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Development and Validation of a Spanish Nutrition Screening Tool for Hispanic American 3 to 5-Year-Olds

Denisse Arias Olivas
Brigham Young University

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Denisse Arias Olivas

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Sarah Gunnell Bellini, Chair
Rickelle Richards
Marc-Aurel Martial

Department of Nutrition, Dietetics, and Food Science

Brigham Young University

ABSTRACT

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Denisse Arias Olivas
Department of Nutrition, Dietetics, and Food Science, BYU
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Latinos comprise 18.9% of the population in the United States and are the largest and fastest growing minority group. Obesity prevalence was 26.2% among Hispanic children compared to 16.6% among non-Hispanic White children. The obesity epidemic among Latino children has been growing rapidly over the past three decades. Multiple barriers, such as lack of culturally appropriate screening tools, language, and lack of access to nutritional assessment and expert consultation, prevents screening of Latino children and further nutritional guidance. For this reason, prevention efforts such as the use of nutritional screening tools is required for early intervention, more so with populations such as Hispanics that are already at higher risk. To prevent the further divide and increased prevalence of obesity, malnutrition, and food insecurity within this group, it is necessary to develop validated, reliable, and culturally competent screening tools that consider the population cultural background. While nutritional screening tools exist and have been validated in English and even translated into Spanish, there are distinct cultural and geographic eating patterns associated with different diet-related disease rates. As we recognize different benefits and results from varying diets, this leads to the conclusion that differing cultural dietary practices present within the Hispanic population in the United States require more than just a translation of existing validated screening tools. The purpose of this project is to develop a Spanish nutrition screening tool for 3-5-year-old children to be used by Spanish-speaking parents in community settings, to appropriately address malnutrition risk factors with cultural sensitivity. To achieve validity of this screening tool, this study had two phases. Phase 1 established face and content validity and phase 2 established criterion validity. This paper will focus on criterion validity. The Spanish nutrition screening tool results were compared to the dietitian assessment risk rating classification using Chi-Square to determine the sensitivity, specificity, positive and negative predictive value of the screening tool. After a comparison between the nutritional assessment and the nutrition screening tool, the tool proved to have a sensitivity of 91.67% and a specificity of 81.48%.

Keywords: nutritional screening, children, Hispanic, criterion validation

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Introduction

Latinos comprise 18.9% of the population in the United States and are the largest and fastest growing minority group.[1] Obesity prevalence was 26.2% among Hispanic children compared to 16.6% among non-Hispanic White children.[1] The obesity epidemic among Latino children has been growing rapidly over the past three decades.[2]

Obesity prevalence increases with increasing age. A model simulating the growth trajectories of childhood obesity into adulthood showed that among obese children, the probability that they will still be obese at the age of 35 increased with age, from 74.9% at 2 years of age to 88.2% at 19 years.[3] Looking at the predicted prevalence of obesity according to race or ethnicity, Hispanics and non-Hispanic Black groups had higher obesity prevalence compared with their white counterparts that was already present by the age of 2 years.[3] Efforts towards obesity prevention early in life are crucial because of the likelihood of childhood obesity persisting into adulthood and the increased risk of developing other chronic diseases like diabetes and cardiovascular disease.[4]

Multiple studies have shown the prevalence and possible risk factors for overweight and obesity in children, and this evidence provides a broader understanding of the complex nature of obesity treatment.[5-11] The conditions in the environments where the people are born, live, learn, work, play, worship and age have an impact in their health and can relate to different risks and outcomes in their quality-of-life.[4] A deeper understanding of the influence and impact of social determinants of health on obesity can allow us to better identify and address risk factors despite the multifactorial etiology of the disease. These individual, social, and environmental factors can influence one another and can operate throughout childhood and adolescence being the reason for weight gain and even escalating to obesity. Some of these factors include marketing of unhealthy foods, under resourced communities, immigration, food insecurity, school environment, access to safe physical activity, and food deserts.[4]

Acculturation is another factor that increases the risk for obesity within the Hispanic population. Acculturation is the process of adopting new practices from the host country usually through a multigenerational timeline.[12] Several studies have shown that obesity among adults of Mexican origin in the United States has been associated with longer stays in the United States but also with being born in the United States versus Mexico.[4]

Another factor that cannot be overlooked is the language difference and sociodemographic factors more commonly affecting Hispanic populations. Spanish is the second most spoken language in the United States. Based data from 2019, 39% of the people who spoke Spanish at home in the US spoke English “less than very well”.[13]

A nutritional assessment is a detailed evaluation of a patient's nutritional status conducted by a healthcare provider and it is used to diagnose malnutrition and make decisions about the recommendations for the intervention and treatment of the patient.[14] In contrast, a nutrition screening tool utilizes risk factors to identify at-risk individuals to help make nutrition diagnosis.[15] Nutrition screening tools are quicker tools that any healthcare professional or individual can carry out and are a more practical alternative to the more extensive and often difficult to access professional assessment.

To prevent the disparity within this group and their increased prevalence of obesity, malnutrition, and food insecurity, it is necessary to develop validated, reliable, and culturally competent screening tools that consider the Hispanic population cultural background. Otherwise, not having appropriate referrals and access to nutritional interventions due to the lack of screening of child obesity and overweight can lead to increased prevalence of metabolic, cardiovascular, osteo-articular diseases and psychiatric disorders.[16] Validity indicates whether a tool measures what it is supposed to measure and is essential in assessing the performance of the developed tool.[17]

Multiple barriers, such as lack of cultural appropriate screening tools, language barriers, and lack of access to nutritional assessment and expert consultation, prevents appropriate nutrition screening and nutritional guidance of Latino children. [18-20] The multiple interactions between immigrant, first and second-generation differing attitudes, levels of acculturation, and shifting cultural patterns in the countries of origin warrant a nutrition screening tool for Hispanic children. The purpose of this study was to develop and validate a Spanish nutrition screening tool for 3-5-year-old children to be used by Spanish-speaking parents in community settings that addresses malnutrition risk factors with cultural sensitivity.

Methods

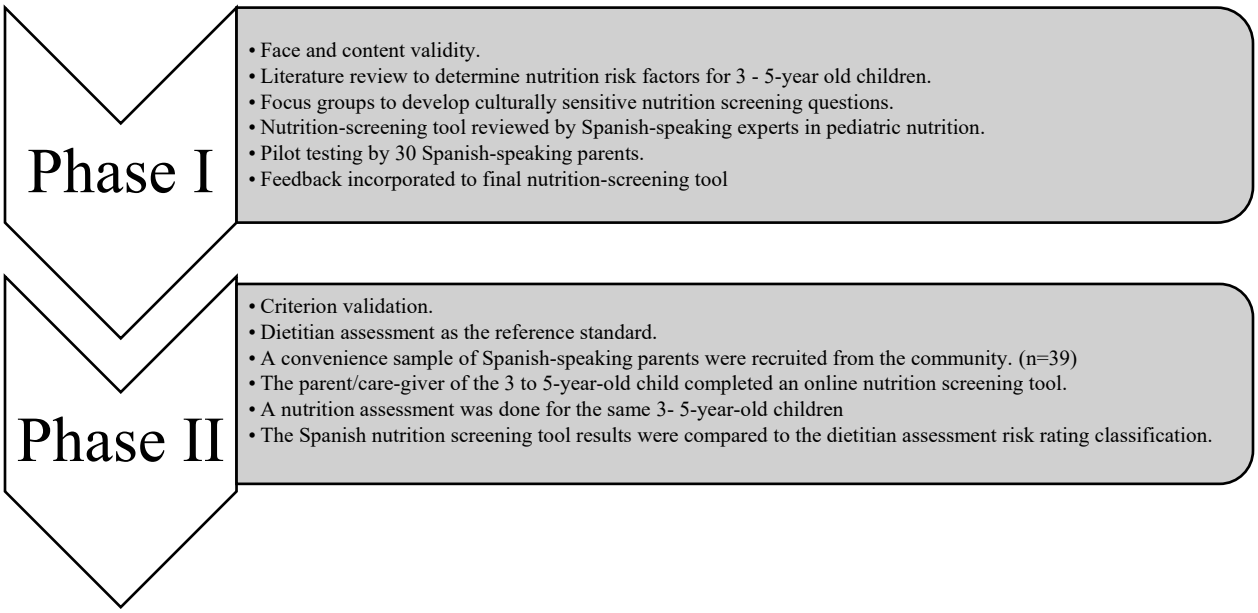

Figure 1 Study phases

Study design

This was a prospective study executed in two phases (Fig. 1). Both phases were approved by the Brigham Young University Institutional Review Board. Phase one was the face and content validity and Phase 2 was the criterion validation.

Phase I – Face and content validity

A literature review was done to determine nutrition risk factors for 3 to 5-year-old children. Focus groups with Spanish-speaking parents were conducted to develop culturally sensitive nutrition screening questions. Based on the results of the focus groups, the researchers developed nutrition-screening questions and entered them into a Qualtrics survey. Then the nutrition-screening tool was sent to Spanish-speaking experts in pediatric nutrition to verify the questions were consistent with malnutrition risk factors in Hispanic children aged 3 to 5 years. Expert reviewers measured the relevancy, clarity, and simplicity of the tool. Then, the feedback from the expert review was incorporated into the screening tool and the survey was sent to approximately 30 Spanish-speaking parents for pilot testing. Feedback from the pilot test was incorporated into the nutrition-screening tool and the finalized nutrition-screening tool was used to establish criterion validity.

The nutrition-screening tool is a simple and quick tool in Spanish that any healthcare professional and parent can carry out and consists of 22 items and 4 sections: food security, food habits, food intake, and food behavior (Appendix A). The tool takes approximately 10 minutes to complete and based on the final score, the child is placed in low risk for malnutrition if the score is between 0 - 15, moderate risk if the score is between 15 - 29, or high risk for if the score is between 30 -48.

Phase 2 – Criterion Validation

This phase of the study was carried out between May and December 2022. Participants provided consent and parental permission for the study. Researchers measured the results of the nutrition screening tool against a reference standard. This study used a complete dietitian assessment as the reference standard which is the preferred tool for criterion validity.[21] A convenience sample of Spanish-speaking parents were recruited by word of mouth from the community and emails sent to participants in Head Start. Persons were included if the primary language spoken at home was Spanish and they had a child between 3 and 5 years old; no other nutritional, weight, exercise, education, or income criteria were considered for exclusion. The parent/care-giver of the 3 to 5 year old child completed an online nutrition screening tool prior to the full dietitian nutrition assessment of the child.

The dietitian assessed adequacy of food intake, anthropometrics, medical history, behavior, and food security status. Food intake was obtained through a 24-hr recall by a native Spanish speaking dietitian (Appendix D), and it was analyzed with the Food Processor SQL nutrition and fitness software to look at the sodium, added sugar and saturated fat levels in the diet and the percentages for the U.S. Department of Agriculture (USDA) food groups.[22,23] Information about medical history (Appendix B), physical activity, behavior and food security (Appendix E) status was obtained through questionnaires specific for each of these components of the assessment. The behavioral questionnaire included questions about screen time, sleep patterns, food preferences and mealtime battles. To assess food security, a validated 2-question food insecurity screening tool was used, which is based on the U.S. Household Food Security Survey Module to identify households at risk of food insecurity.[24] Weight, height and mid upper arm circumference were taken according to the NHANES procedures for anthropometrics measurement (Appendix C).[25]A portable calibrated scale was used to measure weight, a stadiometer was used to measure height, and a flexible tape to measure mid upper arm circumference. Body mass index was calculated as weight in kilograms divided by the square of height in meters. To analyze these measurements and standardize the assessment, we used Z scores that were calculated using the Pedi Tools App.[26] The cutoffs for BMI and MUAC were based on the Academy/ASPEN Malnutrition Consensus Guidelines and the CDC definitions for overweight and obesity.[27,28]

For consistency, all assessments were reviewed by a single dietitian as follows: the dietitian looked at the five different components of the assessment, including anthropometrics, medical history, 24-hour recall, behavior, and food security. Each component of the assessment has criteria that falls in the low, moderate or high risk for malnutrition category, and based on the measurements and responses of the assessment, the child is placed in either of these categories for each component. For anthropometrics, z scores for BMI and MUAC [27,28] were assessed and weighted individually while all other components were weighted as one, for a total of 6 points (anthropometrics (2), medical history (1), 24-hour recall (1), behavior (1), and food security (1)). If a child received a score of 3 or more as high the child was classified as high risk, if a child received a score of 3 or more as moderate the child was classified as moderate risk, and if either criterion was not met, they were classified as low risk. For example, if a child had one anthropometric component at moderate risk, the other anthropometric component at low risk, medical history at low risk, 24-hour recall at moderate risk, behavior at low risk and food security at moderate risk, then the child was classified as moderate risk for malnutrition. The dietitian then determined the overall nutrition risk of the child using the dietitian assessment risk-

rating classification. (See Appendix F) The risk-rating classification guide was developed based on the NutriSTEP risk rating classification, and clinical experience and was sent to pediatric RDNs for content validation.[29]

Data analysis

Descriptive analysis was used for the presentations of the demographic data. The Spanish nutrition screening tool results were compared to the dietitian assessment risk rating classification using Chi-Square to determine sensitivity, specificity, positive and negative predictive value of the screening tool. A FREQ procedure was done using the SAS System to analyze categorical variables and show numbers and percentages of cases observed for each category of a variable. Cramer's V was obtained using the SAS System to determine correlation between our variables and how strong the relationship appears to be. Positive predicted value was calculated dividing the number of true positives by the number of true positives plus the number of false positives. The negative predicted value was calculated dividing the number of true negatives by the number of true negatives plus the number of false negatives.

Results

Participants

The subject characteristics are listed in Table 1. Of the 39 parent-child dyads, 53.8% of the parents were between 31 and 35 years of age and most of the parents that participated were females (89.7%). Forty-six percent of participating parents were from Mexico, 17.9% from Colombia, 15.3% from Chile, 10.2% from Peru and 12.5% from other countries. Fifty-six percent of them had lived 5 years or more in the United States.

The educational level of most of the participants was a bachelor's degree (76.9%) and the income of the people living in the household for most families was between $20,000 and $39,000 (33.3%).

Table 1 Characteristic of the study subjects

Variable (N = 39)	Number	Percentage
Spanish as primary language	39	100%
Identified as Latin	39	100%
Age		
20 – 25	1	2.5%
26 – 30	11	28.2%
31 – 35	21	53.8%
36 – 40	5	12.8%
41 – 45	1	2.5%
Gender		
Males	4	10.2%
Females	35	89.7%
Country of origin		
Mexico	18	46.1%
Colombia	7	17.9%
Chile	6	15.3%

Peru	4	10.2%
Puerto Rico	1	2.5%
Dominican Republic	1	2.5%
Uruguay	1	2.5%
Honduras	1	2.5%
USA	1	2.5%
Time living in the USA		
>5 years	22	56.4%
< 1 year	7	17.9%
1 – 2 years	6	15.3%
3 – 4 years	4	10.2%
Most spoken language at home		
Spanish	35	89.7%
Mix of English and Spanish	4	10.2%
Marital Status		
Married	36	92.3%
Single	2	5.1%
Divorced/Separated	1	2.5%
Educational level		
Bachelor's degree	30	76.9%
Some college	4	10.2%
High School Diploma	3	7.6%
Maters, Doctorate, Postdoctoral	2	5.1%
Annual income of the people living in the household		
Less than $19,000	7	17.9%
$20,000 – $39,000	13	33.3%
$40,000 - $59,000	10	25.6%
$60,000 - $79,000	2	5.1%
More than $100,000	7	17.9%

Criterion Validity

Table 2 Nutritional assessment by Nutrition screening risk

Nutritional assessment by Nutrition screening risk		
Nutritional assessment	**Nutrition screening risk**	
	Low risk	**Moderate risk**
Low risk	22(TN) 81.48%	5 (FP) 18.52%
Moderate risk	1(FN) 8.33%	11(TP) 91.67%

TP= True positive; FP= false positive; FN= false negative; TN= true negative

Table 2 shows the comparison between the nutrition risk as determined by the nutritional assessment and the nutrition risk derived from the nutrition screening tool. Of a total of 39 children, 22 children were classified with low risk for malnutrition both by the dietitian and the nutrition screening tool and 5 children were diagnosed with low risk of malnutrition by the dietitian but classified with moderate risk of malnutrition by the nutrition screening tool. One child was diagnosed with moderate risk of malnutrition by the dietitian but classified as low risk by the nutrition screening tool and 11 children were classified with moderate risk of malnutrition both by the dietitian and the nutrition screening tool. The sensitivity of the tool was of 91.67%, and the specificity of the tool was 81.48%. Positive predictive value of the nutrition screening was of 69% and the negative predictive value of the nutrition screening tool was of 96%. The study obtained a large effect size of 0.68 (Cramer's V) and a chi-square value was of 18.37% between the nutritional assessment and the nutrition screening tool.

Discussion

The creation of a validated screening tool can lead to better identification of at-risk individuals particularly those with barriers to access to other higher-level and more complex assessment tools, as long as they are valid and culturally appropriate. When comparing the nutrition screening tool of this study against the nutritional assessment, the nutrition screening tool proved to effectively identify Hispanic children with risk of malnutrition. The sensitivity of the tool was of 91.67%, and based on the cut points for interpreting data of pediatric malnutrition screening tools by the Academy of Nutrition and Dietetics, this percentage tells us that the tool is excellent at correctly identifying patients with malnutrition.[30] The specificity of the tool was 81.48% which tells us that the tool is good at correctly identifying patients without malnutrition. Positive predictive value of the nutrition screening tool indicates that 69% of the children who were classified as being at moderate risk of malnutrition were truly malnourished. The negative predictive value of the nutrition screening tool indicates that 96% of the children who were classified as being at low risk of malnutrition were truly healthy children with a lower risk of malnutrition. Comparing the nutrition screening tool with NutriSTEP, NutriSTEP had a sensitivity of 84% for moderate risk and a specificity of 46% for moderate risk.[28]

Many of the components of the nutritional assessment for this study matched with the components for evaluation of the pediatric patient with overweight or obesity recommended by the American Academy of Pediatrics (AAP).[4] Some of these include BMI as a screening and diagnosis tool, medical history, physical activity, family and home environment factors, intake of sugar-sweetened beverages, portion sizes, snacking behavior, screen time, sedentary behavior, sleep duration and food security.[4] The 24-hr recall and behavioral questionnaire were an important component of the assessment because we wanted to capture some of the trends that have been seen among US youth regarding the consumption of ultraprocessed foods. The increase in the intake of ultraprocessed foods has been linked to excessive calorie consumption and weight gain.[31] Some studies have looked at the perceptions about sugar-sweetener beverages among Hispanics and shown that parents perceive beverage sugar and sweetener content being natural and containing certain nutrients. [32,3] Other factor that influences parent to offer sugar sweetener beverages is normative beliefs that others serve SSBs to children. [32,33] These perceptions and attitudes towards this type of beverages, emphasize the tendency among the Hispanic population of a higher intake of sugar-sweetened beverages.

The nutritional assessment for this study was detailed and comprehensive and in comparison, the nutrition screening tool was able to identify and capture individuals at risk. Even though it was answered by the parents, the nutrition screening tool had a similar predicting capacity as a nutritional assessment done by an expert and didn't require anthropometrics which makes it easier to complete in a community setting. Another difference between the two is that the nutritional assessment takes approximately 25 minutes to complete, and the nutrition screening tool requires only 10 minutes.

Therefore, when cost, accessibility, ease of use or setting allows only for screening, having a well-structured, scientifically developed, and culturally competent tool can help narrow the gap between individuals who can benefit particularly from these easy and accessible routes of entry into receiving the right nutritional approach. This becomes more important with populations that are already at higher risk of overweight and obesity as well as the diseases related to these conditions like the Hispanic population.[4] Also, minority populations have less access to higher-level interventions such as a nutritional assessment, and therefore benefit from an affordable, easy to use, and replicable screening tools that can create awareness and appropriately direct to next steps.[18]

One of the main strengths of this nutrition screening tool is that it was developed in Spanish taking into consideration culturally competent aspects such as cultural background, values, attitudes, and beliefs. As we were developing the nutrition screening tool, we recognized that differing cultural dietary practices present within the Hispanic population in the United States required more than just a translation of existing validated screening tools. During both phases of the project, the focus groups were conducted in Spanish by native speaking professionals and the questionnaires for the assessment were also created in Spanish and conducted in Spanish. Participants were from different Hispanic cultures with 46% of the participants being from Mexico, 18% from Colombia, 15% Chile, and 10% from Peru which gave us a broader understanding of the attitudes and beliefs of the Hispanic culture. Another strength of the study is that the nutrition screening tool had a high sensitivity (91.67%) and specificity (81.48%).

One of the limitations for this study is that the sample size is smaller compared with other validation studies, and for this reason the results presented could be considered as preliminary data. Another limitation is that both the nutritional assessment and nutrition screening tool only captured Hispanic children at low and moderate risk because of the demographic characteristics of our population. Most of the participants had a bachelor's degree and 18% had an annual income of more than 100,000.

Conclusion

This nutrition screening tool can act as a preventative measure and allow for early intervention. Knowing if the child is at higher risk of malnutrition, can create awareness of the different social determinants of health that could be playing a role in malnutrition, and can appropriately direct the patient to next steps and being referred to a professional. While there are tools in English that assess malnutrition in children between the ages of 2 to 5 years old, there are no nutrition screening tools that have been created in Spanish in the US that are culturally competent. The developed Spanish nutrition screening tool takes into consideration culture, language and was created specifically for Hispanic children in the US. The nutrition screening tool proved to be high in sensitivity and specificity and truly detected Hispanic children at risk and no risk of malnutrition. For this reason, we recommend this tool as first step in nutritional screening of Hispanic children between 2 to 5 years of age. Next steps for this project include a larger sample size that is more representative of the target population.

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APPENDIX A

Herramienta de Detección de Desnutrición

Por favor indique si las siguiente declaraciones aplican a su familia durante el periodo de los últimos 12 meses, es decir desde (nombre del mes) del año pasado. Por favor conteste "frecuentemente", "a veces" o "nunca" de acuerdo a lo que corresponda

---

Me preocupó que la comida se podía acabar antes de tener dinero para comprar más.

- ○ Frecuentemente
- ○ A veces
- ○ Nunca

La comida que compré no rindió lo suficiente, y no tenía dinero para comprar más.

- ○ Frecuentemente
- ○ A veces
- ○ Nunca

Hábitos de alimentación

Por favor, responda estas preguntas sobre su hijo lo mejor que pueda.

Estoy familiarizado/a con lo que come mi hijo/a.

- ○ Totalmente en desacuerdo
- ○ En desacuerdo
- ○ Indeciso
- ○ De acuerdo
- ○ Totalmente de acuerdo

¿Cuántas comidas come su hijo/a en *un día*? (comidas completas y refrigerios)

- ○ Menos de 3
- ○ 3
- ○ 4
- ○ 5
- ○ Más de 5

Mi hijo/a se sienta a comer a la mesa en cada tiempo de comida.

- ○ Frecuentemente
- ○ A veces
- ○ Nunca

Me aseguro de que mi hijo coma todo lo que le sirvo.

- ○ Frecuentemente
- ○ A veces
- ○ Nunca

Ingesta Dietética

Por favor, responda las siguientes preguntas como si fuera su hijo.

¿Cuántas veces come comida rápida durante *la semana*? (comida para llevar como pizza, tacos, nuggets de pollo)

- ○ 0-1 vez
- ○ 2-3 veces
- ○ 4-5 veces
- ○ Más de 5 veces

¿Cuántas veces come comida frita durante *la semana*? (papas a la francesa, pollo frito, tacos dorados)

- ○ 0-1 vez
- ○ 2-3 veces
- ○ 4-5 veces
- ○ Más de 5 veces

Q16 ¿Cuántas veces come comida chatarra durante *la semana?* (nieve, papitas fritas, dulces, galletas)

- ○ 0-1 vez
- ○ 2-3 veces
- ○ 4-5 veces
- ○ Más de 5 veces

¿Cuántas veces toma jugo cien por ciento de fruta durante *el día*?
(jugo comprado o hecho a mano sin azúcar añadida)

- ○ Nunca
- ○ 1-2 veces
- ○ Mas de 3 veces

¿Cuántas veces toma bebidas azucaradas durante *el día*? (soda, aguas frescas, jugo *NO* cien por ciento de fruta)

- ○ Nunca
- ○ 1 vez
- ○ 2 veces
- ○ 3 veces
- ○ Más de 3 veces

Por favor, responda las siguientes preguntas como si fuera su hijo.

¿Cuántas veces come legumbres durante *la semana*? (frijoles, lentejas, chicharos, garbanzos)

- ○ Nunca
- ○ 1 vez
- ○ 2 veces
- ○ 3 veces
- ○ Más de 3 veces

¿Cuántas veces come granos y cereales durante *el día*? (arroz, maíz, trigo, avena)

- ○ Menos de 3 veces
- ○ 3-5 veces
- ○ Más de 5 veces

¿Cuántas veces come proteína durante *el día*? (pollo, pescado, carne de res, carne asada, huevos)

- ○ 0-1 vez
- ○ 2-3 veces
- ○ 4 veces
- ○ Más de 4 veces

¿Cuántas veces come productos lácteos durante *el día*? (leche, queso, yogurt)

- ○ Nunca
- ○ 1 vez
- ○ 2 veces
- ○ 3 veces
- ○ Más de 3 veces

¿Cuántas veces come fruta durante *el día*? (mango, plátano, melón, manzanas)

- ○ Nunca
- ○ 1 vez
- ○ 2 veces
- ○ 3 veces
- ○ Más de 3 veces

Q25 ¿Cuántas veces come verduras durante *el día*? (aguacate, calabaza, brócoli, lechuga, zanahorias)

- ○ Nunca
- ○ 1 vez
- ○ 2 veces
- ○ 3 veces
- ○ Más de 3 veces

Comportamiento

Por favor, responda estas preguntas sobre su hijo lo mejor que pueda.

¿Considera que su hijo/a es activo físicamente? (nada, corre, monta en bicicleta, juega en el parque)

- ○ Sí
- ○ No

Si es activo/a: ¿cuántas horas está en movimiento al día?

- ○ Menos de 1 hora
- ○ 1-2 horas
- ○ 2-3 horas
- ○ Más de 3 horas

¿Su hijo/a tiene tiempo de pantalla? (uso activo de aparatos electrónicos como tableta, televisión, celular)

- ○ Sí
- ○ No

Si contestó sí, ¿cuántas horas tiene de tiempo de pantalla?
(tiempo de pantalla es el uso activo de aparatos electrónicos como tableta, televisión, celular)

- ○ Menos de 2 horas
- ○ 2 horas
- ○ Más de 2 horas

Usualmente, ¿cuántas horas duerme su hijo/a?

- ○ Menos de 10 horas
- ○ 10-13 horas
- ○ Más de 13 horas

No riesgo/ Riesgo bajo	**Riesgo moderado**	**Riesgo Alto**
0-15	15-29	30-48

APPENDIX B

Medical History

1. Por favor mencione si su hijo(a) ha tenido cirugías previas
2. Por favor mencione si su hijo(a) tenido hospitalizaciones previas
3. Por favor mencione si su hijo(a) ha tenido lesiones o algún accidente grave
4. ¿Su hijo(a) tiene alguna de las siguientes condiciones?
    a. Asma
    b. Diabetes
    c. Alergias alimentarias
    d. Anemia
    e. Constipación que haya requerido de visita médica
    f. Problemas de piel crónicos o recurrentes (eczema, dermatitis, etc.)
    g. Retraso o trastorno del desarrollo
    h. Trastorno de conducta (TDAH, ODD, otros)
    i. Problemas dentales
    j. Otros

APPENDIX C

Instructions to Measure Weight, Height, and Arm Circumference

Weight

1. Explain to the child he/she needs to step on the scale alone and stand very still.
2. Have the child remove shoes and heavy clothing, such as sweaters.
3. Ask the child to stand in the middle of the scale, feet slightly apart (on the footprints, if marked), and to remain still until the weight appears on the display.
4. Record the child's weight in kg to the nearest decimal fraction.

Height

1. Remove the child or teen's shoes, bulky clothing, and hair ornaments, and unbraid hair that interferes with the measurement.
2. Take the height measurement on flooring that is not carpeted and against a flat surface such as a wall with no molding.
3. Have the child or teen stand with feet flat, together, and against the wall. Make sure legs are straight, arms are at sides, and shoulders are level.
4. Make sure the child or teen is looking straight ahead.
5. Take the measurement while the child stands with head, shoulders, buttocks, and heels touching the flat surface (wall).
6. Use a flat headpiece to form a right angle with the wall and lower the headpiece until it firmly touches the crown of the head.
7. Accurately record the height to the nearest 1/8th inch or 0.1 centimeter.

Arm Circumference

1. Ensure that the child is not wearing any clothing on his or her left arm.
2. If possible, the child should stand straight and sideways to the measurer.
3. Bend the child's left arm at 90 degrees to the body.
4. Find the mid-point of the upper arm. The mid-point is between the tip of the shoulder and the elbow.
5. Mark with a pen the mid-upper arm point.
6. Ask the child to relax the arm so it hangs by his or her side.
7. Using both hands, place the MUAC tape window (0 cm) on the mid-point.
8. While keeping the left hand steady, wrap the MUAC tape around the outside of the arm with the right hand.
9. Feed the MUAC tape through the hole in the tape while keeping the right hand planted on the arm.
10. Pull the tape until it fits securely around the arm while keeping the right hand steady on the child's arm.
11. Read and record the measurement at the window of the MUAC tape to the nearest millimeter (mm).

APPENDIX D

24 hr recall instructions for dietitian

1. *Explain to the parent that these questions are to assess what the child ate in a day and that he/she should not feel embarrassed about any foods mentioned, as there are no "good" or "bad" foods.*
2. *Get a list of all the foods eaten in a 24-hour period, but no amounts. Use probing questions as "What else did he/she had with this meal?", "Did he/she had tortillas or bread with that meal?", "Did he/she add any sauces or dressings to this meal".*
3. *Go back through and find out amounts*
4. *If they ate out, get the name of the restaurant*

. **Questions**

- ¿A qué hora se despierta su hijo(a)?
- ¿Cuál es la primera comida o bebida que come o toma su hijo(a) en cuanto se despierta? ¿A qué hora es?
- ¿Es eso su desayuno? Si no lo es, por favor describa ¿qué come de desayuno su hijo(a) y a qué hora es?
    - ¿Su hijo(a) toma alguna bebida con esa comida? Descríbalo
- ¿Su hijo come algo antes del lonche? Si sí, por favor describa ¿qué come de colación y a qué hora es?
    - ¿Su hijo(a) toma alguna bebida con esa colación? Descríbalo
- ¿Qué come de lonche su hijo(a) y a qué hora es?
    - ¿Su hijo(a) toma alguna bebida con esa comida? Descríbalo
- ¿Su hijo come algo antes de la cena? Si sí, por favor describa ¿qué come de colación y a qué hora es?
    - ¿Su hijo(a) toma alguna bebida con esa colación? Descríbalo
- ¿Qué come de cena su hijo(a) y a qué hora es?
    - ¿Su hijo(a) toma alguna bebida con esa comida? Descríbalo
- ¿Es esa la última comida del día de su hijo(a)? Si no lo es, por favor describa ¿qué come antes de dormir y a qué hora es?
- ¿A qué hora duerme su hijo(a)?
- ¿Le da suplementos a su hijo(a)? Describa el tipo de suplemento y frecuencia con que se lo da.

APPENDIX E

Food Security Questions

Por cada una de las siguientes declaraciones, por favor indique si la declaración se aplica a su familia “frecuentemente,” “a veces” o “nunca” durante los últimos 12 meses, es decir desde [nombre del mes actual] del año pasado.

1. Estábamos (Estaba) preocupado(s) de que los alimentos se acabaran antes de que tuviéramos (tuviera) suficiente dinero para comprar más.

2. Los alimentos que compramos (compré) no duraron mucho y no teníamos (tenía) suficiente dinero para comprar más.

Behavior Questions

1. ¿Qué tipo de alimentos prefiere su hijo(a)?
2. ¿Qué tipo de alimentos no le gustan a su hijo(a)?
3. ¿Dónde y con quién su hijo(a) come generalmente sus comidas?
4. ¿Cómo consideraría que es el comportamiento de su hijo(a) durante la hora de la comida?
5. ¿Ven televisión mientras comen?
6. ¿Cuántas horas al día su hijo(a) participa en actividades física de intensidad moderada-alta?
7. ¿Cuántas horas de televisión, video juegos y computadora tiene su hijo(a) al día?
8. ¿Cuántas horas de sueño tiene su hijo por noche?

APPENDIX F

Dietitian Assessment Risk Rating Classification

	Low risk	Moderate risk	High risk
Anthropometric	BMI for age z-score -1.645 to 1.036 MUAC for age z-score -1 – 0.9	BMI for age z-score -1 to -1.9 or 1.036 to 1.645 MUAC or age z-score between -1 and -1.9 1 – 1.9	BMI for age z-score less than -2 or greater than 1.645 MUAC for age z-score < -2 / ≥2
Clinical History	Healthy , No food allergies No anemia No dental problems	Recent illness, surgery or hospitalization that has an impact on nutrition Some food allergies History of iron deficiency treated with diet Some dental problems, some cavities	Currently treated for an illness or medical condition that has an impact on nutrition Significant food allergies and food restrictions History of iron deficiency treated with diet and medication Significant dental problems/cavities that make it difficult to eat
24 Recall	Eats a variety of foods from most of all food groups Has a regular food schedule and eats 3 meals a day (breakfast, lunch, and dinner) Eats at least 2 snacks a day	Moderate variety of foods. Eats from some food groups. Rarely eats at regular times. Sometimes skips snacks/ ≥3 snacks	Little to no variety of foods. Eats only from limited food groups Never eats at regular times and skips meals Rarely eats snacks/ More than 3 snacks

	Drink less than 4 oz of juice a day	Drinks ≥4 oz of juice a day but ≤ 6	Drinks >6 oz of juice a day
	<1.1 grams of sodium per 1000kcal	1.2 – 1.9 grams of sodium per 1000 kcal	>2.0 grams of sodium per 1000 kcal
	<6.5% of energy from added sugars	6.6 – 25% of energy from added sugars	>26% of energy from added sugars
	<8% of energy from saturated fats	9 – 15% of energy from saturated fats	>16% of energy from saturated fats
Behavior	Child likes to eat a variety of food	Child prefers sweets or fat foods	Child prefers sweets and fat foods
	Child dislikes few foods	Child dislikes a lot of foods	Child is considered a "picky eater" and has extreme food jags
	Child eats with family at least 3 times a week	Child eats with family less than 3 times a week	Child rarely eats with family
	Child occasionally has mealtime battles	Child frequently has mealtime battles	Child has extreme mealtime battles
	Meal rarely consumed while watching TV	Meal frequently consumed while watching TV	Meals always consumed while watching TV
	Daily active play more than once a day indoors and outdoors	Less than 4 days a week of active play and less than once a day indoors and outdoors	Minimal or no active play indoors and outdoors
	Less than 3 hours of TV or electronic devices a day	3-4 hours of TV or electronic devices a day	More than 4 hours of TV or electronic devices a day

	10-14 hours of sleep including naps	Less than 10 hours a day Including naps	Less than 8 hours a day Including naps
Food security	Sufficient income to offer quantity, quality and variety of foods	Limited income to offer quantity, quality and variety of foods	Insufficient/inadequate income to offer quantity, quality and variety of foods