Health Literacy and Obesity Among Native Hawaiian and Pacific Islanders in the U.S.

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Health Literacy and Obesity Among Native Hawaiian and Pacific Islanders in the U.S.
Abstract

**Objectives:** Our purpose was to describe relationships between demographic characteristics, body mass index (BMI), and health literacy among Native Hawaiians and other Pacific Islanders (NHPIs).

**Design and Sample:** In this cross-sectional survey, we interviewed 364 NHPI adults.

**Measures:** We used Newest Vital Sign (NVS), a health literacy tool; measured heights and weights; and demographic questions.

**Results:** According to participants’ NVS scores, 45.3% had at least a possibility of low health literacy. Lower NVS scores were associated with increased BMI ($r = -0.12, p = 0.027$) and increased age ($r = -0.26, p < 0.001$). Higher NVS scores were associated with higher incomes ($r = 0.21, p = 0.001$) and higher education ($r = 0.27, p < 0.001$). Women scored significantly better than men ($t = -2.0, p = 0.05$). Participants’ NVS scores in Hawaii vs. Utah were not significantly different ($t = .26, p = 0.80$).

**Conclusions:** Pathways to health literacy are complex; however, age, income, education, and BMI explained a modest 19.95% of the combined variance in NVS scores. Public health nurses working to improve health literacy could include review of critical information on nutrition facts labels, frequently used calculations, and application of this information when making food choices.

**Key Words:** health literacy, obesity, nutrition facts label, Pacific Islanders
Background

Limited health literacy is a central contributor to health disparities and a modifiable determinant of health (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; World Health Organization [WHO], 2007). Health literacy depends on the ability to access, understand, and apply basic health information. Not only does it involve understanding and applying words (or basic literacy), it also includes writing, listening, conceptual knowledge, and arithmetic (Nielsen-Bohlman, Panzer, & Kindig, 2004) or numeracy, defined as the ability to read and interpret numbers (Hassan & Heptulla, 2010). In the United States (U.S.), 36% of adults have inadequate health literacy skills (Kutner, Greenberg, Jin, & Paulsen, 2006), which makes it difficult for them to understand health information and subsequently take action to reduce their risks for a variety of preventable conditions and diseases (Carbone & Zoellner, 2012).

Paasche-Orlow and Wolf’s (2007) conceptual causal model perceives health literacy as a phenomenon involving patients and the health care system and describes pathways by which limited health literacy contributes to poor health outcomes. Patients’ social factors, such as income and culture; demographic factors, such as age, ethnicity, and education; and physical and cognitive factors, such as memory and vision, all influence health literacy. In turn, health literacy affects health outcomes at three points: (a) access to healthcare, (b) interactions between healthcare provider and patient, and (c) self-care (Paasche-Orlow & Wolf, 2007).

Based on this model, Osborn, Paasche-Orlow, Bailey, and Wolf (2011) found significant correlations between (a) health literacy and knowledge, (b) knowledge and self-efficacy, (c) self-efficacy and physical activity, and (d) physical activity and health status. These correlations help explain the relationship between health literacy and self-care, through knowledge, self-efficacy, and physical activity. Further, Paasche-Orlow and Wolf (2007) explained, “Self-management
requires not only the knowledge of what to do but also the will and capacity to carry out the health care plan” (p. S22). Although the self-care component of the model is based on research with diseases, such as diabetes and asthma, it might similarly enlighten a possible relationship between lower levels of health literacy and obesity.

Indeed, research suggests a relationship between low levels of health literacy and obesity. Higher body mass indexes (BMIs) have been associated with lower health literacy in children (Sharif & Blank, 2010) and lower numeracy in English-speaking adults (Huizinga, Beech, Cavanaugh, Elasy, & Rothman, 2008). Among overweight (BMI ≥ 25) and obese (BMI ≥ 30; WHO, 2014) adults, low levels of health literacy have been associated with less understanding of obesity-related health consequences, and these adults were less likely to have considered losing weight than adults with marginal or adequate health literacy ($p = 0.027$; Kennen et al., 2005).

Additionally, health literacy affects understanding and application of information that could help with weight loss and healthy weight maintenance. For example, Kennen et al. (2005) determined participants who could not read “calorie” and “obesity” might not be able to understand nutrition facts labels or printed educational materials about nutrition; 22% and 43% respectively of their sample ($n = 210$) could not read these words. Correspondingly, people who read nutrition facts labels tend to consume fewer calories (Post, Mainous, Diaz, Matheson, & Everett, 2010; Temple, Johnson, Recupero, & Suders, 2010), and lower basic literacy and numeracy have been associated with overestimating the size of a single serving of food (Huizinga et al., 2009). Based on the results of these studies, a next logical step toward improving public health is to determine if there is an association between health literacy and obesity in populations with high prevalence of obesity.
One ethnic group with a high prevalence of overweight and obesity is Native Hawaiians and Pacific Islanders (NHPIs), people whose ancestry includes the original inhabitants of Hawaii, Samoa, Tonga, or other Pacific Islands (U.S. Census Bureau, 2012; WHO, 2011). After a thorough literature search, we located only one related study. Sentell, Baker, Onaka, and Braun (2011) reported findings from the Hawaii Health Survey (HHS), a population-based phone survey calculating BMIs with participants’ self-reported heights and weights and measuring health literacy with a single question: “How confident are you filling out medical forms by yourself” (p. 282)? In adjusted models, they found no association among Native Hawaiians between low health literacy and overweight or obesity categories (Sentell et al., 2011). Their study limitations included a single-item measure of health literacy, questionable validity of self-reported heights and weights, and lack of disaggregation of other Pacific Islander ethnic subgroups (i.e. Tongan, Samoan, and other Pacific Islanders) in analysis. If there is an association between health literacy and obesity among NHPIs, it would provide public health nurses with a target for obesity prevention.

**Research Questions**

In our study, we examined the relationships between health literacy, various demographic characteristics, and BMI among a sample of NHPIs. Specifically, we sought to answer the following research questions:

1) What are the health literacy levels among NHPIs in Hawaii and Utah?

2) Which questions on the health literacy tool, the Newest Vital Sign (NVS), are the most challenging for NHPI participants?
3) What is the relationship between NHPI adults’ health literacy and their regional location (Utah or Hawaii), gender, previous attendance at nutrition classes, age, income, educational attainment, BMI, and ethnic subgroup?
Methods

Design and Sample

We conducted this descriptive, cross-sectional survey to examine the relationship of demographic characteristics, BMI, and health literacy in a convenience sample of 354 NHPI adults (Hawaii $n = 209$; Utah $n = 155$). Prior to data collection, we obtained Institutional Review Board approvals from the three participating universities. We collected data from May to July 2011 in Utah and Hawaii, two of seven states with the largest NHPI populations (U.S. Department of Health & Human Services, 2014). Nearly 37,000 NHPIs live in Utah, and 356,000 NHPIs live in Hawaii (U.S. Census Bureau, 2012), with the highest concentrations residing on the islands of Hawaii and Oahu where we collected data (U.S. Census Bureau, 2012).

Informal and formal NHPI leaders identified events and locations for recruitment and served as consultants or members of the research team. With written consent of recruitment site managers, we set up data collection tables at grocery stores, a preschool, and cultural events. When recruits approached, we handed them flyers describing our study. People who expressed interest and met inclusion criteria were invited to participate.

Inclusion criteria were (a) the ability to speak English; (b) self-identification as NHPI or a member of a NHPI subgroup, including Native Hawaiian, Tongan, or Samoan; (c) age 18 years or older; and (d) a primary family caregiver of a child between 6 months and 18 years of age. We sought primary caregivers to increase understanding of NHPI communities’ strengths and challenges in creating nutritious home food environments. We relied on recruits to self-identify as able to participate (e.g., visual acuity) in a health literacy study.

After each person completed the consent procedure and agreed to participate, we conducted a face-to-face survey in English and then weighed and measured him/her as privately
as possible. Data collection required about 15 minutes per participant. To preserve confidentiality we eliminated identifying information from questionnaires and stored completed questionnaires and consent forms separately. Each participant received $10 compensation.

**Measures**

**Health literacy.** Weiss et al. (2005) designed the Newest Vital Sign (NVS) to measure health literacy; it takes an average of three minutes to complete the series of six questions about a nutrition facts label from an ice cream container. They assessed reliability through internal consistency (Cronbach’s $\alpha > 0.76$) and criterion validity by calculating correlations between their participants’ scores on the NVS and the Test of Functional Health Literacy in Adults ($r = 0.59$, $P <.001$; Weiss et al.). In our study Cronbach’s alpha was adequate ($\alpha = 0.78$). NVS questions and associated nutrition facts label are available for free download at http://www.pfizerhealthliteracy.com/physicians-providers/NewestVitalSign.aspx

The NVS’s ice cream label is typical of U.S. nutrition facts labels and includes serving size; servings per container; calories, fat, saturated fat, carbohydrates, cholesterol, sodium, and protein per serving; and a list of ingredients, including peanut oil. The first four NVS questions involve simple calculations; we did not permit pen, paper, or calculators. As an illustration, question one reads: “If you eat the entire container, how many calories will you eat?” This requires participants to note how many servings are in the container, then multiply the calories per serving size by the number of servings in the container. The last two questions invite participants to imagine they have allergies to penicillin, peanuts, latex gloves, and bee stings. With this in mind, participants are asked if the ice cream is safe to eat. Participants who correctly answer this question are then asked to explain why it is unsafe. NVS scores range from 0–6;
scores from 0 to 1 suggest a “high likelihood of limited health literacy,” 2–3 indicate the “possibility of limited health literacy,” and 4–6 indicate “adequate health literacy.”

Demographic measures. In addition to the NVS, we collected data on demographic characteristics including age, gender, household income, educational level, and ethnic subgroup identification. We also asked if participants had ever attended nutrition classes.

Heights and weights. We measured each participant’s fully clothed weight and height with a digital Seca 803 scale and a Seca 213 Stadiometer respectively (Seca North America, Chino, California, USA). We weighed each participant twice. If weights differed, we weighed the participant a third time and averaged the three results for use in calculating BMIs.

Analytic Strategy

We entered and cleaned data in SPSS Version 19 (International Business Machines Corporation, Armonk, New York, USA). We used descriptive statistics to describe our sample. Independent t-tests compared health literacy differences between groups based on gender and regional location (Hawaii vs. Utah). The chi-square test of independence examined associations between demographic variables and respondents’ location (Hawaii vs. Utah). We calculated Pearson product-moment correlations to identify associations between health literacy and age, education level, household income, and BMI. A two-way analysis of variance (ANOVA) identified health literacy differences by ethnicity and location.
Results

Sample

The mean age of our 354 NHPI participants was 39 years ($SD = 15.2$), and 64% were female. More than half were parents ($n = 209, 57.4\%$), including 125 mothers and 84 fathers; the rest were other caregivers, such as extended family members ($n = 86, 23.6\%$) and grandparents ($n = 69, 18.9\%$), including 42 grandmothers and 27 grandfathers. Annual household incomes ranged from 24.7\% with an income less than $20,000$ to 22.3\% with an income of $60,000$ or more. Approximately a quarter (28.8\%) attended college or technical school or earned a college degree. Most had health insurance (87.1\%) and a regular source of healthcare (89.3\%). In our sample, 94 (25.8\%) participants were overweight, and 213 (58.5\%) were obese, for a combined overweight and obesity rate of 84.3\% (Duncan et al., 2014).

Table 1 presents the demographic differences according to where participants lived (Utah or Hawaii). There were no statistically significant differences between participants in these locations with regard to annual household income or education, despite having more participants with a high school education in Hawaii than in Utah (83 compared to 38). However, there were statistically significant differences between participants in Utah and Hawaii with regard to gender, but the relationship was weak (Cramer’s $V = .11$). There were more male participants and fewer female participants than statistically expected in Utah, and fewer male participants and more female participants than statistically expected in Hawaii. There were also differences in marital status; this relationship was also weak (Cramer’s $V = .14$). Specifically, more single participants and fewer married or partnered participants lived in Utah than statistically expected. Whereas, in Hawaii, there were fewer single participants and more married or partnered participants than statistically expected.
Research Question 1: Health Literacy Levels

More than half the participants (54.7%) demonstrated “adequate health literacy” by correctly responding to four or more NVS questions, with 25% correctly answering all six questions. A quarter of participants (26.1%) demonstrated a “possibility of limited health literacy” by correctly answering two or three questions, and 19.2% showed a “high likelihood of limited health literacy” by correctly responding to one question or none. To summarize, 45.3% of NHPI adults’ scores suggested limited health literacy.

Research Question 2: Most Challenging NVS Questions

In Table 2, we ranked NVS questions from most to fewest correct responses. Questions requiring mathematical calculations had the lowest percentages (46% to 65.8%) of correct responses. After we asked participants to assume they had a variety of allergies, including a peanut allergy, the majority (78.9%) correctly answered the food was not safe for them to eat. Of those who responded correctly, 67.1% accurately explained peanut oil made it unsafe. However, nearly one-third were unable to explain accurately, including several who stated they did not know. Erroneous explanations included “because it will make me fat,” “because ice cream has lactose in it, and you said I’m allergic to latex,” and, “I’m going to get acne and have a heart attack.” Thus, nearly half of participants either responded incorrectly to the safety question or, in the follow-up question, were unable to correctly explain why the ice cream was unsafe.
Research Question 3: Health Literacy and Categorical and Demographic Variables

With the exception of regional location, all examined categorical and demographic variables were significantly associated with health literacy. Although Utah participants’ mean NVS score was slightly higher \((M = 3.67, SD = 2.01)\) than Hawaii participants’ mean NVS score \((M = 3.61, SD = 1.94)\), the difference was not significant \((t = .26, p = 0.80)\).

With regard to gender, females’ average number of correct responses \((M = 3.60, SD = 1.95)\) was significantly higher than males’ \((M = 3.36, SD = 2.00)\) \((t = -2.0, p = 0.05)\). Additionally, participants who attended a nutrition class sometime in the past had more correct responses \((M = 3.79, SD = 1.98)\) than participants who had never attended a nutrition class \((M = 3.37, SD = 1.93)\) \((t = 1.95, p = 0.05)\).

Age was negatively correlated with NVS scores \((r = -0.26, p < 0.001)\); older participants had lower NVS scores. This association was weak, with age explaining 6.8% of the variance in NVS scores. We found weak, positive correlations between annual household income and mean NVS scores \((r = 0.21, p = 0.001)\) and between educational attainment and NVS scores \((r = 0.27, p < 0.001)\). Higher household income and education level correlated with higher NVS scores. Income explained 4.5% of the variance in NVS scores, and education explained 7.3% of the variance in NVS scores.

We found a significant negative correlation between BMI and NVS score \((r = -0.116, p = 0.027)\). Higher BMIs were associated with lower NVS scores. BMI explained 1.35% of the variance in scores.

We conducted a two-way ANOVA to determine the influences of respondents’ ethnicity, location, and ethnicity*location interaction on mean NVS scores. There were no significant
differences in location or ethnicity*location interaction, but there were significant differences regarding ethnicity. See Tables 3 and 4. Tukey HSD post-hoc comparisons indicated Samoans had significantly fewer correct answers on the NVS than Native Hawaiians ($p = 0.001$) and Tongans ($p = 0.008$), but not significantly fewer than other Pacific Islanders ($p = 0.324$).

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Insert Tables 3 and 4 about here

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Discussion

Health Literacy

In our study, 45.3% of our participants had a “possibility” or “high likelihood of limited health literacy,” as categorized by their NVS scores; this is 9.3% higher than the percentage of U.S. adults with inadequate health literacy skills (Kutner et al., 2006). Comparable to our results, 46.1% of participants in a study using NVS at private and public healthcare practices had low or possibly low health literacy skills. More participants in the private practice setting had adequate literacy skills (62.7%) compared to participants in public health clinics (46.2%; Ryan et al., 2008). Some studies found higher rates of low health literacy than we found in ours. In a study of Caucasian, Black, and Latino participants with type 2 diabetes receiving care at a free primary care clinic, nearly two-thirds (65%) had NVS scores indicating at least a possibility of low health literacy (Heinrich, 2012). Similarly, 58% of elderly African-Americans had NVS scores indicating a possibility of limited health literacy (Patel et al., 2011). Finally, in a study of teenage athletes and adults, 51.9% of adults and 40.3% of teenage athletes had NVS scores indicating inadequate health literacy (Shah, West, Bremmeyr, & Savoy-Moore, 2010). Findings from our study combined with these studies suggest limited health literacy is a widespread problem across income groups, racial and ethnic groups, and community-based populations.

Similar to studies with a variety of populations and settings, we found nearly half of NHPIs have difficulty interpreting nutrition facts labels. Limited health literacy is problematic because healthcare providers often make dietary recommendations, especially to patients with chronic health conditions, and assume patients can read and understand nutrition facts labels (Rothman et al., 2006). Further, in a large web-based survey of U.S. adults, 34% did not read nutrition facts labels, and 54% responded they would rather enjoy food without worrying about
what is in it (International Food Information Council Foundation, 2012). Thus, when teaching
the mechanics of interpreting nutrition facts labels, public health nurses should emphasize that
nutrition fact labels provide information consumers can use to plan healthy dietary intake for
themselves and their families.

In an item by item analysis of our sample’s NVS scores, we found many participants
struggled with basic math calculations needed to understand and apply information on nutrition
facts labels to decisions related to food purchase and consumption. Our participants also
struggled with food safety for someone with allergies. These findings suggest public health
nurses need to support the acquisition of basic math skills and functional human biology
concepts, such as food and environmental allergies, as part of community health promotion.

**Area of Residence, Age, Ethnicity, and Gender**

**Area of residence.** There was no statistically significant difference in health literacy for
NHPI adults living in Hawaii or Utah. This finding underscores the importance of health literacy
for ethnic subpopulations as migration and resettlement patterns disburse cultural groups
throughout the world.

**Age.** We found NVS scores decreased as age increased. Similarly, Shah et al. (2010)
found young athletes correctly answered more NVS questions than adults. Using a different
nutrition facts label tool, Rothman and associates (2006) found younger participants scored
significantly higher than participants 65 years of age and older ($p = 0.04$). One possible
explanation is younger participants probably took math classes more recently than older
participants, enhancing younger participants’ ability to answer numeracy questions. Review of
basic math skills might help elders refresh skills related to nutrition facts labels. We suggest
inviting math-able teens to create math games for family members of all ages to participate in together and refine their math skills.

**Ethnicity.** Compared to U.S. adults of various ethnicities (Kutner et al., 2006), our sample had a 9.3% higher percentage of inadequate health literacy, and Samoans had significantly lower mean NVS score than Hawaiians and Tongans. Because there are inter-ethnic group differences in health literacy, we suggest developing health literacy interventions that are culturally appropriate for NHPIs generally as well as tailoring approaches to ethnic subgroups. Additionally, American Samoa has overweight prevalence (81–84%) and diabetes prevalence (47%) which are among the highest in the world (WHO, 2010 & 2011). Samoans in Hawaii or the continental U.S. share many of the same genetic risks as their counterparts in American Samoa, further supporting a need to prioritize health literacy when caring for Samoan patients.

**Gender.** Our sample was 64% female, and females had significantly higher NVS scores than males. The higher percentage of females could have a moderating effect on our results. If our sample had been more evenly distributed by gender, the sample’s NVS scores might have been lower with a higher percentage of NVS scores suggesting limited health literacy.

**Limitations**

This study has several strengths, including a sizable sample from which to draw inferences. We recruited participants from two states at sites varying in economic levels and included NHPIs living in their indigenous homeland and NHPI migrants to the U.S. mainland. However, we used a convenience sample which limits generalizability to all NHPIs.

Another limitation is related to the survey measure and data collection site. NVS is one measure of health literacy; however, we did not use additional health literacy measures due to limitations of time and convenience at the data collection sites. Also, surveys were conducted
verbally in English, eliminating NHPIs who do not speak English and might find English-language nutrition facts labels difficult, if not impossible, to read. Some participants asked for a calculator or pen and paper for calculations, so their scores might have differed if we had allowed their use. We did not allow these devices in order to standardize NVS administration and simulate the hurried decisions shoppers often make when reviewing nutrition facts labels.

Implications

Health literacy is complex and is influenced by many factors. Paasche-Orlow and Wolf’s (2007) model suggests demographic variables influence health literacy. However, in our study, demographic characteristics had low predictive power. Research on other variables that might influence health literacy could broaden understanding and suggest ways to improve health literacy. For instance, Osborn, Paasche-Orlow, Bailey, and Wolf (2011) suggested self-efficacy influences health status. Perhaps self-efficacy might also influence health literacy and highlight the benefits of role playing food choices based on nutrition facts labels to build confidence.

Community interventions to increase health literacy among NHPIs could include review of critical information on nutrition facts labels, frequently used calculations, and application of this information when making food choices. Extra care should be taken with elders, because lower health literacy was associated with advancing age. Additionally, because parents and grandparents can transmit health literacy as well as eating habits to their families, improving their health literacy and dietary choices has the potential to cascade into future generations.

Based on the association we found between educational attainment and NVS scores, we recommend nurses advocate for quality formal education and retention in educational programs. Public health nurses can advocate for health literacy to be woven into the curriculum of public schools and for adequate staffing of school nurses who can teach children components of health
literacy. Strengthening and supporting health literacy initiatives are ways to translate research into practice and enhance public health.

Further, we recommend public health nurses and the U.S. Department of Agriculture collaborate to simplify nutrition facts labels, making them easier to interpret. This is especially important given the body of evidence indicating many people misinterpret nutrition facts labels in their current formatting and language. For instance, presenting sugar amounts in teaspoons rather than grams might help people better visualize how much sugar the food contains. Additionally, using non-written educational outreach, such as visual and audio formats, to teach people how to interpret nutrition facts labels would be beneficial.

We recommend future research explore other variables that potentially influence health literacy. Factors such as health beliefs, self-efficacy, and context might have a greater impact on health literacy than demographic variables. Research on methods to help people apply information on nutrition facts labels could promote health. Methods could include classroom didactic, role play, applications for smart phones and other electronic devices, social marketing through social media, home visits, and mentored grocery store purchases.

To make the next generation of nutrition facts labels more user friendly, we suggest iterative cognitive interviews with a wide sample of consumers to establish the most readable formats for nutrition facts labels and word choices therein. In other words, limited health literacy is not simply an individual problem. It is also a system problem. Research on what can be done to help make nutrition facts labels and other health information more accessible and understandable can also build health literacy capacity.

Effective, evidence-based approaches are needed to address NHPI health literacy needs in general as well as the needs of NHPI subgroups. Because a focus on parents-only might miss the
opportunity to reach other caregivers, including grandparents, we recommend a multi-generational approach to teaching health literacy. This approach might work well for other groups with multi-generational involvement in child rearing.
Conclusion

The importance of health literacy was emphasized by former Surgeon General Carmona (2005) who stated, “promoting health literacy is perhaps the most important role of any health professional” (p. S9). The pathways to health literacy are complex and much remains unknown; however, age, income, education, and BMI explained a modest 19.95% of the combined variance in NVS scores in this study. Our results combined with results of other studies suggest it is time to apply what is known about health literacy in caring for individuals, families, and communities cross-culturally to prepare them to make healthy choices.
References


Table 1.

Demographic Characteristics of Participants

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<th>Characteristic</th>
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<th>$\chi^2$</th>
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<td>66 (31.6)</td>
<td>131 (36.0)</td>
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<td>-----------------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pretend you are allergic to penicillin, peanuts, latex gloves, and bee stings. Is it safe for you to eat this ice cream?</td>
<td>287 (78.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(If participant responded no to 5) Why not?</td>
<td>244 (67.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>If you are allowed 60 grams of carbohydrates as a snack, how much ice cream could you have?</td>
<td>239 (65.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>If you eat the entire container, how many calories would you eat?</td>
<td>202 (55.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>If you usually eat 2500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving?</td>
<td>183 (50.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Your doctor advises you to reduce the amount of saturated fat in your diet. You usually have 42g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?</td>
<td>168 (46.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3

*Newest Vital Sign Mean Scores and Ethnic Subgroup*

<table>
<thead>
<tr>
<th>Location</th>
<th>Ethnicity</th>
<th>Utah</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
<th>Hawaii</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
<th>Total</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Native Hawaiian</td>
<td>52</td>
<td>4.46</td>
<td>1.70</td>
<td></td>
<td>170</td>
<td>3.73</td>
<td>1.87</td>
<td></td>
<td>222</td>
<td>3.90</td>
<td>1.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Samoan</td>
<td>63</td>
<td>2.71</td>
<td>1.96</td>
<td></td>
<td>11</td>
<td>3.00</td>
<td>2.05</td>
<td></td>
<td>74</td>
<td>2.76</td>
<td>1.96</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tongan</td>
<td>20</td>
<td>4.40</td>
<td>1.66</td>
<td></td>
<td>2</td>
<td>4.00</td>
<td>.00</td>
<td></td>
<td>22</td>
<td>4.36</td>
<td>1.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Pacific Islander</td>
<td>20</td>
<td>3.85</td>
<td>2.13</td>
<td></td>
<td>26</td>
<td>3.08</td>
<td>2.28</td>
<td></td>
<td>46</td>
<td>3.41</td>
<td>2.23</td>
<td></td>
</tr>
</tbody>
</table>
Table 4

2-Way ANOVA Ethnicity and Location Regarding Newest Vital Sign

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td>53.49</td>
<td>3</td>
<td>17.83</td>
<td>4.92</td>
<td>.002</td>
</tr>
<tr>
<td>Location (Utah vs. Hawaii)</td>
<td>3.41</td>
<td>1</td>
<td>3.41</td>
<td>0.94</td>
<td>.33</td>
</tr>
<tr>
<td>Location * Ethnicity Interaction</td>
<td>8.42</td>
<td>3</td>
<td>2.81</td>
<td>0.77</td>
<td>.51</td>
</tr>
<tr>
<td>Error</td>
<td>1290.53</td>
<td>356</td>
<td>3.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1406.41</td>
<td>363</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>