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Consumption of key food groups during the postpartum period in low-income, non-Hispanic black mothers

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Abstract

The postpartum period can impact diet quality and subsequently place women at greater risk for overweight or obesity. This study examined consumption of key food groups during the first 2 years postpartum among low income, non-Hispanic black, first-time mothers. Data were from the Infant Care, Feeding and Risk of Obesity Study, a cohort of 217 mother–infant dyads, followed from 3 to 18 months postpartum, collected from 2003–2007. At each study visit (3, 6, 9, 12, and 18 months) 24-hour dietary recalls were collected. Consumption levels were compared to those recommended from the 2010 *Dietary Guidelines for Americans* (DGAs) for each of the following food groups: fruits, vegetables, grains, whole grains, protein foods and dairy, as well as an estimated upper limit for sugar-sweetened beverage (SSB) consumption. At each time point, mothers met recommended intake levels for grains and protein foods only. In random-intercept logistic regression models, no demographic or household characteristics were associated with a likelihood of consuming recommended levels for any of the food groups according to the DGAs. Given the low intake of fruits, vegetables, whole grains and lean protein foods and high intake of SSBs and refined grains, interventions targeting women's diet during the postpartum period are warranted.

Keywords

Obesity; Mother; Diet; Postpartum; Dietary Guidelines

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Introduction

The postpartum period marks a significant life transition that can impact diet quality and subsequently place women at greater risk for overweight or obesity. The prevalence of overweight or obesity (BMI≥25) among women of childbearing age is 58.5% (51.4–65.2), but among non-Hispanic black (NHB) women of the same age the prevalence is 80.0% (72.6–85.8) (Ogden, Carroll, Kit, & Flegal, 2014). Although some women adopt healthier eating patterns during pregnancy (Fowles, Hendricks, & Walker, 2005; Fowles & Gabrielson, 2005), many discontinue these habits postpartum (G. C. George, Hanss-Nuss, Milani, & Freeland-Graves, 2005a; Walker et al., 2004; Wiltheiss et al., 2013a). This may be due to stress from increased financial and time demands; food choices based on convenience as well as limited affordability and access to healthy foods may result in suboptimal diet quality, particularly among low-income women (Eikenberry & Smith, 2004; Reyes, Klotz, & Herring, 2013). NHB mothers in particular have been shown to have lower diet quality, higher risk of depression and greater amounts of weight retained during the postpartum period compared to non-Hispanic white (NHW) mothers (Everson, Maty, Lynch, & Kaplan, 2002; Gillman et al., 2001; Hoerr, Tsuei, Liu, Franklin, & Nicklas, 2008; Siega-Riz, Evenson, & Dole, 2004).

Additionally, maternal diet in the postpartum period is considered a key determinant of infant diet (Howard, Mallan, Byrne, Magarey, & Daniels, 2012; Wen, Simpson, Rissel, & Baur, 2013). Maternal diet in general influences foods available in the home and consequently those offered during weaning. Infants who consume nutrient-poor foods such as sugar-sweetened beverages (SSBs), desserts and sweets in place of nutrient-rich foods such as fruits and vegetables (F&V) are at greater risk for obesity later in life (Dattilo et al., 2012; Golley et al., 2013; Park, Pan, Sherry, & Li, 2014). For lactating women, what they eat can influence their child’s palate and acceptance of solid foods during the weaning process as well as taste preferences later in life (Birch & Fisher, 1998; Savage, Fisher, & Birch, 2007). Thus, understanding maternal consumption of such food groups is important not only for adult obesity rates, but also to prevent future risk of obesity in children.

Recommendations for optimal diet quality to help achieve and maintain a healthy weight, promote health, and prevent disease exist through the *Dietary Guidelines for Americans* (DGAs) (U.S. Department of Agriculture and U.S. Department of Health and Human Services, December 2010). The DGAs encourage Americans to focus on foods and beverages that promote a healthy diet; this includes recommendations to increase the consumption of F&V and to decrease the consumption of foods high in added sugar, refined grains and saturated fat. Data have consistently shown that many Americans fail to meet recommended levels of intake of these food groups. Only 17.5% of adult females (age 18 and older) consume recommended amounts of fruit, 9.8% consume recommended amounts of vegetables, and less than 2% consume the recommended amount of whole grains (Moore et al., 2015; U.S. Department of Agriculture, Agricultural Research Service, 2013). The DGAs also include a discretionary calorie allowance, which provides caloric limits for excess energy from solid fats, alcoholic beverages, and added sugars. These “empty calories”, or sources of energy with little to no nutritional value, contribute more than the recommended amount in adult diets, with over 85% of women aged 19–30 exceeding the recommended limit per day (U.S. Department of Agriculture, Agricultural Research Service, 2013). For example, women aged 20–39 consume an average of 275 kcals per day from added sugars; an amount in excess of the recommended maximum of 258 kcals per day from *all* added sugars and solid fats (Ervin & Ogden, 2013).

Little research has been done to examine consumption of key food groups among women during the postpartum period and whether adhering to recommended intake levels is associated with various predictors of diet such as education, employment, age, weight, depression and breastfeeding (Fowles & Walker, 2006; G. C. George, Milani, Hanss-Nuss, & Freeland-Graves, 2005; Olson, 2005). Gaining insight into intake levels of such foods among postpartum women may identify important factors that influence diet and can be used in intervention studies for the purpose of improving the diets of both mothers and children. The purpose of this study is to (1) describe consumption levels of key food groups in a prospective cohort of first-time, NHB mothers from 3 to 18 months postpartum and to assess intake levels based on comparison to the 2010 DGA, and (2) identify predictors of intake so that results can be used to guide nutrition interventions aimed at influencing maternal diet.

Methods

Study design

Data come from the Infant Care, Feeding and Risk of Obesity Project (Infant Care), a longitudinal, observational cohort study of first-time, NHB mothers aged 18–35 years who were recruited through the North Carolina Supplemental Nutrition Program for Women Infants and Children (WIC) (n=217) (Laraia, Borja, & Bentley, 2009; Sacco, Bentley, Carby-Shields, Borja, & Goldman, 2007; Thompson & Bentley, 2013; Thompson, Adair, & Bentley, 2013a; Thompson, Adair, & Bentley, 2013b; H. Wasser et al., 2011; H. M. Wasser et al., 2013). Mothers and infants were followed with in-home visits when infants were 3, 6, 9, 12, and 18 months of age. At each home visit, a wide array of maternal, infant and household characteristics were assessed through questionnaires. Mothers were excluded if their infant was not full term; was <2500 or ≥ 4500 grams in birth weight; had chronic or congenital illness; required medical treatment that interferes with dietary intake, growth, or development (e.g., Down’s syndrome, cerebral palsy, epilepsy, diagnosed mental retardation, cleft lip or palate); or presented with failure-to-thrive. Data collection began in November 2003 and was completed in October 2007. The overall study is described in detail elsewhere (Laraia et al., 2009). The protocol was approved by the School of Public Health Institutional Review Board at the University of North Carolina at Chapel Hill.

Measures

Maternal dietary intake

Dietary intake was assessed at each home visit with one computerized 24-hour dietary recall (24HDR) administered using the Nutrient Data System for Research (NDS-R™) (version 2005; Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN). The NDS-R™ is comprehensive nutrient calculation software that includes more than 18,000 foods and over 8,000 brand-name foods. To ensure accuracy, all study personnel were trained to use the software by an NDS-R™ certified staff member of the Nutrition Obesity Research Center (NORC) at the University of North Carolina at Chapel Hill. Food models and pictures were used to aid in the estimation of portion sizes.

Food groups were defined according to the DGAs: fruits (including 100% fruit juice), vegetables (excluding fried vegetables), total grains, whole grains, dairy and protein foods (meat, poultry, seafood, eggs, soy products and nuts). Servings for commonly consumed and potentially obesogenic foods, such as SSBs and fried vegetables, which include French fries, hash browns and onion rings, were also obtained. Servings from each of the specific food groups at each time point between 3–18 months were obtained by using the NDS-R Food Group Serving Count System. Serving sizes were based on the recommended adult servings that were current at the time the survey was delivered, which were defined per the 2005 DGAs or, for foods not recommended in the DGAs (e.g. cookies, SSBs), the food-label serving sizes from the Food and Drug Administration (FDA). The NDS-R serving sizes were then compared to the food group serving sizes recommended by MyPlate, a web-based program that personalizes recommendations based on the DGAs (https://www.choosemyplate.gov/MyPlate-Daily-Checklist) (U.S. Department of Agriculture, 2016). For this study, current recommendations were used, which at the time of analysis, were the 2010 DGA. Similar to Durham et al., a hypothetical referent mother was created based on the average characteristics of participants in Infant Care: 23 years old, 175lbs, 5′4″, not breastfeeding and sedentary (Durham, Lovelady, Brouwer, Krause, & Ostbye, 2011a). Using MyPlate, recommended food group amounts were based on a 2000 calorie diet and include: 4 servings (2 cups) of fruit, 5 servings (2.5 cups) of vegetables, 6 servings (ounces) of grains, 3 servings (ounces) of whole grains, 5.5 servings (ounces) of protein and 3 servings (cups) of dairy. There is no specific guideline for SSB intake. For a 2000 calorie diet, the FDA recommends a daily limit of 50g from added sugars from all foods and beverages (Food and Drug Administration, HHS, 2015). The average SSB contains approximately 25–30g of sugar per 8oz serving. Therefore, an upper limit (UL) for SSBs is estimated at 1.5 SSBs per day.

Predictor variables

Predictors of intake were drawn from the literature and include factors previously associated with diet: education, age, BMI, marital status, employment, depression, living in a single-headed household, receiving WIC benefits and breastfeeding (G. C. George, Hanss-Nuss, Milani, & Freeland-Graves, 2005b; Hendricks, Briefel, Novak, & Ziegler, 2006; Smithers et al., 2012; Wiltheiss et al., 2013b). Data were collected by trained researchers using a comprehensive, interviewer-administered questionnaire at each time point. Depression was measured using the Center for Epidemiological Studies Depression Scale (Radloff, 1977). For breastfeeding status, mothers were asked whether they were still breastfeeding. Weight and height were measured by a trained research assistant at a subset of visits (3, 6 and 18 months). Height was measured to the nearest 0.5cm and weight to the nearest 0.1kg using a digital scale. BMI was calculated for each individual (weight (kg)/height (m)^2). Weight status was categorized based on international classification guidelines: underweight/normal = BMI<25; overweight = BMI 25–29.9; and obese = BMI ≥30.0.

Statistical analysis

Sample characteristics at each time point (3, 6, 9, 12 and 18 months) were described as frequencies for categorical variables and means and standard deviations for continuous variables. Daily serving size variables for maternal intake were positively skewed, with heavy clustering at zero (i.e., many non-consumers). For these variables, we present the data as the median among consumers only. Data are also presented as the proportion of mothers consuming any amount of a food group at each time point.

Polychoric correlation matrices was used to test for collinearity among predictors. Marital status was highly correlated with education and single-headed households (rho >0.68) and was therefore dropped as a predictor. Receiving WIC benefits was also dropped due to the high percent of women receiving them at each time point. To examine longitudinal associations between meeting the DGAs for each food group and selected maternal and household characteristics, we used random-intercept logistic regression models in which meeting the guidelines for a particular food group was the dependent binary variable and independent variables were maternal and household characteristics plus a variable representing each study visit (time). Post analysis Wald tests were used to assess differences in maternal diet behavior over time. A Bonferonni correction was used to avoid Type 1 error due to multiple comparisons; statistical significance was set at $p \leq 0.001$. To account for missingness in the demographic and household predictor values we imputed using the last observation carried forward (LOCF) method. To address the potential for selection bias due to attrition, differences in baseline characteristics between those who were present and those who were absent at each visit were assessed. All analyses were conducted using Stata 14 (StataCorp, College Station, TX).

Results

Dietary recalls were collected from 197 mothers at month 3 (90.8%), 144 at month 6 (66.4%), 149 at month 9 (68.7%), 120 at month 12 (55.3%) and 122 at month 18 (56.2%) (see Table 1). Within this sample of young, first-time NHB mothers there was a high prevalence of obesity, single-headed households and mothers were receiving WIC benefits. Less than a quarter of the mothers were breastfeeding at 3 months and rates significantly decreased over time; eight mothers were breastfeeding at 12 months (6.7%) and three at 18 months (2.5%). Differences among those who had complete dietary recalls versus those who did not at each time point revealed few significant differences (see Table 1). Mothers with dietary recalls at 12 months were more likely to be older, married, breastfeeding and have a college education. Those with dietary recalls at 18 months were more likely to be older and breastfeeding at baseline.

Across all study visits, fewer than half of the mothers consumed any fruit on a given day (Table 2) and the median serving size among consumers was half the recommended amount (Table 3). Many mothers consumed vegetables, though the median amount of servings per day was much lower than the recommended 5 servings per day across all study visits. Approximately one third of mothers consumed fried vegetables on a given day, with consumers having at least 1.5 servings. Few mothers consumed any whole grains; of those who did, the median serving size did not meet recommended levels. The median intake among consumers for protein foods was near or exceeded the recommended level of 5.5 ounces per day, but the median intake for lean protein, the recommended source for most protein foods, was low at 3.1 ounces per day for month 3 and 2.0 ounces per day for months 6–18 (data not shown). Although many mothers consumed dairy foods, the median number of servings among consumers was approximately one-third the recommendation of 3 servings per day. Most mothers consumed SSBs on a given day and the median number of servings was between 2.3 and 2.8 per day. This is nearly double the estimated UL of 1.5 drinks/day. Nearly all mothers consumed refined grains and protein foods (i.e. meat, poultry, seafood, eggs, soy products, nuts and seeds); these food groups were the only food groups for which the recommendations were met. For all food groups, there were no significant differences in median servings consumed on a given day across study visits. Thus, among consumers on a given day mothers had on average 2.0 servings of fruit, 1.2 servings of vegetables, 1.7 servings of fried vegetables, 5.6 ounces of grains, 1.8 ounces of whole grains, 5.5 ounces of protein foods, 1.0 serving of dairy and 2.5 servings of SSBs (data not shown).

Time interactions for the percentage of mothers meeting the key food group recommendations from 2010 DGAs for the referent profile, which was based on a 2000 calorie diet, did not significantly differ for any of the food groups (see Figure 1). Although not significant, a slightly higher percentage of mothers met the guidelines for vegetables by 18 months and those consuming the estimated UL for SSB intake increased from 6 to 18 months post-partum. A higher percentage of mothers met the guidelines for protein foods and grains compared to other food groups across all study visits. On average, almost half of all participants met the DGAs for servings of grains (45%) and protein (49%) on a given day. However, on average, only 8.7% met the DGAs for fruit, 6.6% for vegetables, 8.0% for whole grains and 8.6% for dairy. For SSBs, on average, 38.1% of mothers consumed at or below the estimated UL of 1.5 drinks per day.

Results of the random-intercept logistic regression, which assesses the odds of meeting recommended levels for each of the key food groups as well as the estimated UL for SSBs for each maternal demographic and household characteristic, while controlling for the others, revealed no significant differences (data not shown). No characteristics were predictive of meeting recommended levels according to the 2010 DGA at the $p<0.001$ level, correcting for multiple comparisons.

Discussion

To our knowledge, this is the first longitudinal study to examine intake of key food group recommendations from the 2010 DGAs and estimated UL for SSBs in a cohort of NHB mothers followed from 3–18 months postpartum. Overall, intake levels remained relatively constant with no significant changes in dietary behaviors or likelihood for meeting key food group recommendations over the 15-month period. Most mothers did not meet the DGAs for any of the food groups. A large number did not consume any fruit on a given day and vegetable consumption was far below recommended levels. The median intake among consumers of grains neared recommended levels for most mothers, but whole grain intake was low, suggesting most grains are coming from refined, processed foods. When compared to a representative sample of U.S. women 20 and older, fruit, vegetable and dairy consumption in the Infant Care sample was lower at 2.0 vs. 2.2, 1.2 vs. 2.9, and 1.0 vs. 1.5 servings per day, respectively; grain consumption was comparable at 5.6 ounces per day and protein was greater at 5.5 vs.4.9 ounces per day (U.S. Department of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center, Food Surveys Research Group (Beltsville, MD) and U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics (Hyattsville, MD)). Our results indicate that postpartum dietary intake patterns of NHB participants are established early and remain stable through the postpartum period.

Our study demonstrates that early motherhood is accompanied by poor dietary choices. Cross-sectional studies among women at different time points in the postpartum period have found similar results, with mothers often not meeting recommended intake levels, particularly for F&V, while consuming excessive amounts of SSBs (Durham, Lovelady, Brouwer, Krause, & Ostbye, 2011b; Fowles & Walker, 2006; G. C. George et al., 2005; van der Pligt et al., 2016). Few studies have looked at changes in maternal diet longitudinally throughout the postpartum period. George et al. compared intake during pregnancy and 6 months postpartum and found that F&V consumption declined while intake of added sugars increased (G. C. George et al., 2005a). Olson looked at food choice behavior during pre-pregnancy, pregnancy and postpartum and reported insufficient intake of F&V, which, similar to our results, remained constant during the postpartum period (Olson, 2005). However, this study was conducted in a predominately white (96%), higher income sample.

Our study reports on a comprehensive set of dietary recommendations and highlights the need for intervention early during the transition to motherhood and throughout the postpartum period, particularly for low-income, NHB mothers. Cost and lack of time for food preparation may be contributing factors to the poor dietary behaviors seen in our study. More than half of participants were working at each time point and nearly all were receiving WIC benefits. Studies show that low-income mothers have lower intakes of F&V and low-fat dairy foods and intakes of F&V decline with decreasing income (Kendall, Olson, & Frongillo, 1996; Tarasuk, 2001). Despite shifting domestic roles, mothers remain principal family food providers. Time spent working could influence the number of meals cooked and consumed at home, thus placing a heavy emphasis on meals and snacks away from home or on prepackaged, ready-to-eat foods, which are often of lower nutritional quality (Robson, Crosby, & Stark, 2016).

Reaching mothers during the postpartum time period is important, especially for socioeconomically disadvantaged women who are often less health-conscious (Pampel, Krueger, & Denney, 2010), but are connected to health and nutrition services through WIC. During the postpartum period women are often receptive to nutrition education, which has been shown to influence vegetable intake and increase nutrition knowledge, particularly in mothers participating in WIC (Nuss, Freeland-Graves, Clarke, Klohe-Lehman, & Milani, 2007; van der Pligt et al., 2016). Intervening during the postpartum period has the potential to influence not only maternal diet, but also infant diet (Papas, Hurley, Quigg, Oberlander, & Black, 2009; Robinson et al., 2007; Wen et al., 2013). This is important, as eating patterns that emerge during infancy have been shown to track through childhood and have lasting effects on food preferences and control of intake later in life (Golley et al., 2013; North & Emmett, 2000; Northstone & Emmett, 2005; Skinner, Carruth, Bounds, Ziegler, & Reidy, 2002). Since maternal diet quality in our sample was poor early in the postpartum period and did not improve over time, interventions may be best timed to begin during the prenatal period. Pregnancy is considered a "teachable moment" where mothers are motivated to adopt risk-reducing health behaviors that are within their means (Phelan, 2010). However, these interventions should continue through the postpartum period, a time that can be stressful, particularly for first time mothers, as they adjust to hormonal and sleep changes, the demands of caring for a newborn and adapting to their new role as parents (L. George, 2005).

Knowing whom to target for nutrition interventions is an area needing more research. The lack of significant findings for the various demographic and household characteristics in predicting the likelihood of mothers meeting recommended intake levels for each of the food groups is likely due to the homogenous nature of our sample in that most mothers were not consuming recommended levels and therefore not meeting recommendations in the DGAs. In addition, the women sampled were all NHB low-income first-time mothers, recruited through WIC clinics; it is possible that income levels are driving the suboptimal dietary behaviors we uncovered rather than the demographic predictors. Future studies should include a larger, more heterogeneous sample to identify demographic and household predictors of maternal diet quality. Importantly, data were collected over ten years ago and prior to the revision of the WIC food packages, which included multiple modifications to better align the food packages with the DGAs and to further promote breastfeeding; an important policy change that could influence maternal breastfeeding and dietary behaviors, warranting future research in this population. Given the large percentage of overweight or obese women in our sample, underreporting of intake is a concern (Braam, Ocke, Bueno-de-Mesquita, & Seidell, 1998; G. Johansson, Wikman, Ahren, Hallmans, & Johansson, 2001; L. Johansson, Solvoll, Bjorneboe, & Drevon, 1998). However, considering the reported intakes as conservative estimates only strengthens the need to intervene, for intake of important food groups like whole grains were low, whereas that of fried vegetables and SSBs was high. Using the LOCF method for predictors that are expected to change, such as weight and depression could impact our findings by inducing bias as well as understating variability. However, sensitivity analyses using complete case data revealed no significant changes in our findings. As with any cohort study with loss to follow up, it is important to note potential selection bias due to attrition. Mothers who dropped out of the study were less likely to be older, married, breastfeeding and have a college education, characteristics often associated with poor diets. However, despite the loss of mothers more at risk for poor diet quality, our conclusions still demonstrate the need to intervene.

The strengths of the current study outweigh the limitations. This study is innovative, as it is one of the first to examine post-partum maternal diet quality over time in a population at high-risk for obesity. Few studies have looked at NHB women specifically, a priority population given their different behavioral patterns and infant feeding practices compared to other races/ethnicities, such as greater likelihood for early introduction of inappropriate foods (Thompson & Bentley, 2013). The longitudinal nature of the data allowed us to simultaneously model and determine the relationship between the longitudinal development of diet quality and the longitudinal changes in maternal diet and household characteristics. Although we had one 24HDR at each time point our results demonstrated a lack of change in consumption patterns over time, thus providing multiple 24HDR to characterize the postpartum period, which provides a unique dataset for others explore. Additionally, using a comparable classification of intake such as the DGAs allows for the comparison of diet in various other populations.

Conclusions

Diet quality for women is suboptimal during the postpartum period and prospective and comprehensive examination of food choices beyond 12 months postpartum is limited, especially in vulnerable populations such as NHB families. This study attempts to close the gap in the literature by describing maternal intake during a time when it can heavily influence the diets of their children. The impact these maternal dietary behaviors can have on infants should not be ignored given the implications role modeling and breastfeeding can have on a child's dietary habits and food preferences. Therefore, future research should focus on the relationship between maternal and infant intake with the goal of uncovering effective intervention targets to prevent early obesogenic patterns from being adopted.

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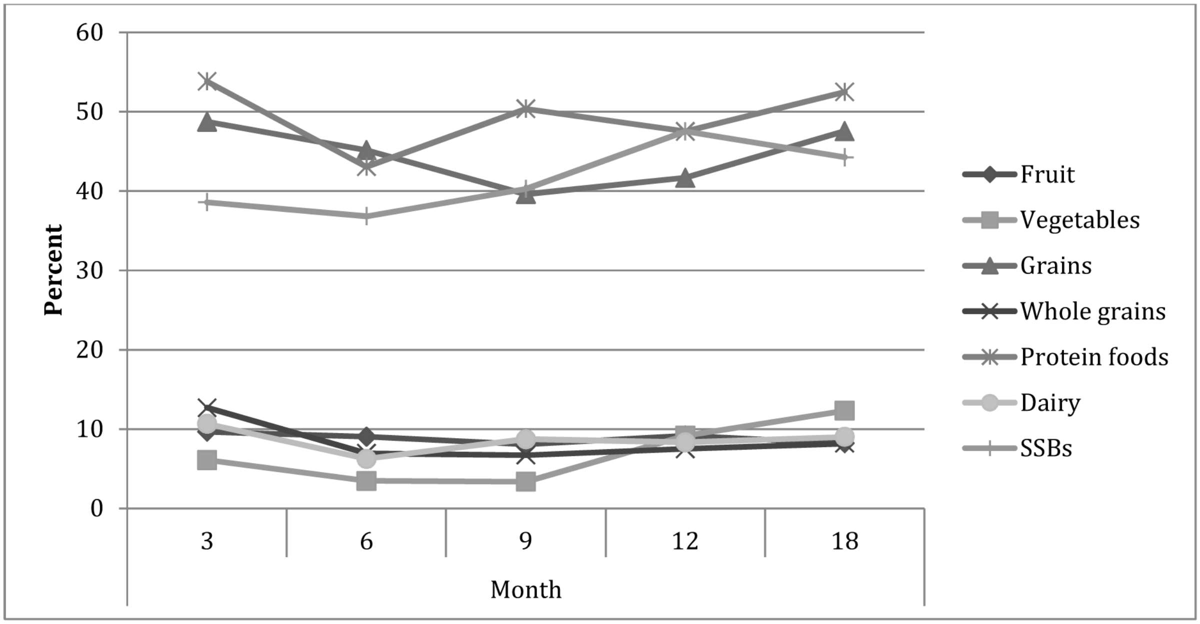

Figure 1. Percent meeting recommended intake levels of key food groups and an estimated upper limit for sugar-sweetened beverage intake among mothers 3–18 months postpartum participating in the Infant Care, Feeding, and Risk of Obesity study.[a]

[a]Recommended levels are based on the 2010 *Dietary Guidelines for Americans* using average characteristics of the sample: 24 years old, 175lbs, 5′4″, not breastfeeding and sedentary.

Table 1

Demographic characteristics of mothers participating in the Infant Care, Feeding, and Risk of Obesity study.

		Study visit (month)				
		3	**6**	**9**	**12**	**18**
Age, y (n)		22.6 ±3.8 (197)	23.0 ±3.9 (144)	23.4 ±3.9 (149)	24.2 ±4.2 (120) ***	24.5 ±4.1 (122) **
Education, % (n)	Less than high school	26.7 (52)	26.4 (38)	26.2 (39)	25.0 (30)	26.2 (32)
	High school	30.3 (59)	27.8 (40)	26.9 (40)	22.5 (27)	27.9 (34)
	Some college	32.3 (63)	34.7 (50)	34.9 (52)	39.2 (47)	33.6 (41)
	College or higher	10.8 (21)	11.1 (16)	12.1 (18)	13.3 (16) *	12.3 (15)
Married, % (n)		10.3 (20)	10.5 (15)	13.7 (19)	14.6 (16) *	17.0 (17)
Single-headed household, % (n)		20.3 (40)	23.9 (34)	24.5 (35)	24.6 (29)	29.6 (34)
Currently working, % (n)		54.4 (106)	61.0 (86)	63.0 (90)	58.6 (68)	62.6 (72)
Receiving WIC, % (n)		95.9 (185)	94.2 (130)	96.0 (119)	89.8 (88)	70.9 (56)
Depressive symptoms, % (n)[a]		28.4 (54)	30.2 (38)	25.4 (35)	29.2 (33)	33.6 (38)
Breastfeeding, % (n)		23.9 (47)	16.0 (23)	11.4 (17)	6.7 (8) *	2.5 (3) *
Weight status % (n)[b]	Underweight/Normal	27.1 (54)	28.4 (40)	NA	NA	28.7 (25)
	Overweight	28.4 (56)	24.1 (34)	NA	NA	21.7 (18)
	Obese	44.2 (87)	47.5 (67)	NA	NA	48.2 (40)

Significantly different at baseline at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[a]Measured using the Center for Epidemiological Studies Depression Scale with a score of ≥16 indicating depressive symptoms.

[b]Weight status was not measured at the 9 and 12 month visits.

Table 2

Percent of mothers consuming key food groups 3–18 months postpartum participating in the Infant Care, Feeding, and Risk of Obesity study.

Food category	**Percent Consuming**				
	3 month (n=197)	**6 month (n=144)**	**9 month (n=149)**	**12 month (n=120)**	**18 month (n=122)**
Fruit[a]	44	47	43	43	41
Vegetables[b]	88	89	89	92	93
Fried vegetables[c]	31	34	29	30	25
Grains	99	99	97	98	99
Whole grains	39	31	32	38	34
Protein foods[d]	98	98	98	95	99
Dairy	84	87	85	87	87
Sugar-sweetened beverages	88	88	82	77	85

[a] All fruit, including whole fruit and juice

[b] All vegetables, including whole and juice, excluding fried vegetables

[c] Includes breaded and fried vegetables such as French fries, hash browns and onion rings

[d] All meat, poultry, seafood, eggs, soy products, nuts and seeds

Table 3

Median consumption of key food groups among mothers 3–18 months postpartum participating in the Infant Care, Feeding, and Risk of Obesity study.

Food category	Recommendation[a]	Median Servings per Day[b]				
		3 month (n=197)	6 month (n=144)	9 month (n=149)	12 month (n=120)	18 month (n=122)
Fruit[c]	4 servings (2 cups)	2.0	2.0	2.0	2.1	2.0
Vegetables[d]	5 servings (2.5 cups)	1.1	1.0	1.2	1.3	1.7
Fried vegetables[e]	NA	1.5	1.8	1.8	1.7	1.6
Grains	6 oz equivalents	5.9	5.6	4.8	5.3	5.6
Whole grains	3 oz equivalents	1.9	1.6	1.8	1.9	2.0
Protein foods[f]	5.5 oz equivalents	5.8	5.2	5.7	5.5	5.6
Dairy	3 servings	1.0	0.9	1.0	1.0	1.0
Sugar-sweetened beverages	≤ 1.5 drink/day[g]	2.5	2.8	2.4	2.6	2.3

[a]Recommendations are based on the 2010 *Dietary Guidelines for Americans* using average characteristics of the sample: 24 years old, 175lbs, 5′4″, not breastfeeding and sedentary.

[b]Median among consumers only

[c]All fruit, including whole fruit and juice

[d]All vegetables, including whole and juice, excluding fried vegetables

[e]Includes breaded and fried vegetables such as French fries, hash browns and onion rings

[f]All meat, poultry, seafood, eggs, soy products, nuts and seeds

[g]Estimated upper limit, based on the FDA recommendation of 50g added sugar per day for a 2000 calorie diet; the average SSB has approximately 30g sugar per 8oz serving