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DIET QUALITY AND WEIGHT CHANGE AMONG OVERWEIGHT AND OBESE POSTPARTUM WOMEN ENROLLED IN A BEHAVIORAL INTERVENTION PROGRAM

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Abstract

Background—Postpartum weight retention is a significant risk factor for long-term weight gain. Encouraging new mothers to consume a healthy diet may result in weight loss.

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Objective—To assess predictors of diet quality during the early postpartum period; to determine if diet quality, energy intake, and lactation status predicted weight change from five to 15 months postpartum; and to determine whether an intervention improved diet quality, reduced energy intake, and achieved greater weight loss compared to usual care.

Design—Randomized clinical trial (KAN-DO: Kids and Adults Now - Defeat Obesity), a family and home-based, ten-month, behavioral intervention to prevent childhood obesity, with secondary aims to improve diet and physical activity habits of mothers, in order to promote postpartum weight loss.

Participants—Overweight/obese, postpartum women (n=400), recruited from 14 counties in the Piedmont region of North Carolina.

Intervention—Eight education kits, each mailed monthly; motivational counseling; and one group class.

Methods—Anthropometric measurements and 24-hour dietary recalls collected at baseline (approximately five months postpartum) and follow-up (approximately ten months later). Diet quality was determined using the Healthy Eating Index-2005 (HEI-2005). 3

Statistical analyses—Descriptive statistics, chi-square, analysis of variance, bi-and multivariate analyses were performed.

Results—At baseline, mothers consumed a low quality diet (HEI-2005 score = 64.4 ± 11.4). Breastfeeding and income were positive, significant predictors of diet quality; while BMI was a negative predictor. Diet quality did not predict weight change. However, total energy intake, not working outside of the home, and breastfeeding duration/intensity were negative predictors of weight loss. There were no significant differences in changes in diet quality, decreases in energy intake or weight loss between the intervention (2.3 ± 5.4 kg) and control (1.5 ± 4.7 kg) arms.

Conclusions—The family-based intervention did not promote postpartum weight loss. Reducing energy intake, rather than improving diet quality, should be the focus of weight loss interventions for overweight/obese postpartum women.

Keywords

Diet quality; HEI-2005; Postpartum weight loss; Obesity

INTRODUCTION

Over the last 20 years, the prevalence of obesity has more than doubled, with 34% of the population obese (body mass index [BMI] ≥ 30), and another 34% overweight (BMI = 25–29.9) [1–3]. Women of childbearing age are at particularly high risk for becoming overweight or obese; as approximately four million women give birth each year[4], and almost half of these women gain more weight during pregnancy than recommended by the Institute of Medicine[5]. Excessive weight gain during pregnancy is associated with higher postpartum weight retention[5–8], and although the average weight retention from prepregnancy to postpartum (six weeks to 24 months) is between 0.5–3 kg[9],14–25% of postpartum women retain >4.5 kg[8, 10]. Significant postpartum weight retention is also associated with higher pre-pregnancy weight and smoking cessation during pregnancy[9]; not breastfeeding[7, 11, 12]; and less nutrition knowledge[13].

Although some women eat healthier foods during pregnancy, they may discontinue these healthy eating habits after giving birth[14]. Collectively, studies show that diet quality for women is suboptimal during the postpartum period[15–18]. Intervening during the early

postpartum period to encourage women to continue healthy diet habits practiced during pregnancy may support postpartum weight loss.

This paper presents results from a secondary analysis of data from KAN-DO (Kids and Adults Now - Defeat Obesity), a randomized controlled trial testing a family-based parenting intervention to prevent childhood obesity[19]. To reach families during a critical period when changes in activity and eating habits may already be taking place, mothers of preschool children were recruited soon after the birth of a baby. The primary aims of the study were to promote healthy weight by improving dietary and physical activity habits in preschool children of overweight or obese mothers. Secondary aims were to improve diet and physical activity habits of mothers, in order to promote postpartum weight loss.

The purpose of this secondary analysis was to examine diet quality and weight loss among postpartum overweight and obese women. The aims were: 1) to describe and assess predictors of diet quality during the early postpartum period (approximately five months postpartum); 2) to determine if baseline diet quality, as well as baseline energy intake and lactation status, predicted weight change from five to 15 months postpartum, and 3) to determine whether mothers in the intervention arm improved diet quality, reduced energy intake, and lost more weight as compared to mothers in the control arm.

METHODS

Participants

The overall KAN-DO study design and methods have been previously described (19). Measurements were done at study entry ("baseline" – two to seven months postpartum) and end-of-intervention ("follow-up"-- approximately ten months post-baseline). The average time of baseline assessments was 160 ± 38 days or approximately five months postpartum. Participants were recruited from 14 counties in North Carolina between September 2007 and November 2009. Eligibility criteria were: self-reported pre-pregnancy and baseline BMI ≥ 25 kg/m^2, having given birth within the last six months, having another child aged two to five years, English-speaking, ≥ 18 years old, no medical conditions preventing daily physical activity and access to a telephone and mailing address.

Prior to the baseline visit, an introductory packet containing a self-administered questionnaire was mailed to participants. The questionnaire included questions regarding demographics and breastfeeding status. At the baseline visit, research staff obtained informed consent and collected baseline anthropometric measures, including verification of current BMI ≥ 25 kg/m^2. Following the baseline visit, two 24-hour dietary recalls were completed. Upon completion of the baseline assessments, women were randomized to the control or intervention arm. Four hundred and ninety-six women were prescreened as eligible; however 96 of the mothers either did not complete baseline measurements or had a BMI less than 25 kg/m^2 when they were measured at the baseline visits, so 400 were randomized. The same process of inperson visit, questionnaire and telephone recalls was used to collect anthropometric, questionnaire, and dietary data at follow-up. The study was approved by the Institutional Review Boards of The University of North Carolina at Greensboro and Duke University Medical Center.

Anthropometric measures

Weight was measured at baseline and follow-up using the Tanita BWB-800S digital scale (Tokyo, Japan) and height was measured with the SECA 214 portable stadiometer (Hamburg, Germany). Participants were measured without shoes and wearing minimal clothing. Participants were asked how much they weighed before pregnancy and how much weight they had gained during their pregnancy. Weight at delivery was estimated as the sum

of these two weights. Weight loss from birth to baseline was estimated as weight at baseline minus weight at delivery.

Lactation and depression status

In the baseline questionnaire, lactation status was assessed by asking the mother how she was currently feeding her infant: breastfeeding only, formula feeding only, or a combination of the two methods. At follow-up, breastfeeding duration and intensity during the first year postpartum was assessed by asking about feeding method during each month (birth-12). Two points were given for each month that the woman fully breastfed, one point for each month of partial breastfeeding, and no points for months of no breastfeeding, adding up to a total lactation score ranging from 0–24 [20]. Depression status was assessed using the validated 10-question Edinburgh Postnatal Depression Scale (EPDS) [21, 22]. Scores of 13 or greater were considered a positive screen for depression.

Dietary assessment and analysis

Telephone dietary interviews were conducted by trained research staff using the Nutrition Data System for Research (NDSR, versions 2007, 2008, and 2009), which uses the multiple pass, 24-hour dietary recall method. The multiple pass method is a technique used to increase accuracy of dietary recalls, in which the interviewer first collects a brief list of foods consumed, then probes for more details about the food items, and lastly reviews the collected information with the participant[23]. This method has been validated with doubly labeled water[24].

Two unannounced recalls were collected at each time point, within two weeks of the in-person visit. Participants were given food portion visuals to assist them in estimating portion sizes and were asked to verify that their food intake was typical for the day being recalled. To accommodate the busy schedules of new mothers, there was no restriction as to whether the days were weekdays or weekend days.

The Healthy Eating Index-2005 (HEI-2005) tool was used to determine each participant's diet quality. HEI-2005 is based on the 2005 Dietary Guidelines from the United States Department of Agriculture (USDA), and has been shown to be a valid and reliable measure of diet quality[25]. The HEI-2005 is comprised of 12 components; nine assess adequacy of key nutrients in the diet and three assess items that should be consumed in moderation[26]. The components are expressed per 1,000 calories or as a percent of total calories. A score is assigned to each component, and then summed to provide a total score ranging from 0–100. Total scores 8 of 81–100 are 'good', scores of 51–80 'need improvement' and scores of 50 or below are 'poor'[27].

The method described by Miller et al.[28] was used to calculate the HEI-2005 scores from the two day averages of the NDSR data, with some minor modifications for oils and solid fats. Since HEI-2005 defines "Oils" as fats that are liquid at room temperature, the monounsaturated fatty acids and polyunsaturated fatty acids gram amounts were used as a surrogate for the Oils component. Grams of saturated fat and trans fat were used as a surrogate for solid fat.

Intervention and control arms

Participants randomized to the intervention arm received eight monthly educational kits via mail. The kits focused on stress management and parenting, promoted positive healthy changes in the home, and encouraged healthy behaviors in mothers and children. Three kits focused specifically on making changes related to dietary habits. Information included

appropriate portion sizes, ways to increase fruit and vegetable intake, ideas for nutritious snacks, how to read food labels, and sample grocery lists with meal plans.

Participants received a 20–30 minute telephone call from a trained health coach to review the kit's content and address women's motivation and barriers to change. Participants were invited to attend one group session during the intervention, led by a Registered Dietitian and the trained health coach, to reinforce information from the kits.

Participants in the control arm also received monthly mailings; however their information focused on reading skills and enjoyment for the preschooler[29].

Statistical analysis

Data were analyzed in two ways: 1) a cross-sectional analysis of baseline measurements on all participants and 2) a longitudinal analysis including only those participants who completed both baseline and follow-up measurements. The first aim of the study was to determine predictors of the mother's diet quality during the early postpartum period (i.e. at baseline). Analysis of variance was conducted to assess relationships between dietary quality (using the baseline HEI-2005 scores) and the following ten baseline characteristics (selected based on prior literature suggesting association with diet quality, and on availability in the data set): BMI, race, household income, education, lactation status, marital status, parity, work status, smoking status, and depression screen.

Then a multivariate linear regression model was used to assess factors predicting mother's diet quality. The ten variables listed above as well as age were entered into the model all at the same time. BMI and age were entered as continuous variables, whereas the rest were entered as categorical. HEI score, the dependent variable, was entered as a continuous variable.

The second aim was to determine whether diet quality, energy intake, and breastfeeding predicted weight change from baseline to follow-up weight. The distribution of the lactation scores was bimodal, therefore lactation score was dichotomized for the analysis <12 and ≥ 12. A score <12 represented breastfeeding for a shorter duration and/or lesser intensity than a score ≥ 12. Pearson's and Spearman's correlation analysis was used to assess the relationship between weight change and baseline HEI-2005 score, energy intake and lactation score.

Then multivariate regression analysis was used to assess the extent to which baseline HEI-2005 score, energy intake, and breastfeeding predicted weight change. The following covariates were also included in the model because of their potential influence on weight change: arm assignment, baseline weight, household income, work status, race, parity, education level, age, smoking status, marital status, and depression. All three predictor variables, as well as the covariates, were entered at the same time.

The final aim of the study was to determine whether mothers in the intervention arm significantly improved diet quality, reduced energy intake, and lost more weight compared to those in the control arm. Change in HEI-2005 scores was compared between participants in the intervention arm and the control arm. Differences between arms in percent change in energy consumption and percent change in weight were also examined.

An alpha level of $p<0.05$ was used to determine statistical significance and results were reported as mean ± standard deviation. JMP statistical software (version 8, 2008, SAS Institute Inc., Cary, NC) was used for all analyses.

RESULTS

Characteristics of Participants

Of the 400 participants randomized to KAN-DO, 392 completed two baseline dietary recalls. Characteristics of these participants included in this cross-sectional analysis sample are listed in Table 1. On average, women were 160 ± 38 days (approximately five months) postpartum at baseline assessments.

Follow-up questionnaires were completed by 308 women, and of these, two days of dietary recalls were collected from 276. There were no significant differences in baseline characteristics between the 276 participants remaining at follow-up and the 116 participants that dropped out. Intervention (n=131) and control (n=145) arms did not differ on any baseline characteristics (Table 1). Additionally, there were 18 women who were pregnant at follow-up (ten in the intervention and eight in the control). These women were included in the diet quality analyses because quality is evaluated per 1,000 kcal, i.e. controlling for energy intake. In addition, the results did not change when they were removed from the diet quality analysis. However, they were excluded from the weight change analyses. Forty three percent of women had a lactation score < 12, and the remaining 57% had a score ≥ 12 at follow-up.

Diet quality based on HEI-2005 scores

Average total HEI-2005 and component scores are shown in Table 2. Scores for total grains, meat and beans, and oils components were the highest, while scores for total fruit and sodium components were the lowest. Distributions of the HEI-2005 scores for each of the 12 components were bimodal or skewed; only the total HEI-2005 scores were normally distributed. The percent of women meeting the total fruit and vegetable recommendations were very low, 13% and 21% respectively. And only 9% of the women met the recommendation of having a good diet quality.

Predictors of diet quality during the postpartum period

Mean HEI-2005 scores for each level of the baseline characteristic variables of the cross-sectional sample are shown in Table 3. There were significant bivariate relationships between all of the baseline characteristics and HEI-2005 scores except for work status and depression.

Results of multivariate analysis revealed three significant predictors of baseline HEI- 2005 score: BMI, lactation status, and household income ($r^2 = 0.20$). For every unit increase in BMI, HEI-2005 score *decreased* by 0.25. Women who were not breastfeeding had a total HEI-2005 score that was 3.01 points lower than women who were fully breastfeeding. And compared 12 to women with a household income ≤ $15,000, women in all other income categories had significantly higher HEI-2005 scores.

Predictors of weight change

Weight change was highly variable, ranging from −16.4 kg to + 22.4 kg. Higher diet quality at baseline correlated with greater weight loss at follow-up ($p<0.01$). There was also a significant relationship between baseline energy intake and weight change ($p<0.01$), indicating that the less energy consumed at baseline, the more weight was lost 10 months later. No significant relationship was found between lactation score group and weight change.

After controlling for other variables in multivariate analysis, baseline diet quality was no longer a significant predictor of weight change ($p = 0.07$). However, baseline energy intake

remained a significant negative predictor of weight change and mother's work status and lactation score group also significantly predicted weight change. Women who did not work for pay lost less weight than those women working full-time.

Women with a high intensity/long duration of breastfeeding lost a similar amount of weight [1.5 ± 5.2 kg] as those with low intensity/short duration [2.2 ± 5.0 kg] ($p = 0.33$). However, they reported significantly more weight loss (10.6 ± 7.5 versus 8.7 ± 6.2 kg, $p=0.03$) from birth to baseline measurement (average five months postpartum). In addition, women who breastfed for a high intensity/long duration had significantly higher energy intake at baseline (2142 ±557 kcal) than those who with no or low intensity/short duration (1915 ± 564 kcal, $p<0.002$). However, their energy intake at follow-up was similar to those who did not breastfeed or who breastfed for a low intensity/short duration (1840 ± 528 kcal vs. 1770 ± 490 kcal, respectively).

Changes in diet quality

HEI-2005 scores at baseline and follow-up for the longitudinal sample, separately for the intervention and control arms, are on Table 2. There were no significant differences between arms at baseline or follow-up. The percent of women meeting the recommendations for each of the HEI-2005 components and the total HEI-2005 score are also listed in Table 2. The only significant difference was the percent of women in the control arm meeting the recommendation for meat and legumes increased from 50% to 66%, while the percent of women in the intervention arm meeting the recommendation decreased from 62% to 59% ($p<0.01$). Although not significant, the percent of women in the intervention arm meeting the recommendation for the solid fat, alcohol, and added sugar (SoFAAS) component increased from 9% to 17%, while the percent of women in the control arm did not change. Lastly, the percent of women in the intervention arm that met the recommended Total HEI-2005 score of greater than 80 doubled from 8% to 16%; compared to controls (12% to 15%; $p=0.09$).

Changes in energy intake and body weight

Average estimated weight loss from birth to baseline was similar in both arms: intervention was 9.7 ± 8.0 and control was 9.8 ± 6.1 kg. Both arms reduced their average energy intake from baseline to follow-up (intervention arm by 12.6% and the control arm by 11.4%). After excluding the women who were pregnant at follow-up, the average weight loss was 2.3 ± 5.4 kg (intervention) and 1.5 ± 4.7 kg (control).

DISCUSSION

Among this group of overweight and obese women, only nine percent reported consuming a good quality diet at five months postpartum. Higher diet quality was associated with fully breastfeeding, lower BMI, and household income greater than $15,000. Diet quality was significantly related to weight change from five to 15 months postpartum; however, when controlling for all of the other variables, only baseline energy intake, maternal work status, and breastfeeding remained significant. And finally, participants in the intervention arm did not significantly improve diet quality, reduce energy intake, or lose more weight from baseline to follow-up compared to those in the control arm.

The mean total HEI-2005 score at baseline for the cross-sectional sample was 64.4, not reaching the level of a "good quality diet", which is an HEI-2005 score >80 [27]. However, this score was better than the national average of 58.2 for individuals in the 2001–2002 National Health and Nutrition Examination Survey[30].

HEI-scores of 51.4 were reported in another sample of low-income overweight and obese postpartum women[31]. Average HEI-2005 component scores for the KAN-DO participants were fairly similar to this low-income cohort, except for the Oils and SoFAAS components. These women had an average oils score of 2.3 ± 0.1 and an average SoFAAS score of 7.5 ± 0.5, much lower than the KAN-DO participant averages. These differences may be due to a real difference in dietary intake or in the methods of estimating oils in the diets.

Although the bivariate analyses showed significant relationships between HEI-2005 scores and all baseline characteristics (except work status and depression), only BMI, lactation status and household income remained significant predictors of diet quality during the early postpartum period after adjusting for the other variables. This suggests that women who choose to breastfeed their infant may also choose to eat a healthier diet. However, it is not clear whether 15 the decision to breastfeed leads to a healthier diet, or whether women with healthier lifestyles also choose to breastfeed.

The second aim of this study was to assess predictors of weight change from early postpartum to ten months later. Although diet quality did influence weight change (higher HEI-2005 score associated with increased weight loss), it was not a significant predictor ($p=0.07$). However, energy consumed was predictive of weight change. Another finding was that women who stayed at home lost less weight than those who worked full-time. A possible reason for this is that stay-at-home moms have easy access to food and more time to eat during the day.

A limitation of this study may be underreporting of diet intake. It is common for overweight and obese populations to underreport actual food consumption, especially with foods high in fat and sugar that may be perceived as unhealthy choices[32–34]. Other limitations of this study include only two days of dietary intake were recalled, and prepregnancy weight and weight gain during pregnancy were based on self-report.

Other studies have reported women who breastfeed lose more weight postpartum than those who do not breastfeed[7, 11, 12]. While women in our sample with higher intensity/longer duration breastfeeding lost more weight from birth to baseline measurements than those with lower breastfeeding intensity and duration, their weight loss was not greater during the study period. Women with higher lactation scores consumed more energy at baseline and follow-up, possibly explaining the observed results. They may have reduced their breastfeeding in the later months, but not their energy intake. In addition, the lactation intensity and duration was reported from one to 12 months postpartum, while the baseline and follow-up measurements were, on average, made at five and 15 months postpartum, respectively. Baker et al[7] found that breastfeeding intensity and duration were related to weight loss in the postpartum period, but only for women with a BMI of <35 kg/m^2. With 28% of KANDO participants having BMI's ≥ 35 kg/m^2, these results are similar to those of Baker et al[7].

The KAN-DO intervention aimed to promote postpartum weight loss through improved health behaviors in overweight and obese women. However, no significant effect of the intervention in diet quality or weight loss emerged. Both arms reported a decrease in energy intake, but again arm differences were not significant.

Based on previous research[35], it was theorized that a home-based intervention may prove more successful than a group-based intervention for postpartum women because it would require less time. However, the home-based method in the KAN-DO study did not result in significant changes and the attrition rate was still high (23%). An earlier study by Leermakers et al. reported similar attrition rates (27%), but more successful results with postpartum weight loss using a home-based correspondence intervention[36]. However, their intervention focused on energy restriction rather than diet quality. Their positive results

suggest that focusing on overall calories rather than just diet quality may result in greater weight loss.

CONCLUSIONS AND APPLICATIONS

Among overweight and obese women, those with a lower BMI, a higher income, and who were breastfeeding had a healthier diet quality during the early postpartum period. Women who breastfed with a high intensity/long duration lost more weight from birth to five months postpartum than those moms who breastfed for a low intensity/short duration or did not breastfeed at all; however, they did not lose more from five months to 15 months postpartum. Importantly, those who breastfed with a higher intensity/longer duration consumed more energy both at baseline and follow-up. Finally, there were no differences between intervention and control arms in change in energy intake, diet quality, or weight from baseline to follow-up.

To better assist women in losing weight during the postpartum period, the focus should be on reducing total energy intake. Furthermore, if women (particularly, overweight and obese women) are encouraged to breastfeed they should be given accurate information on how many extra calories, if any, they need.

This intervention focusing on parenting, improving the family dietary intake, and increasing physical activity did not result in significant weight loss for postpartum mothers. The results from this study suggest that reduced energy intake may be the best emphasis of future postpartum weight loss interventions.

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Table 1

Baseline (average 160 days postpartum) characteristics of participants in KAN-DO (cross-sectional and longitudinal samples).

Characteristic	Cross-sectional Sample	Longitudinal Sample Baseline to Follow-up (n = 276)	
	Total Baseline (n = 392) % (n)	Control (n = 145) % (n)	Intervention (n = 131) % (n)
DEMOGRAPHICS			
Age, years (mean, SD)	32.6(4.9)	33.7(4.3)	33.3(4.6)
Race			
White/other	78 (307)	83(120)	84 (110)
Black	22(85)	17 (25)	16(21)
Household Income	(n = 386)	(n = 144)	(n = 128)
Up to $15,000	10(38)	6(8)	6(8)
$15,001 – $30,000	9(35)	8(11)	4(5)
$30,001 – $60,000	24 (93)	22(32)	28 (36)
$60,001 +	56(220)	64 (93)	60 (79)
Education			
≤12th grade	11 (45)	9(13)	7(9)
Some college or vocational	20(77)	17 (25)	16(21)
College graduate	42 (166)	46(67)	44 (58)
Graduate school	27 (104)	28 (40)	33 (43)
Marital Status			
Single	13 (51)	8 (12)	8 (11)
Married	87 (341)	92 (133)	92 (120)
Parity			
Second	68 (267)	67 (97)	76 (99)
Third	21 (82)	23 (33)	15 (19)
Fourth or more	11 (43)	10 (15)	10 (13)
Work Status			
Full time	30 (116)	30 (44)	29 (38)
Part time	19 (75)	21 (30)	18 (24)
Not paid for work	51 (201)	49 (71)	53 (69)
WEIGHT AND BEHAVIORS			
Body Mass Index (kg/m^2)			
Overweight (25 – 29.9)	39 (153)	39 (56)	44 (57)
Obese class I (30 – 34.9)	32 (126)	30 (44)	32 (42)

Characteristic	Cross-sectional Sample	Longitudinal Sample Baseline to Follow-up (n = 276)	
	Total Baseline (n = 392) % (n)	Control (n = 145) % (n)	Intervention (n = 131) % (n)
Obese class II (35 – 39.9)	17 (68)	21 (30)	12 (16)
Obese class III (≥40)	12 (45)	10 (15)	12 (16)
Weight (kg, mean and SD)			
Prepregnant	82.7 (15.0)	82.7 (13.1)	81.7 (15.5)
Gained during pregnancy	13.8 (6.6)	14.4 (5.8)	14.9 (6.8)
Lost since birth	9.2 (6.8)	9.8 (6.1)	9.7 (8.0)
Baseline	87.5 (15.7)	87.3 (1.2)	86.9 (1.4)
Lactation Status			
Fully breastfeeding	41 (159)	50 (73)	44 (58)
Mixed feeding	21 (83)	14 (20)	20 (26)
Fully formula feeding	38 (150)	36 (52)	36 (47)
Smoking Status	(n = 391)		
Current smoker	5 (20)	3 (5)	5 (7)
Non-smoker	95 (371)	97 (140)	95 (124)
Depression Screen[a]			
Negative screen	83 (327)	86 (125)	85 (111)
Positive screen	17 (65)	14 (20)	15 (20)

[a]According to the Edinburgh Postnatal Depression Scale [22]

No significant differences between groups.

Table 2

Average HEI-2005 score, component scores, and the percent meeting HEI-2005 recommendations of the cross-sectional and longitudinal samples.

HE I-2005			Cross-sectional Analysis At Baseline (n = 392)	Longitudinal analysis (n = 276)			
				Control (n = 145) Average score[a] (% Meeting Recommendation)		Intervention (n = 131) Average score[a] (% Meeting Recommendation)	
Component	**Score Range**	**Recommendation per 1,000 kcal**	**Average Score[a] (% Meeting Recommendation)**	**Baseline**	**Follow-up**	**Baseline**	**Follow-up**
Total HE I-2005 Score	0 – 100	>80	64.4 ± 11.4 (9%)	65.0 ± 11.8 (12%)	66.0 ± 11.9 (15%)	65.9 ± 11.2 (8%)	65.4 ± 11.1 (16%)
Total Energy (kcal)				2076 ± 547	1840 ± 520	2013 ± 607	1760 ± 516
Total Fruit	0–5	≥0.8c	1.9 ± 1.8 (13%)	1.9 ± 1.8 (15%)	1.9 ± 1.8 (13%)	1.9 ± 1.7 (11%)	2.0 ± 1.7 (12%)
Whole Fruit	0–5	≥0.4c	2.1 ± 2.0 (20%)	2.1 ± 2.0(19%)	2.2 ± 2.0 (22%)	2.3± 2.1 (25%)	2.5 ± 2.0 (25%)
Total Vegetables	0–5	≥1.1 c	3.2 ± 1.4 (21%)	3.1 ± 1.4(19%)	3.1 ± 1.5(21%)	3.3 ± 1.4 (23%)	3.2 ± 1.5 (26%)
Dark Green and Orange Vegetables and Legumes	0–5	≥0.4c	2.2 ± 1.9 (20%)	2.2 ± 1.9 (19%)	2.2 ± 2.0 (22%)	2.4 ± 1.9 (23%)	2.1 ± 2.0(23%)
Total Grains	0–5	≥3.0 oz	4.7 ± 0.6 (72%)	4.8 ± 0.5 (75%)	4.7 ± 0.7 (74%)	4.7 ± 0.7 (71%)	4.7 ± 0.7 (77%)
Whole Grains	0–5	≥1.5oz	2.7 ± 1.9 (25%)	3.0 ± 1.9 (30%)	2.9 ± 1.8 (26%)	2.9± 1.9 (27%)	2.9 ± 1.8 (29%)
Milk	0–10	≥1.3c	6.3 ± 3.1 (24%)	6.4 ± 3.1 (28%)	7.0 ± 2.8 (26%)	6.7 ± 3.0 (26%)	6.4 ± 3.0 (24%)
Meat and Legumes	0–10	≥2.5oz	8.7 ± 2.2 (57%)	8.4 ± 2.2 (50%)	8.7 ± 2.2 (66%)[b]	8.9 ± 2.0 (62%)	8.7 ± 2.1 (59%)[b]
Oils	0–10	≥12 gm	10.0 ± 0.3 (97%)	10.0 ± 0.1 (99%)	10.0 ± 0.4 (99%)	10.0 ± 0.3 (98%)	10.0 ± 0.3 (99%)
Sodium	0–10	≤700 mg	3.4 ± 2.6(1%)	3.7 ± 2.7(1%)	3.4 ± 2.7 (0%)	3.3 ± 2.6 (0%)	2.9 ± 2.7 (0%)
Saturated Fat	0–10	≤7% of total kcal	5.7 ± 3.4 (9%)	5.7 ± 3.4 (9%)	5.6 ± 3.4 (8%)	5.5 ± 3.5 (8%)	5.3 ± 3.5 (8%)
SoFAAS[c]	0–20	≤20% of total kcal	13.6 ± 4.7 (13%)	13.8 ± 4.9 (15%)	14.3 ± 4.8 (15%)	13.9 ± 4.5 (9%)	14.5 ± 4.4 (17%)

[a] Mean± SD

[b] Significantly different from baseline, $p < 0.01$

[c] SoFAAS = Energy from solid fat, alcohol, and added sugar

Table 3

Average baseline HEI-2005 scores by level of baseline predictor variables, cross-sectional analysis (n=392).

Variable	Baseline HEI-2005 Score	p-value
DEMOGRAPHICS		
Race		**<0.001**
White/other	65.4	
Black	60.6	
Household Income		**<0.0001**
Up to $15,000	53.1	
$15,000 – $30,000	60.9	
$30,001 – $60,000	66.0	
$60,001 +	66.4	
Education		**<0.0001**
≤12th grade	57.4	
Some college or vocational	61.4	
College graduate	65.4	
Graduate school	68.1	
Marital Status		**<0.001**
Single	56.2	
Married	65.6	
Parity		**0.03**
Second	65.3	
Third	63.3	
Fourth or more	60.7	
Work Status		0.25
Full time	64.6	
Part time	66.2	
Not paid for work	63.6	
WEIGHT AND BEHAVIORS		
Body Mass Index (kg/m^2)		**<0.002**
Overweight (25 – 29.9)	66.2	
Obese class I (30 – 34.9)	64.9	
Obese class II (35 – 39.9)	63.2	
Obese class III (≥40)	58.9	
Lactation Status		**<0.001**
Fully breastfeeding	66.6	
Mixed feeding	66.5	

Variable	Baseline HEI-2005 Score	p-value
Fully formula feeding	60.9	
Smoking Status		**<0.001**
Current smoker	53.9	
Non-smoker	65.0	
Depression Screen [a]		0.19
Negative screen	64.7	
Positive screen	62.7	

[a]According to the Edinburgh Postnatal Depression Scale [22]

Analysis of variance