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I, Jessica Kohls Gahl, hereby submit this work as part of the requirements for the degree of:

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A Theory-Based, Dietary Intervention Focused on Increasing Vegetable Consumption in Postpartum Mothers and their Infants

This work and its defense approved by:

Chair: Grace A. Falciglia, PhD
Sarah C. Couch, PhD
A Theory-Based, Dietary Intervention Focused on Increasing Vegetable Consumption in Postpartum Mothers and Infants

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By

Jessica Kohls Gahl

Bachelor of Arts, The Ohio State University, 2001

Committee Chair: Dr. Grace Falciglia
Abstract

Background: Overweight (BMI $\geq 25$) and obesity (BMI $\geq 30$) have reached epidemic proportions in the United States, positioning obesity at the forefront of the nation’s health agenda as a critical public health threat. The pregnancy and post-partum periods in women have been identified as stages which may contribute to future obesity. The diets of most Americans are high in calories, fat, and sugar, and low in nutrient dense, low-calorie foods, such as fruits and vegetables. Diets high in vegetables and fruits are linked to reduced risk for chronic disease. Fruit and vegetables are nutrient-dense and low in calories and have recently been associated with reduced risk of major weight gain and obesity development. The purpose of this study was to evaluate the effectiveness of a dietary intervention on increasing vegetable consumption in breast-feeding (BF) and formula feeding (FF) postpartum mothers to aid in attaining a healthy weight. There was no control group in this intervention study as this study was involved in the preparatory stage for a larger study. It was expected that after completion of the program, both groups of mothers would consume more vegetables attributable in part to an increase in vegetable preference and self-efficacy in purchasing, preparing and consuming vegetables.

Methods: Postpartum mothers (N=47) were recruited for a dietary intervention with focus on increasing vegetable intake to aid in attaining a healthy weight. The intervention consisted of a pre-evaluation session, nutrition education program, and a post-evaluation session.

Results: BF mothers significantly increased their self-efficacy in vegetable selection, preparation and consumption ($p=0.01$) and FF mothers demonstrated a trend towards increasing self-efficacy ($p=0.06$). Both groups significantly increased intake of Total Target Vegetables (BF, $p=0.03$; FF, $p=0.01$), Other Vegetables (BF, $p=0.05$; FF, $p=0.05$) and All Vegetables (BF, $p=0.01$; FF, $p=0.01$), increasing a total of 1.8 servings for BF and 2.2 servings for FF beyond baseline for all vegetables.

Conclusion: A theory-based dietary intervention is effective in increasing vegetable consumption in postpartum women.
Table of Contents

Introduction 1

Literature Review 2

Methods
  Participants 11
  Intervention 11

Measures
  Vegetable Variety Survey 17
  Preference and Self-efficacy Questionnaire 17
  Three-day Food Intake Record 18
  Weight & BMI 19
  Statistical Analysis 19

Results 19

Discussion 34

References 38

Appendix 44
A Theory-Based, Dietary Intervention Focused on Increasing Vegetable Consumption in Postpartum Mothers and their Infants

Overweight (BMI ≥ 25) and obesity (BMI ≥ 30) have reached epidemic proportions in the United States, positioning obesity at the forefront of the nation’s health agenda as a critical public health threat. The number of overweight children, adolescents, and adults has risen over the past four decades (US Department of Health and Human Services, 2000). In the United States, it is estimated that more than 9 million Americans, 65.7% of the total population, (NHANES, 2001-2002), are classified as either overweight or obese. The American Obesity Association notes that obesity is the second leading cause of preventable death in the U.S. (American Obesity Association, 2005).

The obesity epidemic in the United States has initiated research efforts focused on the contributing factors of obesity throughout the lifecycle, from as early as infancy. The first year of life and the pregnancy and post-partum period in women have been identified as two stages which may contribute to future obesity (Johnson, Gerstein, Evan Woodward-Lopez, 2006) making them both critical times to intervene. Additionally, though there is emphasis for optimal health and wellness during these stages, limited resources are available for feeding infants and toddlers or nutrient intake recommendations during pregnancy and postpartum.

The current American diet, from toddlers to adults, is high in sugar, fat and calories, with minimal consumption of fruits and vegetables. Modifying the dietary intake of women and their infants to include more low-calorie, nutrient dense foods such as vegetables may help reduce overall energy, fat and sugar intakes and aid in achieving and maintaining a healthy weight. The health of mothers, infants, and children is of vital significance, both as a reflection of the current health status of a considerable part of the U.S. population and as a predictor of the health of the future generations.
Literature Review

The diets of most Americans are high in calories, fat, and sugar, and low in nutrient dense, low-calorie foods, such as fruits and vegetables. Fruit and vegetable consumption in the United States is alarmingly low. Data from the 2005 Behavioral Risk Factor Surveillance System (BRFSS) discovered that 27.2% of adults (22.1% of men, 32.2% of women) consumed vegetables three or more times per day and 32.6% (28.7% of men, 36.4% of women) ate fruit two or more times per day (Centers for Disease Control and Prevention, 2005).

Diets high in vegetables and fruits are linked to reduced risk for chronic disease associated with the essential vitamins, minerals and fiber that they contain (US Department of Health and Human Services, US Department of Agriculture, 2005). Fruit and vegetables are nutrient-dense and low in calories and have recently been associated with reduced risk of major weight gain and obesity development (He, et al., 2004, as cited in Fowles & Walker, 2006). National efforts to increase the intake of fruits and vegetables are evidenced by the replacement of the Five-a-Day Campaign, with a new, more elaborate public health initiative, Fruits & Veggies-More Matters. managed by the Centers for Disease Control and Prevention and the Produce for Better Health Foundation (PBH) in partnership with many other organizations. Reviews of literature indicate that interventions that promote an increase in fruit and vegetable consumption can be successful at least in the short term (Pomerleau, Lock, Knai, McKee, 2005).

The Feeding Infants and Toddlers Study (FITS) was organized to provide information concerning the food and nutrient intake of US children 4 to 24 months of age (Fox, Pac, Devaney and Jankowski, 2004). The FITS discovered that the diets of infants and toddlers in the United States imitate those of their parents and other adults. By age 2, almost one third of the toddlers in the study did not consume fruit on the day of the 24-hour recall and about 20% of toddlers did
not consume a vegetable on the day of the recall. At 15 to 18 months, French fries or fried
potatoes was the most frequently consumed vegetable and consumption of deep yellow
vegetables was 12% for this age group. The amount of deep yellow vegetables decreased from
29% in infants 9 to 11 months to 8% in toddlers 19 to 24 months. Furthermore, few toddlers met
the adequate intake for fiber intake (Fox, et al., 2004). The eating patterns depicted in the FITS
study demonstrate that the percentage of infants and toddlers eating energy dense, nutrient
lacking foods increases with age, potentially increasing the risk of obesity in childhood. It has
also been suggested that being obese as a child puts individuals at higher risk for high BMIs and
obesity in adulthood potentially leading to an increased risk for chronic diseases, such as
coronary heart disease, hypertension and type 2 diabetes (Johnson, Gerstein, Evans &
Woodward-Lopez, 2006).

Prior to the release of the American Dietetic Association’s Start Healthy Feeding
Guidelines for Infants and Toddlers, few authoritative guidelines for feeding complimentary
foods to infants and toddlers existed besides recommendations regarding use of breast milk,
formula, and cow’s milk (American Academy of Pediatrics, 1997; American Academy of
Pediatrics, 1992; Fomon, 2001). With the increase in prevalence of childhood obesity, early
prevention is imperative. The FITS clearly illustrates that the diets of infants and toddlers are
inadequate; composed of energy-dense, nutrient poor foods and deficient in fruit and vegetable
intakes. Fruit and vegetable consumption is optimal for energy balance because both are
naturally low in calories, nutrient-dense, and are high in fiber and water. While children are
predisposed to neophobia and have an instinctive dislike for bitter flavors, the first year of life is
a critical time in development and presents an opportune period to introduce healthy foods,
especially vegetables, into the diet.
During the first two years of life, the parental influence on food intake (Fisher & Birch, 1995; Cutting, Fisher, Grimm-Thomas, & Birch, 1999), the reduced neophobic response (Birch and Fusger, 1995, Birch 1998), and the acceptance of new food with fewer exposures (Birch & Marlin, 1982, Lederman et al., 2004, Birch 1999) contribute to the potential for increasing the acceptance of healthy foods and the development of beneficial eating behaviors that may persist throughout childhood and into adulthood. Additionally, because the mother influences the child’s diet through providing healthy foods and through the expression of flavors in breast milk of the foods in her diet (Mennella & Beauchamp, 1998, Mennella, Jagnow & Beauchamp, 2001), improving the maternal diet is vital to the improvement of the infant and toddler diet. While the first two years of life appear to be the most beneficial time to intervene with the child’s diet, this period coincides with one of the most dynamic periods of change in the mother’s life as well.

Szwajcer and colleagues (2005) found that pregnant women and women planning to become pregnant are more interested in pregnancy-related nutritional information and are more motivated to change at this period in life than others. Olson (2005) also found that there was a positive change in food choices related to the transition to motherhood which indicates that the postpartum phase is an optimal time to improve dietary behaviors and food choices, specifically increasing fruit and vegetable consumption. This period in the mother’s life provides an opportune time to intervene in the nutritional practices and behaviors of the mother which should in turn influence the behaviors of the child.

A significant observation made by Pomerance and colleagues (1980) was that women in their study showed substantial deficiencies in their understanding of nutritional guidelines and weight gain in pregnancy. This finding has been substantiated in additional research by Fowles (2002), which noted that while women in free clinics had more accurate knowledge, their
knowledge base remained sub-par. These findings indicate that improvement to nutritional
knowledge and dietary intake during the reproductive years needs to be made, regardless of
socio-economic status.

Johnson and colleagues (2006) evaluated current research and identified critical factors
throughout the lifecycle that collectively may put a person at risk for obesity. The critical life
stages in the development of obesity include rapid weight gain in infancy and childhood, early
puberty and excessive gestational weight gain (Johnson, et al, 2006). These periods in the
lifecycle can each separately attribute to weight gain but when considered in a cumulative
context they can significantly increase an individual’s risk of overweight and obesity later in life.

The most recent National Health and Nutrition Examination Survey (NHANES) for
1999-2002 found that one third of adult American women are obese. Among children aged 6
through 19 years 31.0% were at risk for overweight and overweight, with 16% being considered
overweight (Centers for Disease Control and Prevention, 2003). The obesity epidemic has
triggered scientists to examine weight gain at various stages in the lifecycle more critically,
especially during and following childbirth and as early as the first year of life. Healthy People
2010 identified overweight and obesity as one of ten leading health indicators for the next
decade. The Leading Health Indicators reflect the major health concerns in the United States at
the beginning of the 21st century (US Department of Health and Human Services, 2000).

In women, obesity is associated with increased morbidity, including type 2 diabetes,
hypertension, infertility, heart disease, gall bladder disease, osteoarthritis, asthma, breast and
endometrial cancers (Gore, Brown & West, 2003; Gunderson & Abrams, 2000; Rooney &
Schauberger, 2002; Rooney, Schauberger, & Mathiason, 2005; U.S. Department of Health and
Human Services, 1998). Women of childbearing age (18-34) have been found to have the
highest incidence of major weight gain (CDC. 2003; Gore, et al., 2003; Rooney & Schauberger, 2002; Rooney, et al., 2005). Research indicates that excessive weight gain during pregnancy, having a pregravid BMI greater than 25 or failure to lose pregnancy weight within a significant time period place women at higher risk of long-term excess weight gain and obesity during middle age (Rooney & Schaumberger, 2002; Rooney et al 2005). Minority women are at even higher risk for becoming overweight or obese (Gore, et al. 2003). With a substantial proportion of women (15-20%) retaining at least 5 kg 6 to 18 months postpartum (Calfas & Marcus, 2007), childbearing seemingly becomes a transitional event for obesity and weight gain. (Walker, Sterling & Timmerman, 2005).

Pregnancy is one of the few occasions in most women’s lives where they gain significant weight over a short period of time and are often encouraged to do so. The products of conception (fetus, placenta, and amniotic fluid), expansion of different maternal tissues (blood, extracellular fluid, uterus, breasts) and increases in maternal fat and protein stores account for the weight gain during pregnancy (Butte, Wong, Treuth, Ellis & Smith, 2004). Throughout pregnancy women require extra dietary energy to compensate for the energy deposited in maternal and fetal tissues as well as the increase in energy expenditure related to the rise in basal metabolism and changes in the energy expenditure of physical activity (Butte & King, 2005; Butte, et al, 2004). In determining a woman’s appropriate gestational weight gain many factors need to be considered including maternal pregravid weight for height, age and parity, cigarette smoking, socioeconomic status, current energy intake and ethnic background (Institute of Medicine and Food & Nutrition Board, 1990).

In the past forty years, the recommendations for weight gain during pregnancy have gradually increased based on optimal fetal development and birth weight. A large body of
evidence suggests that maternal weight gain during pregnancy is an important determinant of fetal growth (Subcommittee on Nutritional Status and Weight Gain During Pregnancy, 1990). Inadequate prenatal weight gain is a significant risk factor for intrauterine growth retardation and low birth weight in infants. (Hickey, Cliver, McNeal, Hoffman & Goldenberg, 1996; Luke, Hediger & Scholl, 1996; Goldenberg, 1998). In 1990, the Institute of Medicine issued recommended ranges for weight gain during pregnancy based on a woman’s pregravid body mass index (BMI) based predominantly on improving infant birthweight (IOM, 1990). The recommended gestational weight gain ranges from the IOM are described in Table 1. These guidelines have been accepted as the standard for weight gain during pregnancy in the United States though some investigators believe the recommended ranges need to be reviewed and that other outcomes related to labor, delivery and maternal health need to be taken into account (Abrams, Altman & Pickett, 2000).

Table 1. Institute of Medicine recommendations for gestational weight gain based on prepregnancy BMI.

<table>
<thead>
<tr>
<th>Prepregnancy BMI</th>
<th>Recommended weight gain (for singleton deliveries)</th>
</tr>
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<tbody>
<tr>
<td>&lt;19.8</td>
<td>28-40 lb (12.5 – 18 kg)</td>
</tr>
<tr>
<td>19.8 - 26.0</td>
<td>25-35 lb (11.5 – 16 kg)</td>
</tr>
<tr>
<td>26.1 to 29.0</td>
<td>15-25 lb (7-11.5 kg)</td>
</tr>
<tr>
<td>&gt;29.0</td>
<td>At least 15 lb (6.0 kg)</td>
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aWomen < 157 cm should strive for weight gain at the lower end of the range for their BMI group
bInstitute of Medicine and Food and Nutrition Board, 1990

Weight gains within the IOM’s recommendations are associated with the best fetal and maternal outcomes (Adams, et al, 2000; Polley, Wing & Sims, 2002; Rooney & Schaubberger, 2002; American College of Obstetricians and Gynecologists, 2005). Although weight gain goals today are more lenient than previous guidelines, many pregnant women still exceed the current
recommendations (Polley, et al., 2002; Rooney, et al, 2005; Rooney & Schauberger, 2002). The National Maternal and Infant Health Survey (1988) found that 36% of women gain more than recommended. Twenty percent of underweight women, 37% of normal-weight women and 64% of overweight women exceed the current IOM recommendations for their prepregnancy BMI classification (Polley, et al., 2002). Other research studies indicate that only 30-40% of American women have weight gains within the IOM’s recommended ranges (Abrams, et al., 2000).

Weight gains outside the IOM’s recommended ranges are linked with twice as many poor pregnancy outcomes than gains within the recommendations (Abrams, et al., 2000). Women who gain below these guidelines risk low infant birthweight and preterm birth and higher weight gains are associated with greater risk of macrosomia and cesarean delivery (Abrams, et al., 2000; Polley, et al., 2002). Weight gain during pregnancy above the recommended IOM ranges is also associated with postpartum weight retention (Leermakers, Anglin & Wing, 1998; Abrams, et al., 2000) with those women retaining nearly twice as much weight after pregnancy as women who gain within the guidelines (Polley, et al., 2002). Conversely, research shows that women who returned to their pregravid weight by 6 months postpartum gained the least amount of weight in the long-term (Rooney & Schaumberger, 2002). Great disparity in weight change associated to childbearing has been observed, implying that a number of women are at higher risk for excess weight gain and postpartum weight retention during the reproductive years (Gunderson & Adams, 2000).

Gunderson, Abrams and Selvin (2001) found that early net postpartum weight changes (at 6 weeks postpartum) did not vary by pregravid BMI Group but that late postpartum weight changes (median 2 years postpartum) differed significantly. Early postpartum weight loss can be
attributed to loss of placenta, amniotic fluid, maternal blood volume and other body components which are mostly non-adipose tissue (Gunderson, et al., 2001). Additionally, lifestyle changes across all BMIs in terms of restricted activity patterns and altered sleep cycles are typical in the first 6 weeks postpartum. Late postpartum weight changes are more likely to be related to changes in body fat stores and are related to the return to regular physical activity and pre-pregnancy lifestyle (Gunderson, et al., 2001).

There are many factors that are believed to influence postpartum body weight including pregravid BMI, race/ethnicity, parity, age at first birth, smoking habit, lifestyle behaviors, inadequate social support, low income and depressive symptoms and lactation (Gore, et al, 2003; Gunderson & Adams, 2000). Despite the influence of these factors, research has consistently observed that the best predictor of postpartum weight retention is excessive gestational weight gain, especially within the immediate postpartum period (less than 1 year) (Leermakers et al., 1998; Gunderson & Adams, 2000). Further research that examines the relationship between these two factors is needed. Though little information is available regarding the impact of lifestyle changes during the postpartum period, exercise and dietary intake are important contributors to energy balance and also require further investigation.

Approaching the problem of postpartum weight retention during pregnancy, with programs focusing on weight gain restriction, is controversial due to the relationship between maternal weight gain and fetal birthweight (Leermakers et al., 1998). Although pre-natal weight loss interventions would be ideal for combating pre-pregnancy BMI, 50 to 60% of all pregnancies are unplanned making these interventions irrelevant to many women. (Walker, et al., 2005). Considering these issues, the postpartum period emerges as the optimal time to intervene. In addition, some women gain weight during the postpartum period attributable to increased food
intake, a decrease in physical activity, increased time watching television and less social support (Johnson, et al., 2006). Most of these factors are behavioral and can be successfully managed during this time.

Some women make healthy improvements in their diets during pregnancy but often these modifications are not maintained postpartum (Fowles & Walker, 2006). A number of studies have discovered that the diets of many women at 3-6 months postpartum are unhealthy, characterized by low intake of vegetables and breads (Fowles & Walker, 2006; Olson, 2005). Two studies (Fowles & Walker, 2006; Olson, 2005) found that dietary quality was higher in postpartum women who were breastfeeding, and that women who were breastfeeding at 6 months postpartum had higher intake of vegetables, fruit and milk than women who were not breastfeeding. The shift of emphasis from quality of the diet, may be related to the adjustment to the intricacy of dealing with a newborn, priority being placed on the developing infant, the stress of returning to work, caring for other children, and other roles in the postpartum mother’s life. While not all women are at risk for obesity related to gestational weight gain and postpartum weight retention, postpartum programs (beyond 6 weeks postpartum) could help prevent the onset of obesity in women at high risk and aid in the maintenance of diet and nutrient intake in all postpartum women.

The purpose of the current research was to evaluate the effectiveness of a dietary intervention on increasing vegetable consumption in postpartum mothers to aid in attaining a healthy weight. Vegetables were chosen as the focus of the study due to their high-nutrient, low-calorie nature and the relationship of vegetables with reduced risk of major weight gain and obesity development. There is no control group in this intervention study as this study was
involved in the preparatory stage for a larger study which addressed maternal diet and the influence on the diet of her infant.

Methods

Participants

Women were recruited at their six week post-partum appointment at a large, private obstetric center in Cincinnati, Ohio. Participants in this study were accrued between April 2005 and November of 2006. The Samaritan Obstetrics practice of Cincinnati provides obstetric and gynecologic care for women residing in the greater Cincinnati regional area: Southwestern Ohio (70% of patients), Northern Kentucky (10%), and Eastern Indiana (20%). In terms of demographic characteristics, 70% of the patients are White (not Hispanic), 10% are White (Hispanic), 16% are African-American, and 4% are others (mainly Asian).

Eligibility criteria included: post-partum women aged 18 to 40, who delivered a full-term infant (greater than 36 weeks), and who did not intend to move from the greater Cincinnati area for the subsequent four months. Exclusion criteria included women who: had multiple infant pregnancies, high-risk pregnancies, in-vitro fertilization pregnancy, were on diabetic/special diets, used drugs, alcohol, tobacco and/or women who participated in the Special Supplemental Program for Women Infants and Children (thus receiving additional nutritional counseling). Eligibility was confirmed by study coordinators during the contact phone call with the participants. Written informed consent (Appendix A) was obtained from all participants and the study protocol was approved by the institutional review board at the University of Cincinnati.

Intervention

Breastfeeding and formula-feeding postpartum mothers and their infants participated in a theory-based dietary intervention program advocating consumption of dark green, deep yellow
vegetables (peas, green beans, carrots, sweet potatoes, and squash) within the context of a healthy diet. The study involved a four-month nutrition education program aimed at increasing the mother’s vegetable intake to help attain a healthy weight. The intervention was delivered by nutrition master’s level research assistants. Both the breast-feeding and the formula feeding groups participated in the program, there was no control group.

Mothers were recruited during their six-week post-partum follow-up visit with one of five obstetricians at the Samaritan practice. During this visit, the obstetrician introduced the study to women who met the inclusion criteria and asked for the mother’s participation. Recruitment flyers were also posted in the examination rooms. Those who agreed to participate were asked to complete a pre-evaluation session, a nutrition education program, and a post-evaluation session.

Interested mothers provided their names and phone numbers (Appendix B) to the office manager who relayed the information to the research coordinator. The research coordinator gave the contact information to the research assistant who contacted the mother to review the exclusion criteria, the components of the study and to schedule the educational session if the mother was not excluded. During this call the research assistant determined which study group the mother would be assigned based on her feeding plan for her infant. If the woman planned for at least 50% of feeds for the next four months to be breast milk, the mother and child were placed into the “breast-feeding group”. If less than 50% of feeds during the next 4 months were breast milk, the mother and child were assigned to the “formula feeding group”.

*Pre-evaluation session (6-8 weeks infant age):* During the first session the research assistant met individually with each subject. At the beginning of the pre-evaluation session, the research assistant read the informed consent form (Appendix A) with the participant and answered any questions to ensure that everything was understood. Mothers were unable to
participate if informed consent was not obtained. Weight and height were measured by the trained research assistant with a standardized, calibrated balance beam scale (Health o meter Professional Dial, 402KL) and stadiometer (Hite-Rite Precision Mechanical) in the obstetrics office and were used for the baseline BMI calculation. Mothers in the formula feeding group with a baseline BMI greater than 25 were placed on 1600 calorie daily intakes and those with a BMI less than 25 were put on an 1800 calorie daily intake. To account for the caloric requirements of breastfeeding, mothers in the breastfeeding group with a baseline BMI greater than 25 were placed on 2100 calorie daily intakes and those with a baseline BMI less than 25 were put on 2300 calorie diet. The diets were discussed during the face-to-face counseling session.

The subjects were then asked to complete a demographic information sheet (Appendix C), a vegetable variety survey (Appendix D), and a vegetable preference and self-efficacy questionnaire (Appendix E). Prior to this session, the research assistant would mail or e-mail the participant a blank 3-day food record form and instructions (Appendix F) on how to complete them. The research assistant reviewed the participants’ food records during the session, verifying that the food record was detailed and accurate (name-brand if available, portion sizes, food type and preparation).

Nutrition education program (6-8 weeks - 6 months infant age): The dietary intervention was delivered to both groups of mothers (breast-feeding and formula feeding) over a four-month period and consisted of one face-to-face counseling session, two follow-up contacts by phone, and three pamphlets mailed to their homes. Strategies for behavior change such as goal setting, self-efficacy, and self-monitoring were included in the intervention. The Social Cognitive Theory provided the theoretical framework for the nutrition education component. This theory
focuses on the learning which takes place within a social context and includes concepts such as observational learning, imitation, and modeling (Bandura, 1991). This theory is often used for research of behavior change as it considers the manner in which behavior, personal factors and environmental influences interact (Bandura, 1991).

The face-to-face counseling session with the research assistant was held at the obstetrician office when the infant was 6-8 weeks old and lasted approximately one hour, immediately following the pre-evaluation session. During the counseling session, the research assistant discussed the program goals with the subject, addressed current eating habits, provided the curriculum to and discussed the curriculum materials with the participants. The curriculum included general nutrition guidelines for post-partum women, information specific to increasing intake, preparing and selecting the five target vegetables, weight management tips, goal setting (long-term and short-term), suggestions regarding how to overcome obstacles, recipes and sample menus. The intervention emphasized replacement of high-energy, low-nutrient-dense foods with fruits, vegetables, whole-grains, low-fat dairy and lean protein foods. A focus was placed on five target vegetables (carrots, squash, sweet potatoes, green beans and peas) that represent the deep-yellow and dark-green vegetables which are healthful yet underrepresented in the majority of Americans’ diets. These five vegetables are typically the first vegetables introduced into the infant’s diet and can be consumed across the lifespan, from infancy through adulthood. Dietary counseling emphasized these vegetables which provided the basis of the intervention curriculum.

The educational content of the intervention was supported by known effective strategies for behavior change such as, outcome expectations (the benefits of eating a diet rich in vegetables),
self-efficacy (purchasing and preparation suggestions, easy ways to eat more vegetables, sample menus, recipes) and self-monitoring (counting and documenting vegetable intake).

Two telephone contacts were conducted by the research assistant to encourage the participant’s continuation with the program and adherence to the diet. The research assistant helped overcome barriers, provided support and answered any questions or concerns of the participants. The first phone call was made two weeks after the face-to-face counseling session and the second was made three months after the counseling session. The second phone call was similar to the first but the research assistant also scheduled the post-evaluation session, reviewed how to fill out the 3-day food record with the participant and reminded the participant to bring the 3-day food record and food logs to the post-evaluation session. Scripts (Appendix G) were used by the research assistants for both phone contacts and the calls lasted from 10 to 25 minutes, depending on the participant.

The three brochures (Appendix H) were mailed monthly to the participant after the counseling session. The mailings emphasized the target vegetable and provided additional recipes, tips on how to include more vegetables in the diet, healthy snack options and tips for avoiding weight gain.

Post-evaluation (6 months of infant’s age): During this session the research assistant met individually with each participant. The participants were asked again to complete a vegetable variety survey (Appendix D) and a vegetable preference and self-efficacy questionnaire (Appendix E). A blank food record form and instructions on how to complete food records (Appendix F) were provided in the curriculum for the participant to complete prior to the post-evaluation session. During the session, the research assistant reviewed the three-day food record
with the participant, clarifying any ambiguity. At this time the mother was asked to describe their infant’s vegetable acceptance (preference and consumption) using an infant feeding questionnaire (Appendix I). Upon completion of the study, participants were provided a $10 gift certificate to Wild Oats®.

It was expected that after completion of the program, both groups of mothers would consume more vegetables attributable in part to an increase in vegetable preference and self-efficacy in purchasing, preparing and consuming vegetables. It was also predicted that the increased consumption of vegetables would replace intake of other high calorie, high fat, nutrient-deficient foods leading to a decrease in caloric intake while maintaining an overall healthy diet. In addition, we believed that the women who were breastfeeding would produce milk containing flavors of the target vegetables and these flavors would be perceptible to their nursing infants, which would increase vegetable intake in the breastfeeding infants as compared with the formula-fed infants. The impact of the mother’s diet on the child’s diet was assessed when the child was 6-months old by measuring the amount of vegetables consumed. It was expected that breastfed infants will consume a higher amount of target vegetables than the formula-fed infants. The infant component and outcome measures and will not be discussed in this manuscript.

Every effort was made to maintain the confidentiality of the study records. The mothers’ names were recorded with a study number on a separate sheet of paper, and kept in a locked file cabinet, accessible only to the principal investigator, research coordinator and research assistants. If the data from the study is published, the mothers’ names will not be identified.
Measures

*Vegetable Variety Survey*

The Vegetable Variety Survey (Appendix D) was used to determine the number of different vegetables consumed by the mother in a 30-day period. The research assistant read a list of 19 vegetables, including the five target vegetables, to the participants and asked them if they had, “eaten each of these vegetables at least once in the past month”. The vegetables listed included all forms of each vegetable, including fresh, canned, frozen, raw and cooked, unless specified in the description. The Vegetable Variety Survey was modified from a vegetable variety measurement instrument developed by Wolfe, Frongillo and Cassano (2001). Research has shown that at least 15 days is required to capture dietary variety (Wolfe, et al, 2001). Wolfe and colleagues (2001) found the tool to be understood and interpreted across different racial and ethnic groups.

*Preference and Self-efficacy Questionnaire*

In order to evaluate preference for certain vegetables, participants were provided a preference rating using a 5-point, Likert scale with endpoints labeled 1 (disliked extremely) to 5 (liked extremely) for ten vegetables, including the five target vegetables. The mother’s self-efficacy in selecting, shopping for, safely preparing and eating vegetables was measured with a 5-point, Likert scale with endpoints labeled 1 (disagree strongly) to 5 (agree strongly). The participants were asked to indicate their level of agreement with nine statements (e.g. “I can make a salad from beginning to end”) related to the scale. Both preference and self-efficacy questionnaires were modified from instruments used by Liquori, Kock, Contento, and Castle (1998) which demonstrated a Cronbach alpha reliability of .66 for preference and .35 for self-efficacy in a nutrition education intervention with elementary school children.
Mother’s Three-day Food Intake Record

Data on the food and nutrient intake and food group servings were assessed using 3-day food records (daily average) at the beginning and end of the study (Appendix F). The subjects were given personal and written instructions on recording and the records were reviewed for completeness and accuracy by a nutritionist with the aid of a portion picture poster. If needed, missing portion sizes and food descriptions were added after discussions with the women, and the type, brand and preparation method of all foods used were recorded to the best capability. Daily energy and nutrient intakes as well as food group servings were calculated using The Food Processor ® SQL Nutrition and Fitness Software computerized program (ESHA Research, 2002-2003).

All foods and beverages consumed were analyzed for total energy (kcal), macronutrient composition (grams and percent calories), fiber (g), vitamin C (mg), folate (µg), calcium (mg), iron (mg) and food groups (number of servings). The 3-day food intake record measured the overall dietary quality of the mother, and more specifically, the number of servings of vegetables and other food groups consumed. Classification of foods within food groups were based on the grouping scheme developed by the Food Guide Pyramid for Americans (US Department of Agriculture, Human Nutrition Information Service, 1992) and included the Vegetable, Fruit, Milk/Yogurt/Cheese, Meat/Poultry/Fish/Dry Beans/Eggs/Nuts, Bread/Cereal/Rice/Pasta groups.

The Food Guide Pyramid (now superseded by MyPyramid) was introduced by the USDA in 1992. A sixth group (fats, oils and sweets) consists mostly items that are high in fat and/or calories and were not recorded for the study as these foods should be eaten in moderation or intake should be limited.
In addition to these outcome measuring tools, two other monitoring instruments were used by the mother. To promote vegetable intake through self-monitoring, the mother was provided a log (Appendix J) in which she recorded her vegetable intake on a daily basis throughout the four month duration of the study. A daily infant feeding log (Appendix K) was also provided to record breast feeding/formula feeding patterns and transition to solid foods throughout the four month duration of the study.

Weight and BMI

Weight was assessed at the pre- and post-evaluation sessions and height was measured during the pre-evaluation session. Weight and height were measured by trained personnel with a standardized, calibrated balance beam scale (Health o meter Professional Dial, 402KL) and stadiometer (Hite-Rite Precision Mechanical) in the obstetrics office and were used for the baseline BMI calculation (weight, kg, divided by the square of the height, m²).

Statistical Analysis

Data analysis was performed using Statistical Analysis Systems (SAS) software (version 8.02, 1999, SAS Institute Inc., Cary, N.C.). The significance level was chosen at \( p \leq 0.05 \).

Results

Sample Characteristics

Sixty-one women who met the entry criteria were enrolled in the study, had baseline measurements taken and received the intervention materials. Thirty-nine of the women reported were placed in the breast-feeding group and 22 were designated to the formula feeding group based on self-reported intentions for infant feeding practices. Forty-seven mothers completed the study, 28 breast-feeding and 19 formula feeding (77.0% retention). Reasons for discontinuing the study included: time constraints, family relocation, no longer interested in
participating and the diet was too restrictive. Four women were not able to be contacted for their second follow-up phone call or post-evaluation and were excluded, leaving a total of 47 women in the final analysis.

The study sample was consistent with the demographic distribution of the patient population of Samaritan OB/GYN. The study population was predominantly Caucasian (1 Asian, 1 Other) and well educated (85.1% college graduates). Subject characteristics at baseline are provided in Table 1. There were no significant differences in most baseline characteristics (age, education, height, language) except first child – 79% of breastfeeding group were enrolled with their first child while only 42% of the formula feeding were enrolled with their first child.

Table 1. Participant Characteristics at Baseline

<table>
<thead>
<tr>
<th></th>
<th>Breast-feeding (n=28)</th>
<th>Formula feeding (n=19)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>29.3 ± 3.7</td>
<td>30.6 ± 3.9</td>
<td>0.75</td>
</tr>
<tr>
<td>Height (in.)</td>
<td>65.9 ± 2.6</td>
<td>65.4 ± 2.5</td>
<td>0.53</td>
</tr>
<tr>
<td>Weight (lbs.)</td>
<td>169 ± 5.7</td>
<td>170 ± 6.9</td>
<td>0.86</td>
</tr>
<tr>
<td>BMI (kg/m$^2$)</td>
<td>27.4 ± 1.0</td>
<td>28.1 ± 1.2</td>
<td>0.68</td>
</tr>
<tr>
<td>% of participants with one child</td>
<td>78.6 %</td>
<td>42.1 %</td>
<td></td>
</tr>
</tbody>
</table>

*Mean ± SD.

Preference - Vegetable Preference Measurement Tool

Table 2. Preference Survey: Mean, Standard Deviation of Servings of Each Variable by Feed. P-value is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Time</th>
<th>Mean Score$^{ab}$</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preference for peas</td>
<td>Breast</td>
<td>Baseline</td>
<td>3.79</td>
<td>1.10</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>4.04</td>
<td>0.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>3.68</td>
<td>1.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>3.79</td>
<td>1.18</td>
<td></td>
<td>0.80</td>
</tr>
<tr>
<td>Preference for green beans</td>
<td>Breast</td>
<td>Baseline</td>
<td>4.25</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>4.57</td>
<td>0.69</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>4.37</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>4.42</td>
<td>0.77</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>Preference for carrots</td>
<td>Breast</td>
<td>Baseline</td>
<td>4.39</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>4.36</td>
<td>0.99</td>
<td></td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>4.37</td>
<td>1.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>4.47</td>
<td>0.96</td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td>3.61</td>
<td>1.52</td>
<td>0.50</td>
</tr>
</tbody>
</table>
The vegetable preference measurement tool was used to evaluate the change in the participant’s partiality towards various vegetables, including the target vegetables. Each target

### Table 2a. Preference Survey: Total Number of Subjects, Proportion of Subjects whose preference Score Increased Compared to Baseline Preference; P-value Tested the Equality of Two Proportions (Results were obtained from Fisher’s Exact Test.)

<table>
<thead>
<tr>
<th>Variable (Difference)</th>
<th>Feed</th>
<th>Total Number of Subjects</th>
<th>Proportion (%) Preference Increased&lt;sup&gt;a&lt;/sup&gt;</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preference for peas</td>
<td>Breast</td>
<td>28</td>
<td>32.14</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>21.05</td>
<td></td>
</tr>
<tr>
<td>Preference for green beans</td>
<td>Breast</td>
<td>28</td>
<td>25.0</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>21.05</td>
<td></td>
</tr>
<tr>
<td>Preference for carrots</td>
<td>Breast</td>
<td>28</td>
<td>28.57</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>26.32</td>
<td></td>
</tr>
<tr>
<td>Preference for sweet potatoes</td>
<td>Breast</td>
<td>28</td>
<td>32.14</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>36.84</td>
<td></td>
</tr>
<tr>
<td>Preference for squash</td>
<td>Breast</td>
<td>28</td>
<td>39.29</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>42.11</td>
<td></td>
</tr>
<tr>
<td>Preference for target veg</td>
<td>Breast</td>
<td>28</td>
<td>60.71</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>57.89</td>
<td></td>
</tr>
<tr>
<td>Preference for other veg</td>
<td>Breast</td>
<td>28</td>
<td>60.71</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>63.16</td>
<td></td>
</tr>
<tr>
<td>Preference for all veg</td>
<td>Breast</td>
<td>28</td>
<td>64.29</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>63.16</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Subjects whose preference score was larger at the end compared to baseline.
vegetable was scored based on the participant’s response. The value for “Preference for Target Vegetables” was determined by adding the values of the five target vegetables, “Preference for Total Vegetables” was quantified by adding the scores of all ten vegetables and “Preference for Other Vegetables” was determined using the difference between the “Preference for Total Vegetables” and “Preference for Target Vegetable” scores.

It was expected that the two groups would increase their preference equally. Using Fisher’s Exact Test, the data demonstrated that preference increased for all variables, except a slight decrease in breast-feeding mothers’ preference for carrots, but these findings were not significant. There was a trend towards increase in preference of all vegetables for breast-feeding mothers. The data shows that the intervention worked equally on both groups for increasing participant preference for vegetables.

**Self-Efficacy - Self-efficacy Measurement Tool**

### Table 3. Self-Efficacy Scores: Mean, Standard Deviation of Score by Feed. P-value is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Time</th>
<th>Mean Score</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy total score</td>
<td>Breast</td>
<td>Baseline</td>
<td>38.89</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>42.61</td>
<td>0.98</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>36.32</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>39.63</td>
<td>1.19</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*Scores for self-efficacy based on 5-point, Likert scale (1, Disagree Strongly – 5, Agree Strongly). Total score determined by totaling responses to 9 statements. Range of Mean Scores was 9-45 for self-efficacy total score.*

### Table 3a. Self-Efficacy Scores: Mean of differences (end-baseline), Standard Deviation by Feeding Group; P-value Tested the Equality of the Two Differences (End-Baseline). (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Mean of Differences</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference in self-efficacy total score</td>
<td>Breast</td>
<td>3.71</td>
<td>1.39</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>3.3</td>
<td>1.69</td>
<td></td>
</tr>
</tbody>
</table>
Using the self-efficacy measurement tool to calculate a self-efficacy score for participants at baseline and at the completion of the intervention, the change in self-efficacy was able to be determined. The “Self-efficacy Total Score” was determined by adding the participant responses to the nine self-efficacy questions. The range for “Self-efficacy Total Score” was 9 – 45. The data indicates that both groups equally improved in self-efficacy as there was no significant difference between the baseline and end scores of self-efficacy between the two groups. A significant increase was observed in the self-efficacy of the breast-feeding group ($p$-value = 0.01) and a trend towards improvement in the self-efficacy was observed for the formula feeding group ($p$-value = 0.06). Both groups improved their self-efficacy from baseline at the completion of the study.

*Vegetable Consumption*

**Table 4. Food Group Analysis (Vegetables): Mean, Standard Deviation of Servings* of Each Variable by Feed. P-value is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Time</th>
<th>Mean (Servings)</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All vegetables</td>
<td>Breast</td>
<td>Baseline</td>
<td>3.79</td>
<td>0.44</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>End</td>
<td>5.58</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>3.57</td>
<td>0.54</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>End</td>
<td>5.79</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Total target vegetables</td>
<td>Breast</td>
<td>Baseline</td>
<td>0.44</td>
<td>0.21</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>End</td>
<td>1.21</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>0.87</td>
<td>0.17</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>End</td>
<td>1.43</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>Breast</td>
<td>Baseline</td>
<td>0.46</td>
<td>0.13</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>End</td>
<td>0.85</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>0.27</td>
<td>0.16</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>End</td>
<td>0.68</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td>Breast</td>
<td>Baseline</td>
<td>0.10</td>
<td>0.06</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>End</td>
<td>0.23</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>0.15</td>
<td>0.07</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>End</td>
<td>0.20</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Green Beans</td>
<td>Breast</td>
<td>Baseline</td>
<td>0.16</td>
<td>0.05</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>End</td>
<td>0.15</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>0.05</td>
<td>0.06</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>End</td>
<td>0.19</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>Breast</td>
<td>Baseline</td>
<td>0.08</td>
<td>0.07</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>End</td>
<td>0.16</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseline</td>
<td></td>
<td>0</td>
<td>0.08</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Three-day food records at baseline and at the end of the intervention were utilized to determine and compare the mean intake (servings) of vegetables consumed by each group at these intervals and to deduce any change in the participants’ consumption of vegetables. A serving of vegetables was considered to be equal to 1 cup raw vegetables or ½ cup cooked vegetables. One of the primary objectives of the intervention was to increase vegetable consumption within the context of a healthy diet.

Analysis of Variance was used to compare the change in consumption between the breast-feeding and formula feeding groups as well as between the baseline and end data for each group. It was assumed that both groups would increase their consumption of vegetables equally.
and Table 4a demonstrates that this was indeed the case. Table 4 indicates that both groups significantly increased their intake of All Vegetables (breast-feeding p-value = 0.01; formula feeding p-value = 0.01), Total Target Vegetables (breast-feeding p-value = 0.03; formula feeding p-value = 0.01) and Other Vegetables (breast-feeding p-value = 0.05; formula feeding p-value = 0.05). Additionally, the breast-feeding group significantly increased their intake of carrots (breast-feeding p-value = 0.05). The significance for All Vegetables was more likely influenced by the increase in Total Target Vegetables as the significance is stronger than that for Other Vegetables, denoting the effect of the intervention on vegetable consumption.

Vegetable Variety - Vegetable Variety Measurement Tools Data

Table 5. Variety Scores: Total Number of Subjects, Proportion of Subject in Each Category by Feed; P-value Tested the Equality of Proportions (%) Between Two Feed Groups Across All Three Categories. (Results were obtained from Mantel-Haenszel Chi-squared Test.)

<table>
<thead>
<tr>
<th>Variable (Difference)</th>
<th>Feed</th>
<th>Total Number of Subjects</th>
<th>Proportion (No -&gt; Yes)</th>
<th>Proportion (No Change)</th>
<th>Proportion (Yes -&gt; No)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peas</td>
<td>Breast</td>
<td>28</td>
<td>10.71</td>
<td>85.71</td>
<td>3.57</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>15.79</td>
<td>84.21</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Green Beans</td>
<td>Breast</td>
<td>28</td>
<td>3.57</td>
<td>96.43</td>
<td>0</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>0</td>
<td>100.0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>Breast</td>
<td>28</td>
<td>3.57</td>
<td>96.43</td>
<td>0</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>0</td>
<td>100.0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>Breast</td>
<td>28</td>
<td>14.29</td>
<td>75.0</td>
<td>10.71</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>47.37</td>
<td>52.63</td>
<td>0</td>
<td>0.65</td>
</tr>
<tr>
<td>Squash</td>
<td>Breast</td>
<td>28</td>
<td>25.00</td>
<td>57.14</td>
<td>17.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>26.32</td>
<td>63.16</td>
<td>10.53</td>
<td></td>
</tr>
</tbody>
</table>

Consumption of variety within the vegetable group was determined using the vegetable variety tool at both baseline and end in order to detect any change that occurred during the intervention. Scores were determined based on the participant consumption of 19 different vegetables/vegetable groupings, including the five target vegetables. The Mantel-Haenszel Chi-squared Test was used to determine the proportion of participants, from baseline to end, who
changed their response from yes to no, changed their response from no to yes or who had the same response at both times. The proportions were similar for both groups except in terms of sweet potatoes for the formula feeding group \( (p\text{-value} = 0.01) \). The data implies that a larger proportion of the formula feeding mothers did not consuming sweet potatoes at baseline but consumed them at the end of the intervention.

Table 6. Variety Scores: Mean, Standard Deviation of Scores for Each Variable by Feed. P-value is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Time</th>
<th>Mean Score ( ab )</th>
<th>SD</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total target vegetables</td>
<td>Breast</td>
<td>Baseline</td>
<td>3.86</td>
<td>0.17</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>4.11</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>3.16</td>
<td>0.20</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>3.95</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>Other vegetables</td>
<td>Breast</td>
<td>Baseline</td>
<td>10.11</td>
<td>0.37</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>11.29</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>10.74</td>
<td>0.45</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>11.16</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>All vegetables</td>
<td>Breast</td>
<td>Baseline</td>
<td>13.96</td>
<td>0.44</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>15.50</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>13.89</td>
<td>0.54</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>15.11</td>
<td>0.54</td>
<td></td>
</tr>
</tbody>
</table>

\( a \) Variety score based on summation of all vegetables consumed over previous month, for every vegetable consumed, 1 unit was scored.

\( b \) Range of scores for was 0-5 for Total Target Vegetables; 0-19 for All Vegetables; and 0-14 for Other Vegetables.

Table 6a. Variety Scores: Total Number of Subjects, Mean, Standard Deviation by Feeding Group; P-value Tested the Equality of the Two Differences (End - Baseline). (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable (Difference)</th>
<th>Feed</th>
<th>Total Number of Subjects</th>
<th>Mean of Differences ( ab )</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total target vegetables</td>
<td>Breast</td>
<td>28</td>
<td>0.25</td>
<td>0.24</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>0.79</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>Other vegetables</td>
<td>Breast</td>
<td>28</td>
<td>1.18</td>
<td>0.53</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>0.42</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>All vegetables</td>
<td>Breast</td>
<td>28</td>
<td>1.54</td>
<td>0.62</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>1.21</td>
<td>0.76</td>
<td></td>
</tr>
</tbody>
</table>

\( a \) Variety score based on summation of all vegetables consumed over previous month, for every vegetable consumed, 1 unit was scored.

\( b \) Range of scores for was 0-5 for Total Target Vegetables; 0-19 for All Vegetables; and 0-14 for Other Vegetables.
The vegetable variety measurement tool was also utilized to provide a variety score at baseline and end for the variety of vegetables consumed in the prior month. For every vegetable consumed, 1 unit was scored. The range of scores for: Total Target Vegetables was 0-5; All Vegetables was 0-19; and Other Vegetables was 0-14. Analysis of Variance was utilized to compare the mean of the variety scores at baseline and end for each of the two groups, to determine if there was a change in the intake of vegetable variety within the groups. Table 6 indicates a significant increase in scores from baseline to end for Other Vegetables ($p$-value = 0.03) and All Vegetables ($p$-value = 0.02) for the breast-feeding group. Total Target Vegetables increased significantly in the formula feeding group ($p$-value = 0.01) but not the breastfeeding group.

Analysis of Variance was also used to compare the mean of differences (baseline to end) for the breast-feeding and formula feeding groups. No difference between the groups was expected. It was hypothesized that both groups would improve their variety score equally. While Table 6 demonstrates a significant difference in the baseline to end changes in variety scores for different variables within the groups, Table 6a indicates that there is no significant difference between the groups and that the intervention had the same effect on both groups.

Food Group Analysis (All Food Groups)

Table 7. Food Group Analysis: Mean, Standard Deviation of Servings of Each Variable by Feed. $p$-value is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Time</th>
<th>Mean (Servings *)</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit</td>
<td>Breast</td>
<td>Baseline</td>
<td>2.16</td>
<td>0.22</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>1.68</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>1.55</td>
<td>0.27</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>1.49</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>Breast</td>
<td>Baseline</td>
<td>2.18</td>
<td>0.20</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>1.88</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>Baseline</td>
<td>2.48</td>
<td>0.24</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End</td>
<td>1.62</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>
Table 7a. Group Summary: Mean & Standard Deviation of Difference (End-Baseline) by Feeding Group; P-value Tested the Equality of Means of Two Feed Group. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable (Difference)</th>
<th>Feed</th>
<th>Total Number of Subjects</th>
<th>Mean of Differences a</th>
<th>SD</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>Breast</td>
<td>28</td>
<td>-1.67</td>
<td>0.74</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-1.22</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>Fruit</td>
<td>Breast</td>
<td>28</td>
<td>-0.48</td>
<td>0.31</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-0.06</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>Breast</td>
<td>28</td>
<td>-0.30</td>
<td>0.28</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-0.86</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>Breast</td>
<td>28</td>
<td>0.22</td>
<td>0.30</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>0.47</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>All vegetables</td>
<td>Breast</td>
<td>28</td>
<td>1.79</td>
<td>0.63</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>2.23</td>
<td>0.76</td>
<td></td>
</tr>
</tbody>
</table>


Three-day food records at baseline and at the end of the intervention were utilized to determine and compare the mean intake (servings) of the grain, fruit, milk, meat and vegetable food groups consumed by breast-feeding and formula feeding mothers at these intervals and to deduce any change in the participants’ consumption of vegetables. Servings were based on the Food Guide Pyramid (1992) guidelines for food group serving size.

While one of the primary objectives of the intervention was to increase vegetable intake, it was anticipated that this increased consumption would replace intake of other high calorie, high fat, nutrient-deficient foods leading to a decrease in caloric intake without diminishing the overall quality of the diet. Analysis of Variance was used to compare the change in consumption between the breast-feeding and formula feeding groups as well as between the baseline and end
data for each group. It was hypothesized that the intervention would affect the breastfeeding and formula feeding groups equally and that the increased vegetable consumption would not substitute other nutrient-rich, low-calorie foods needed in a healthy diet. For example, while both groups increased their vegetable intake significantly, there was little observed change in the average number of servings of meat did not change significantly.

Table 7 indicates that the breast-feeding group significantly decreased their intake of servings of grains ($p$-value = 0.03) dropping from a mean of 7.9 servings at baseline to 6.2 servings at the end of the intervention. It also shows that the formula feeding group decreased their consumption of milk and dairy ($p$-value = 0.02) dropping from a mean of 2.5 servings at baseline to 1.6 servings at the end of the intervention. The data regarding the increase in servings of vegetables for both groups was noted in Table 4 and was discussed previously. Despite these changes, Table 7a shows that overall diet was affected by the intervention equally in both groups.

**Nutrient Analysis**

**Table 8. Nutrient Survey: Mean, Standard Deviation of Each Variable by Feed. P-value is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Feed</th>
<th>Time</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breast</td>
<td>2174.45</td>
<td>111.00</td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>1999.48</td>
<td>109.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>2236.56</td>
<td>132.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>1882.97</td>
<td>132.32</td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td>Cal (kcal)</td>
<td>Breast</td>
<td>90.23</td>
<td>4.26</td>
<td></td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>87.89</td>
<td>4.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pro (g)</td>
<td>Breast</td>
<td>86.27</td>
<td>5.07</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>86.23</td>
<td>5.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHO (g)</td>
<td>Breast</td>
<td>281.43</td>
<td>15.42</td>
<td></td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>262.22</td>
<td>15.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>278.34</td>
<td>18.38</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>225.64</td>
<td>18.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat (g)</td>
<td>Breast</td>
<td>78.16</td>
<td>5.96</td>
<td></td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>69.80</td>
<td>5.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>84.59</td>
<td>7.10</td>
<td></td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>71.11</td>
<td>7.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Feed</td>
<td>Total Number of Subjects</td>
<td>Mean of Differences</td>
<td>SD</td>
<td>P-value</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>--------------------------</td>
<td>---------------------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>DiffCal</td>
<td>Breast</td>
<td>28</td>
<td>-174.98</td>
<td>155.57</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-353.59</td>
<td>187.13</td>
<td>0.47</td>
</tr>
<tr>
<td>DiffPro</td>
<td>Breast</td>
<td>28</td>
<td>-2.34</td>
<td>5.96</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-0.04</td>
<td>7.17</td>
<td>0.81</td>
</tr>
<tr>
<td>DiffCHO</td>
<td>Breast</td>
<td>28</td>
<td>-19.21</td>
<td>21.61</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-52.70</td>
<td>25.99</td>
<td>0.33</td>
</tr>
<tr>
<td>DiffFat</td>
<td>Breast</td>
<td>28</td>
<td>-8.36</td>
<td>8.35</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>-13.48</td>
<td>10.04</td>
<td>0.70</td>
</tr>
<tr>
<td>Diff%calfrom Pro</td>
<td>Breast</td>
<td>28</td>
<td>1.30</td>
<td>0.96</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>19</td>
<td>3.28</td>
<td>1.15</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Table 8a. Nutrient Survey: Mean, Standard Deviation of Difference (End – Baseline) of Each Nutrient. P-value Tested the Equality of Means of Two Feed Group. (Results were obtained from Analysis of Variance)
Nutrient analysis of the 3-day food record was utilized to ensure the maintenance of the quality of the diet and to evaluate specific nutrients related to vegetable intake. Analysis of variance was used to evaluate the difference in nutrient intake between the two groups in addition to the difference between the baseline and end data for each group. It was expected that the intervention would affect the groups equally. The baseline and end values for both groups in terms of % Calories from Fat, % Calories from CHO and % Calories from PRO all demonstrate that the women’s diets were within the normal DRI Macronutrient Distribution Ranges: Fat should compose 20-35% of total calories consumed, carbohydrate should comprise 45-65% of total calories consumed and protein should make up 10-35% of total calories consumed (Institute of Medicine, 2002).

Variables in Table 8 that show a significant difference from baseline to end include: formula feeding increased intake of Vitamin C significantly ($p$-value = 0.05) and % calories from Protein ($p$-value = 0.01) and decreased consumption of Carbohydrate ($p$-value = 0.05) and Calcium ($p$-value = 0.05). The formula feeding group also demonstrated a trend towards
improvement in decreasing caloric intake \((p\text{-value} = 0.07)\) from a mean of 2237 kcal at baseline to 1883 kcal at the end of the study. While not significant, the Analysis of Variance within the groups also shows an increase for both groups in Fiber, Vitamin C, and \% Calories from Protein and an increase in folate for the breast-feeding group. Additionally, a decrease is evident in both groups in Calorie, Fat and Carbohydrate intake. Data in Table 8a validate that there is no significant difference in the nutrient intake between the two groups and that the intervention influenced both groups equally.

Weight

Table 9. Weight Measurements: Mean, Standard Deviation of Weight (lbs.) by Feed. \(p\text{-value}\) is Testing the Equality of Baseline and End Means. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable (Weight, lbs.)</th>
<th>Feed</th>
<th>Time</th>
<th>Mean</th>
<th>SD</th>
<th>(p\text{-value})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Baseline</td>
<td>168.55</td>
<td>5.69</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>160.54</td>
<td>5.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formula</td>
<td>Baseline</td>
<td>170.16</td>
<td>6.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>End</td>
<td>162.21</td>
<td>6.91</td>
<td>0.32</td>
<td></td>
</tr>
</tbody>
</table>

Table 9a. Weight Measurement: Mean, Standard Deviation of Difference (End – Baseline) of Each Measurement. \(p\text{-value}\) Tested the Equality of Means of Two Feed Group. (Results were obtained from Analysis of Variance)

<table>
<thead>
<tr>
<th>Variable (difference)</th>
<th>Feed</th>
<th>Mean of Differences</th>
<th>SD</th>
<th>(p\text{-value})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (lbs.)</td>
<td>Breast</td>
<td>-7.95</td>
<td>9.77</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Formula</td>
<td>-8.02</td>
<td>8.05</td>
<td></td>
</tr>
</tbody>
</table>

Weight was measured at baseline and at the end of the intervention and used in combination with the height to attain BMI values for the participants. Analysis of Variance was used to determine the mean of differences from baseline to end within the groups and to compare the mean differences between groups. Again, the expected outcome in regard to weight loss was that both groups would lose weight equally. While not significant, both groups lost a mean of
approximately 8 pounds from baseline to the end of the study (breast-feeding 8.01 lbs ± 5.7, formula feeding 7.95 lbs ± 6.91).

Chart 1 provides more detail in the distribution of weight lost by BMI classification (BMI>25 or BMI<25) within each group. The majority of all the participants (36/47 = 76.6%) lost between 5 and 14.9 pounds from baseline to end of the study. The chart illustrates that the women lost similar amounts of weight despite their BMI categories, with the exception of two participants with the most weight lost. Five participants are not represented in Chart 1 because they gained weight, these women are depicted in Chart 2.

Chart 1. Amount of weight loss by group and BMI (including only participants who lost weight from baseline to end, n = 42)
Chart 2. Amount of weight gain by group and BMI (including only participants who gained weight from baseline to end, n = 5)

Discussion

The current study found that a theory-based dietary intervention focused on increasing vegetable intake with postpartum women significantly increased consumption of vegetables. Both groups increased their mean consumption of vegetables to greater than 5 servings a day, exceeding recommendations for this population. We anticipated that if participants consumed more low-calorie, nutrient-dense vegetables, these foods would substitute those that are high in calorie and low in nutrients. While there was not a significant decrease in many of the other variables, the decrease in calories and the consumption of fat and carbohydrates combined with the increase in vegetable intake may support this theory. Furthermore, the basic composition of
the diet was not affected as evidenced by the percent of calories from Fat, the increase in vegetable intake may support this theory. Furthermore the basic composition of the diet was not affected as evidenced by the percent of calories from Fat, Carbohydrate and Protein which were all within recommended ranges (Institute of Medicine, DRI, 2002) at both baseline and end.

The increase in vegetable consumption is supported by the literature review by Pomerleau and colleagues (2005) which suggested that interventions promoting fruit and vegetable intake can result in a short-term increase in vegetable intake among healthy adults. Piiranen and colleagues (2006) studied a dietary intervention with healthy Finnish pregnant women. Although the study focused on altering fat consumption in the context of a healthy diet in pregnant women to better meet current recommendations, one aspect of the intervention focused on increasing vegetable intake. The dietary counseling resulted in a significant increase in consumption of vegetables, among other nutrients necessary for a healthy diet, in the intervention group compared with the control. This may illustrate the findings by Szwajcer and colleagues (2005) and Olson (2005) that women are more motivated and willing to alter dietary behaviors related to the transition to motherhood.

Prior research confirms the evidence found in this study. Previous interventions that combined increased physical activity with dietary changes and behavioral modifications demonstrated modest weight losses in postpartum women (Gore, et al., 2003). In a study with low-income, postpartum, African American women, Gennero and Fehder (2000) found that weight loss in these women was due to modifications in dietary quality and activity during the postpartum period. Leermakers and colleagues (1998) discovered that a correspondence intervention was successful in promoting weight loss in postpartum women and Lovelady and
colleagues (2000) found that a 10 week eating and exercise program provided to postpartum overweight women resulted in weight loss without any negative impact on lactation delivery.

O’Toole and colleagues (2003) had a low retention rate in their study with postpartum women and concluded that women had difficulty maintaining active participation in a diet and exercise program during this period. Interventions with postpartum women can be ineffective because commitment and focus may be sacrificed as women can become engrossed with the additional responsibility and time required for infant care as well as the overall adjustment to becoming a mother. Although retention was good (77%) in this study, recruitment of postpartum mothers proved more difficult which may be related to the findings by O’Toole.

This study was limited by the small sample size, absence of a control group, duration of the study and by a lack of diversity in ethnicity and educational level in the study sample. Furthermore, the limitations of the food record method used for the analysis of dietary intake need to be recognized as a possible influence for the reported energy intake. Food intakes are often underestimated or inaccurately reported by participants when using the food record method (Caan et al, 2004) which may affect energy intake.

Efforts to lose considerable amounts of weight and maintain weight loss once obese can be overwhelming and defeating to an individual’s emotional well-being. Attempts to sustain an optimal weight are more likely to be successful if they begin in childhood and continue through adulthood. The known risks of morbidity and mortality linked to overweight in women, the rise in prevalence of obesity among women in the reproductive age group, the relationship of weight gain during pregnancy and retention of postpartum weight make factors associated with weight gain in women an important public health concern. Women’s health programs are essential for reaching and supporting women, regardless of risk for excess weight gain and postpartum weight
retention to maintain the focus on optimal nutrient intake throughout pregnancy and the postpartum period. These programs may help improve dietary quality in postpartum women, which may in turn influence a decrease in the incidence of obesity in this population.

As the US population continues through the lifecycle and waistlines continue to expand, it is important for the health care sector to find a suitable lifestyle intervention for postpartum mothers and their children to promote the achievement and maintenance of a healthy weight.
References


Appendix A
University of Cincinnati  
Department of Nutritional Sciences  
Consent to Participate in a Research Study  
College of Allied Health Sciences  
Grace Falciglia, PI  
Phone #: 513-558-7505   Email: Falcigg@ucmail.uc.edu

Introduction:
Before agreeing to take part in this study, it is important that the following procedures be read and understood. It describes the purpose, procedures, risks, and benefits of the study. It also describes the right to withdraw from the study at any time. It is important to be aware that no guarantee can be made as to the results of the study.

Title of Study:
Achieving pre-pregnancy weight by enhancing quantity of consumed vegetables and looking at infant eating practices and food patterns.

Purpose:
The purpose of this research study is to determine whether increasing the amount vegetables you eat will help in after pregnancy weight loss, and to determine infant eating practices and food patterns at six months of age. You will be one of 60 people taking part in this study.

Duration:
Your participation in this study will begin six weeks after you have had your baby and end six months after you have had your baby.

Procedures:
During the course of the study, the following will occur:

Pre-evaluation session (6 – 8 weeks infant age): During this session our research assistant will meet with you. Prior to this session, the research assistant will mail or e-mail you blank food record forms and instructions on how to complete them. The research assistant will review your food records with you during this session. You will also be asked to complete a vegetable variety survey, and a vegetable preference and self-efficacy questionnaire.

Nutrition Education program (2-6 months infant age): This program has three main parts: (a.) one face-to-face counseling session; (b.) two follow-up phone calls to motivate you; and (c.) three mailings once a month starting four weeks after the counseling session.

(a.) The face-to-face counseling session with the research assistant will be held at your doctor’s office when the infant is 6-8 weeks old and will last 45 minutes. This session will take place immediately following your pre-evaluation session. During this session, the research assistant will talk about the program goals and provide nutrition information for women who recently had a baby as well as information to increase the amount of vegetables you eat. You will be asked to fill out a vegetable food log in which you will record your vegetable intake on a daily basis throughout the four month duration of the study. A daily infant feeding log will also be given to
record breast feeding/formula feeding patterns and transition to solid foods throughout the four month duration of the study.

(b.) The two telephone calls will be from the research assistant. She will encourage you to continue with the program, as well as to answer any concerns or question that you may have. The first phone call will be made two weeks after the face-to-face counseling session and the second will be made three months after the counseling session.

(c.) Three information sheets will be sent to you every month after the counseling session. These will highlight the consumption of a healthful diet in which recipes and preparation tips will be provided.

Post-Evaluation (6 months of infant’s age): During this session our research assistant will meet with you and ask you to fill out the vegetable variety survey, and the vegetable preference and self-efficacy questionnaire. The research assistant will review your food logs and your 3-day food record. You will also be asked to give information regarding your infant’s vegetable intake using an infant feeding questionnaire.

Exclusion:
You will not be able to participate in this study if any of the following apply to you: multiple infant pregnancies, problems with sugar intolerance, special diets, use of drugs, alcohol (no more than 5 ounces of wine, 12 ounces of beer and no liquor), and/or tobacco.

Risks/Discomforts:
There are no risks and/or discomforts related with this study.

Benefits:
The benefits to you for taking part in this study will be receiving nutritional recommendations from a registered dietitian to help you in achieving your pre-pregnancy weight.

New Findings:
You will be told if there is any new information that becomes available during the study that may affect your participation in the study.

Confidentiality:
Every effort will be made to keep the study records confidential. Your name and that of your child will be recorded together with a study number on a separate sheet of paper, and kept in a locked file cabinet, accessible only to the principal investigator and study personnel. The data from the study may be published; however, neither you nor your child will be identified by name. Your identity and that of your child will remain confidential unless submitting it is required by law.

Right to refuse or withdraw:
Your participation is voluntary and you may refuse to participate, or may discontinue participation AT ANY TIME, without penalty. The investigator has the right to withdraw you from the study AT ANY TIME. Your withdrawal from the study may be for reasons related to
you (for example, not following study-related directions from the investigator, etc.) or because the entire study has been terminated.

**Offer to answer questions:**
If you have any other questions about this study, you may call Dr. Grace Falciglia at 513-558-7505. If you have any questions about your rights as a research participant, you may call the Chair of the Institutional Review Board – Social and Behavioral Sciences, at 513-558-5784.

**Legal Rights:**
Nothing in this consent form waives any legal right you may have nor does it release the investigator, the sponsor, the institution, or its agents from liability for negligence.

I HAVE READ THE INFORMATION PROVIDED ABOVE. I VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY. I WILL RECEIVE A COPY OF THIS CONSENT FORM FOR MY INFORMATION.

____________________________________________  _________________  
Participant Signature          Date

____________________________________________  __________________  
Signature and Title of Person Obtaining Consent       Date

Identification of Role in the Study
Appendix B
NUTRITION
STUDY

Patient Name_____________________________________________________

_____ IS interested in participating in the study

Please contact:  Nadezhda Neganov
Cell phone: 257-6650
Office: 558-7957

_____ Is not interested in participating in the study
Preventing childhood obesity through early exposure to vegetable flavors in breast milk.

Name: ___________________________ Assigned ID#: ___________________________

Address: ___________________________ Apt#: ___________________________

City, State, Zip Code: ______________________________________________________

Home Phone: ___________________________ Cell Phone: ___________________________

Age: ________________ Race: ________________ Language: _________________________

Education Level: _______________________

Is this your first child? Y N

Was your infant full-term? Y N

Was this a singleton delivery? Y N

Is your child male or female? M F
Appendix D
I am going to read you a list of vegetables. Please tell me whether or not you have eaten each of these vegetables at least once in the past month. Unless specified, include all forms of each vegetable, including fresh, canned, and frozen, and both raw and cooked, and include vegetables in casseroles, soups, and other mixed dishes. Also, include lettuce or tomato on a sandwich or hamburger.

“Have you had _________ at least once in the past month?”

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lettuce, such as in a salad or on a sandwich</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fresh tomatoes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cucumbers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cabbage, including in coleslaw</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broccoli</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cauliflower</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greens such as collard, mustard or spinach (not including lettuce/cabbage)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tomato sauce, canned tomatoes, salsa, spaghetti or pizza, or in casseroles or mixed dishes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Corn, including corn on the cob</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green peas, sweet peas, snow peas, edible pea pods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green beans, snap beans, string beans including wax or yellow, but not beans such as pinto or kidney</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carrots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sweet potatoes or yams</td>
</tr>
<tr>
<td></td>
<td></td>
<td>White potatoes, such as baked, mashed, French fries, or in potato salad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Winter squash, such as acorn, butternut, or pumpkin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peppers such as green or red peppers or hot peppers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Onion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eggplant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avocado, including in guacamole</td>
</tr>
</tbody>
</table>
Appendix E
Food Preference and Self-efficacy Questionnaire

Date: ___________        ID _________

**Instructions:** On a scale of 1 to 5 with 1 being dislike extremely and 5 being like extremely, tell me how much you like each of these vegetables.

<table>
<thead>
<tr>
<th></th>
<th>Dislike Extremely</th>
<th>Neutral</th>
<th>Like Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Broccoli</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Spinach</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Sweet potatoes</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Carrots</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Turnips</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Green beans</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Squash</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Peas</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Tomatoes</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Eggplant</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Instructions:** Please indicate your level of agreement with the following statements.

<table>
<thead>
<tr>
<th></th>
<th>Disagree Strongly</th>
<th>Neutral</th>
<th>Agree Strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can make a salad from beginning to end.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I can choose a variety of vegetables when I am at the food market.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I know how to clean fresh vegetables.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I can eat 3-5 servings of vegetables each day.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I know how to safe handling vegetables</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I can eat vegetables as a snack at anytime</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I can steam vegetables.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I know how to buy fresh produce</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I can recognize when a vegetable costs less than usual (is on sale)</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you for volunteering to participate in a research study that assists mothers in achieving their pre-pregnancy weight. Attached you will find a sample food record and a 3-day food record. Use the sample food record as a guide to fill out the 3-day food record. Please record three consecutive days of your food intake before our counseling session.

**SAMPLE FOOD DAY RECORD**

<table>
<thead>
<tr>
<th>Time</th>
<th>Description of Food Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 am</td>
<td>Coffee</td>
<td>8 oz</td>
</tr>
<tr>
<td></td>
<td>Sugar</td>
<td>1 tsp.</td>
</tr>
<tr>
<td></td>
<td>creamer</td>
<td>1 tsp.</td>
</tr>
<tr>
<td></td>
<td>Linder’s blueberry bagel</td>
<td>1 bagel</td>
</tr>
<tr>
<td></td>
<td>Low-fat cream cheese</td>
<td>2 Tbs.</td>
</tr>
<tr>
<td></td>
<td>Yogurt – low fat Dannon</td>
<td>8 oz</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Subway</td>
<td>6 inch wheat sub &amp; 3 oz turkey</td>
</tr>
<tr>
<td></td>
<td>Turkey 6-inch on wheat</td>
<td>¼ Cup</td>
</tr>
<tr>
<td></td>
<td>Lettuce</td>
<td>2 slices</td>
</tr>
<tr>
<td></td>
<td>Tomato</td>
<td>1 Tbs.</td>
</tr>
<tr>
<td></td>
<td>Mayo</td>
<td>1 bag</td>
</tr>
<tr>
<td></td>
<td>Sun chips</td>
<td>12 oz.</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>Pretzel Rods</td>
<td>6 count</td>
</tr>
<tr>
<td></td>
<td>Crystal Light - Lemonade</td>
<td>16 oz.</td>
</tr>
<tr>
<td>7:00 pm</td>
<td>Grilled Chicken</td>
<td>4 oz</td>
</tr>
<tr>
<td></td>
<td>Salad</td>
<td>1 Cup</td>
</tr>
<tr>
<td></td>
<td>Cucumber</td>
<td>½ Cup</td>
</tr>
<tr>
<td></td>
<td>Tomato</td>
<td>2 slices</td>
</tr>
<tr>
<td></td>
<td>Ranch dressing</td>
<td>1 Tbs.</td>
</tr>
<tr>
<td></td>
<td>Baked potato</td>
<td>1 small</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>2 Tbs.</td>
</tr>
<tr>
<td></td>
<td>Sour cream</td>
<td>2 Tbs.</td>
</tr>
<tr>
<td></td>
<td>Steamed Baby carrots</td>
<td>1 Cup</td>
</tr>
<tr>
<td></td>
<td>Margarine</td>
<td>1 Tbs.</td>
</tr>
<tr>
<td></td>
<td>Skim Milk</td>
<td>12 oz</td>
</tr>
<tr>
<td>9:00 pm</td>
<td>Decaff Hot tea</td>
<td>12 oz</td>
</tr>
<tr>
<td></td>
<td>Sugar</td>
<td>2 tsp.</td>
</tr>
<tr>
<td></td>
<td>Ginger Snaps Cookies</td>
<td>6 cookies</td>
</tr>
</tbody>
</table>

**Supplements:**

*Brand/Dosage* ______________ *Prenatal Vitamins* ____________________________________________________________

__________________________________________________________

**Spices:**

________________________ Mrs. Dash, season salt________________________
## FOOD DAY RECORD

<table>
<thead>
<tr>
<th>Time</th>
<th>Description of Food Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Supplements:**

*Brand/Dosage*

___________________________________________________________________________

__________________________________________________________________________________________

**Spices:**

_______________________________________________________________________________

University of Cincinnati Department of Nutritional Sciences, 2005
# FOOD DAY RECORD

<table>
<thead>
<tr>
<th>Time</th>
<th>Description of Food Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Supplements:
*Brand/Dosage*

### Spices:

---

University of Cincinnati Department of Nutritional Sciences, 2005
**FOOD DAY RECORD**

<table>
<thead>
<tr>
<th>Time</th>
<th>Description of Food Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Supplements:**

*Brand/Dosage*

**Spices:**

---

University of Cincinnati Department of Nutritional Sciences, 2005
Appendix G
Initial Meeting: Face-to-Face

Hello my name is…………. From the Department of Nutrition of the University of Cincinnati Medical Center and we are conducting a research study on post pregnancy weight reduction/management, as well as infant-eating practices/food acceptance patterns. This study involves Dr. Grace Falciglia, Dr. Deborah Krummel, Kory Boeing, Nadezhda Kanshin, Erin Wagner and Suzanne Smith. I would like to invite you to participate in this study. Your involvement in the study would help us find out if nutrition education could promote healthy weight management/reduction for post pregnant women. Also we are hoping to assess if improvement in your diet can create healthy eating in your infant and increase their food acceptance. Upon partaking in this study, you will receive free nutrition consultation from a Registered Dietitian and analysis of your current diet.

Would you like to participate in this study?

IF NO:
Thank you for your time and have a great day.

IF YES: Would mind completing these 3 questionnaires, after which I would explain the study to you. One questionnaire regards demographic information. Another help us assess your current vegetable variety consumption and the third would help us assess your food current preferences and knowledge regarding vegetable consumption.

(For Intervention Group)
The study would consist of 2 counseling sessions (One, 2-weeks from today and the next 5-6 months after today). Each counseling session will take approximately 45 minutes.

During the first counseling session, we will ask questions about the food that you are eating, explain the benefits and goals of the study, as well as give you education about post pregnancy weight reduction/management. We will ask you to keep a monthly log of your vegetable intake and your child’s intake. All of the information to be gathered is strictly confidential and will be used for research purposes only.

We will call you about 2 weeks after today’s visit to reinforce the information received during counseling session and answer any questions you may have at that time. You will then receive further 3 nutrition information brochure via the mail periodically.

During the second counseling session we will collect your food log and your infant’s food log as well as complete another 24-hour recall and post evaluation questionnaires. The study will end about 6 months after today’s visit.

(For both groups)
Today we are going to gather a 24-hour food recall from you and we will ask you to mail back to us, the other two 24 hour food recall after you complete them at home (For intervention group we will asked them to bring it to us when the come for their first counseling session)

---------------------------------------------------------------------------------------------
SCRIPT FOR STUDY

Follow-up calls (#1)

Hi, this is ........from the University of Cincinnati Medical center. I'm calling to find out how you are doing with the information that I gave you when we met.

- Have you had a chance to read through all of the handouts?
- Have you been setting goals and using the monitoring tool? How is that going?
- Do you have any questions about the material or problems that I can address?
- Have you run into any barriers that have deterred you from eating vegetables?
- Have you tried any of the ideas or recipes in the handouts?
- Have you been eating the 5 target vegetables?
  - If no, what is stopping you?
  - If yes, did you have any trouble finding or preparing the veggie?
Follow-up calls (#2)

Hi, this is …….from the University of Cincinnati Medical center. I’m calling to find out how you are progressing with your vegetable consumption since we last talked.

- Have you had a chance to read through the brochures I mailed you?
- Do you have any questions about the material or problems that I can address?
- Have you been setting goals and using the monitoring tool? How is that going?
- Have you run into any barriers that have deterred you from eating vegetables?
- Have you tried any of the ideas or recipes in the brochures?
- Have you been eating the 5 target vegetables?
  - If no, what is stopping you?
  - If yes, did you have any trouble finding or preparing the veggie?

- At this time, I would like to schedule a time we can meet for the final counseling session.
Appendix H
Greetings!

This is Suzanne Smith and Jessica Gahl, checking in with you. This mailing is to remind you that if you have any questions or concerns, please don’t hesitate to call us at (513) 558-7957. Our numbers also can be found on the inside pocket of ‘Healthy Mothers, Healthy Kids’ binder.

This is the 1st of 3 mailings that you will receive from us, the next one will arrive in a month.

Hoping everything is going well, and you and your little one are doing wonderfully. Don’t forget to set and meet your daily goals for vegetable intake. Also make sure to choose at least 1 to 2 servings of vegetables that are carrots, green beans, squash, sweet potatoes and peas.

Much success to you with your healthy eating goals and if there is anything you need, please don’t hesitate to call us.

Suzanne and Jessica.

THE ABCS OF 5-A-DAY
A=Apple
B=Banana
C=Carrots—Buy carrot match sticks or grated carrots and use them in tossed salads.
D=Dried Fruit
E=Every day—Every meal—Try to have at least one vegetable with every meal, every day!
F=Fruit
G=Green Beans—Steam or grilled. They are great as a quick addition to any meal.
H=Herbs—Use fresh herbs to brighten salad, soups and pasta dishes.
I=Italian—No ideas for dinner? Go Italian. Pasta with tomato sauce is great. Add mixed vegetables into the sauce, for a more nutritious alternative.
J=Juice
K=Kale—Nutrition power house
L=Lettuce—Keep a bag on hand all the time.
M=Melons
N=Nuts
O=Oranges
P=Peas—Use them in a stir-fry, a salad, pasta, or eat right out of the bag.
Q=Quick—Microwave is a quick way to cook veggies.
R=Raspberries
S=Squash—Can be used in soups, sauces, or can be grilled.
T=Tomatoes—Grape tomatoes, are wonderful for salads or quick snacks.
U=Ultimate—The ultimate dressing for salads is oil and vinegar.
V=Vegetables—Buy an assortment of fresh or frozen.
W=Watermelon
X=xPlore—Take the time to try a new veggie of the season.
Y=Yams or sweet potatoes are a great snack. Microwave and top with reduced calorie syrup or cinnamon.
Z=Zucchini—Summer squash can be used in muffins, omelets, stir-fry dishes and kabobs.

CHEF’S CORNER

Barbecued Summer Squash
Serve this dish over rice or pasta for a summer treat that keeps the heat out of the kitchen.
1 zucchini, sliced into 1/2 inch rounds
1 yellow summer squash, sliced into 1/2 inch rounds
1 medium eggplant, sliced into 1/2 inch rounds

Marinade:
1 Tbsp olive oil
3 Tbsp balsamic vinegar
2 cloves garlic, crushed
Ground black pepper to taste
1/4 cup chopped green onion

Combine the ingredients for the marinade in a large bowl and blend well. Add the vegetables to the marinade and mix together. Place on the barbecue turning regularly until golden brown on each side. Brush with extra marinade as necessary. When cooked, remove the squash slices form the barbecue and toss with any remaining dressing. Sprinkle with the chopped green onion and serve immediately.

Check your ‘Healthy Mothers, Healthy Kids’ binder for more
Healthy Snack Guide

Stock Your Kitchen Right
Follow the Food Guide Pyramid to stock your kitchen. Having the right stuff on hand is very important for making fast healthy snacks. If your snacks are based on whole grains, fruits and vegetables with a little dairy and lean protein you will be on your way to better health. Of course you will want to watch your intake of salt and saturated fat to keep your heart healthy. Here are some items you may want to keep on hand:

Grains:
- Lowfat, whole-grain crackers
- Rice cakes
- Whole wheat pita bread (100%)
- Whole wheat bread (100%)
- Baked tortilla chips

Vegetables:
- Raw vegetables
- Salads
- Potatoes and sweet potatoes
- Vegetable juice (100%)
- Vegetable soups

Fruits:
- Fresh fruit
- Dried fruit
- Fruit juice (100%)

Heart Healthy Protein:
- Nuts and nut butters
- Bean dip
- Bean soup

- Bean salad
- Baked tofu
- Canned tuna or salmon

Heart Healthy Dairy:
- Nonfat light yogurt
- Fortified soymilk and skim milk
- Smoothies made with soymilk or skim milk

Easy Snack Ideas
For healthy snacks, think out with the bag -- that is, out with foods that are sold as snacks in all those cute packages and bags. The healthiest snacks do not really include refined carbohydrates such as pretzels, crackers, cookies and chips, all of which are often high in sodium and fat and low in fiber. This is especially important if you are trying to watch your weight, lower your blood pressure or control your blood sugar. Here are some healthy, delicious snack ideas:

- Peanut butter crackers - An old standby is healthy when you place it on 100% whole grain, lowfat whole grain crackers (such as WASA brand crackers) or even 100% whole grain bread. If you are watching your weight, keep the peanut butter to 1 Tbsp per serving and add some light, no-sugar-added preserves or fresh sliced fruit.

- Soup - Purchase low-sodium, low-fat vegetable or bean soup. It can be microwaved in minutes in a coffee mug. If you are keeping this at the office, don’t forget the can opener.

- Rabbit bag - Put a few raw veggies and fruits together in a zip lock bag. Use orange wedges, apple slices, raw cauliflower and raw carrots. The orange gives everything a nice flavor and helps keep the apple slices from turning too brown.

- Smoothie - Blend skim milk, fruit and wheat germ to make a delicious drink that tastes like a milk shake.

- Low-sodium vegetable juice helps you get to 5 a day.

- Sandwiches don’t have to be just for lunch; they are great for snacks, too. Stuff a whole wheat pita with lean turkey or beans, lettuce, tomato and a little vinegar and oil for a heart healthy treat.

- Tuna or salmon on toast - Make a tuna or salmon salad with canned fish and lowfat mayonnaise. Spread it on 1 slice of toasted 100% whole wheat bread and top with fresh sliced tomato and shredded romaine lettuce.

- Oatmeal raisin bowl - Make a bowl of oatmeal with raisins and cinnamon.

- Cereal parfait - Place light nonfat yogurt, fruit and whole grain cereal in a plastic cup and you will have a nutritious snack ready to go.

- Baked sweet potato - Bake a sweet potato in the microwave and top with reduced calorie pancake syrup.

Calories per Serving:

<table>
<thead>
<tr>
<th>Healthy Snacks</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broccoli</td>
<td>24</td>
</tr>
<tr>
<td>Carrots</td>
<td>52</td>
</tr>
<tr>
<td>Apple</td>
<td>81</td>
</tr>
<tr>
<td>Pear</td>
<td>97</td>
</tr>
<tr>
<td>Banana</td>
<td>108</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High-Calorie Snacks</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretzel</td>
<td>214</td>
</tr>
<tr>
<td>Cookie</td>
<td>260</td>
</tr>
<tr>
<td>Muffin</td>
<td>340</td>
</tr>
<tr>
<td>French fries</td>
<td>350</td>
</tr>
<tr>
<td>Cinnamon bun</td>
<td>370</td>
</tr>
</tbody>
</table>

Greetings!

How are you doing? This is Suzanne Smith and Jessica Gahl checking in to see how you are progressing. Hopefully you are setting and meeting your daily goals for vegetables and slowly, but surely losing that weight.

Again, please don’t hesitate to call us at (513) 558-7957 if you have any questions or concerns. Our phone numbers can also be found on the inside pocket of ‘Healthy Mothers, Healthy Kids’ binder.

This is the 2nd of the 3 mailings that you will be receiving from us, the next one will arrive in a month. Make sure to choose at least 1 to 2 servings of vegetables that are carrots, green beans, squash, sweet potatoes and peas.

Much success to you on your weight loss progress and healthy eating goals. If there is anything you need, please don’t hesitate to call us.

Suzanne and Jessica.

The 10 Bright Ideas for Weight Loss

1) **You should think “choose well” not “diet.”**
   Don’t starve yourself, but choose foods that will allow you to fill up on fewer calories. Such foods are minimally processed, high in fiber, and low in fat and sugar. Vegetables are a perfect example.

2) **Try to make exercise fun.**
   Take up things that you like to do, then you are more likely to stick with it.

3) **Only eat when you are hungry.**
   Avoid eating to relax, cure boredom or overcome depression. Take a walk or call a friend, instead.

4) **Take care when eating out.**
   Choose soup or a salad, or small dishes that are low in fat. Ask for sauce or dressing on the side. Don’t feel that you have to finish everything, take it home and have it for lunch the next day.

5) **Be a smart shopper.**
   Fill grocery carts 2/3 full of whole foods instead of processed convenience foods. Buy fresh vegetables, aim for 5 servings a day.

6) **Snack for better health.**
   Snack only when hungry. Instead of packaged snacks, think “out with the bag” and enjoy fresh veggies. Sweet potatoes make great snacks.

7) **Be a little adventurous.**
   Expand your range of healthier food choices.

8) **Use less fat when cooking.**
   Prepare foods using lower-fat cooking methods and eliminate “extra” fats by trimming visible fats from meat and removing the skin from poultry.

9) **Limit sugar and refined starch.**
   Fill up on foods that are high in fiber like yams, peas, beans and whole grains. Avoid foods that are made with white flour and high in added sugar.

10) **Don’t skip breakfast.**
   Start the day with high-fiber, low-fat breakfast, this will help you to consume less calories for the rest of the day.

Be sure to make small, gradual, realistic changes that will build upon one another and create a healthier future.
4 Essentials for a Healthy Shopping Cart

It's time for a shopping cart check. The next time you go shopping, take a look at your cart. Is it a healthy shopping cart? Here are four essentials:

**Fruits and Vegetables**
A healthy shopping cart contains a substantial amount of fresh or frozen fruits and vegetables. Go for produce in season for the best values and quality. Use frozen or reduced-sodium canned produce for stretching the time between shopping trips or for time-pressed meals.

Plan on using fruits and vegetables for all meals - from breakfast to dessert. Include these nutritional winners in your snacks too.

**Beans**
A healthy shopping cart contains beans e.g. pinto beans, black beans, red beans, split peas, lentils and or other products made with these legumes. Buy canned beans and keep them on hand to throw into soups, pasta dishes and salads. Dried beans are great to keep on hand for soups.

The freezer section often contains lima beans, black eyed peas and vegetable mixes that contain beans.

**Whole Grains**
Whole grains are found throughout the grocery store. Look for them in the cereal aisle, pasta/rice aisle and the bread aisle. According to new FDA label laws, a food may be considered whole grain if it contains 51% or more whole grains. Manufacturers may use the following claim: “Diets rich in whole grain foods and other plant foods and low in total fat, saturated fat, and cholesterol, may help reduce the risk of heart disease and certain cancers.”

This information brought to you by:
Greetings!

This is Suzanne Smith and Jessica Gahl checking in on your progress. This is the last mailing that you will be getting from us and in about two weeks or so, we will be calling you to see how you are doing and to schedule your last visit with us. Don’t forget to fill out the 3-day food records that can be found in the ‘Healthy Mothers, Healthy Kids’ binder, under the “Food Records” tab.

If you have any questions or concerns, please don’t hesitate to call us at (513) 257-6650. The number also can be found on the inside pocket of ‘Healthy Mothers, Healthy Kids’ binder.

Hopefully you are setting and meeting your daily goals for vegetables. Also, **make sure to choose at least 1 to 2 servings of vegetables that are carrots, green beans, squash, sweet potatoes and peas.**

Much success to you on your weight loss goals.

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**TIPS TO HELP YOU EAT VEGETABLES!**

**In general:**

*Buy vegetables that are easy to prepare. Pick up pre-washed bags of salad greens and add baby carrots or grape tomatoes for a salad in a minutes.*

*Buy packages of baby carrots or celery sticks for quick snacks.*

*Vary your veggie choices to keep meals interesting.*

*Try crunchy vegetables, raw or lightly steamed.*

**For the best nutritional value:**

*Select vegetables with more potassium often, such as sweet potatoes, winter squash, split peas, kidney beans, lentils, lima beans, soybeans.*

*Prepare more foods from fresh ingredients to lower sodium intake.*

**At meals:**

*Plan some meals around a vegetable main dish, such as a vegetable stir-fry or soup. Then add other foods to complement it.*

*Try a main dish salad for lunch. Go light on the salad dressing.*

*Include a green salad with your dinner every night.*

*Shred carrots or zucchini into meatloaf, casseroles, quick breads, and muffins.*

*Include chopped vegetables in pasta sauce and lasagna.*

*Order a veggie pizza with toppings like mushrooms, green peppers, and onions, and ask for extra veggies.*

*Use pureed, cooked vegetables such as potatoes to thicken stews, soups and gravies. These add flavor, nutrients, and texture.*

*Grill vegetable kabobs as part of a barbecue meal. Try tomatoes, mushrooms, green peppers, and onions.*

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**CHEF’S CORNER**

**Green Bean Potato Salad**

1 lbs green beans, with ends cut
2 lbs red potatoes, cut into bite-sized pieces
1 cup red bell peppers, diced
1/2 cup red onion, chopped

**Dressing:**

3 cloves garlic, minced
3 Tbsp fresh dill
4 Tbsp balsamic vinegar
3 Tbsp olive oil
1 Tbsp Dijon mustard
Black pepper, to taste

Steam green beans in a steamer for 5 to 8 minutes. Cook potatoes in boiling water until tender. Cool green beans and potatoes and place in a bowl. As they are cooling, prepare the dressing by mixing all ingredients. Add onion and bell pepper to the cooled green beans and potatoes: top

**Make vegetables more appealing:**

*Add color to salads by adding baby carrots, shredded red cabbage, or spinach leaves. Include in-season vegetables for variety through the year.*

*Include cooked dry beans or peas in flavorful mixed dishes, such as chili or minestrone soup.*

*Decorate plates or serving dishes with vegetable slices.*

*Keep a bowl or cut-up vegetables in a see-through container in the refrigerator. Carrot and celery sticks are traditional, but consider broccoli florets, cucumber slices, or red or green pepper strips.*
**INFANT FEEDING QUESTIONNAIRE**

Within the last month were: (y = yes, n = no)

If offered & tasted, at what age was the infant when he/she first tasted ________?
(months)

The first time the infant tasted ________, did he/she like or dislike it/them?
(like/dislike)

If the infant did not like ________ the first time, how many times did you offer ________ before it was accepted?
(number of times)

If the infant did not like ________ the first time, how many times did you offer ________ before you stopped?
(number of times)

<table>
<thead>
<tr>
<th>Food</th>
<th>OFFERED?</th>
<th>Age When First Tasted</th>
<th>First Time Like/Dislike</th>
<th>Times Accepted</th>
<th>Times Stopped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green Beans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squash</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bananas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple Juice</td>
<td></td>
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</tr>
</tbody>
</table>
Think about what your child has eaten over the past month. Using the smiley face scale, determine your infant’s degree of enjoyment for________?

![Smiley face scale]

1----------------- 2----------------- 3----------------- 4----------------- 5-----------------

Carrots _____  Peas _____  
Green Beans _____  Cereal _____  
Squash _____  Bananas _____  
Sweet Potatoes _____  Apple Juice _____

Think about what your child has eaten over the past month. Check the appropriate *frequency* and the appropriate *amount* that is applicable.

<table>
<thead>
<tr>
<th>Type of Food</th>
<th>Frequency</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrots</td>
<td>1 Tbsp</td>
<td></td>
</tr>
<tr>
<td>Green Beans</td>
<td>1 Tbsp</td>
<td></td>
</tr>
<tr>
<td>Squash</td>
<td>1 Tbsp</td>
<td></td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>1 Tbsp</td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td>1 Tbsp</td>
<td></td>
</tr>
<tr>
<td>Cereal</td>
<td>¼ Cup</td>
<td></td>
</tr>
<tr>
<td>Bananas</td>
<td>1 Tbsp</td>
<td></td>
</tr>
<tr>
<td>Apple Juice</td>
<td>¼ Cup</td>
<td></td>
</tr>
</tbody>
</table>
Appendix J
1. Write your weekly vegetable goal on the lines provided to the left.

2. Record the number of total vegetables (V) that you eaten daily on the line provided on the calendar.

3. Then record all the vegetables that you have eaten for that day.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetable servings of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All vegetables</td>
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<td></td>
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</tr>
<tr>
<td>All vegetables</td>
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<td></td>
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<tr>
<td>All vegetables</td>
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<tr>
<td>All vegetables</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>All vegetables</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>All vegetables</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>All vegetables</td>
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</tr>
</tbody>
</table>

Goals: Eat at least 2 servings of vegetables daily, aiming for 5 servings and 7 servings of vegetables.

Vegetables: Carrots, green beans, squash, sweet potatoes, and peas.
Appendix K
<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Fill in the calendar circle if you breastfed or circle FF if you formula-fed your infant on a particular day.

2. If you formula fed, record the total number of ounces your infant consumed for that entire day.

3. Lastly record on the calendar all the food that your infant ate for a particular day. Amount not necessary.