14 (2.4%)	411 (70.1%)	97 (16.6%)	64 (10.9%)	586
	3	9 (1.5%)	404 (66.3%)	109 (17.9%)	87 (14.3%)	609
	4	16 (1.9%)	523 (61.5%)	157 (18.4%)	155 (18.2%)	851
	5	0 (0.0%)	17 (45.9%)	5 (13.5%)	15 (40.5%)	37
	Total	39 (1.9%)	1,355 (65.1%)	368 (17.7%)	321 (15.4%)	2,083
All children	2	27 (2.3%)	801 (68.1%)	220 (18.7%)	128 (10.9%)	1,176
	3	18 (1.5%)	795 (64.5%)	249 (20.2%)	170 (13.8%)	1,232
	4	30 (1.7%)	1,092 (62.7%)	329 (18.9%)	292 (16.8%)	1,743
	5	1 (1.4%)	40 (54.1%)	8 (10.8%)	25 (33.8%)	74
	Total	76 (1.8%)	2,728 (64.6%)	806 (19.1%)	615 (14.6%)	4,225

Data source: Personal communication, D. Vargo (January 26, 2011).

### Children 2-5 Years Receiving WIC Services, 2009

The American Samoa Department of Human and Social Services administers the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC provides nutritious foods, nutrition education, and referrals to health and other social services to participants at no charge. WIC serves low-income pregnant, postpartum, and breastfeeding women and infants and children up to age 5 who are at risk for nutritional deficiencies. D. Vargo from the American Samoa Community College in an interview on January 26, 2011 provided an analysis of the WIC program data.

Among the 4,225 children between 2-5 years of age participating in WIC, 33.7% were overweight or obese, 34.1% of the girls and 33.1% of boys. The data for BMI percentile categories by age groups show that at 2 years of age, 68.1% of the children were in the healthy BMI-for-age category and the proportion of healthy weight children decreased with age so that, by age 5, the proportion of children in the healthy category decreased to 54.1%. At the same time the proportion of children in the combined overweight and obese categories increased with age. At 2 years of age, 29.6% of the children were overweight or obese compared to 44.6% by 5 years of age. Additionally, during the time period from 2 to 5 years, the proportion of overweight

children decreased from 18.7% to 10.8% while the proportion of obese children increased from 10.9% at age 2 to 33.8% at age 5.

In summary, it appears that, as the children's age increases, the proportion of children in the obese category increases as overweight children eventually become obese and normal weight children become overweight or obese. Thus, the increase in the combined overweight and obese category is due largely to increases in the obese category.

### American Samoa High School Youth Risk Behavior Survey

The American Samoa Department of Education conducted the Youth Risk Behavior Survey (YRBS) with 3,625 students in six public high schools in grades 9–12 during 2007. For tobacco, 56.8% of students have ever tried cigarette smoking, compared to 50.3% of US students, and 16.8% smoked their first cigarette before 13 years of age. Moreover, 9.1% reported smoking on 20 or more days in the last 30 days and 11.8% reported smoking more than 10 cigarettes per day. Interestingly, 84.5% of the students who smoke reported having tried to quit smoking cigarettes, compared to 48.7% of the US students, during the past 12 months.<sup>11,12</sup>

Risk Behavior	American Samoa <sup>11</sup>	United States <sup>12</sup>
Ever tried cigarette smoking	56.8%	50.3%
Smoked first cigarette before age 13	16.8%	14.2%
Smoked at least 1 cigarette in past 30 days	24.2%	20.0%
Smoked on 20 or more days in the last 30 days	9.1%	8.1%
Smoked more than 10 cigarettes per day	11.8%	10.7%
Tried to quit smoking cigarettes during the past 12 months	84.5%	49.7%

Data source: Centers for Disease Control and Prevention, Youth Online: High School YRBS, American Samoa<sup>11</sup> and Centers for Disease Control and Prevention, Youth Risk Behavior Surveillance, United States 2007<sup>12</sup>

Risk Behavior	American Samoa <sup>11</sup>	United States <sup>12</sup>
Overweight (BMI ≥95%)	19.9%	15.8%
Obese (BMI ≥85% and <95%)	38.6%	13.0%
Slightly or very overweight (Self-reported)	22.6%	29.3%
Exercise to lose or keep from gaining weight	68.4%	60.9%
Eating fewer calories	48.2%	40.6%
Stopped eating for 24 hours	28.6%	11.8%
Took diet pills, powders, liquid	13.5%	5.9%
Vomited or took laxatives	14.2%	4.3%
Ate fruits and vegetables five or more times a day during the past seven days.	27.2%	21.4%
Watched three or more hours of TV on an average school day	34.9%	35.4%
Played video or computer games three or more hours per day	25.4%	24.9%
Played on one or more sports teams during the past 12 months	64.3%	56.3%
Physically active for a total of at least 60 minutes per day on five or more of the past seven days.	22.8%	34.7%

Data source: Centers for Disease Control and Prevention, Youth Online: High School YRBS, American Samoa<sup>11</sup> and Centers for Disease Control and Prevention, Youth Risk Behavior Surveillance, United States 2007<sup>12</sup>

Being overweight or obese are significant problems affecting adolescents in American Samoa. The results of the 2007 YRBS, comparing American Samoan student with US students, showed that 22.6% of the American Samoan students self-reported themselves as slightly or very overweight, compared to 29.3% US students, while 19.9% were overweight, compared to 15.8% of US students, and 38.6% were obese, compared to 13.0% of US students. In contrast, 64.3% of the American Samoan students reported playing sports compared to 56.3% of the US students.<sup>11,12</sup>

## Diabetes Specific and Related Data

### Diabetes Prevalence

According to the 2004 NCD STEPS survey, 47.3% of those surveyed had diabetes based on capillary blood measurements and the total prevalence is represented in large part by persons who were newly diagnosed (41.1%).<sup>9</sup> Prevalence of diabetes increases with age from 29.9% in those 25-34 years to 69.7% among those 55-64 years.

### Diabetes and Tuberculosis

The number of patients with tuberculosis was obtained in an interview with F. Yandall, Coordinator of the Tuberculosis Program, on January 29, 2011. There are few documented cases of patients with active tuberculosis infections in American Samoa—three cases in 2007, four in 2008, and three in 2009. Of the three patients in 2009, two had been diagnosed with, and are being treated for diabetes.

### Renal Dialysis

Information and data on the staffing and patients receiving services were obtained in an interview with O. Tafiti, Supervisor of the Dialysis Unit, on January 27, 2011. The Renal Dialysis Unit at the Lyndon B. Johnson Tropical Medical Center (LBJ) currently operates 16 dialysis units. There is a staff of 12 licensed and certified RNs, LPNs, and Hemodialysis Technicians who provide the services for patients. On Monday, Wednesday, and Friday an average of 64 patients are dialyzed per day; while on Tuesday and Thursday 46 patients per day are treated. From 2006 to 2008, a total of 848 patients, 822 patients, and 866 patients, respectively, received hemodialysis. In 2009, the number of patients increased to 957 patients and, in 2010, the number of patients receiving hemodialysis further increased to a total of

1,127 patients. Between 2006 and 2010, there has been a 33% increase in the number of patients receiving hemodialysis. These data represents only residents who receive services at LBJ because no data exist for patients who are treated off-island. Because of this increasing number of patients with end-stage renal disease requiring dialysis treatment, there are plans to expand the unit and add an additional seven hemodialysis stations to meet the demand.

## Description of the Administrative System Legislation and Regulations

Currently, there are no legislation or regulations in place specific to food safety, food importation, nutrition, physical activities, or other public health responsibilities for the prevention and control of diabetes and other chronic diseases. On October 21, 2010, a landmark legislation, the Smoke Free Environment Act (H.B. No. 31-48 Public Law No. 31), was signed into law that bans smoking in restaurants, bars, taxis, buses, and other public and private locations. The law further stipulates that the Department of Health shall function as the lead agency for implementation, management, and enforcement of the Act and that the Director of Health shall adopt regulations in accordance with the Administrative Procedures Act to implement this law and to provide for its effective and efficient administration.

Diabetes control is a priority in American Samoa as evidenced by the Proclamation for Diabetes Awareness Month in November, 2010. The Proclamation recognized that: (1) Diabetes has reached epidemic proportions with over 6,000 diagnosed diabetics in American Samoa and, if conditions do not change, one in three children born today will face a future with diabetes; and (2) The people of American Samoa can take steps to control the disease and lower the risk of complications, such as heart disease, stroke, and kidney disease, by maintaining healthy eating and exercise habits. Therefore, the Governor called upon all the people of American Samoa to learn more about the risk factors and symptoms associated with diabetes, and to observe the Diabetes Awareness Month with appropriate programs and activities.

### Planning Documents

There are no overall planning documents at the Department of Health for the prevention and control of NCDs, to include diabetes. Consultants from the World Health Organization

Age	Previously Diagnosed and on Medication		Blood Glucose $\geq 110$ mg/dl and NOT on Medication		Total Prevalence	
	n	%	n	%	n	%
25-34	4	0.6	162	29.3	166	29.9
35-44	20	2.9	281	46.7	301	49.6
45-54	57	12.5	223	48.3	280	60.9
55-64	62	19.6	141	49.2	203	69.7
Total	143	6.0	807	41.1	950	47.3

Data source: WHO and American Samoa Government, NCD Risk Factors STEPS Report<sup>9</sup>

(WHO) and the Secretariat of the Pacific Community (SPC) are working with the administration of the Department of Health to plan a summit to develop a strategic plan to address the issues identified in the American Samoa NCD STEPS Survey of 2007.

At the program level, the staff of the American Samoa Diabetes Prevention and Control Program (DPCP) has developed plans to implement the following Year 3 activities: (1) Partner with American Samoa Diabetes Coalition (ASDC) and develop culturally-specific outreach; (2) Expand education/counseling, screening, and referral services; (3) Increase outer island outreach and referral; (4) Develop capacity for Chronic Disease Electronic Management System (CDEMS) in partnership with LBJ and Community Health Centers (CHC); (5) Establish workplace wellness physical activity policy within American Samoa Department of Health; and (6) Improve clinic, CHC, dispensary procedures to support walk-in diabetes screening and referral.

### **Policy and Procedure Manual**

There are no diabetes or NCD Program policy and procedures manuals in the Department of Health.

### **Health Insurance**

There is one private insurance company in American Samoa that provides local hospital insurance coverage for approximately 5,000 residents who are able to afford the insurance premiums, which is only 9.0% of the population based on the 2010 census. This coverage is limited to meet the needs of clients in times of sudden catastrophic emergencies that require immediate hospitalization and treatment. The benefits of this supplemental insurance include payment for hospitalization up to 180 days, local and general anesthesia, ambulance, short-stay hospitalization, and rehabilitation unit. An additional benefit is a one-time payment (\$750 to \$1200 depending on the plan) when a covered person is diagnosed and treated with a heart attack, stroke, coma (for a period of at least 7 days), or paralysis (for a period of at least 30 days).

### **Partnerships and Collaborations**

The American Samoa DPCP collaborates with two major partners to provide advocacy, education, preventive, and screening services in the community:

- (1) The *American Samoa Diabetes Coalition* (ASDC) is comprised of 12 members representing the DPCP, community churches, medical care providers from LBJ, and other agency representative. The goal of the ASDC is to assist the DPCP to decrease the prevalence of diabetes in American Samoa and to prevent the progression to serious secondary complications. The objectives of the ASDC are to: (a) Increase community awareness and services that are available to help patients with their diabetes; (b) Provide health education through media and to increase community knowledge on how to prevent, control, and treat diabetes; (c) Promote and provide diabetes outreach programs to the community; (d) Strengthen partnership with church organizations, village organizations, NGO, and government agencies for support in fighting diabetes; (e) Assist in advocating for health policies

that promote the control of health risk behaviors like smoking, unhealthy eating habits, and decreased physical activities; (f) Assist DPCP in screening for diabetes cases to improve the availability of data for grant support and for adequate diabetes data for American Samoa; and (g) Assist DPCP in planning and implementing Diabetes Month activities and programs.

(2) A collaborative effort between the *Territorial Administration on Aging* (TAOA), the DPCP Program, the ASDC, and the HIV/AIDS Program provides monthly outreach and screening services for senior citizens who are served by the TAOA. In August 2010, health care providers from the partnership agencies provided outreach and screening services to 76 seniors between the ages of 54-83 years. Participants were screened with random blood sugars and blood pressure measurements and those with abnormal measurements were referred to the medical clinic at LBJ for further assessment, diagnosis, and treatment.

### **Research**

There were several research projects related to obesity and diabetes in American Samoa. For example, the *Cultural Translation of Interventions: Diabetes Care in American Samoa*, is a behavioral intervention study to translate efficacious health treatments into routine clinical and public health practice to eliminate health disparities for communities at risk. The project is located at the Tafuna Community Health Center and provides culturally adapted interventions for patients with Type 2 diabetes to support their diabetes self-management. The interventions are delivered by community health workers.<sup>13</sup>

Another example is the research project entitled, *Prevalence of Overweight in American Samoan Schoolchildren, 2008/2009 School Year* (See Table 5). This research project has led to three annual reports with the first report provided in the 2006/2007 school year. The most recent study measured BMI of children in grades 2, 5, 8, and 11 in all 23 public schools in American Samoa. Students were also asked questions concerning behavioral and social factors known to contribute to obesity. In addition to finding that 55% of students were overweight or obese, the study also showed that most elementary school students rode the school bus while high school students depended more on cars; and the majority of students lived in two-parent households and also reported dining at home with their family.<sup>10</sup>

### **Description of the Clinical Services System Outreach and Prevention**

The DPCP staff provide a variety of outreach and prevention services that include providing educational brochures and materials in the community that usually accompany community presentations on diabetes risk factors, nutrition and physical activity. They also provide diabetes education and awareness over the radio and via posters, announcements, health fairs and community events, and school presentations and activities that involve promoting nutrition and physical activity.

### **Screening and Diagnosis**

Screening services are provided upon request by the patient and in a variety of settings that include regular clinic visits

and outreach activities at workplaces, health fairs, and special community events and church events. The major strategy to reduce morbidity and premature mortality associated with Type 2 diabetes is to assure early detection through active screening. There are no policy and procedures in the Department of Health that guide screening and diagnostic services. There is one criteria that is used by the DPCP staff to determine eligibility for screening — anyone 21 years or older who requests screening will be screened for diabetes.

### **Treatment and Management**

Treatment and management services for patients with diabetes are provided by the medical clinic at LBJ and the CHCs. There are no common sets of policies and procedures or standards to assure that the services that the patients are receiving are consistent, comprehensive, and based on clinical guidelines. Patients have the choice of selecting the health care provider among the physicians at the medical clinic at LBJ or physicians at the CHCs. Because there are no mechanisms for linkage between the physicians at the medical clinic at LBJ and the CHCs, there is fragmentation and loss of continuity in the care for patients with diabetes and other chronic diseases.

LBJ has the only Certified Diabetes Educator (CDE) in the USAPI that provides diabetes education services at the medical center. All newly diagnosed patients receiving inpatient care are referred to the CDE and are provided education on the disease process and the risk factors for diabetes, the importance of medication adherence, developing personal goals, nutrition education, and self-management activities. The CDE also provides services to patients admitted to the hospital and recommends insulin dosages and other treatments, monitors patients' status while in the hospital, and provides updated continuing education sessions for the physicians and nurses in both LBJ and the Department of Health.

### **Specialty Clinic**

There are no specialty clinics for patients with diabetes. Most concerning is the lack of podiatry services to prevent the complications of diabetes, such as foot infections to avoid lower limb amputations among patients with diabetes.

### **Description of the Support Services System Quality Assurance and Continuing Education Programs**

There are no formal quality assurance or continuing education programs in the Department of Health. LBJ is approved by the Centers for Medicare and Medicaid Services and is required to have quality assurance and continuing education programs.

### **Diabetes Health Education Materials**

The DPCP is currently using culturally-appropriate diabetes and other NCD educational materials and brochures in American Samoa. Some examples of the educational materials include brochures on how to manage diabetes (eg, *You Can Control Diabetes* and *Every Samoan Should Know*) and on healthy eating (eg, *Measuring Helps You Eat the Right Amount*) from Papa Ola Lokahi, Pacific Diabetes Education Program<sup>14</sup> and

on diabetes risk factors (eg, *Am I at Risk For Type 2 Diabetes*) and complications (eg, *Keep Your Kidneys Healthy*) from NIH and CDC.<sup>15,16</sup>

### **Pharmacy Services**

Pharmacy services are provided at LBJ, with medications necessary to manage diabetes and its complications reported to be available. However, medications are often not available because supplies are limited. One reason for the limited supply of medications have to do with inconsistent ordering of new supplies.

### **Laboratory Services**

Laboratory services are provided at LBJ and the laboratory meets the requirements for certification by Clinical Laboratory Improvement Amendments (CLIA) regulations. All of the laboratory tests necessary to manage diabetes and its comorbidities are available.

### **Description of the Data System**

There is no comprehensive data system in the Department of Health that houses the data and information for all the public health programs in American Samoa. Each program, however, has its own unique dedicated data system with no coordination or connections between the existing systems.

In 2005, LBJ acquired and implemented Veterans Health Information Systems and Technology Architecture (ViSTA), the automated information system that supports ambulatory and inpatient care developed by the Department of Veterans Affairs. The Computerized Patient Record System (CPRS) was developed as an electronic health record for clinicians and provides a single interface for health care providers to review and update patient medical records, place orders for medications, procedures, nursing orders, laboratory tests, and diets. The CPRS also organizes and presents all relevant data on a patient in a way that directly supports clinical decision-making.

The DPCP has initiated the implementation of the Chronic Disease Electronic Management System (CDEMS), an electronic registry that is designed to assist medical providers and management in tracking the care of patients with chronic health conditions. A paper-based system, CDEMS is designed around a progress note that facilitates standardization of care for patients with diabetes and other chronic conditions.

In American Samoa, patients with diabetes are provided services at the medical clinic at LBJ and the CHCs at Tafuna, Leone, and Amouli, which are all part of the Department of Health. The primary data for the diagnosis, treatment, and management of patients with diabetes and other chronic diseases are generated at these sites. In order to capture these data for entry into the CDEMS, there is a need to develop Memorandum of Agreements between the DPCP and each of the facilities to allow staff to capture data for CDEMS. In addition, further training and education will need to be provided to the DPCP staff to be able to analyze, interpret and report the data back to these facilities.

Table 10. Combined Administrative and Clinical Issues and Needs Priority Ranking		
Priority Rank	Issue/Need	Average Score <sup>a</sup>
1	Need for a Territory-wide health plan that includes components for DOH, CHCs, and LBJ	24.6
2	Need for written standards for screening for co-morbidities and complications secondary to diabetes	27.3
3	Need to promulgate standards for the screening, diagnosis, and management of diabetes based on the ADA or IDF Standards	27.9
4	Need for a Team Approach to manage patients with diabetes	28.4
5	Need for policy and procedures across all programs in DOH related to diabetes prevention and control	30.3
6	Need for legislation related to food safety, nutrition, physical activity and other risk factors for CDs	33.4
7	Need for more community partnerships to address the prevention and control of diabetes and related chronic diseases	33.6
8	Need for additional training for DOH health care providers on the treatment and management of diabetes	33.7
9	Need to identify alternative sources of additional resources for the prevention and control of diabetes and related chronic diseases	39.4
10	Need to establish a Diabetes Clinic in the DOH	41.6

<sup>a</sup>Lower the average score, higher the priority

### Conclusion: Prioritized Issues and Needs

The residents of American Samoa experience the highest rates of diabetes and its complications in the world. It is a public health crisis that demands serious attention by health care providers, health care systems, policy makers, and government agencies to answer. The first step in addressing these alarming health disparities is to identify the current burden of disease and the agencies and programs charged with delivering care to patients in American Samoa. Others have described the rate of diabetes, but this report brings forth new information regarding chronic diseases with an emphasis on diabetes, its co-morbidities and complications and describes the system of services in place to address these chronic diseases.

Although the total population has remained relatively stable between 2000 and 2010, there has been a shift in the age distribution of the population. There were significant declines in the population under 15 years and between 25-34 years with corresponding increases in the population 45 years and older. The vital statistics show that the leading causes of death were heart disease, diabetes, cancer, and stroke — all chronic diseases. Other findings impacting on the health status include the alarming high rates of overweight and obesity among the children and adults. Overall, 55% of children in public schools and 93.5% of the adults are overweight or obese; with a subsequent adult diabetes prevalence rate of 47.3%, and a 33% increase in adult hemodialysis patients.

Some of the major issues for the system of services reveal that there is a paucity of health plans, policy and procedures, coordination among the providers, or common standards of care to address the issues and problems of chronic diseases and diabetes. There are limited surveillance data for chronic diseases, data for vital statistics, hospital data, and public health programs.<sup>17</sup> Often mortality, morbidity, and risk behavior data across the Pacific jurisdictions cannot be compared because of differences in defining the data elements, data collection methods, and timeliness of reporting.

This systems assessment elucidated five priority areas: (1) A need for a Territory-wide health strategy that clearly identifies

the roles of each institutional stakeholders and delineates communication processes between the DOH, CHCs, and LBJ; (2) A need for written standards for screening for co-morbidities and complications secondary to diabetes; (3) A need to promulgate standards for the screening, diagnosis, and management of diabetes based on the American Diabetes Association or International Diabetes Federation Standards; (4) A need for a collaborative multidisciplinary team approach to optimize the treatment of patients with diabetes; and (5) A need for policy and procedures across all programs in DOH for diabetes prevention and control.

### Disclosure Statement

The authors report no conflict of interest.

### Acknowledgements

Funded by the National Institute on Minority Health and Health Disparities (NIMHD) of the National Institutes of Health (NIH) (Grant 3R24MD001660). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIMHD or the NIH. A special thank you to Mrs. Elisapeta S. Ponausuia, Acting Director of Health, Territory of American Samoa for her administrative support; the key informants and the focus group participants for their expertise; and the American Samoa Needs Assessment Team Dr. Faiese Roby (Team Leader), Moellia Tolo, Daphne Fale, Loata Sipili, Dr. Saipale Fuimaono, Tupe Siatini, and Too Tuiolemotu for their participation.

#### Authors' Affiliation:

- Pacific Chronic Disease Coalition, Atlanta, GA (HMI)
- Territory of American Samoa, Department of Health, Pago Pago, American Samoa (FR, ESP)
- College of Public Health, University of Iowa, Iowa City, IA (NA)

#### Correspondence to:

Henry M. Ichiho MD, MPH; c/o Augusta Rengil, Executive Director, Pacific Chronic Disease Coalition; Ph: (680) 587-2010; Email: podc10@gmail.com

### References

1. Pacific Islands Health Officers Association. Board Resolution #48-01: Declaring a Regional State of Health Emergency Due to the Epidemic of Non-Communicable Diseases in the United States-Affiliated Pacific Islands. May 24, 2010. [http://www.palau-health.net/images/NCD\\_Declaration.pdf](http://www.palau-health.net/images/NCD_Declaration.pdf). Accessed October 31, 2012.
2. Ichiho H, Aitaoto N. Assessing the system of services for chronic diseases prevention and control in the U.S.-affiliated Pacific Islands: Introduction and methods. *Hawaii J Med Public Health*. 2013;72(5 Suppl 1):5-9.



3. United States Central Intelligence Agency. The World Factbook: American Samoa Web site. <https://www.cia.gov/library/publications/the-world-factbook/geos/rm.html/>. Accessed May 9, 2011.
4. Ruidas L, Adaoag A, Williams VT, Sesepasara ML. Cancer in American Samoa. *Pacific Health Dialog*. 2004;11(2):17-22.
5. Advamag, Inc. Countries and Their Cultures, Samoan americans Website. Accessed on January 10, 2012. <http://www.everyculture.com/multi/Pa-Sp/Samoan-Americans.html>.
6. U.S. Census Bureau. U.S. Department of Commerce, Economics and Statistics Administration. Population and Housing Profile, 2000 Census of Population and Housing, American Samoa. <http://www.census.gov/prod/cen2000/island/ASprofile.pdf>. Revised May 2004. Accessed February 15, 2011.
7. U.S. Census Bureau. International Program, International Database Web site. Mid-Year Population by Five-Year Age Groups and Sex, Custom Region, American Samoa. <http://www.census.gov/population/international/data/idb/region.php>. Accessed February 15, 2011.
8. American Samoa, Department of Commerce, Statistics Division. American Samoa Statistical Yearbook 2008. [http://www.doc.as/wp-content/uploads/2011/11/Statistical-Yearbook\\_2008.pdf](http://www.doc.as/wp-content/uploads/2011/11/Statistical-Yearbook_2008.pdf). Accessed May 15, 2010.
9. World Health Organization. Western Pacific Region and the American Samoa Government. American Samoa NCD Risk Factors STEPS Report. Printed in Suva, Fiji: World Health Organization; March 2007.
10. Vargo D. Prevalence of Overweight in American Samoan Schoolchildren (2008/2009 School Year). Report to the Directors, Department of Health and Department of Education. Territory of American Samoa; May 2009.
11. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – United States, 2007 Web site. <http://www.cdc.gov/mmwr/pdf/ss/ss5704.pdf>. Accessed August 12, 2010.
12. Centers for Disease Control and Prevention. Youth Online: High School YRBS, American Samoa 1993-2007 Results Web site. <http://apps.nccd.cdc.gov/youthonline/App/Default.aspx?SID=HS>. Accessed November 22, 2010.
13. DePue JD, Rosen RK, Batts-Turner M, Bereolos N, House M, Held RF, Nu'usolia O, Tuitele J, Goldstein MG, McGarvey ST. Cultural Translation of Interventions: Diabetes Care in American Samoa. *American Journal of Public Health*. 2010;100(11):2085-2093.
14. Papa Ola Lokahi. Pacific Diabetes Education Program Web site. <http://www.pdep.org>. Accessed September 5, 2012.
15. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). NIDDK Clearinghouses Publications Catalog Web site. <https://catalog.nidk.nih.gov/materials.cfm?CH=NDIC>. Accessed October 2, 2012.
16. Centers for Disease Control and Prevention. Diabetes Public Health Resource Web site. <http://www.cdc.gov/diabetes/pubs/tycd>. Accessed October 2, 2012.
17. Hosey G, Ichiho H, Satterfield D, Dankwa-Mullan I, Kuartei S, Rhee K, et al. Chronic disease surveillance systems within the US associated Pacific Island jurisdictions. *Preventing Chronic Disease* 2011; 8(4):A86. [http://www.cdc.gov/pcd/issues/2011/jul/10\\_0148.htm](http://www.cdc.gov/pcd/issues/2011/jul/10_0148.htm). Accessed September 15, 2012.