Considerations for Evaluation of Fruit and Vegetable Intake in Low-Literate Spanish-Speaking Participants in USDA Food and Nutrition Education Programs

Abstract: Rates of obesity and associated chronic disease are high in Hispanics in the United States. Nutrition education interventions promoting dietary change in underserved populations have been shown to have positive effects on behaviors such as fruit and vegetable (FV) intake, thereby reducing the chronic disease burden. Evaluation tools in the Spanish language to assess the dietary behavior changes made in response to the intervention are important in determining the success of such efforts. Currently, there are no Spanish-language tools focused exclusively on FV intake and behaviors that include features to enhance readability for use in low-literacy participants of US Department of Agriculture (USDA) food assistance and education programs. There is a need for such tools to determine the degree to which programs are able to promote behavior change. In designing these tools, researchers should take into account potential issues that may arise when administered. For example, respondents may have

difficulty estimating consumption for mixed dishes and vegetables added to food. To address such issues, researchers should employ strategies to assist respondents to understand what constitutes FV and appropriately identify amount consumed. Addition of images to tools or development of accompanying instruction guides may be helpful. Once developed and tested,

aimed at improving FV behaviors and ultimately, intake.

Keywords: fruit and vegetable; Hispanic; USDA; Spanish; nutrition education

Hispanics comprise approximately 18% of the population in the United States.¹ A significant

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such scales may be used with Spanish-speaking participants of USDA food assistance and education programs

portion of this group suffers from obesity and associated chronic conditions. In 2013 to 2016, Hispanic men participating

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in the National Health and Nutrition Examination Survey had a significantly higher age-adjusted prevalence of obesity compared with non-Hispanic white men (40.6% vs 36.2%).² Dietary intake plays an important role in maintaining a healthy weight and thus preventing chronic conditions. High intake of fruit and vegetable (FV) is associated with a reduced risk of obesity and chronic disease³; however, a previous study exploring FV intake among Hispanics in California found that intake did not meet the national recommendations.⁴ FV intake should be encouraged in this population, particularly given that consumption of these foods may decrease as Hispanics acculturate to the United States.^{5,6}

Nutrition education interventions promoting dietary change in underserved populations have been shown to have positive effects on behaviors such as FV intake, thereby reducing the chronic disease burden.^{7,8} In providing nutrition education, evaluation tools to assess the dietary behavior changes made in response to the intervention are used as a key evaluation method for this audience. Usual behaviors assessed using a questionnaire are cognitively easier for low-literacy respondents to report, as opposed to more detailed forms of dietary assessment such as 24-hour recalls.^{9,10} Assessing FV intake rather than FV behaviors presents a unique challenge, particularly with regard to accurately measuring quantity of FV consumed and with low-literate program participants, with corresponding consequences for validity assessments.¹¹ FV consumption is often determined using food frequency questionnaires, which provide crude information on intake over time, such as 3 months or 1 year, rather than more precise measurements at one 24-hour time point.¹² These tools may only assess frequency of consumption, or may also request information on portion size consumed.¹³ Other possible methods of measuring intake include 24-hour dietary recalls and food diaries, both of which provide more precise information on quantity consumed but require highly

resource-intensive data collection and analysis processes.¹¹ Of note, previous studies have shown improved accuracy of recall in those who are able to read and spell; assessment methods that require detailed reporting of intake may present challenges for low-literacy populations.^{11,14} Alternatively, other types of self-report questionnaires may be used, such as food behavior checklists.^{13,15-18}

In assessing FV intake using self-report questionnaires, design of questionnaire items to accurately measure quantity consumed is an important consideration. In 2005, the Dietary Guidelines for Americans were changed to provide dietary recommendations using “cups,” “cup equivalent,” or “ounces” rather than “servings” to indicate portion size, and MyPyramid, launched in 2005, provided educational materials with graphics representing a typical “ounce” or “cup” in each food group.¹⁹ This change was based on research demonstrating that consumers had difficulty understanding the dietary recommendations in the previous Food Guide Pyramid, and formative research conducted for the MyPyramid campaign found that many consumers did not understand the term “serving” in the Dietary Guidelines.²⁰ The 2015 Dietary Guidelines continue to provide dietary guidance in terms of cups and ounces,²¹ and current US Department of Agriculture (USDA) MyPlate nutrition materials use these units of measurement.²² Given that the content of the USDA’s nutrition education programs and recommendations for FV intake are based on the current Dietary Guidelines, and that research suggests that consumers have difficulty with the term “servings,”^{20,23} evaluation instruments used in nutrition education programs should reflect the current units used to quantify FV consumption. However, recent research evaluating intake of FV has not reflected the USDA’s shift to the use of cups to measure FV intake in the dietary recommendations. Since 2005, there have been few instruments developed and validated to measure FV behaviors and intake in adults in the United States. Tools tested

include 3 short screeners measuring both servings and cups of FV consumed,²³ a food frequency questionnaire developed to assess intake in Alaska Natives,²⁴ and the National Cancer Institute’s 19-item Fruit and Vegetable Screener, along with a single question on overall FV consumption.²⁵ All of these are English-language tools, and only the first study mentioned used “cups” as a measure of intake.²³ Since the change in the recommendations, there have been no Spanish-language tools developed and validated in adult populations that focused exclusively on FV and use “cups” to quantify FV intake.

Tools to measure FV intake that both reflect the current recommendations and are appropriate for Spanish-speaking populations are needed. In designing instruments for Spanish-speaking groups, literacy level is an important consideration. Evaluation data are usually collected in a group setting, requiring program participants to be able to comprehend and complete written surveys independently. Because many participants have minimal skills, a tool readability level of Grades 1 to 2 is recommended.²⁶ In addressing the needs of low-literacy audiences, readability of evaluation tools is an important factor.²⁷ Adding features such as visuals to questionnaires to replace text is one way to increase client understanding and improve readability scores.²⁷⁻²⁹ Currently, there are no Spanish-language tools focused exclusively on FV intake and behaviors that include such features to enhance readability for use in low-literacy participants of USDA food assistance and education programs. As almost all nutrition education program evaluation is conducted in group settings,³⁰ there is a programmatic need for such evaluation tools for mixed classes in which some participants may not be able to read English.

There are a number of additional considerations in devising tools to assess FV intake in Spanish speakers. First, participants may have difficulty determining what foods they ate qualified as FV. Previous studies have demonstrated that respondents

frequently misunderstand what they should include and not include in reporting FV intake on self-report questionnaires.^{11,31} A previous study evaluating the validity of a questionnaire assessing FV intake in adult populations in 4 states, including a low-income Spanish-speaking population in Chicago, revealed that participants had difficulty estimating vegetable intake, as well as fruit.³² In that study, which evaluated a 6-item telephone questionnaire, researchers generally found acceptable correlations between individual foods on the questionnaire and 2 other methods of dietary assessment, except in the low-income Hispanic segment of the sample, in which the correlations were consistently low. The authors note that these low correlations may potentially be attributed to differences in Hispanic and Anglo food patterns. Low-income Spanish-speaking respondents may have had difficulty estimating intake because food items such as carrots, green salad, and fruit juice on the questionnaire may not have reflected fruits and vegetables commonly consumed among Hispanics. In a traditional Mexican diet, vegetables are used mainly as ingredients in the preparation of soups, rice, pasta, meat, and tortilla-based preparations, rather than consumed in the form of salads and vegetable side dishes.³³ It is possible that participants may omit key mixed vegetable-rich dishes to aid with vegetable in estimating their consumption. In addition, if items inquired about FV intake together, considering both together may be more difficult for some respondents.

Such issues may potentially be addressed through the inclusion of illustrated examples of FV to be included. In addition, as in previous studies, instruction guides to accompany the questionnaire may be developed for those administering it, with responses to possible questions that could arise regarding which foods to include as FV.^{34,35} However, it is possible that participants may not inquire when questions arise, and simply respond to the questions as they interpret them. As there is generally limited time and funding

available for evaluation of nutrition education programs, tools are often self-administered, making it important to clearly convey what information is requested in questionnaire items, with the assumption that participants may not inquire when they do not understand an item. Future research is needed to explore additional possibilities to help respondents understand what foods should be included in items related to FV intake. It is important to appropriately adapt questionnaires for the low-income Spanish-speaking population if tools are based on existing instruments designed for other groups.

Another consideration in tool development is the ability of respondents to accurately determine the amount consumed. Many respondents may have had difficulty quantifying intake, particularly with regard to “cup equivalents” consumed. As “cup equivalents” is abstract in nature, it may be cognitively difficult to estimate quantity consumed in these terms. One possible method of improving understanding of how to quantify intake may be to include a definition of a cup/serving. This method was used in a study evaluating 3 short FV intake screeners in a sample of 244 multiethnic adults in the United States.²³ Although definitions were included in the instruments, however, validity coefficients for both “cup” and “serving” items were relatively low, possibly reflecting the difficulty respondents have with these abstract concepts.²³ Also, when considering adding text to an instrument, the literacy level of the target population is important to take into account, as text should be minimized for low-literacy audiences.²⁶⁻²⁸

There is a need for FV evaluation tools with a low respondent burden suitable for use in low-literate Spanish speakers in a group setting. In designing such tools, researchers should employ strategies to assist respondents to understand what constitutes FV and appropriately identify amount consumed. Use of validated instruments will allow for evaluation of nutrition education programs and improvement of such

efforts for effective delivery of messages to promote health.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical Approval

Not applicable, because this article does not contain any studies with human or animal subjects.

Informed Consent

Not applicable, because this article does not contain any studies with human or animal subjects.

Trial Registration

Not applicable, because this article does not contain any clinical trials. **AJLM**

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