

# Level of Recommended Heart Attack Knowledge among Native Hawaiian and Pacific Islander Adults in the United States

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## Abstract

*In this report we examine the level of knowledge about heart attack symptoms and what action to take if a heart attack is suspected among Native Hawaiian and Pacific Islander (NHPI) adults in the United States using data from the 2014 NHPI-National Health Interview Survey. Analyses include summary statistics to describe levels of heart attack knowledge and multivariate logistic regression to identify characteristics associated with having the recommended heart attack knowledge. Less than half (44.4%) of NHPI adults have the recommended heart attack knowledge. Significant differences in knowledge levels were found based on age; those aged 45-64 years and those aged 65 years and older were 68% and 78% more likely, respectively, to have the recommended heart attack knowledge compared those aged younger than 45 years. The level of recommended heart attack knowledge among NHPI is lower than that of the general population. Improving the heart attack knowledge of all Americans should continue to be a national priority, but efforts to target this group for heart attack knowledge improvement should be made given their high risk for heart attack.*

## Keywords

*Native Hawaiians and Pacific Islanders; heart attack; symptoms; National Health Interview Survey*

## Introduction

Each year, nearly 800,000 Americans experience a heart attack, 16.7% of which result in death.<sup>1</sup> The Centers for Disease Control and Prevention (CDC) have reported that Native Hawaiians and Pacific Islander (NHPI) adults have a higher rate of coronary heart disease, angina, and history of heart attack than white persons (6.0% vs 5.4%, respectively).<sup>2</sup> Native Hawaiians are 10% more likely to die of a heart attack than white persons.<sup>3</sup>

Research clearly documents that knowledge of heart attack warning signs and symptoms can prompt action to seek treatment in a timely manner and reduce mortality among those experiencing heart attacks.<sup>4</sup> Rapid treatment of heart attacks has been shown to reduce 30-day mortality from heart attack by 37%.<sup>5-7</sup> As a result, improving the public's "recommended heart attack knowledge" is a national priority.<sup>8</sup> Recommended heart attack knowledge includes knowing the five major signs and symptoms of a heart attack (pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath) and knowing to call 9-1-1 if they suspect a heart attack.<sup>9</sup>

Although improvements in knowledge levels have been observed from 2008 to 2014, a recently published analysis of 2014 National Health Interview Survey data indicate less than half of adult Americans (47.2%) have the recommended

heart attack knowledge, and disparities in this knowledge exist based on gender, age, educational levels, and race.<sup>9</sup> Specific to race, more white Americans (51.7%) have the recommended knowledge compared to blacks (42.9%), Hispanics (36.1%), and Asians (28.2%).<sup>9</sup>

Historically, health and sociodemographic statistics NHPI have been aggregated with persons of Asian heritage, thereby masking differences that exist between these two distinct racial groups and preventing appropriate adaption of public health interventions for cultural competence.<sup>10</sup> Acknowledgement of those significant differences led the National Center for Health Statistics to field the NHPI-National Health Interview Survey (NHIS) in 2014, through which 3,000 households with at least one NHPI member participated. Key findings from that survey show a significantly higher disease burden among the NHPI population subgroup compared to Asians alone and the United States (US) population as a whole,<sup>2</sup> and warrant the need for continued publication of health statistics specifically on NHPI persons. Therefore, to complement recently published data on the levels of recommended heart attack knowledge among adult Americans,<sup>9</sup> we present findings from an analysis of data from the 2014 NHPI-NHIS.

## Methods

### Data

As noted above, 2014 NHPI-NHIS data were used for our cross-sectional study. The questionnaire used for NHPI-NHIS was based on the NHIS general population survey questionnaire. A complex-stratified-multistage-area-probability design was used when the NHPI-NHIS was fielded to ensure the sample was representative of the non-institutionalized adult US NHPI population. Completed details on the NHPI-NHIS methodology are available in another publication.<sup>11</sup>

### Study Population

The study population consisted of 2,172 adults (age ≥18 years) who self-identified as NHPI alone (51%) or NHPI in combination with one or with more other racial identities but who reported NHPI was their primary race (49%). The NHPI-NHIS public use files do not include data to allow for the identification of specific NHPI racial groups (eg, Native Hawaiians, Samoans, Chuukese) or specific location of residence. Therefore, results are limited to representing the adult US NHPI population who are fully or primarily NHPI.

## Measures

The outcome of interest was recommended heart attack knowledge, which includes knowledge of five heart attack symptoms and knowing what to do if a heart attack is suspected. To determine knowledge of heart attack symptoms, respondents were asked, "Which of the following would you say are the symptoms that someone may be having a heart attack: Pain or discomfort in the jaw, neck, or back; Feeling weak, lightheaded, or faint; Chest pain or discomfort; Pain or discomfort in the arms or shoulder; and Shortness of breath." To determine knowledge of best action to take if a heart attack is suspected, respondents were asked to select one answer from a list of possible actions. Dummy variables were created to indicate whether respondents correctly identified the correct symptom and action. A summary variable was created which summed the number of symptoms and action the respondents correctly selected (range 0-6). A dummy variable was created to indicate whether a respondent had the recommended heart attack knowledge (summary variable score = 6) or not (summary variable score < 6).

The following characteristics were used to describe the survey population and used as predictors of having the recommended heart attack knowledge: female gender, age group (18-44 years, 45-64 years, ≥65 years), educational level (less than a high school education, high school graduate or equivalent, some college or college graduate), medical provider diagnosed history of coronary heart disease, and medical provider diagnosis of heart attack or angina.

## Analysis Plan

We used summary statistics (frequencies and proportions) to describe levels of knowledge of heart attack symptoms by select sociodemographic characteristics. We also applied a multivariate logistic regression model to identify characteristics associated with recommended heart attack knowledge. Estimates were weighted to account for complex sampling design features (sampling weights and stratification) and to provide an unbiased representation of the adult NHPI population living in the US. Associations were considered significant at the alpha level of 0.05. Analyses were completed using Stata v.15.1 (Stata Corp, College Station, TX).

## Results

The study population consisted of 2,172 adult NHPIs, but application of sampling weights and other design features in the analysis allows generalizability to the adult US NHPI population. The NHPI population is evenly divided by gender (50.1% female), but as a group is relatively young, with 61.2% being 18-44 years of age and only 9.3% being 65 years of age and older. Most NHPI persons have at least some college education (50.2%) and only 10.2% have less than a high school education. Three out of every 100 NHPI persons has a history of coronary heart disease, while two out of 100 has a history of heart attack or angina (Table 1).

Overall, 44.4% of NHPI persons had the recommended heart attack knowledge. Of the heart attack symptoms, nearly

all NHPI persons know that chest pain is a symptom of heart attack (91.1%), while they were least likely to know that pain/discomfort in the jaw, neck, or back is a sign of heart attack (54.7%). Nearly all NHPI persons know that the best action to take if a heart attack was suspected was to call 9-1-1 (94.7%) (Table 1).

In the regression model, controlling for the demographic characteristics and history of heart-related health conditions, we observed significant differences in knowledge levels based on age. NHPI adults aged 45-64 years were 68% more likely, and NHPI adults aged 65 years and older were 78% more likely, to have the recommended heart attack knowledge compared with NHPI adults younger than 45 years of age. We did not find statistically significant associations between sex or educational attainment and having the recommended heart attack knowledge. Similarly, having a history of coronary heart disease or heart attack/angina was not significantly associated with likelihood of having the recommended heart attack knowledge (Table 2).

## Discussion

Having the recommended heart attack knowledge is critical for optimal outcomes associated with heart attack. Quick recognition of heart attack symptoms and quick action to obtain treatment if a heart attack is suspected can reduce the risk of complications and mortality.<sup>5-7</sup> We found that less than half (44.4%) of NHPI adults living in the US have the recommended heart attack knowledge, that is they know all five signs/symptoms that a heart attack may be occurring and know to call 9-1-1 if a heart attack is suspected. This level of knowledge is lower than that of the adult US population as a whole (47.2%) and that of white persons (51.7%), but is higher than the level of knowledge among blacks (42.9%), Hispanics (36.1%), and Asians (28.2%).<sup>9</sup> In terms of predictors of recommended heart attack knowledge, we found that older NHPI persons (≥45 years) were significantly more likely than younger NHPI persons (18-44 years) to know all of the signs and symptoms of a heart attack and what to do if they suspect a heart attack is occurring, after adjusting for other demographic characteristics and heart-related conditions. No other characteristics, including having a history of heart attack/angina, were associated with having the recommended heart attack knowledge.

Although the level of heart attack knowledge across all racial/ethnic groups in the US needs improvement, it is particularly important that this knowledge level be improved among NHPI persons, given their higher likelihood of having coronary heart disease, heart attack, angina, and other health conditions that elevate the risk of heart attack, such as obesity and diabetes.<sup>2,3</sup> A review of the research literature did not identify any heart attack knowledge improvement interventions specifically targeting NHPI persons. However, several potential educational interventions were identified: (1) a 10-15 minute educational session delivered by health professionals to female patients visiting clinics in Northern California;<sup>12</sup> (2) an eight week class offered to interested participants in senior centers in Georgia;<sup>13</sup> and (3) a community-wide public education trial.<sup>14</sup> All showed

Table 1. Characteristics and Level of Recommended Heart Attack Knowledge among Native Hawaiian and Pacific Islander Adults Residing in the United States, Overall and by Select Characteristics

	Total				Pain or discomfort in the jaw, neck, or back				Feeling weak, lightheaded, or faint				Chest pain or discomfort			
	unweighted		weighted		unweighted		weighted		unweighted		weighted		unweighted		weighted	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<b>Total</b>	2172	100	590,460	100	1,320	60.8	321,673	54.7	1,678	77.3	434,192	73.8	1,992	91.8	535,873	91.1
<b>Sex</b>																
Male	1,026	47.2	294,112	49.9	592	57.8	145,360	49.8	785	76.6	203,993	69.9	941	91.9	266,262	91.2
Female	1,146	52.8	296,348	50.1	728	63.5	176,313	59.5	893	77.9	230,199	77.7	1,051	91.7	269,611	91.0
<b>Age group</b>																
18-44 years	942	43.4	361,370	61.2	497	52.8	176,724	49.2	731	77.7	263,786	73.5	871	92.6	329,253	91.7
45-64 years	833	38.4	173,929	29.5	553	66.5	109,964	63.2	632	76.0	128,541	73.9	766	92.1	159,070	91.5
≥65 years	397	18.3	55,161	9.3	280	68.0	34,985	63.4	315	79.4	41,865	75.9	355	89.4	47,550	86.2
<b>Educational level</b>																
Less than high school	218	10.0	59,931	10.2	113	51.8	29,126	48.6	148	68.0	40,307	67.3	185	84.9	50,671	84.6
High school graduate	747	34.4	233,958	39.6	448	60.0	121,162	51.8	579	77.5	171,210	73.2	684	91.6	212,920	91.0
At least some college	1,207	55.6	590,460	50.2	759	63.0	171,385	58.2	951	78.9	222,675	75.7	1,123	93.2	272,282	92.5
<b>Health conditions</b>																
History CHD	119	5.5	19,637	3.3	87	73.1	13,036	66.4	98	82.4	16,100	82.0	109	91.6	18,280	93.1
History AMI/Angina	73	3.4	13,563	2.3	52	71.2	8,220	60.6	58	79.5	9,831	72.5	64	87.7	11,656	85.9
	Pain or discomfort in the arms or shoulder				Shortness of breath				Call 911				Know all recommended heart attack knowledge			
	unweighted		weighted		unweighted		weighted		unweighted		weighted		unweighted		weighted	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<b>Total</b>	1,825	84.1	467,779	79.5	1,880	86.6	499,003	84.8	2,067	95.3	556,876	94.7	1,098	50.6	261,240	44.4
<b>Sex</b>																
Male	855	83.5	233,849	80.1	883	86.2	247,613	84.8	978	95.5	276,548	94.8	505	49.3	120,237	41.2
Female	970	84.6	233,300	78.9	997	87.0	251,390	84.8	1,089	95.0	280,328	94.6	593	51.8	141,003	47.6
<b>Age group</b>																
18-44 years	765	81.3	273,961	76.3	821	87.3	306,888	85.5	902	95.9	339,765	94.7	420	44.6	141,870	39.5
45-64 years	728	87.5	148,940	85.7	721	86.7	146,997	84.5	792	95.2	166,019	95.5	449	54.0	90,464	52.0
≥65 years	332	83.6	44,878	81.4	338	85.1	45,118	81.8	373	94.0	51,092	92.6	229	57.7	28,906	52.4
<b>Educational level</b>																
Less than high school	164	75.2	47,745	79.7	178	81.7	48,779	81.4	202	92.7	55,751	93.0	92	42.2	23,438	39.1
High school graduate	620	83.0	182,234	77.9	643	86.1	192,277	82.3	715	95.7	222,127	94.9	370	49.5	99,941	42.7
At least some college	1,041	86.4	237,800	80.8	1,059	87.9	257,947	87.6	1,150	95.4	278,998	94.8	636	52.8	137,861	46.8
<b>Health conditions</b>																
History CHD	106	89.1	18,269	93.0	104	87.4	17,494	89.1	109	91.6	18,185	92.6	70	58.8	9,610	48.9
History AMI/Angina	63	86.3	12,009	88.5	62	84.9	11,563	85.3	67	91.8	12,575	92.7	43	58.9	6,203	45.7

Data Source: Native Hawaiian and Pacific Islander National Health Interview Survey, 2014.

Note: CHD=coronary heart disease; AMI=acute myocardial infarction.

**Table 2. Predictors of Recommended Heart Attack Knowledge among Native Hawaiian and Pacific Islander Adults Residing in the United States, by Select Characteristics†**

Respondent Characteristics	Odds Ratios‡	95% Confidence Intervals
<b>Sex</b>		
Male	—	
Female	1.26	(0.96-1.66)
<b>Age group</b>		
18-44 years	—	
45-64 years	1.68**	(1.16-2.42)
≥65 years	1.78*	(1.28-2.49)
<b>Educational level</b>		
Less than high school	—	
High school graduate	1.27	(0.74-2.19)
Some college/college graduate	1.47	(0.96-2.23)
<b>Health conditions</b>		
History of coronary heart disease	0.92	(0.56-1.52)
History of heart attack or angina	1.06	(0.56-2.03)

Data source: Native Hawaiian and Pacific Islander National Health Interview Survey, 2014.

Note: “—” denotes reference category.

†Recommended heart attack knowledge includes knowing the five major signs and symptoms of a heart attack (pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath) and to call 9-1-1 if a heart attack is suspected.

‡Calculated using multivariate logistic regression. Archer-Lemeshow test:  $F(7,21)=1.48; P=.23$ , indicating no evidence of lack of fit. Estimates are weighted to account for complex sampling design (sampling weights and stratification) and reflect the adult NHPI population living in the United States.

\* $P<.05$ ; \*\* $P<.01$ .

improvements in knowledge of heart attack symptoms and what to do if a heart attack is suspected at post-intervention, and each included features that may be particularly appropriate for use with NHPI persons.

The Northern California educational intervention targeted women during their visits to primary care clinics that served a large number of persons from racial and ethnic minority groups. The intervention materials were available in both English and Spanish.<sup>12</sup> Given the historical trauma shared by many NHPI communities related to American colonialism and imperialism,<sup>15</sup> NHPI persons in the US may feel more comfortable obtaining health care services in clinics that specifically target NHPI patients, such as the Native Hawaiian Health Care System (designed specifically to improve the health of Native Hawaiians residing in Hawai‘i). Additionally, the potential language barriers experienced by other Pacific Islander subpopulations may make these types of clinics more attractive to patients as they may employ community health workers and/or medical interpreters that would ensure proper translation and interpretation of materials and information into multiple languages. Thus, such clinics may provide concentrated NHPI populations to target for recommended heart attack knowledge interventions. This may be particularly important as 14% of NHPI persons

are limited in English proficiency while only 9% of the general US population is similarly limited.<sup>16</sup> Other reports, however, indicate 6.2% of NHPI persons are uninsured and that one in four NHPI persons has not used outpatient health care services in the past year.<sup>17</sup> Lack of insurance and use of clinic services by some NHPI persons would limit the reach of a clinic-based intervention.

The Georgia intervention was delivered in weekly group sessions in community senior centers. No known data is available regarding use of senior centers among NHPI persons, but the success of a heart attack knowledge intervention through group classes may be appropriate for NHPIs in other community settings. For example, churches have been shown to be effective sites for engaging NHPI communities in health-related activities and interventions.<sup>18-23</sup>

The relevant feature of the community-wide intervention trial was the use of an advisory board of leaders of community organizations and health professionals. Community advisory boards provide an opportunity for the priorities, experiences, and preferences of the persons who will be targeted by the intervention to be considered and included in the development of the intervention, and in some cases, in the implementation and evaluation of the intervention.<sup>24</sup> This type of input can help ensure the intervention is culturally appropriate and likely to be receptive to the intended participants.

The results of this study must be considered in light of limitations. The study is based on self-reported data from the NHPI-NHIS. Although there may be some concern with the quality of self-reported data, the NHIS has been conducted by the CDC and has been relied upon to monitor the health of the nation for more than 50 years. Additionally, there may be concern regarding the survey methodology to ensure the results are representative of the national population of NHPI persons. However, an assessment conducted by the National Center for Health Statistics indicated that “differences between the samples were not substantial enough to raise concerns about the underlying quality of the 2014 NHPI NHIS data” (p.2).<sup>25</sup>

## Conclusions

Our study determined that less than half of NHPI adults living in the US have the recommended level of heart attack knowledge to facilitate timely access to heart attack treatment. This is concerning given the high rates of heart-related illness and the high risk for heart attack among this population group. We believe our results contribute to the limited, but growing, literature regarding the health and health-related characteristics of NHPI persons living in the US and may inform efforts to develop educational interventions aimed at improving knowledge related to heart attack symptoms and appropriate action to take if a heart attack is suspected.

## Conflicts of Interest

None of the authors identify any conflicts of interest.



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