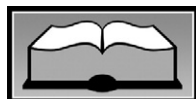


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Health Literacy Is Associated with Healthy Eating Index Scores and Sugar-Sweetened Beverage Intake: Findings from the Rural Lower Mississippi Delta

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ABSTRACT

Background Although health literacy has been a public health priority area for more than a decade, the relationship between health literacy and dietary quality has not been thoroughly explored.

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Objective To evaluate health literacy skills in relation to Healthy Eating Index (HEI) scores and sugar-sweetened beverage (SSB) consumption while accounting for demographic variables.

Design Cross-sectional survey.

Participants/setting A community-based proportional sample of adults residing in the rural Lower Mississippi Delta.

Methods Instruments included a validated 158-item regional food frequency questionnaire and the Newest Vital Sign (scores range 0 to 6) to assess health literacy.

Statistical analyses performed Descriptive statistics, analysis of variance, and multivariate linear regression.

Results Of 376 participants, the majority were African American (67.6%), without a college degree (71.5%), and household income level <\$20,000/year (55.0%). Most participants (73.9%) scored in the two lowest health literacy categories. The multivariate linear regression model to predict total HEI scores was significant ($R^2=0.24$; $F=18.8$; $P<0.01$), such that every 1-point increase in health literacy was associated with a 1.21-point increase in HEI scores, while controlling for all other variables. Other significant predictors of HEI scores included age, sex, and Supplemental Nutrition Assistance Program participation. Health literacy also significantly predicted SSB consumption ($R^2=0.15$; $F=6.3$; $P<0.01$) while accounting for demographic variables. Every 1 point in health literacy scores was associated with 34 fewer kilocalories per day from SSBs. Age was the only significant covariate in the SSB model.

Conclusions Although health literacy has been linked to numerous poor health outcomes, to our knowledge this is the first investigation to establish a relationship between health literacy and HEI scores and SSB consumption. Our study suggests that understanding the causes and consequences of limited health literacy is an important factor in promoting compliance to the Dietary Guidelines for Americans.

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The American Dietetic Association recognizes health literacy as one of their seven public health priority areas and recently identified health literacy as a mega issue for the profession of dietetics (1). Health literacy has also been on the United States' health care agenda for more than a decade (2-4). Although defined in numerous ways, the mostly widely accepted definition of health literacy is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (2)." Components of health literacy include oral literacy, print literacy, media literacy, numeracy, and cultural and conceptual knowledge (3,5). Compared to targeting nutrition knowledge through education on specific dietary components or health conditions, addressing health literacy is a more complex concept.

Despite the rapid growth of health literacy in the scientific literature, several gaps have been identified. First, whereas health literacy has been associated with use of health care services, health care costs, and a wide variety of health outcomes (6-10), the relationships between health literacy skills and dietary quality have not been thoroughly explored. Previous research has examined the relationship health literacy and/or numeracy has with body mass index (11), interpreting food labels (12,13), acquiring of and trust in nutrition information sources (14), and clinical indicators of dietary self-management such as glycemic control (15-17). Importantly, we know of no studies that have investigated the relationship between health literacy and diet or beverage quality. Because the Dietary Guidelines for Americans are the foundation of nutrition policy and education (18), it is imperative to understand the relationship between health literacy skills and adoption of these guidelines. Understanding this association can help guide development and execution of appropriate dietary communication and intervention efforts. Second, in a recent systematic review of 25 health literacy and behavioral trials targeting disease self-management and health promotion published between 2000 and 2010, the majority (n=24; 96%) targeted the primary health care setting (Allen K, Zoellner J, Motley M, Estabrooks P, unpublished data, May 2010), with fewer efforts aimed at understanding and promoting the health literacy needs of community-based populations. Given that low-health-literate individuals typically have less access to primary care and lack the necessary skills to navigate the complex health care system, the need to reach community populations and to explore the relationship between health literacy and health promotion and disease prevention in nonprimary care settings warrants attention. Of the 25 health literacy trials, none reported on indicators of diet quality and only one study by Kim and colleagues (19) reported on dietary self-management behaviors. Further, a consistent finding in clinical settings that has specific relevance for practicing dietetics practitioners is that low health literacy is associated with patient difficulty in following basic self-management recommendations (20). Finally, and from a practical perspective, understanding the relationship between health literacy and positive dietary change could allow dietetics practitioners to be involved in the development and delivery of evidence-based strategies that meet the needs of those with low health literacy.

The connection between health literacy and health disparities is an emerging area of interest (21) and a key focus of this research. The Lower Mississippi Delta region of Arkansas, Louisiana, and Mississippi is one of the most health disparate regions in the United States (22). There is a high concentration of African Americans and a high prevalence of chronic disease in the Delta (23,24). The education disparities experienced by Delta residents are well documented and it is estimated that 64% of Mississippi residents, 61% of Louisiana residents, and 56% of Arkansas residents function at the two lowest levels of literacy proficiency compared to the national average of 46% (25,26). In the counties that comprise the Delta, the percent of residents functioning at the two lowest levels of proficiency increases dramatically to 80%, 78%, and 78%, respectively, for Mississippi, Louisiana, and Arkansas (25). Furthermore, numerous studies detail many nutrition challenges facing the Delta population (27-32). Despite the documented nutrition, education, and literacy disparities in this region, no known studies have explored the connection between health literacy and health or nutrition behaviors.

One of the most common indicators of dietary quality is the Health Eating Index (HEI). This method is designed to measure adherence to the 2005 Dietary Guidelines for Americans, and examines total diet quality and 12 component scores, one of which is energy from solid fats, alcoholic beverages, and added sugars (SoFAAS) (33,34). Although sugar-sweetened beverages (SSBs) are included in the calculation of the SoFAAS component score, the emerging public health concern of SSBs (35,36) signifies the importance of understanding the contribution of SSB in isolation of other solid fats, alcoholic beverages, and other added sugars. Given the doubling of SSB consumption during the past 3 decades in the United States (35,37), the positive relationship between SSBs and obesity (38-40), and evidence that SSB consumption is inversely related with education attainment (41), understanding specific associations between health literacy and SSBs could lead to important targeted intervention strategies for reversing SSB consumption trends.

Research gaps in health literacy literature and the disparities experienced by Delta residents substantiate the need to explore nutrition literacy in this vulnerable population. The primary aim of this cross-sectional study targeting adult Delta residents was to evaluate the scope of limited health literacy and determine the relationship between health literacy and diet quality. A second purpose was to determine the relationship between health literacy and SSB consumption. We hypothesized health literacy would be positively associated with total HEI-2005 scores as well as with each of the 12 component HEI scores, and hypothesized a negative association between health literacy and kilocalories per day from SSBs.

METHODS

This cross-sectional research study was approved by The University of Southern Mississippi's Institutional Review Board, and informed consent was obtained from each participant before administering the survey. Inclusion criteria required participants be 18 years of age (or older), English-speaking, and a resident of the Lower Mississippi Delta region. The target population was adults re-

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