

THE EFFECTS OF MATERNAL WEIGHT PERCEPTIONS AND CONCERNS,
DEPRESSION AND SMOKING ON INFANT FEEDING PRACTICES

BY

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THESIS

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ABSTRACT

Health behaviors of mothers during the postpartum period are as important as health behaviors during pregnancy. Understanding the health behaviors of mothers during the postpartum period is very important in understanding how they take care of themselves and their infants. The aim of the study was to assess mothers' weight perceptions and concerns, smoking and depression on infant feeding practices during the postpartum period. The study used secondary data collected from the "Food consumption and oral health by the use of day care among WIC children" study. The "Food consumption and oral health by the use of day care among WIC children" study was a prospective study which took place at a supplementary women infant and children (WIC) office in Champaign Urbana Public Health Department in Illinois. Participants recruited for the study were mother-infant dyads who were already enrolled in WIC. We used the baseline data for this study. Self-administered survey responses from 103 mothers were analyzed using spss version 20. The study had a response rate of 38.5%.

The study results showed that, the mean age of child and mother enrolled in the study were 4.1 months with a standard deviation of 1.7 and 25.6 years with a standard deviation of 5.4 respectively. The breastfeeding initiation rate for mothers enrolled in the study was 77.7%. The mean age (months) of child when formula and solid food was introduced was 1.2 with a standard deviation of 1.4 and 4.4 with a standard deviation of 1.0 respectively. The mean age of child when breastfeeding stopped was 2.2 months with a standard deviation of 1.4. Among mothers who initiated breastfeeding, 10 representing 12.5% smoked during pregnancy. Sixteen mothers who smoked during postpartum did initiate

breastfeeding. Among mothers' who were diagnosed with postpartum depression, only one practiced exclusive breastfeeding for at least 3 months. Mothers who identified as White, 11 representing 47.8% breastfed their babies for more than 3 months and among mothers who identified as Black or African American, 5 representing 21.7% breastfed their babies for at least 3 months. Of the mothers who smoked during the postpartum period, 13 of them had introduced solids to their infants who were 4 months and older. Seventy-six of the mothers enrolled in the study representing 73.8% said they were unconcerned about their child becoming overweight. However, 80 (77.7%) of the mothers said they were responsible for maintaining their child's weight. Forty-six mothers representing 44.7% said they were overweight and 68 (66.6%) said they were not satisfied with their current weight.

Using logistic regression, the study found a significant association between postpartum smoking and breastfeeding initiation. However, there was no association between postpartum smoking and exclusive breastfeeding at least 3 months, as well as no association with any breastfeeding at least 3 months. There was also no association between smoking during pregnancy and postpartum depression on infant feeding practices. The study showed no association between child's weight concerns on breastfeeding initiation, exclusive breastfeeding at least 3 months, any breastfeeding at least 3 months and introduction of solids at age 4 months and older. This study has shown that postpartum smoking has an effect on breastfeeding initiation.

DEDICATION

I dedicate this work to the men who believe in me and love me unconditionally. To my husband, Kwame Asante Darfour-Oduro and my father, Mr. Peter Kingsley Nti.

ACKNOWLEDGMENTS

*Yes, God is good; in earth and sky,
From ocean depths and spreading wood,
Ten thousand voices seem to cry,
“God made us all, and God is good.”*

Written by John Hampden Gurney (1802 – 1862).

I will like to thank the Almighty God for His love and favor upon my life. I sincerest thanks goes to my advisor, Dr. Juhee Kim for guiding me through my Masters’ degree program, my thesis and for being a good person to me. I will also want to thank Dr. RoseAnn Mathai for helping me understand the data for this research and Dr. Diana Grigsby-Toussaint for agreeing to work on my research approval. My heartfelt thanks go to my husband for his love and encouragement. Lastly, I will like to thank my family for their support.

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Chapter 1

Introduction

American Dietetic Association advocates that women of childbearing age should maintain good nutritional status by living a lifestyle that optimizes maternal health and reduces the risk of birth defects, suboptimal fetal growth and development, and chronic health problems in their children (Kaiser & Allen, 2002). However, the National Health and Nutrition Examination Survey (NHANES) 2001-2002 report showed that many women of childbearing age in the United States do not maintain good nutritional status before, during, and after pregnancy. Among non pregnant women of childbearing age (14 to 50 years), dietary intakes of vitamin E, magnesium, potassium, fiber, and calcium are particularly low compared to the appropriate Dietary References Intakes (US Department of Agriculture, 2005). A high prevalence of inadequate intakes of these same nutrients has also been found among pregnant and lactating women (IOM, 2005).

According to the study of Birch & Fisher (1998); Jain et al. (2001), mothers' personal food preferences and dietary decisions for their family play an important role in shaping the diet of their infants and young children. Often women become vulnerable to excessive weight gain and may therefore have a higher risk of postpartum weight retention and obesity (Kac et al. 2004; Kac & Velasquez, 2005; Walker 2007). Studies also show that many women are not able to lose all the weight they gain during pregnancy leading to postpartum weight retention (Yang, 2013). The obesity epidemic is a growing public health crisis in the United States. The prevalence of American adults who are at least 100 pounds overweight has risen dramatically in the past decade (Sturm, 2007). The U.S.

Department of Health and Human Services reports that the rates of obesity have been increasing steadily over the past 30 years, a trend largely attributed to Americans consuming diets high in fat and calories and living sedentary lifestyles (2007). Currently 35.8% of all American women are obese with Body Mass Index (BMI) $\geq 30 \text{ kg m}^{-2}$ (Flegal et al. 2012).

Research has shown a strong association between income level and obesity (Gearhart et al. 2008). In United States, obesity is most common among people with low socioeconomic status. Lower socio-economic status and poverty are strongly related to consuming an inadequate diet (Shelton 2005). The study of Robinson et al. (2004), reported that women with low educational background are much more likely to eat diets that are poor in quality than women with higher educational level. Johnson et al. (2006) and Ewing et al. (2006) make reference to the fact that age and education levels are demographic factors that have been found to be related to body weight. They also found that weight gain increases with age and decreases with educational attainment. Additionally, several studies have also show that living in an urban area is positively related to higher overweight and obesity prevalence. Hodge et al. (2011) said the high rate of obesity may be due to the easy access to high-fat foods and the rise in sedentary lifestyles due to access to transportation capabilities and less physically demanding jobs.

According to the Gartner et al. 2005's study, both the short and long-term health benefits of breastfeeding have been well documented and all over the world, breastfeeding is recognized as beneficial for both infants and mothers (American Academy of Pediatrics.

1997; WHO. 1990; American Dietetic Association. 1986). The American Academy of Pediatrics recommends exclusive breastfeeding for about six months, followed by continued breastfeeding as complementary foods are introduced, with continuation of breastfeeding for one year or longer as mutually desired by mother and infant (2012). According to the US Department of Health and Human Services (2010), breastfeeding rates in the United States still fall short of national recommendations.

The American Academy of Pediatrics (1997) have also stated that human milk is the preferred feeding for all infants including premature and sick newborns, with rare exceptions. According to the Healthy People 2020, US Department of Health and Human Services (2010), the goals are to increase the proportion of mothers who breastfeed their infants to 75% in the early postpartum period, 50% for 6 months postpartum period and 25% 1 year postpartum. The latest National Immunization survey reported in the U.S Department of Health and Human Services (2010) showed that the rate of initiation of breastfeeding for the total US population was 75%. The breastfeeding initiation rates for the Hispanic or Latin population was 80.6% while the breastfeeding initiation rates was 58.1% for the non-Hispanic black or African American population. According to the study of McDowell et al. (2008), initiation of breastfeeding among low income non-Hispanic black mothers was 37%. The breastfeeding initiation rates among mothers younger than 20 was 59.7% compared to 79.3% in mothers older than 30 years. The lowest breastfeeding initiation rate was 30% among non-Hispanic black mothers younger than 20 years.

According to the study of Giovino et al (2009), the number of women who smoke cigarettes in the United States has declined over the past half century. Despite the reduction in smoking among women, the study of Martin et al. (2006) indicated that 10–12% of women reported smoking during their pregnancy. Prior to or during pregnancy half of all women who smoke quit (Tong et al. 2009; Colman & Joyce, 2003), however, up to 80% of those women will return to smoking within 1 year postpartum (Mullen, 2004). Several studies have also shown that children who are exposed to secondhand smoke have higher mortality rates and are at greater risk for numerous health problems including respiratory diseases and ear infections (DiFranza et al 2004; Jedrychowski & Flak 1997; U.S. Department of Health and Human Services, 2006).

Depression is also an important predictor of smoking relapse in the general population. Studies have shown that smokers who experience depressive symptoms experience more intense withdrawal symptoms (Niaura et al, 2001; Paperwalla et al, 2004) and are more likely to relapse following a successful attempt to quit than smokers who do not have depressive symptoms (Niaura et al, 2001; Burgess et al, 2002). Among pregnant and postpartum mothers, depression has been associated with a host of adverse child outcomes relating to behavioral functioning, emotion regulation, attachment, cognitive and intellectual functioning, motor development, and neuroendocrine and psychophysiological functioning (Goodman & Brand, 2009; Murray & Cooper 1997). Depression among lactating mothers has also been associated with the more reports of feeding difficulties and lesser satisfaction with breastfeeding (Field et al. 2002; Hellin & Waller, 1992; Milligan et al. 1990).

According to the IOM (1995) report, women with unwanted pregnancies are less likely to seek early, or any, prenatal care and more likely to expose the fetus to cigarette smoking and substance abuse. The authors also reported that these women are also more likely to have infants weighing less than 2500g, and their infants are more likely to die during their first year of life. The study of Chenga et al. (2009) found that unhealthy behaviors were more prevalent among mothers with unwanted births than mothers with intended births.

According to Maynard et al. (2003), with respect to childhood obesity recognizing children who are overweight or at risk for becoming overweight is important in formulating preventive and treatment strategies. The study of Baughcum et al. (2000) found that 79% of mothers with an overweight preschool-aged child failed to perceive that child as being overweight. Mothers' weight perception and concerns are important for predicting the food choices mothers make for themselves and their children. Smoking and depression during the postpartum period is a health behavior that is very important in determining how mothers will take care of themselves and their infants.

CHAPTER 2

Literature Review

2.1 Mothers' breastfeeding practices

Studies show that, almost every mother in Scandinavia and 70% of mothers in the United Kingdom and the United States initiate breastfeeding after birth. But after 4 months of birth only 45% to 60% of mothers in Scandinavia while only 15% to 30% of mothers in the United Kingdom and the United States still engage in exclusive breastfeeding (Union of County Health Visitors in Denmark, 2003; Lande et al. 2003; Li et al. 2005; National Board of Health and Welfare, 2004; Department of Health, 2002). According to the Centers for Disease Control and Prevention (2010), breastfeeding is initiated by three-quarters of women in the United States but reported that only 13.3% breastfed exclusively through six months of post-partum. Additionally, the prevalence of any breastfeeding through 6 and 12 months is 43% and 22.4%, respectively (Centers for Disease Control and Prevention 2010). According to Center for Diseases Control and Prevention (2010) report, participants enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) recorded a breastfeeding initiation rate of 67.5% while for those women with higher income who were ineligible for WIC, the breastfeeding initiation rate was 84.6%.

Li et al. (2005) conducted a study on breastfeeding rates in the United States by Characteristics of the Child, Mother, or Family the 2002 National Immunization Survey. At the end of the study, Li et al. (2005) found that older mothers and those with higher

socioeconomic status had consistently higher breastfeeding rates. They also reported that compared to children whose mothers had only a high school education, those whose mothers had graduated from college had rates that were 21%, 22%, and 9% higher for initiating, maintaining to 6 months and exclusive breastfeeding at 6 months respectively. They found that 71.4% of children had ever been breastfed. 35.1% continued breastfeeding to 6 months and 16.1% continued to 12 months. Although 63.4% of children were exclusively breastfed at 7 days, this figure dropped to 42.5% at 3 months and 13.3% at 6 months. Also, a bivariate analysis revealed that there was a significant differences relating to race/ethnicity, day care, and WIC participation, maternal age, socioeconomic status, and geographic area.

According to the study of Li et al. (2005), mothers of non-Hispanic black children were less likely to initiate and maintain breastfeeding than mothers of non-Hispanic white children (51.5% vs 72.1% for ever breastfeeding, 19.7% vs 36.6% for continuing at 6 months). Also, the results showed that only 5.4% of non-Hispanic black infants were exclusively breastfed at 6 months, compared with 14.6% of non-Hispanic white infants and 13.8% of Hispanic infants. In addition, the authors found that mothers of children who received WIC benefits during the first year of life were less likely to initiate or maintain breastfeeding than were mothers whose child was not in WIC. According to the study, differences seen in the WIC status were particularly large between those who participated and those who were eligible but not enrolled (63.2% vs 86.0% for ever breastfeeding, 26.4% vs 55.8% for continuing at 6 months). The authors also found that

at all time points after birth children in WIC were less likely to be exclusively breastfed than were children not in WIC.

2.2 Introduction of Infant formula and solid foods

The first few months after birth may be a critical window for the development of obesity (Gillman, 2008). During early infancy, parental feeding practices such as the time when solid food is introduced could be a key modifiable determinant of childhood obesity (Huh et al. 2011). According to the study of Baker et al. (2004) and Kim & Peterson (2008), introduction of solid foods earlier than 4 months of age is associated with greater weight gain during infancy. The study of Huh et al. (2011) showed that at 4 months of age, 67% of the children were breastfed and 33% were formula-fed. Of the infant who were fed with formula 36% were never breastfed. Among mothers of the 8% of infants who were breastfed and 33% of infant who were fed formula, they reported introducing solid foods before 4 months of age.

The study of Kim & Peterson (2008) reported that infants who were being cared for by relatives had a lower breastfeeding initiation rate, a higher rate of early introduction of solid foods, and greater weight gain compared to infants who were cared for by their parents. Early introduction of solid foods was a risk factor for weight gain. However, according to the study of Price et al. (2012), mothers who initiate breastfeeding reported facing some barriers in following the recommendation to breastfeed exclusively. Some of the barriers mothers expressed included frustration over feeding frequency and duration, breast pain, and concern that breast milk is not enough sustenance for their baby.

2.3 Maternal weight perception and concerns

Among low income women, postpartum weight retention and depressive symptoms are two leading health conditions that are important for community health care agencies to address (Walker et al, 2002; Walker et al, 2004). Women are more susceptible to excess weight gain during the postpartum period (Gore et al. 2003; Gunderson& Abrams, 2000). There is evidence that a large number of women have substantial postpartum weight retention (Ohlin & Rossner, 1990). Some women may have difficulty distinguishing adequate versus excessive weight gain during pregnancy. Thus, some women may report over concern with weight gain and dysfunctional cognitions in relation to body image (Gee & Troop, 2003; Fairburn & Welch 1990).

Several epidemiologic studies have suggested interventions during the postpartum period to prevent excess weight gain among mothers and their infants. Some of the interventions suggested include mother's diet, physical activity, and sedentary practices (Ogden et al. 2010), and promotion of breastfeeding (Paul, et al. 2009; Harder et al. 2005). According to the study of Birch & Fisher (2000), maternal weight perception of the weight status of the child influences infant feeding practices. The study of Francis et al. (2001), reported that a normal weight child who is perceived to be too slim is more likely to be exposed to pressure in feeding. Also, an overweight or obese child who is not perceived as overweight or obese is likely to continue to receive its usual types and amounts of food, resulting in the risk of further promoting an increased in weight gain (Genovesi et al 2005).

2.4 Smoking during pregnancy and postpartum

According to the Center for Disease Control and Prevention (2007), a recent large survey of women who delivered infants in 2004 in 26 states showed that approximately 23% of the women smoked cigarettes in the 3 months before pregnancy, of whom 45% quit smoking during pregnancy. Of these women, 52% relapsed within 6 months of delivery. The study of Allen et al, (2009) also found that approximately half (50.3%) of the women who quit smoking during pregnancy reported relapsing to smoking during the postpartum period. They also found that, a greater percentage of women who went into relapse had depressive symptoms (23.4%) than of those who did not relapse (14.1%). The prevalence of smoking increases from 20% to almost 50% among persons with depression (Sondik, 2010; Pratt & Brody 2010). Also, depressed smokers are less likely to quit smoking (Pratt & Brody 2010; Anda 1990) and are at least 40% less successful in their quit attempts (Papwerwalla et al. 2004; Covey et al. 1998).

2.5 Postpartum Depression among mothers

The study of Petterson & Albers, (2001) reported that having limited socioeconomic resources are associated with greater risk of symptoms of depression. Walker et al. (2002), reported that the prevalence of elevated depressive symptoms at 6 weeks postpartum has been reported as 60% in low-income women. Allen et al. (2009) conducted a study to look at postpartum depressive symptoms and smoking relapse. The study revealed that women with depressive symptoms were more likely to experience postpartum relapse to smoking than women without depressive symptoms. Similarly they found that postpartum relapse was significantly more likely seen among women who

were aged 25 years; had 12 years of education or less; were not married; were black, non-Hispanic; were publicly insured; entered prenatal care in the second trimester of pregnancy; had an income \leq 185% of the level defined by the federal poverty line; smoked more than five cigarettes per day before pregnancy; and had three or more stressful events during pregnancy.

CHAPTER 3

Methodology

3.1 Research Justification

Health behavior of mothers during the postpartum period is very important in predicting how mothers will take care of themselves and their infants. Lack of knowledge about the benefits of breastfeeding may cause mothers not to breastfeed or might make mothers not enthused about breastfeeding. Mothers who have knowledge about the benefits of living healthy after birth are likely to adopt and maintain healthy behaviors for good health for themselves and their babies. These mothers are also likely to practice healthy infant feeding behavior. This study hopes to find out if mothers with good health behaviors follow the recommended infant feeding practices.

3.2 Overall Aim

To understand mothers' weight perception and concerns, depression and smoking during the postpartum period and whether they are indicators for infant feeding practices.

3.3 Specific Aim

This study aims to test the effect of mothers' weight perception and concerns, depression and smoking on infant feeding practices.

3.4 Hypothesis

Mothers who do not smoke and are not depressed are more likely to follow the recommended infant feeding practices. The infant feeding practices tested in this study

were breastfeeding initiation, age of child when breastfeeding stopped, age of child when formula was introduced and lastly age of child when mother introduced solid food.

3.5 Participants Recruitment

This study was conducted using secondary data collected from the study “Food consumption and oral health by the use of day care among WIC children”. For collection of the primary data, eligible participants were mother and infant who were already enrolled in the Supplementary Women Infant and Children program. They were recruited in the waiting room at the WIC office of the Champaign Urbana Public Health Department. Flyers were used to inform participants of the study. Case managers and research staff also talked to participants in the waiting room of the WIC office about the study. Trained research personal also ensured that infants recruited were within the specified age range for the study.

Two hundred and seventy-eight mother-infant dyads consented to take part in the “Food consumption and oral health by the use of day care among WIC children” study. However, 107 mother-infant dyads completed the study from October 2009 to August 2011, with an initial response rate of 38.5%. At the end of the study, two infants were excluded because they were not enrolled in WIC but visited the Champaign Urbana Public Health Department for other reasons. During data analysis, data from 2 participants were also excluded because they were not the biological mothers of the infants. The total analytic sample for this study was 103 mother-infant dyads.

3.6 Data collection

Mothers who agreed to partake in the “Food consumption and oral health by the use of day care among WIC children study” provided an informed consent and personal contact information. To be included in the study, infants were expected to be within the ages of 2 to 8 months during the time of recruitment and must be enrolled in the WIC program with a primary caregiver or biological mother. Eligible participants were asked to complete a study survey and this study only used the survey information collected from eligible participants. Research staff contacted each mother/caregiver via telephone to remind them about the study and to find out if they had started answering the survey questions. They also inquired from mothers if they had any questions about the study. The study was approved by the Institutional Review Board of the University of Illinois at Urbana-Champaign.

3.7 Survey Measures

Surveys were analyzed for 103 participants who were the biological mothers to the child. Two participants who were not biological mothers of the infant were excluded during data analysis. The exposure variables in this study were maternal weight perceptions and concerns, smoking during pregnancy, smoking during the postpartum period and postpartum depression. Mothers’ weight perception, weight satisfaction, and knowledge about what contribute to a person’s weight and child’s weight was also analyzed. The survey provided questions about breastfeeding initiation, current exclusive breastfeeding, current breastfeeding, age of infant when formula and solid food was introduced and when breastfeeding ceased which were used as outcome variables. Solid food was

defined as any cereal or baby food in jars or finger foods. Mother's age, race, employment status, marital status, household income level, child's age and gender were identified as possible confounders. See appendix for the survey questions.

CHAPTER 4

Results

Data collected for this study was analyzed using SPSS version 20. Data was analyzed for the characteristics of mothers and the characteristics of child enrolled in the study. Mothers' exposure variables, that is, mothers' weight perception and concerns, smoking during pregnancy and postpartum and postpartum depression were compared to the outcome variable, that is, the infant feeding practices.

Of the children enrolled in the study, 38 (36.9%) were male and 65 (63.1%) were females. Fifty-five of the children were whites, 30 were black or African Americans, 5 identified as mixed race and 9 as other race. With respect to mothers' race 55 representing 53.4% of participants were identified as white, 30 representing 29.1% were identified as Black or African American. Forty-four (42.7%) of the subjects enrolled in the study were married while 59, representing 57.3% were single. Forty-six (44.7%) mothers were employed while 57 (55.3%) were unemployed. Thirty-eight subjects had an annual household income that is less than \$10,000. Nine representing (8.7%) had between \$10,000 and \$ 14,000 and 24 (23.3%) had between \$15,000 and \$24,000 annual incomes. Eighteen mothers made between \$25,000 and \$ 34,999 while 9 mothers earned between \$ 35,000 and \$49,999.

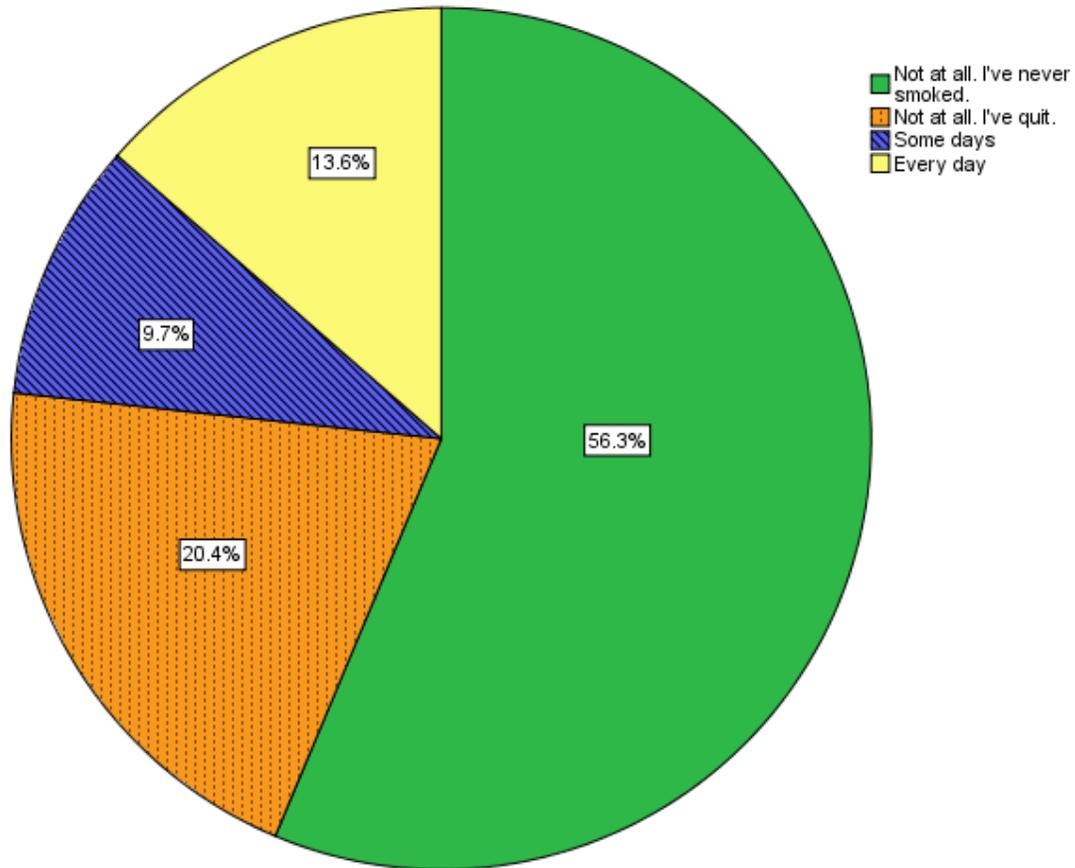
The average age of mothers and child enrolled in the study were 26 years and 4 months respectively. Mothers' prepregnancy body mass index (BMI) recorded a mean value of 28.1 and a standard deviation of 13.7. The mean Mothers' postpartum BMI was 29.6 and

the standard deviation was 13.9. The mean weight of child at birth was 7.3 pounds and the current child mean weight was 14.3 pounds.

Table 1: Characteristics of the study population

	← n (%) →
Child's gender	
Male	38 (36.9)
Female	65 (63.1)
Child's Race or Ethnicity	
White	55 (53.4)
Black or African American	30 (29.1)
Mixed	5 (4.9)
Other	9 (8.7)
Mother's Race or Ethnicity	
White	55 (53.4)
Black/African American	30 (29.1)
Other	18 (17.5)
Marital status	
Married	44 (42.7)
Single	59 (57.3)
Employment status	
Employed	46 (44.7)
Unemployed	57 (55.3)
Household Income	
Less than \$10,000	38 (36.9)
Between \$10,000 and \$14,000	9 (8.7)
Between \$ 15,000 and \$ 24,000	24 (23.3)
Between \$ 25,000 and \$ 34,999	18 (17.5)
Between \$ 35,000 and \$ 49,999	9 (4.9)
	Mean ± standard deviation
Mother's Age (years)	25.9 ± 5.4
Child's Age (months)	4.1 ± 1.7
Mothers prepregnancy BMI	28.1 ± 13.7
Mothers postpartum BMI	29.6 ± 13.9
Child's birth weight (pounds)	7.3 ± 1.2
Child's current weight (pounds)	14.3 ± 2.8

Figure 1: Cigarettes smoking status during the postpartum period.



Out of the 103 mothers enrolled in the study, 56.3% of mothers have never smoked. 20.4% of the mothers have quit smoking. 9.7% of the mothers reported smoking some days and 13.6% of the mothers enrolled in the study smoke every day.

Table 2: Smoking, depression, weight perceptions and concerns

	← n (%) →
Smoking	
Mothers who smoked during pregnancy	16 (15.5)
Mothers who did not smoke during pregnancy	87 (84.5)
Post-partum Depression	
Mothers who were diagnosed with post-partum depression	17 (16.5)
Mothers who were not diagnosed with post-partum depression	83 (80.6)
Mothers' Current weight perception	
Overweight	46 (44.7)
Not Overweight	56 (54.4)
Weight satisfaction	
Not satisfied	68 (66.0)
Satisfied	35 (34.0)
Concern child become overweight	
Unconcern	76 (73.8)
Concerned	27 (26.2)
Responsibility for maintaining child's weight	
Somewhat responsible	23 (22.3)
Very responsible	80 (77.7)

The smoking status of mothers during pregnancy was assessed and among the 103 mothers whose surveys were analyzed, 16 (15.5%) of them reported smoking during pregnancy and 87 representing 84.5% did not smoke during pregnancy. Mothers were also asked if they had ever been diagnosed with postpartum depression, 17 (16.5%) of them said they had been diagnosed as having postpartum depression while 83 (80.6) said they have not been diagnosed with postpartum depression.

When mothers were asked about their current weight perception, 46 of them representing 44.7% felt they were overweight while 56 of the mothers said they were not overweight. Sixty-eight mothers said they were not satisfied with their weight. However, 35 representing 34% of mothers said they were satisfied with their weights. When mothers were asked how concerned they are about their children becoming overweight, 76 (73.8%) said they were unconcerned, however 27 representing 26.2% said they were concerned about their child becoming overweight. When mothers were asked about how responsible they were for maintaining their child's weight, 23 representing 22.3% said they were somewhat responsible whereas 80 representing 77.7% said they felt they were very responsible.

Table 3: Infant feeding practices.

	← n (%) →
Breastfeeding initiation	
Children who were breastfed	80 (77.7)
Children who were never breastfed	23 (22.3)
Exclusive breastfeeding at 3months	
Children who were exclusively breastfed at least 3 months	8 (11.0)
Children who were not exclusively breastfed for more than 3 months	65 (89.0)
Any breastfeeding at 3months	
Children who were breastfed for at least 3months	23 (31.5)
Children who were not breastfed for more than 3months	50 (68.5)
Introduction of solids at 4months	
Children who have been introduced to solids	40 (65.6)
Children who have not been introduced to solids	21 (34.4)
Age (months) of child	Mean ± standard deviation
When breastfeeding stopped	2.2 ± 1.4
When formula was introduced	1.2 ± 1.4
When solid was introduced	4.4 ± 1.0

Among children who were enrolled in the study, breastfeeding was initiated in 80 of the children resulting in a breastfeeding initiation rate of 77.7%. Among children older than age 3 months, 8 mothers representing 11% were practicing exclusive breastfeeding. However, 65 (89%) mothers were not practicing exclusive breastfeeding. Twenty-three children were breastfed for more than 3 months while 50 representing 63.5% were not breastfed for more than 3 months. Among children older than 4 months, 40 of them representing 65.6% had been introduced to solid foods whereas, 21 (34.4%) had not been introduced to solid foods. The average age of child when mother stopped breastfeeding was 2.2 months. The mean ages of child when formula and solid food was introduced were 1.2 and 4.4 months respectively.

Table 4: Smoking, depression, Mother's race, child characteristics and breastfeeding initiation (n =80)

	← n (%) →	
	Breastfeeding Initiation	
	Yes	No
Smoking during pregnancy		
Mothers' who smoked during pregnancy	10 (12.5)	6 (26.1)
Smoking during postpartum		
Smoke	16 (20.0)	8 (34.8)
Post-partum Depression		
Mothers' who were diagnosed with postpartum depression	13 (16.3)	4 (17.4)
Mothers Race		
White	42 (52.5)	13 (56.5)
Black or African American	21 (26.3)	9 (39.1)

Out of the mothers who smoked during pregnancy, 10 initiated breastfeed. Among mothers who smoke during the postpartum period, 16 of them did initiate breastfeeding and 8 did not initiate breastfeeding. For mothers who were diagnosed with postpartum depression, 13 initiated breastfeeding and 4 did not initiate breastfeeding. Forty-two mothers who identified as White did initiate breastfeeding while 13 did not initiate breastfeeding. Twenty-one Black or African American mothers also did initiate breastfeeding whereas 9 of them did not initiate breastfeeding.

Table 5: Smoking, depression, Mother's race and exclusive breastfeeding at least 3 months (n=73)

	← n (%) →	
	Exclusive Breastfeeding at least 3 months	
	Yes	No
Smoking during pregnancy		
Mothers' who smoked during pregnancy	1 (12.5)	8 (12.3)
Smoking during postpartum		
Smoke	1 (12.5)	17 (26.2)
Post-partum Depression		
Mothers' who were diagnosed with postpartum depression	1 (12.5)	12 (18.5)
Mothers Race		
White	7 (87.5)	31 (47.7)
Black or African American	1 (12.5)	23 (35.4)

Out of the mothers who reported smoking during pregnancy, only one practiced exclusive breastfeeding for more than 3 months. Among mothers who smoked during postpartum, one mother practiced exclusive breastfeeding for more than 3 months. Of the mothers who were diagnosed with postpartum depression, only one practiced exclusive. Among the mothers who exclusively breastfed their babies for more than 3 months, 7 of them were Whites and one was Black or African American.

Table 6: Smoking, depression, Mother's race and breastfeeding for more than 3months (n = 73) and introduction of solids > 4months (n=61)

	← n (%) →		← n (%) →	
	Breastfeeding at least 3months		Introduction of solids > 4months	
	Yes	No	Yes	No
Smoking during pregnancy				
Mothers' who smoked during pregnancy	1 (4.3)	8 (16.0)	6 (15.0)	2 (9.5)
Smoking during postpartum				
Smoke	2 (8.7)	16 (32.0)	13 (32.5)	3 (14.3)
Post-partum Depression				
Mothers' who were diagnosed with postpartum depression	3 (13.0)	10 (20.0)	10 (25.0)	2 (9.5)
Mothers' Race				
White	11 (47.8)	27 (54.0)	25 (62.5)	10 (47.6)
Black or African American	5 (21.7)	19 (38.0)	12 (30.0)	5 (23.8)

Among mothers who smoked during pregnancy, one was still breastfeeding baby after 3 months of age. For mothers who smoked during the postpartum period, 2 breastfed their babies for more than 3 months of age. Out of the mothers who had been diagnosed with post-partum depression 3 breastfed their babies for more than 3 months. Among mothers who identified as white, 11 breastfed their babies for more than 3 months of age. Five Black or African American mothers also did breastfed their babies for more than 3 months.

Among mothers who smoked during pregnancy, 6 had introduced solid food to their children aged 4 months or older. For mothers who smoked during the postpartum period, 13 of them had introduced solids to their infants aged 4 months or more. Out of the mothers who had been diagnosed with post-partum depression, 10 had introduced solids. Among mothers who identified as white, 25 had introduced solids to their babies aged 4 months and above and among Black or African American mothers, 12 had also introduced solid food to their babies who were older than 4 months.

Table 7: Mothers knowledge about what contributes to a person and child's weight

	← n (%) →	← n (%) →
	Contributes to Person's weight	Contributes to child's weight
Sedentary behaviors		
Somewhat important	63 (61.2)	58 (56.3)
Very important	35 (34.0)	37 (35.9)
Physical activity		
Somewhat important	31 (30.1)	37 (35.9)
Very important	72 (69.9)	62 (60.2)
Poverty		
Somewhat important	66 (64.1)	64 (62.1)
Very important	29 (28.2)	23 (22.3)

When mothers were asked about what contributes to a person's weight, 63 (61.2%) said sedentary behaviors were somewhat important whereas 35, representing (34.0%) said sedentary behaviors are very important in contributing to a person's weight. For physical activity, 31 (30.1%) said physical activity was somewhat important and 72 (69.9%) said physical activity was very important in contributing to a person's weight. Mothers were asked if poverty could contribute to a person's weight, 66 (64.1%) said poverty was somewhat important in contributing to a person's weight and 29 (28.2%) said poverty was very important when it comes to a person's weight.

When mothers were asked about what contributes to child's weight, 58 representing (56.3%) said sedentary behaviors were somewhat important whereas 37, representing (35.9%) said sedentary behaviors were very important in contributing to a child's weight. For physical activity, 37 mothers said physical activity was somewhat important and 62 (60.2%) said physical activity was very important in contributing to a child's weight. Mothers were asked if poverty could contribute to their child's weight, 64 of the mothers said poverty was somewhat important in contributing to a child's weight and 23 (22.3%) said poverty was very important in contributing to a child's weight.

Table 8: Odds ratios and confidence intervals for mothers health behavior variables and breastfeeding practices.

Mothers' Characteristics	Infant feeding practices.			
	Breastfeeding Initiation	Exclusively Breastfeeding At least 3months	Any breastfeeding At least 3 months	Introduction of solids > 4months
	Odds ratio (95% confidence interval)			
Smoking during pregnancy	0.289 (0.077 - 1.085)	1.173 (0.095 - 14.442)	0.325 (0.033 - 3.177)	0.643 (0.077 - 5.391)
Smoking during postpartum	1.675 (1.011 - 2.775)	1.459 (0.595 - 3.573)	1.809 (0.885 - 3.698)	1.517 (0.759 - 3.031)
Postpartum Depression	0.810 (0.226 - 2.894)	1.119 (0.139 - 8.984)	0.538 (0.116 - 2.500)	0.520 (0.078 - 3.474)
Child's weight concerns	0.868 (0.609 - 1.237)	1.113 (0.630 - 1.967)	0.786 (0.519 - 1.190)	0.980 (0.619 - 1.551)
Responsibility for maintaining child's weight	1.508 (0.574 - 3.957)	1.084 (0.194 - 6.047)	0.868 (0.221 - 3.407)	1.979 (0.377 -10.396)

a. Controlled for mother's age, race, marital status, employment status, household income level, child's age and gender; boldface values are significant at P < 0.05.

A logistic regression model was used to determine the relationship between mother's weight perceptions and concerns, depression and smoking on infant feeding practices. After controlling for mother's age, race, marital status, employment status, household income level, child's age and gender, there was also no relationship between smoking during pregnancy and breastfeeding initiation. However, there was a significant association between postpartum smoking and breastfeeding initiation. There was no relationship between smoking during pregnancy and exclusive breastfeeding for at least 3 months as well as any breastfeeding at least 3 months. No relationship was found between smoking during postpartum and exclusive breastfeeding at least for 3 months as well as any breastfeeding at least for 3 months. There was also no relationship between postpartum depression and breastfeeding initiation as well as no relationship between postpartum depression and exclusive breastfeeding at least 3 months. There was no relationship between child's weight concerns on breastfeeding initiation as well as no relationship between child's weight concerns and exclusive breastfeeding at least 3 months. There was also no relationship between child's weight concerns and any breastfeeding at least 3 months. There was also no relationship between mothers' responsibility for maintaining child's weight on breastfeeding initiation as well as no relationship between mothers' responsibility for maintaining child's weight and exclusive breastfeeding at least for 3 months. There was also no relationship between mothers' responsibility for maintaining child's weight any breastfeeding at least 3 months. There was no association between smoking during pregnancy, postpartum smoking, postpartum depression, concern over child's weight and mothers' responsibility for maintaining child's weight on introduction of solid food to babies age 4 months and older.

CHAPTER 5

Discussion

The results of our study showed that 13.59% of mothers smoked daily and 9.71% also reported smoking during some days during the 4 months of postpartum. Sixteen participants also reported smoking during pregnancy and of the 16, six of them never breastfed their babies. Eighty-seven of the women enrolled in the study did not smoke during pregnancy, and 19.5% of them never breastfeed their babies. Seventeen of the mothers were diagnosed with postpartum depression. Out of the 17 mothers, four of them never breastfed or fed their babies with breast milk. According to the U.S Department of health and human services (2010), the rate of initiation of breastfeeding for the total US population based on the latest National Immunization survey data was 75%. Out of the 103 mothers enrolled in the study, 80 of them initiated breastfeeding resulting in a breast feeding initiation rate of 77.67%. The breastfeeding initiation rate recorded in our study was similar to the breastfeeding initiation rate reported by the U. S Department of health and human services (2010).

According to the study of Lee et al. (2005), maternal smoking may affect practices such as breastfeeding which promote child health. Disantisi et al. (2010), conducted a study to look at the associations among breastfeeding, smoking relapse, and prenatal factors in a brief postpartum smoking intervention. They found a trend in their results that suggested that the longer mother's breastfed during the month following delivery; the longer they remained abstinent from smoking. This study found a significant association between postpartum smoking and breastfeeding initiation; however, there was no association

between postpartum smoking and breastfeeding for more than 3 months of age. Because of the small sample size of the postpartum smoking, we may have not detected the association but there is a trend in the contingency table. The study also recorded no significant association between postpartum smoking and exclusive breastfeeding at least 3 months.

Goldade et al. (2008), reported in their study that after one month postpartum, only 10 women were breastfeeding exclusively, whereas 24 of the mothers were breastfeeding but had also introduced the bottle or other solid foods and 4 had stop breastfeeding completely. The authors also reported that at three months of postpartum, 6 women were still breastfeeding exclusively and at 6 months of postpartum only 2 participants were breastfeeding exclusively (Goldade et al. 2008). This study found that mothers who reported to have stopped breastfeeding during the time of sample collection did not follow the six months exclusive breastfeeding recommendation. This is low exclusive breastfeeding compare to national average. For mothers with children aged at least 3 months, 8 representing 11% were exclusively breastfeeding. Also, the results from the study showed that 40 mothers representing 65.6% who had infants aged 4 months and older had introduced solid foods and this is higher than national estimate.

Gaffney et al, (2012) studied Postpartum Depression, Infant Feeding Practices, and Infant Weight Gain at Six Months of Age. The authors used 10-item Edinburgh Postnatal Depression Scale (EDPS) to report depressive symptoms. The results of the study showed that the crude analysis demonstrated that postpartum depression was associated significantly with early introduction of solids (odds ratio [OR]: 1.42; 95% CI: 1.07, 1.89),

however, when the authors adjusted for potential confounders, this association did not remain significant. This study used diagnoses of postpartum depression to predict infant feeding practices. The results of this study did not find any relationship between postpartum depression on breastfeeding initiation and exclusive breastfeeding at least 3 months as we as no relationship between postpartum depression and any breastfeeding at least 3 months. There was also no association between postpartum depression and introduction of solids to babies 4 months and older.

According to the study of Birch & Fisher (2000), maternal weight perception of the weight status of the child influences infant feeding practices. However, this study did not find any association between child's weight concerns and breastfeeding initiation as well as no relationship with exclusive breastfeeding at least 3 months and any breastfeeding for at least 3months. There was also no relationship between mothers' perceived responsibility for maintaining child's weight and infant feeding practices.

CHAPTER 6

Conclusion

The breastfeeding initiation rate reported in the study was consistent with the breastfeeding rate of the total US population. The study found that some mothers never breastfeed their babies. The average age of the infant when breastfeeding stopped was 2.2 months with a standard deviation of 1.4. These are lower than national average. Among the variables tested in this study, only race was consistently related to breastfeeding variables and introduction of solids. This study has shown that postpartum smoking has an effect on breastfeeding initiation. Thus, intervention program that will help mothers quit smoking will be helpful in encouraging breastfeeding initiation.

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Appendix

SURVEY QUESTIONS

1. What was your child's birth weight in pounds or in kg (your best estimate is fine)?

Weight in pounds _____

Weight in kg _____

2. What is your child's current weight in pounds or in kg?

Weight in pounds _____

Weight in kg _____

3. What is your race?

- | | |
|--|--------------------------------|
| <input type="checkbox"/> American Indian or Alaska Native | <input type="checkbox"/> Asian |
| <input type="checkbox"/> Native Hawaiian or other Pacific Islander | <input type="checkbox"/> White |
| <input type="checkbox"/> Black or African American | <input type="checkbox"/> Mixed |

4. What is your child's race?

- | | |
|--|--------------------------------|
| <input type="checkbox"/> American Indian or Alaska Native | <input type="checkbox"/> Asian |
| <input type="checkbox"/> Native Hawaiian or other Pacific Islander | <input type="checkbox"/> White |
| <input type="checkbox"/> Black or African American | <input type="checkbox"/> Mixed |

5. What is the total combined income of all members of this household during the previous year.

This includes money from jobs and farms, and money from other income such as rent, pensions, dividends, and social security payments?

- | | |
|---|--|
| <input type="checkbox"/> Less than \$10,000 | <input type="checkbox"/> Between \$10,000 and \$14,999 |
|---|--|

- Between \$15,000 and \$24,999
- Between \$25,000 and \$34,999
- Between \$35,000 and \$49,999
- Between \$50,000 and \$74,999
- Between \$75,000 and \$99,999
- Over \$100,000
- Don't know

6. What is your relationship to the child?

- Biological mother
- Biological father
- Adoptive mother
- Adoptive father
- Black or African American
- Step mother
- Step father
- Other (please specify)_____

7. What is your current marital status?

- Married
- Divorced
- Separated
- Single
- Widowed
- Cohabiting
- Civil Union

8. Are you currently employed?

- Yes
- No

9. How often do you smoke cigarettes?

- Not at all. I've never smoked.
- Not at all. I've quit.
- Some days
- Every day

10. Did you smoke at all during your pregnancy?

- Yes No Don't know

11. Have you ever been diagnosed with post-partum depression?

- Yes No Don't know

12. Was your child ever breastfed or fed breast milk?

- Yes No

13. Are you currently breast feeding or feeding breast milk your child?

- Yes No

14. Is your child currently exclusively breast fed, meaning no other food or water are given to him/her?

- Yes No

15. How old was your child when you stopped breast feeding?

- Not applicable
 Age in months _____

16. How old was your child when you began feeding him/her formula? Your best estimate is fine

- Never
 Age in months _____

17. How old was your child when solid food was first introduced (include baby foods in jar) ?

- I have not introduced , yet.

Age in months _____

18. Using the scale below, please indicate how you would classify your current weight.

- Markedly underweight Underweight
 Average Overweight
 Markedly overweight

19. What is your height? (Your best estimate is fine)(feet or meters)

Height in feet _____

Height in cm _____

20. How much did you weigh just before you became pregnant with this child? (Your best estimate is fine)

Weight in pounds _____

Weight in kg _____

21. How much do you weigh now? (in pounds or in kilos)

Weight in pounds _____

Weight in kg _____

22. How satisfied are you with your current body weight?

- Very unsatisfied Unsatisfied Don't know
 Satisfied Very satisfied

23. Using the scale, please circle one number; How concerned are you about your child becoming over weight?

- Unconcerned
- Slightly Unconcerned
- Neutral
- Slightly Concerned
- Concerned

24. How responsible do you feel for maintaining your child's weight?

- Not responsible at all
- Not very responsible
- Neutral
- Somewhat responsible
- Very responsible

25. How important do you think each factor below is in determining a person's weight status? Please check the one that suits the best.

	Not at all important	Not very important	Neutral	Somewhat important	Very important
Sedentary behaviors					
Physical activity					
Poverty					

26. How important do you think each factor below in determining YOUR CHILD'S WEIGHT status? Please check the one that suits the best.

	Not at all important	Not very important	Neutral	Somewhat important	Very important
Sedentary behaviors					
Physical activity					
Poverty					