Health Literacy and Nutrition Behaviors among Low-Income Adults

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Abstract: The purpose of this study was to explore the relationship between health literacy and nutrition behaviors using a low-income sample. Face-to-face surveys at 11 social services offices generated a convenience sample of 154 Supplemental Nutrition Assistance Program (SNAP)-eligible adults. We assessed health literacy, fruit and vegetable intake, food label use, consumption of healthy foods, and demographic characteristics. Thirty seven percent of the sample had adequate health literacy as measured by the Newest Vital Sign (NVS). Race and parenthood were significantly related to health literacy scores. Adequate health literacy, as measured by the NVS, was associated with frying chicken less often and eating the peels of fresh fruit more often. The findings suggest that health practitioners should ensure nutrition-related messages are accessible to all of their clients, especially those with the lowest health literacy levels.

Key words: Health literacy, nutrition behaviors, nutrition labeling, low-income population.

Health literacy is an important determinant of good health and well being. However, a significant proportion of the adult population lacks basic health literacy skills. The National Assessment of Adult Literacy (NAAL) indicates that 36% of adults have basic or below basic health literacy skills, which means they are unable to perform a range of everyday tasks, such as taking a prescription properly, completing a patient information form, and following guidelines for preventive services. Low health literacy is even more prevalent among low-income individuals.

Health literacy can be defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.” Health literacy encompasses several different skills. Reading skills include prose literacy (“the ability to read and understand text”) and document literacy (“the ability to locate and use information in documents”). Numeracy skills encompass “the ability to apply arithmetic operations and use numerical
information in printed materials. Oral communication skills include the ability to listen to and process verbal communication and respond appropriately. Writing skills include being able to produce clear and accurate written communication. Individuals use health literacy skills when interacting with health professionals, printed materials such as food labels, and physical spaces such as grocery stores. Recent thinking about health literacy has expanded beyond the capacities of individuals to consider the health system and how health practitioners can make messages accessible.

In addition to being linked to better self-care, preventative care, and overall health, health literacy may also impact an individual's diet and nutrition behaviors. Adults with limited health literacy may have difficulty completing nutrition-related tasks, such as following dietary recommendations from health practitioners, reading food labels, and making informed decisions when faced with choices in the grocery store. Additionally, there is evidence that individuals with low levels of health literacy are less likely to consume the recommended daily amount of fruits and vegetables and less likely to use nutrition labels.

This study contributes to our understanding of health literacy by describing the health literacy abilities of low-income, Supplemental Nutrition Assistance Program (SNAP)-eligible adults, exploring demographic characteristics associated with health literacy, and examining the relationship between health literacy and nutrition behaviors. To our knowledge, no other study has examined the associations between health literacy and nutrition behaviors using a low-income sample. Given previous research suggesting that individuals with low health literacy are less likely to consume the recommended amount of fruits and vegetables and use nutrition labels, we expected to find that participants with lower levels of health literacy would employ fewer healthy eating practices than participants with higher levels of health literacy.

Methods

Recruitment and data collection. The present study used data from the Maryland Health and Nutrition Literacy Study, which examined the nutrition knowledge, attitudes, skills, and behaviors among SNAP-eligible adults. A convenience sample (n = 154) was recruited from the waiting rooms at 11 SNAP offices in five counties representing the geographic, economic, and demographic diversity of Maryland's 24 counties. Forty-one percent of the sample came from nonmetropolitan counties, and 61% came from metropolitan counties. Data were collected using a face-to-face survey, which lasted between 30 minutes and one hour. An interviewer read all questions to the participants and recorded their answers. Written informed consent was collected from all participants, and participants received nutrition resources, emergency food resources, and $25 cash for their time. The study was approved by the University of Maryland Institutional Review Board.

Measures. Health literacy was assessed using the Newest Vital Sign (NVS), a six item measure (see Figure 1). The NVS assesses document literacy and numeracy by requiring respondents to locate and utilize information from a Nutrition Facts label and make calculations. Using guidelines provided by Weiss, Mays, Martz, et al. participants were given one point for each question they answered correctly and placed
into one of three categories: 0–1 points indicated a high likelihood of limited health literacy, 2–3 points indicated a possibility of limited health literacy, and 4–6 points indicated adequate health literacy.

We used the NVS because it allowed us to assess both reading and numeracy skills, which gave us a fuller picture of the participants’ health literacy abilities than would have been possible with a measure that only assesses one dimension of health literacy. Additionally, the NVS has demonstrated good internal consistency (Cronbach’s $\alpha = .76$) and criterion validity was established using the Test of Functional Health Literacy in Adults ($r = 0.59$, $p < .001$). Finally, the NVS can be administered in less than five minutes, which was important because this measure was included in a longer survey. Nineteen questions from the Short Format of the Diet Health and Knowledge Survey (SFDHKS) that measure use of food labels, consumption of low-fat/low-calorie foods, consumption of fiber, and avoidance of extra fat were used to assess nutrition behaviors (see Table 2 for these questions). Higher scores indicated performing healthy behaviors more frequently. These questions demonstrate face validity, and Obayashi, Bianchi, and Song established the discriminant and correspondence validity of the questions measuring food label use.

Nutrition behaviors were also assessed using six questions that measure fruit, vegetable, and fruit juice consumption (see Table 2 for these questions). Fruit juice consumption was measured separately from fruit consumption, therefore, the fruit consumption observed in this study may be lower than in other studies in which fruit juice is included in the measure of fruit.

We measured demographic characteristics in order to describe our sample and control for these characteristics in the ANOVA models. Education was measured with the question, “What is the highest grade in school you have completed?” Participants were also asked, “How much money does your household take home each year?” “How...
do you describe your race/ethnicity?” and how many of their children under 18 were living in their household.

Food security status, defined as all household members having “access at all times to enough food for an active, healthy life,” was assessed using a five-question version of the Short Form of the USDA Food Security Scale in which questions AD1 and AD1a from the six-question version were combined. The short form of the measure demonstrated concurrent criterion validity by assigning the same food security status as the longer 18 item measure for 97.7% of the households in the 1995 Current Population Survey. The five-item measure also demonstrated good internal consistency for our sample (Cronbach’s α = .85).

Analysis. We ran frequencies to describe our sample and ANOVAs using PROC GLM to determine demographic predictors of health literacy and to test the association between health literacy and nutrition behaviors. A p-value of .05 was used to determine statistical significance for the ANOVAs. Analyses were performed using SAS version 9.1.

Results

One hundred and fifty-four participants were recruited, and 142 completed the NVS (Table 1). The majority of the sample was female (76%), earned less than $10,000 per year (56%), had at least a high school education (61%), reported low or very low food security status (74%), and were parents (65%). The average age was 37. Half of the sample was African American and a third was non-Hispanic White.

Thirty seven percent of the sample had adequate health literacy, 41% had possibly limited health literacy, and 22% had high likelihood of limited health literacy. Examining individual items on the NVS, the majority of the sample answered the first (57%), second (56%), third (67%), and fourth (67%) questions incorrectly and the fifth (81%) and sixth (71%) questions correctly.

Demographic predictors of health literacy. Race (F = 3.39, p < .05) and whether or not the respondent was a parent (F = 7.43, p < .01) were found to be significant predictors of health literacy. White respondents had the highest health literacy scores followed by Black and other respondents, and parents had higher health literacy scores than respondents who were not parents. Income, education, race, gender, and food security status were not significantly related to health literacy.

Health literacy and nutrition behaviors. Less than half of the sample reported “always” or “often” using the list of ingredients (29%), short phrases on food labels (36%), the Nutrition Facts label (37%), information about a serving size (29%), or statements on the label that describe the health benefits of the food (31%). Less than a quarter of the sample indicated “always” or “often” choosing to consume low-fat or low-calorie foods such as lower-fat lunch meats (19%), skim or 1% milk (22%), low-fat cheese (9%), frozen yogurt (24%), and low-calorie salad dressing (19%). The majority of the sample indicated “always” or “often” adding fats such as butter to potatoes (60%) and bread or muffins (53%). Less than half of the sample indicated “always” or “often” adding fats such as butter (47%) and cheese (16%) to vegetables. Most of the sample reported avoiding extra fat by not regularly frying chicken (75%) and trimming fat
from meat (65%), while 41% of the sample indicated “always” or “often” removing the skin from chicken. Fifty-one percent of the sample reported eating the peels of fresh fruits, and 43% reported eating the peels of fresh vegetables. The majority of the sample reported consuming less than the recommended 2 cups of fruit (68%) and 2.5 cups of vegetables (83%) per day. The average fruit juice consumption was 1.5 4-ounce glasses the previous day and 2 4-ounce glasses on a usual day.

We used ANOVAs to explore the relationship between health literacy and nutrition behaviors while controlling for income, education, race, gender, food security status,
Table 2.
HEALTH LITERACY AND HEALTH BEHAVIORS

<table>
<thead>
<tr>
<th>Nutrition Behaviors</th>
<th>NVS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adequate Health Literacy M (SD)</td>
</tr>
<tr>
<td>Use of food label</td>
<td></td>
</tr>
<tr>
<td>(When you buy foods, how often do you use each of the following sections of the label?)</td>
<td></td>
</tr>
<tr>
<td>List of ingredients</td>
<td>2.66 (1.40)</td>
</tr>
<tr>
<td>Short phrases on label (e.g. &quot;low fat&quot;)</td>
<td>3.00 (1.39)</td>
</tr>
<tr>
<td>Nutrition panel that tells the amount of calories, protein, fat, and such in a serving of the food</td>
<td>3.24 (1.31)</td>
</tr>
<tr>
<td>Information about the size of a serving</td>
<td>2.7 (1.17)</td>
</tr>
<tr>
<td>Statements describing health benefits of nutrients in the food</td>
<td>2.73 (1.33)</td>
</tr>
<tr>
<td>Consumption of low-fat/low-calorie foods</td>
<td></td>
</tr>
<tr>
<td>(How often do you do the following things?)</td>
<td></td>
</tr>
<tr>
<td>Eat lower fat lunch meats instead of regular lunch meats</td>
<td>2.78 (1.30)</td>
</tr>
<tr>
<td>Drink skim or 1% milk instead of 2% or whole milk</td>
<td>2.28 (1.50)</td>
</tr>
<tr>
<td>Eat low-fat cheese instead of regular cheese</td>
<td>1.98 (1.12)</td>
</tr>
<tr>
<td>Eat frozen yogurt instead of ice cream</td>
<td>2.54 (1.47)</td>
</tr>
<tr>
<td>Use low-calorie salad dressing instead of regular dressing</td>
<td>2.61 (1.39)</td>
</tr>
<tr>
<td>Added fats</td>
<td></td>
</tr>
<tr>
<td>(How often do you do the following things?)</td>
<td></td>
</tr>
<tr>
<td>Add butter, margarine, sour cream to potatoes</td>
<td>2.00 (1.24)</td>
</tr>
<tr>
<td>Add butter or margarine to cooked vegetables</td>
<td>3.00 (1.52)</td>
</tr>
<tr>
<td>Add cheese or creamy sauce to cooked vegetables</td>
<td>3.64 (1.16)</td>
</tr>
<tr>
<td>Add butter or margarine to breads or muffins</td>
<td>2.60 (1.36)</td>
</tr>
<tr>
<td>Avoidance of extra fat</td>
<td></td>
</tr>
<tr>
<td>(How often do you do the following things?)</td>
<td></td>
</tr>
<tr>
<td>Fry chicken</td>
<td>3.68 (1.10)</td>
</tr>
<tr>
<td>Remove skin from chicken</td>
<td>3.36 (1.60)</td>
</tr>
<tr>
<td>Trim the fat from meat</td>
<td>4.08 (1.21)</td>
</tr>
</tbody>
</table>

*p<.05
*Mean scores on a five point likert scale where 5=always and 1=never
Mean scores on a five point likert scale where 1=always and 5=never
M = Mean
SD = Standard Deviation
and whether or not the respondent was a parent. Adequate health literacy was associated with frying chicken less often ($F=3.87, p<.05$) and eating the peels of fresh fruit more often ($F=2.98, p<.05$; Table 2).

**Discussion**

This study examined health literacy and nutrition behaviors using a sample of SNAP-eligible adults. Only 37% of the sample had adequate health literacy, a proportion similar to that found in other low-income samples. Lo, Sharif, and Ozuah found that 23% of the 326 low-income parents in their sample were able to read and correctly use the dosage information on a medicine bottle. Practitioners working with low-income individuals should consider that their clients may struggle to understand and utilize nutrition labels and provide instructions for how to use the Nutrition Facts label in addition to making recommendations about the amount of calories, fat, protein, and carbohydrates their clients should consume each day. We suggest that the NVS may be a useful teaching tool. Practitioners should also make written materials accessible to people with low literacy levels by using plain language and pictures in addition to words.

The majority of the sample answered the first four questions on the NVS incorrectly while a majority of the sample answered the last two questions correctly. The first four questions require numeracy and document literacy skills whereas the last two questions only require document literacy skills. This may suggest that numeracy is more challenging than literacy for this low-income sample. Practitioners should keep in mind the unique challenges that numerical calculations present when making recommendations about daily consumption. For example, some clients may not be able to calculate how many grams of fiber they consume each day. For these clients, practitioners can explain which foods are a good source of fiber and encourage their clients to eat more of these foods, rather than telling them to consume 25 grams of fiber daily.

Race and parent status were found to be significant predictors of health literacy status. White respondents were more likely than respondents of other racial backgrounds to have higher levels of health literacy. A similar association between race and health literacy has been reported elsewhere. Parents were more likely than non-parents to have higher levels of health literacy. Using a nationally representative sample, Yin and colleagues also found a similar relationship between health literacy and parenthood. It is not clear why parents would have a higher level of health literacy. Parents may be motivated to improve their health literacy by a desire to provide high quality care for their children. The parents in our sample may have also developed health literacy abilities as participants in nutrition education programs offered only to parents by the Special Supplemental Program for Women, Infants, and Children.

The participants in our sample reported practicing relatively unhealthy nutrition behaviors. Less than half of the sample indicated that they used the information on nutrition labels, chose to consume low-fat or low-calorie foods, and ate the recommended daily amount of fruits and vegetables. It is especially disconcerting that participants report rarely using nutrition labels because there is evidence that actual label usage is less frequent than respondents’ self-reports. Participants may not use nutrition labels,
because they are unable to understand them, as demonstrated by their scores on the NVS. Additionally, low-income individuals may not eat low-fat or low-calorie foods or the recommended daily amount of fruits and vegetables, as these foods may be, or may be perceived to be, more expensive than other foods.27,28

The results suggest that health literacy and healthy eating practices are not strongly related. Only frying chicken less often and eating the peels of fresh fruit more often were associated with adequate health literacy. Health practitioners should adapt their nutrition-related messages to ensure they are accessible to all of their clients, especially those with the lowest health literacy levels. Practitioners should use plain language and/or pictures in written communication. Teach-back, or asking clients to explain instructions or recommendations in their own words, also helps ensure clients’ understanding.24

This study’s limitations include a small sample, which may not be representative of all SNAP-eligible, low-income adults. Our participants were utilizing the services available at social services offices and agreed to participate in an hour-long survey about nutrition, thus we may not have surveyed the individuals with the fewest resources, those with the lowest levels of health literacy, or those with the least healthy behaviors. Our measure of health literacy assesses document literacy and numeracy but does not assess prose literacy. Additionally, the SFDHKS and the fruit and vegetable consumption measure are self-report measures, which may be vulnerable to social desirability or recall bias.

Health care practitioners, especially those serving low-income clients, should be concerned with health literacy and developing strategies for effective communication. Low levels of health literacy may have implications for clients’ nutrition behaviors and their ability to carry out nutrition-related recommendations. Practitioners must clearly communicate dietary recommendations and guidelines to their clients, use techniques such as teach-back to ensure comprehension, and demonstrate proper use of available tools, such as nutrition facts labels.

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Notes