



A Semi-Quantitative Food Frequency Questionnaire Validated in Hispanic Infants and Toddlers Aged 0 to 24 Months



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ABSTRACT

Background There are limited validated food frequency questionnaires (FFQs) for infants and toddlers, most of which were evaluated in Europe or Oceania, and the ones available for use in the United States have important limitations.

Objective Our aim was to assess the validity of an FFQ developed for infants and toddlers.

Design A semi-quantitative FFQ was developed that included 52 food items, their sources, and portion sizes. The FFQ inquired about diets over the previous 7 days. Its validity was assessed in a cross-sectional study. Participants completed the FFQ, followed by a 24-hour recall on two occasions with 1 week between data collection.

Participants/setting A total of 296 caregivers of infants and toddlers aged 0 to 24 months enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children, Puerto Rico.

Main outcome measures Intake of nutrients and food groups were averaged for the two FFQs and the two 24-hour food recalls, and adjusted for energy intake.

Statistical analyses performed Spearman correlations were performed for intakes of energy, nutrients, and foods between administrations and between instruments. Correlation coefficients were de-attenuated to account for variation in the 24-hour recalls.

Results A total of 241 participants completed the study. Intake of all nutrients and foods were significantly correlated between FFQs and 24-hour recalls and between the means of FFQs and 24-hour food recalls. The de-attenuated correlation for nutrients between the FFQs and 24-hour recalls ranged from 0.26 (folate) to 0.77 (energy), with a mean correlation of 0.53. The de-attenuated correlation for food groups between the FFQs and 24-hour recalls ranged from 0.28 (sweets) to 0.80 (breast milk), with a mean correlation of 0.55. When analyses were restricted to those consuming foods other than breast milk or formula ($n=186$), results were similar.

Conclusions This semi-quantitative FFQ is a tool that offers reasonably valid rankings for intake of energy, nutrients, foods, and food groups in this sample of infants and toddlers.

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INFANT FEEDING DURING THE FIRST 1,000 DAYS OF life (from conception to age 24 months) is crucial for healthy growth and development.¹ This period is vital in the prevention of future chronic diseases, including

obesity, later in childhood and adulthood. In particular, obesity is a major public health problem in children and adults, with one of the highest prevalences among Hispanics.²

Understanding infant dietary intake is important, as studies relate the following nutritional factors to excess weight: breastfeeding duration,³ early introduction of complementary foods, juice intake,^{4,5} and formula feeding,⁶ among others. However, assessing infant dietary intake is complicated, as there are many changes occurring in short periods of time. Infants generally move quickly from a largely milk-based diet to a diet with a variety of foods also consumed by the other family members.⁷ Understanding infant dietary intake and how this relates to weight gain is also important for establishing infant diet recommendations,

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which currently vary widely among pediatricians, and there are only a few authoritative guidelines available.⁸ Studying the dietary patterns during the first 1,000 days allows for the identification of practices and patterns that are not healthy in the population from early on. Because food preferences develop early in life,⁹ understanding dietary consumption patterns in infants can help develop specific recommendations for this group, foster healthy eating habits from this stage of life, and contribute to the prevention of childhood obesity.

Validated instruments are needed to accomplish these goals. Currently, there are only a few instruments to capture dietary patterns in infants and toddlers worldwide, but most of the instruments available are not validated. The few validated food frequency questionnaires (FFQs) available for infants and toddlers are for populations in Europe or Oceania.¹⁰⁻¹⁶ To our knowledge, there are only four validated FFQs for use in infants and toddlers in the United States,¹⁷⁻²⁰ with important limitations, such as not validated for both nutrients and food groups, only beverages included, limited foods validated, validated among a small sample of infants and toddlers, and not updated (this is important as the food industry has introduced many infant foods in the past several years). Validated instruments are needed to accurately assess the diet of the population in any type of study.^{21,22} Therefore, the objective of this study was to assess the validity of a food frequency questionnaire (FFQ) developed specifically for infants and toddlers aged 0 to 24 months for both nutrients and food groups.

METHODS

This was a cross-sectional study to assess the validity of a semi-quantitative FFQ among a sample of Hispanic infants and toddlers aged 0 to 24 months old. This FFQ inquired about infants' and toddlers' diets during the previous 7 days. Caregivers of infants and toddlers completed two FFQs (at baseline and at week 3), followed by two 24-hour recalls (at weeks 2 and 4). Only 1 week was allowed between administrations of the instruments because of the high variability in an infant's diet as new foods are introduced.

The University of Puerto Rico's Medical Sciences Campus Institutional Review Board approved the study protocol and all participants provided written informed consent.

Participants

We recruited a nonprobabilistic convenient sample of caregivers aged 21 years or older with infants and toddlers aged 0 to 24 months. Recruitment occurred daily in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinic of the Municipality of Trujillo Alto in Puerto Rico during a 3-month period (November 2014 to February 2015). This is the only WIC clinic in this municipality, allowing recruitment of all active participants of that clinic (total enrollment in September 2014 was 476 participants aged 0 to 24 months) as participants attend the clinic about once per month for either an appointment with the nutritionist or to pick up their monthly check. Infants or toddlers with any serious health condition that could alter normal feeding practices were excluded, as were caregivers younger than 21 years of age.

Sociodemographic Questionnaire

This questionnaire included items related to age, sex, and educational attainment of the caregivers, and number of children in the household.

Anthropometric Assessment

Weight was assessed in infants by trained research personnel while the infants wore light clothing and a clean diaper using a manual scale (Detecto model 3p7044), which was calibrated daily. Recumbent length was measured in centimeters using an infantometer (Perspective Enterprises model #PE-RILB-BRG2). Measurements were taken in duplicate and averaged. Weight status was assessed calculating weight-for-length using World Health Organization growth charts.²³ Weight was categorized as underweight (<5th percentile), healthy weight (5th to 89th percentile), and excessive weight (\geq 90th percentile).

FFQ

A semi-quantitative FFQ was developed adapting the Infant Feeding Practices Survey II conducted by the Centers for Disease Control and Prevention and Food and Drug Administration.²⁴ The original FFQ had 19 food items (without portion sizes), and frequency of consumption was assessed as feedings per day or per week. This FFQ was expanded in our revised version to include other food items with a brief description on how these were prepared and/or their source (eg, raw, canned). Previous infant studies were used to identify the food items most typically consumed by infants and toddlers in the United States, including the most frequently consumed foods in Hispanic infants, such as rice, tortilla, cereals and mixed dishes (pizza), bananas, raw and home cooked vegetables, starchy vegetables (plantains), and fruit juices.^{7,25,26} This FFQ was pilot-tested in a convenience sample of 60 mothers 21 years and older with infants 0 to 12 months in Puerto Rico to assess the clarity of the statements included and to assess whether additional food items needed to be included.²⁷ In this pilot study, 60 mothers (28 with infants 0 to 4 months; 14 with infants 5 to 8 months, and 18 with infants 9 to 12 months old) completed the FFQ. Most participants considered the statements included in the FFQ to be clear (90%). These results enabled us to further improve our modified FFQ for infants and toddlers.

The final FFQ included 52 food items; 5 were about milk intake (breast milk, formula, cow's milk, flavored milk, and other milks) and their portion size; 4 were about other dairy products and soy-based foods; 7 were about water, juice, and sugar-sweetened beverages and their portion sizes; 7 were about refined and whole-grain cereals, rice, pasta, bread, and crackers and their portion sizes; 6 were about fruits, their source (fresh, baby food, or canned/processed), and their portion sizes; 5 were about vegetables, their source (fresh, baby food, or canned/processed) and their portion sizes; 4 were about starchy roots (potatoes, sweet potatoes, plantains, cassava); 7 were about protein foods (beans, eggs, red meat, poultry and seafood) and their portion sizes; 5 were about sweets (candies, cookies, cakes, biscuits, muffins) and salty snacks and their portion sizes; and 2 were about fats (margarine, butter, and oil). The frequency of consumption of each food during the previous 7 days was assessed as feedings per day if the food was consumed on a daily basis or

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