BREASTFEEDING INTENTIONS AND PRACTICES AMONG THE DIFFERENT VEGETARIAN GROUPS IN THE UNITED STATES

by

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(Under the Direction of Alex Kojo Anderson)

ABSTRACT

This study assessed breastfeeding intentions and practices among vegetarians in the United States. Study aims were to examine the potential differences in feeding intentions and practices of the vegetarian types. This was a cross-sectional online survey of female vegetarians (N = 266) with the survey link emailed to vegetarian listservs administrators for membership completion. Participants were primarily Caucasian (77%) and an average age of 33.8±11.1 years. Overall, participants' breastfeeding intention, including exclusive breastfeeding, was higher than actual breastfeeding practice, irrespective of vegetarian type. Being a pesco vegetarian was associated with higher likelihood of intention to breastfeed (OR = 6.60, 95% CI: 1.12-38.60) compared to being a flexitarian. There was no significant difference between breastfeeding practices by vegetarian type. Future studies of a larger and a more heterogeneous sample are needed to ascertain breastfeeding practices among vegetarians to inform the design of effective interventions aimed at promoting breastfeeding among vegetarians.

INDEX WORDS: Vegetarian, Breastfeeding, Online survey

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DEDICATION

This work is dedicated first and foremost to the Lord. I freely boast in the might, wisdom, knowledge, understanding, and kindness he has given me to create my thesis. I would also like to dedicate this to my family and friends who walked with me every step of the way. Your support meant more to me than you will ever know and gave me the courage to press on when I was overwhelmed. Thank you for always pointing me to Christ, praying for me, and reminding me of who I am. With the biggest smile on my face, I can now say, “I made it to the finish line.”

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CHAPTER 1

INTRODUCTION

Over the past decade the number of people living in the United States adopting a plant-based diet has increased. The vegetarian population is growing and the sub-groups are likewise increasing in number. According to a recent survey, approximately 6 to 8 million people in the United States are practicing vegetarians (Vegetarian Times 2008). The definition for vegetarianism varies widely between scholars and laypeople alike (Ruby 2012). Self-identified vegetarians can range from excluding all animal products to occasionally consuming meat, fish, and poultry (Ruby 2012). Beardsworth and Keil (1992) suggested that meat consumption is a continuum of categories ranging from the inclusion of meat in the diet on one extreme and the exclusion of all meat from the diet on the other extreme. Therefore, it is important to note that not all vegetarians are on the extreme end of meat exclusion of the continuum. A vegetarian is generally defined as a person whose diet consists of grains, legumes, nuts, seeds, vegetables, and fruits, with or without dairy products and eggs, while excluding meat from the diet (Vegetarian Society 2013). While some forms of vegetarianism may include dairy products and/or eggs, others do not. Likewise, while some forms of vegetarianism include fish or the occasional consumption of organic meat, others do not (Vegetarian Society 2013). The continuum would be similar to the following: omnivore, flexitarians (occasional organic meat consumption), pescetarianism (fish consumption), vegetarian (no meat consumption), lacto-ovo vegetarian (dairy and egg consumption), lacto vegetarian (dairy consumption), and vegan (avoids animal or animal by-product consumption). Individuals are motivated to self classify as specific types of

vegetarians for many reasons, and often, there are distinct differences between the vegetarian groups. For instance, ethical vegetarians avoid meat in their attempt to reduce animal slaughter for food consumption or other reasons (Fox and Ward 2008). They have also been found to be more effective in implementing dietary change, and show greater dietary restriction than health driven vegetarians (Hoffman et al 2012, Ruby 2012). Vegans used to be the minority group of the vegetarian population, but have doubled in number over the last decade to make up approximately one-half of the vegetarian population in the United States (Vegetarian Times 2008).

Evidence is showing that people who consume a plant-based diet have better overall health and a reduced risk for chronic disease (Dyett et al 2012). For example, vegetarians are more likely to engage in regular physical activity, have a healthy body mass index (BMI), and have a lower reported smoking and alcohol consumption (Dyett et al 2012, Northstone et al 2007). All groups of vegetarians generally have a lower BMI than omnivores, with vegans typically having the lowest BMI of all the vegetarian groups (Newby et al 2005). The benefits that this diet may provide have been linked to a strong motivating factor for people to become vegetarian. Personal health is one of the more common reasons for practicing vegetarianism. In fact, health concerns are a major motivating factor for individuals who are flexitarians [those who limit their consumption of meat and select only organic products] (Fox and Ward 2008). Health driven vegetarians are strongly concerned about sustaining personal health and avoiding illness (Ruby 2012). On the other hand, another common motivating factor for vegetarianism has a drastically different focus. For ethically driven vegetarians, concern for animal welfare and moral considerations are the primary focus, rather than the individual's health (Ruby 2012). Most vegans are motivated by ethical reasons and tend to express greater concern about the

impact of dietary choices on animal welfare and the environment than vegetarians motivated by other reasons (Ruby 2012).

Not surprisingly, ethical and health motivated vegetarians differ in the patterns of dietary adoption (Jabs et al 1998). Health driven vegetarians tend to gradually change their diet and often use 'trial adoptions' of food choices, while ethical vegetarians tend to make sudden changes in their diet and are more willing to make personal sacrifices in order to prevent animal cruelty (Fox and Ward 2008). Interestingly, vegetarians have dynamic motives for becoming vegetarian, and they also tend to progress over time within the practice of vegetarianism. Hamilton (2006) surveyed a sample of vegetarian adults in the UK and found that 74% of participants changed their motives for being vegetarian, 34% added a motive, 13% dropped a motive, and 23% dropped and added new motives. Barr and Chapman (2002) surveyed a sample of vegetarian adults in Canada and found that the majority of vegetarians (63%) initially consumed a larger range of animal products but gradually adopted a progressively smaller range of animal products over time. Fox and Ward (2008) found similar progressions into the dietary practice itself. It is often noted that health and ethical vegetarians who are semi- or ovo-lacto vegetarians tend to progress to veganism over time (Fox and Ward 2008).

Certain life changes such as divorce, change of career, and continuing education have been known to provoke individuals to change their identity and adopt a new dietary practice (Fox and Ward 2008). Bisogni et al (2002) found that diet and identity were mutually constitutive, with identities influencing dietary choices, and deriving from dietary choices as well. Lindeman and Sirelius (2001) argue that life-style decisions, including food choices, are a means for people to express personal and philosophical commitments. The primary reason for engaging in the vegetarian life-style can provide a context for dietary choices made, as well as connections to

other beliefs, values and commitments (Fox and Ward 2008). The underpinning philosophy of the vegetarian may be a trajectory foreshadowing other life-style commitments.

Few studies have examined the nutritional impact of a vegetarian diet and the practices of individuals in other life-choices, such as breastfeeding. Breastfeeding, and in particular exclusive breastfeeding, is unequivocally the recommended method of infant feeding for the first six months of life (James and Lessen 2009). Respected organizations such as the Academy of Nutrition and Dietetics, the American Academy of Pediatrics, the Special Supplemental Nutrition Program for Women, Infant and Children (WIC), and the blueprint for the health of Americans, *Healthy People 2020* support breastfeeding and have developed policy statements or programs that strive to support and increase the breastfeeding rate in the United States (Ogbuanu et al 2009, US Department of Health and Human Services 2010, Mehta et al 2012). In fact, an objective of *Healthy People 2020* is increasing the proportion of breastfeeding initiation, duration, and exclusivity among mothers and their newborns (US Department of Health and Human Services 2010). Although in the past, breastfeeding rates have been relatively low, they are currently on the rise among the general population (Taveras et al 2003). The Centers for Disease Control and Prevention released an update on July 31, 2013 stating that breastfeeding rates have increased to 77% initiation, 49% breastfeeding through six months, and 27% breastfeeding through twelve months from 2000 to 2010. *Healthy People 2020* adjusted the SMART (specific, measurable, achievable, realistic, and timely) objectives to reflect projected trends for breastfeeding in the general population (US Department of Health and Human Services 2010). These projections are based on past experience from *Healthy People 2000* and *2010*, and existing data used to assess projected increases for breastfeeding by the end of the decade if the status quo were to continue without further intervention, and then where it would

be if a proven or likely-effective intervention were in place (US Department of Health and Human Services 2010). The projections for the 2020 decade indicate a target increase to 81.9% initiation [vs 75% in 2010], 60.6% through 6 months [vs 50% in 2010], and 34.1% through 12 months [vs 25% in 2010] (US Department of Health and Human Services 2010).

Although these percentages are set for the general population, understanding the breastfeeding habits of the people groups that compose the population can greatly impact the success of achieving these breastfeeding objectives for the nation. Identifying population groups who fail to meet the set standards and why they fail to do so can help organizations implement appropriate and effective interventions to reduce the disparity gap (US Department of Health and Human Services 2010). On the other hand, identifying groups who meet the set standards can provide valuable learning opportunities for organizations as to why individuals breastfeed and how they overcome breastfeeding barriers (US Department of Health and Human Services 2010). *Healthy People 2020* targets groups so that the collective general population can progress towards the set objective (US Department of Health and Human Services 2010).

One group that is raising alarm in its contribution for the disparity gap is overweight and obese mothers. The prevalence of overweight and obesity is approximately 63.7% (Fegal et al 2012) among women of childbearing age and may have a startling impact on the breastfeeding rate (Wojcicki 2011). Recent studies have shown that pregravid BMI was inversely associated with breastfeeding initiation and duration of breastfeeding (Mehta et al 2012, Wojcicki 2011). The scientific literature suggests that overweight and obese women of childbearing age should be considered a high-risk group for breastfeeding initiation and duration, along with low-income, African Americans, and those in the Southern part of the United States (Mehta et al 2012, Wojcicki 2011).

Other groups that contribute to the disparity gap in breastfeeding are low income and African American race. For example, breastfeeding initiation rates have been reported to be as low as 16% among minority, low-income, and urban women (Persad and Mensinger 2007). A study among mothers participating in the WIC program reported 67% breastfeeding initiation, 33% breastfeeding through six months, and 17% breastfeeding through twelve months (Bolton et al 2009). African American women are routinely cited as a high-risk group for not initiating breastfeeding and shorter duration of breastfeeding (Persad and Mensinger 2007). They are also often reported to be less likely to receive breastfeeding support from the WIC program than Caucasian women and more likely to be advised to bottle-feed (Beal and Perrin 2003, Bonuck et al 2005, Ogbuanu et al 2009).

While organizations are continuing to implement interventions for high-risk groups, they are also continuing to encourage low-risk groups to maintain their breastfeeding practices (US Department of Health and Human Services 2010). The literature on this topic to date has repeatedly found that higher educated, higher income, and Caucasian women with a healthy BMI are in the low-risk group (CDC 2007, Persad and Mensinger 2008). As a way to encourage both high and low-risk groups to breastfeed, the government is striving to create a society-wide approach for providing assistance to mothers in overcoming breastfeeding barriers (National Institute for Health Care Management 2012). Although a society-wide approach entails many facets, the government expects the health system to bear most of the burden. This means that the health system is expected to provide (but is not limited to) increasing the amount of lactation rooms available to working mothers, providing breast pumps, facilitating access to lactation consultants, breastfeeding clinics and support groups, and ensuring appropriate follow-up visits after hospital discharge (National Institute for Health Care Management 2012). In some aspects,

providing these means could be a challenge for the health system; however, each is significantly important in helping women overcome common breastfeeding barriers. For instance, roughly half of the workforce are women (United States Breastfeeding Committee 2013), so by increasing the available facilities to breastfeed within the work environment would be of great assistance to working mothers who are breastfeeding (National Institute for Health Care Management 2012). Likewise, support groups have been widely documented in achieving success in breastfeeding duration (Persad and Mensinger 2008).

The government and health system have a better understanding of how to assist target groups that have been extensively studied on their breastfeeding practices. However, less is known regarding how to effectively assist the breastfeeding needs of understudied groups, such as vegetarians collectively, and the different types of vegetarians. To date, no research has reported whether vegetarians collectively or the composing types are a high or low-risk group for breastfeeding, or examined the breastfeeding practices in order to better understand how to most effectively assist them.

Scientific literature has identified these high-risk groups (overweight and obese women, African American women, low-income, and minority groups) as less likely to breastfeed their infants, while identifying higher-income, Caucasian women, and those who have a healthy BMI as more likely to breastfeed (CDC 2007, Persad and Mensinger 2008**)**. Vegetarians are also a minority group in the United States, but they also tend to have a higher-income, have a healthy BMI, and are predominately Caucasian (Dyett et al 2013, Newby et al 2005, Ruby 2012). Although studies have examined all of these characteristics, none have examined vegetarians, nor the composing groups there of, to indicate if they are a high-risk group or a low-risk group for breastfeeding.

With the increasing number of vegetarians in the United States and efforts by various health organizations to increase breastfeeding rates, particularly to achieve the breastfeeding goals outlined in the *Healthy People 2020* objectives, understanding the influence that vegetarianism may have on breastfeeding intentions and practices among vegetarian women could prove to be beneficial in targeting groups to increase their breastfeeding rate. Currently, there are no studies that have focused on the breastfeeding behaviors of vegetarian women. The purpose of this study is to fill an important gap in the scientific literature regarding breastfeeding practices among vegetarians. This study assesses the breastfeeding intentions and practices among vegetarian women in the United States; and examines the differences in breastfeeding intentions and practices among the different groups of vegetarian women in the United States.

Chapter 2 of this thesis provides a review of the literature regarding the benefits of breastfeeding, breastfeeding goals for 2020, demographics of women who breastfeed and of women who are vegetarian, and different survey methods of infant feeding assessment for breastfeeding mothers.

Chapter 3 outlines in manuscript format the thesis research work that includes methods, results, and discussion of the key findings from the survey of vegetarians across the United States.

Chapter 4 provides a summary of the key findings from the survey and recommendations for future research.

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CHAPTER 2

LITERATURE REVIEW

The scientific literature continues to support the benefits of a nutritious plant-based diet for adults, the benefits of breastfeeding for infants and mothers, as well as the financial benefits of both of these practices for individual families and global populations. It seems reasonable that because there is continual affirmation of these dietary practices, more people would engage in them. It has been shown that individuals who engage in these dietary choices share common characteristics. However, no studies have been conducted to date that have examined the overlap between breastfeeding and vegetarianism. This literature review will highlight topics related to both breastfeeding and vegetarianism, including health and economic benefits of breastfeeding, breastfeeding goals for 2020, demographics shared by breastfeeding mothers and vegetarians, and different survey methods of infant feeding assessment for breastfeeding mothers.

Health and Economic Benefits of Breastfeeding

Breastfeeding and Infant Health

Human breast milk, in its pure and unique composition, is the only food needed for a healthy infant for the first six months of life (James and Lessen 2009). The composition of breast milk changes during a feeding, within a day and with the age of the infant (James and Lessen 2009). Breast milk not only nourishes the infant nutritionally, it protects the infant from illness. Growth factors and hormones present in the milk aid in the maturation of the gastrointestinal tract, helping to protect the infant against harmful pathogens (Sprong et al 2001). Other benefits of breastfeeding endorsed by the Academy of Nutrition and Dietetics include a reduction in

infections and diseases such as otitis media, lower respiratory tract infection, gastroenteritis, and asthma (James and Lessen 2009).

Breastfeeding has also been associated with improved cognitive function in infants and young children (Marrow-Tlucak et al 1988, Kramer et al 2008). The study by Marrow-Tlucak and colleagues (1988) examined the cognitive functioning of infants who were exclusively breastfed for 4 months to those who were exclusively formula fed for 4 months at one and two years of age using the Mental Development Index of the Bayley Scales (Marrow-Tlucak et al 1988). The study found that those who were breastfed exclusively for 4 months had improved cognitive functioning at one year of age (121.3 ± 8.6 verses 111.2 ± 15.7, p= 0.041) and at two years of age (113.8 ± 22.6 verses 99.9 ± 15.3, p= 0.025) compared to their formula feeding counterparts. Kramer et al (2008) in their study conducted in Belarus also demonstrated that children who had been breastfed as infants scored higher on the Wechsler Abbreviated Scales of Intelligence (WASI) in vocabulary (53.5 ± 11.6 verses 46.9 ± 11.4) and for the full-scale IQ (109.7 ± 15.4 verses 101.9 ± 15.8) at six years of age than those who were not breastfed. The same study also showed that those who were breastfed also scored higher in reading and writing performance.

Breastfeeding has also been associated with a reduced risk of sudden infant death syndrome (SIDS) (Bartick and Reinhold 2010, James and Lessen 2009, Hauck et al 2011). In their meta-analysis, Hauck et al (2011) concluded that any amount of breast milk has a protective effect against SIDS, regardless of duration (summary odds ratio: 0.40, 95%CI: 0.35-0.44), and that exclusive breastfeeding had an even stronger protective effect against SIDS (summary odds ratio: 0.27, 95%CI: 0.24-0.31).

The Academy of Nutrition and Dietetics supports breastfeeding as a primary prevention of acute and chronic diseases such as otitis media infection, which is one of the most frequently diagnosed infections for children (Ball and Wright 1999, James and Lessen 2009). Healthcare costs associated with otitis media have been estimated at $291 total per episode (Bartick and Reinhold 2010). In a 2007 report from the Agency for Healthcare Research and Quality (AHRQ), the data showed that any breastfeeding had a protective effect against otitis media with an odds ratio of 0.77 (95%CI: 0.64-0.91) while the odds ratio for exclusive breastfeeding for more than 3 months was 0.50 (95%CI: 0.36-0.70). Breastfeeding may also reduce the risk of obesity, which is one of the more prevalent and costly conditions in the United States. Using the findings from three systematic reviews and meta-analyses, each month of breastfeeding was associated with a 4% decrease in obesity risk (unadjusted OR 0.96/month of breastfeeding, 95%CI: 0.94-0.98) (AHRQ 2007).

Bartick and Reinhold (2010) assessed the impact of being breastfed as a child on common health conditions, such as otitis media, obesity, gastroenteritis, childhood asthma, and type 1 diabetes mellitus and found that if 90% of the population breastfed for 6 months, the United States could save $13 billion per year and prevent on average 911 infant deaths (Bartick and Reinhold 2010). Even with an 80% compliance rate, the United States could save $10.5 billion per year and prevent 741 infant deaths (Bartick and Reinhold 2010). Notably, meeting the *Healthy People 2020* set objectives would not only promote the future health of children, but it would also save this country billions of dollars per year (Bartick and Reinhold 2010). The economic, health, and developmental benefits of breastfeeding make it the ideal infant feeding option. For this reason, governmental and non-governmental organizations are strategically

targeting specific populations by implementing interventions to increase the percentage of women who breastfeed.

Economics of Breastfeeding

Breastfeeding is not only an economically efficient way to provide optimal nutrients to the infant, but because of the health benefits that are associated with breastfeeding, the United States healthcare system has an opportunity to save millions of dollars on healthcare cost (Ball and Wright 1999). Bartick and Reinhold (2010) assessed current and projected healthcare cost savings if 90% of families in the United States breastfed for 6 months. After estimating costs for common infections and conditions, the researchers found that the United States could save billions of dollars spent in healthcare costs if the majority of the population breastfed for 6 months (Bartick and Reinhold 2010).

Breastfeeding Goals for 2020

Taking the time to understand sub-groups within the general population has been a key factor in implementing appropriate and successful interventions to increase breastfeeding rate. Though prior national breastfeeding rates have been relatively low, they are currently on the rise among the general population (Taveras et al 2003). Each decade the *Healthy People* consortium sets objectives to be met by the end of the decade. For this decade, *Healthy People 2020* adjusted the SMART (specific, measurable, achievable, realistic, and timely) objectives to reflect projected trends for breastfeeding in the general population (US Department of Health and Human Services 2010). These projections are based on past experience from *Healthy People 2000* and *2010,* and existing data used to assess projected increases for breastfeeding by the end of the decade if the status quo were to continue without further intervention, and then where it would be if a proven, effective intervention were in place (US Department of Health and Human

Services 2010). The projections for the 2020 decade has a target of 81.9% for breastfeeding initiation [vs 75% in 2010], 60.6% continue breastfeeding through 6 months [vs 50% in 2010], while 34.1% continue breastfeeding through 12 months [vs 25% in 2010] (US Department of Health and Human Services 2010).

As previously mentioned, there are characteristic demographics shared among women who breastfeed (older in age, well-educated, higher socioeconomic status, Caucasian, and maintaining a healthy weight), and among women who choose not to breastfeed (younger in age, low education level, low socioeconomic status, African American, and being overweight or obese). However, Ahluwalia et al (2003) used the Pregnancy Risk Assessment and Monitoring Survey (PRAMS) data and found an overall significant percentage increase (18.4%, 95%CI: 14.6, 22.2) of women who initiated breastfeeding, especially in higher risk groups including women between the age of 20-29 (17.5%, 95%CI: 12.0, 23.0) and women who were not married (33.9%, 95%CI: 22.4, 45.3). Smaller percentage shifts were seen for low-risk groups such as women who were more educated, Caucasian, older, and married (Ahluwalia et al 2003, James and Lessen 2009). This overall increase has been credited largely to breastfeeding promotion initiatives implemented by different agencies and organizations in the United States over the past several years (US Department of Health and Human Services 2010, Cadwell 1999).

Although the *Healthy People 2020* targets for breastfeeding are set for the general population, understanding the breastfeeding patterns of the various sub-groups that compose the population can greatly impact the success of achieving these objectives. Identifying sub-groups who fail to meet the set targets (i.e., high-risk groups) and why they fail to do so can help governmental and non-governmental organizations design and implement appropriate and effective interventions to reduce the disparity gap (US Department of Health and Human

Services 2010). On the other hand, identifying sub-groups who meet the set objectives (i.e., low-risk groups) can also provide valuable insights as to why these groups breastfeed and how they overcome breastfeeding barriers (US Department of Health and Human Services 2010).

Demographics Shared by Breastfeeding Mothers and Vegetarians

Breastfeeding Demographics

Both governmental and non-governmental organizations strategically target specific populations by implementing interventions to increase the percentage of women who breastfeed. One way consortia, such as *Healthy People 2020,* do this is by noting common trends in characteristics of low-risk and high-risk groups so that appropriate interventions to better assist these groups in overcoming breastfeeding barriers can be implemented (US Department of Health and Human Services 2010). While assessing these trends, researchers have found a strong link between infant feeding intentions and actual practices among common demographic groups. Characteristics may influence beliefs and attitudes about infant feeding, which then may influence infant feeding intentions, and finally practice of the behavior (Donath et al 2003). One study conducted in the United Kingdom measured maternal infant feeding intention of 10,548 women at 32 weeks gestation, and breastfeeding duration intention in the first week, as well as 2, 4 and 6 months postpartum (Donath et al 2003). Out of those who intended to breastfeed for at least 4 months, 55.3% (95% CI: 53.9, 56.7) continued breastfeeding through 6 months, compared with 26.4% (95% CI: 24.3, 28.6) of the subjects who intended to breastfeed for 2 to 4 months, and 20.2% (95% CI: 17.9, 22.4) of the participants who intended to breastfeed for one month (Donath et al 2003).

Findings from the Centers for Disease Control and Prevention's National Immunization Survey show that women who breastfeed are commonly Caucasian (77.7%), first born (74.5%),

older in age (79.3% are 30 or older), have a higher level of education (76.5% have a bachelor's degree and 88.3% have a graduate degree), are above the poverty line (84.4% for >350%), and are married (81.7%). Ryan et al (2002) examined breastfeeding rates by the 4 regions of the United States: North, South, West, and New England. At 6 months, 28.8% of the women assessed in the South, 31.7% of participants in the North, 37.0% of participants in New England, and 42.5% of women assessed in the West were breastfeeding (Ryan et al 2002). In the study by Kogan et al (2008), using a multivariate analysis of state variation they found that women who reside in the West and Northwest parts of the United States had the highest breastfeeding rates. In addition, compared to Oregon (used as reference), Southern states were 2.5 to 5.5 times more likely to not breastfeed (Kogan et al 2008).

Perhaps not surprisingly, the women who intend to, and practice breastfeeding also tend to have healthier habits. Studies have found a positive association between breastfeeding and being at a healthy weight, receiving breastfeeding support, and not smoking and not using drugs (Bailey and Wright 2011, Mehta et al 2012). In a longitudinal study in which 550 pregnant women were followed through 12 months postpartum, Mehta et al (2012) observed associations between pregravid body mass index (BMI) and breastfeeding duration. The researchers found that a higher BMI is inversely related to breastfeeding duration (Mehta et al 2012). The participants who entered pregnancy overweight or obese had a greater relative risk ratio (RRR) of not initiating breastfeeding (RRR = 5.39, 95% CI: 2.41, 12.04), of breastfeeding less than 4 months (RRR = 2.38, 95% CI: 1.33, 4.27), or of exclusively breastfeeding less than 1 month (RRR = 2.09, 95% CI: 1.24, 3.51) compared to those who had a healthy pregravid BMI (Mehta et al 2012).

According to a study by Persad and Mensinger (2008), having access to a breastfeeding support group is one of the most important factors for successful breastfeeding. Ogbuanu et al (2009) utilized data from the Arkansas Pregnancy Risk Assessment Monitoring System (N = 2,917) examined hospital support services used to promote breastfeeding. Women who reported that the hospital did not teach them how to breastfeed were twice as likely not to initiate breastfeeding compared to those who were taught (OR: 2.27, 95% CI: 1.30-3.91) (Ogbuanu et al 2009). In addition, out of the women who were given a helpline number 74.2% initiated breastfeeding compared to 25.8% of those who did not receive the phone number ($p < 0.0001$) (Ogbuanu et al 2009). Regardless of being classified as a high-risk or low-risk group, mothers who have a breastfeeding support group were more likely to engage in, and sustain the practice of breastfeeding (Bonuck et al 2005, Ogbuanu et al 2009, Persad and Mensinger 2008).

Characteristics of Vegetarians

Many groups, such as Alcoholics Anonymous, Alzheimer's Association, and even vegetarian groups provide both in-person and web-based support to their members because of the influence they offer to individuals. When excluding dietary sources, it could be challenging to consume all of the necessary nutrients required to sustain the body and aid in proper functioning. Vegetarian and vegan support groups are an excellent resource for those struggling with this challenge**.** In fact, most vegetarians have access to support groups to help them maintain their dietary behavior in a healthy and appropriate fashion (Jabs et al 1998). Overall, vegetarian women tend to engage in positive health habits, regardless of the underlying motivation for practicing vegetarianism. Research has shown that food choices are more than just dietary practice; they are a philosophy of life that is richly reflected in the characteristics commonly shared by vegetarians (Bobic et al 2012). For instance, positive health habits that are shared by

most vegetarians, both within the United States and globally, include engaging in regular exercise, maintaining a lower BMI, and being a non-smoker (Dyett et al 2013, Huang et al 2011, Newby et al 2005, Northstone et al 2007). When assessing vegetarian motivation and health habits, Dyett et al (2013) found that the vast majority of the participants did not smoke (97%) while just over half (51%) consumed alcohol. In addition, Newby et al (2005) conducted a cross-sectional study of 55,459 vegetarian and non-vegetarian women to examine the risk of overweight and obesity among vegetarian women. The study found that vegans had a significantly lower risk of overweight/obesity (OR = 0.35, 95% CI: 0.18, 0.69), as well as lacto vegetarians (OR = 0.54, 95% CI: 0.35, 0.85), and flexitarians (OR = 0.52, 95% CI: 0.43, 0.62) when compared to omnivores (Newby et al 2005). Rimal (2002) assessed various factors affecting meat preferences among American consumers and found that those who have a higher vs. lower education (0.1762 ± 0.0626)) and income level (0.0044 ± 0.0016), are older (0.0070 ± 0.0021), and reside in the Northeast (0.1350 ± 0.0824) and West (0.1396 ± 0.0820) vs. other regions of the United States prefer a meatless diet.

Other characteristics shared among vegetarians include altruistic values (environmental protection, equality, and social justice), liberal political views (for instance, opposition to capital punishment), and work for charitable organizations, local government, or education (Dietz et al 1995, Ruby 2012). Interestingly, all of these reflect an empathetic characteristic, which has been reported in the literature (Davis 1983, Filippi et al 2010). Some might attribute this to the fact that most vegetarians are women (Beardsworth and Bryman 1999, Stahler 2005, Worsley and Skrzpiec 1998) and women are generally identified as more empathic than men (Stahler 2005). However, a study that examined the brain scans of male and female vegetarians noted increased activity of empathy-related areas in the brain for both genders (Filippi et al 2010). Furthermore,

Empathy quotient (EQ) has been reported to be higher for vegetarians (EQ= 49.5 ± 8.9, p= 0.001) compared to omnivores (EQ= 38.8 ± 8.1, p= 0.001) (Filippi et al 2010).

Shared Characteristics Between Breastfeeding Mothers and Vegetarians

Based on the characteristics of vegetarians and women who breastfeed, there are some striking commonalities between the two groups. Regionally, both groups are more prevalent in the Northeastern and West Coast of the United States. Vegetarians and women who breastfeed are more likely to be of Caucasian ethnicity, have higher incomes, higher education, a healthy BMI, and maintain a non-smoking and non-drug-using habits. In addition, both of these groups of women are also more likely to utilize support groups.

Although characteristics of vegetarians have been documented, there is no research that has examined if vegetarians collectively, or the subtypes of vegetarians, are a high-risk or low-risk group in respect to breastfeeding practices. Understanding this would be immensely helpful in designing the kind of support targeting vegetarians in the most effective way to enhance their progress towards breastfeeding goals set by *Healthy People 2020*.

Survey Methods of Infant Feeding Assessment for Breastfeeding Mothers

When using a survey to gather information on breastfeeding mothers, one must consider the appropriate method to utilize. Some of the most common survey methods include paper and pencil, telephone, and person-to-person interviewing (Bonuck et al 2005, Mehta et al 2012, Visness and Kennedy 1997). However, these methods are not as feasible to utilize due to higher production cost; increased time commitment for the participant; removed anonymity of the participant; longer time to reach the participant and for the participant to respond, and a longer time in general for the researcher to receive information. The surveys generally do not have the necessary wide geographic reach which then easily limits the number and diversity of

participants in the study. However, internet-based surveys are globally accessible to anyone who has internet connection, are both economically and time efficient, provide immediate results, protect the anonymity of the participant, and they have been shown to provide valid results when compared to other survey methods.

Utilizing an Internet-Based Survey

Internet usage has become commonplace in the United States and is inclusive of all demographic groups (Pew Research Center 2010). For the majority of demographic groups, over half use the internet regularly (Pew Research Center 2010). In fact, one study provided the option of taking an internet-based survey, or the same survey via pencil and paper, and found that participants who choose the internet-based option were more educated (OR: 1.9, 95% CI: 1.2-3.0) and were significantly younger (OR: 0.69 per 10 years of age, 95%CI: 0.57-0.83) than those who chose the pencil-paper option (Mayr et al 2010). The widespread internet usage allows internet-based surveys the potential to reach a large number of participants of all demographics. Other benefits of internet-based surveys include time and cost efficiency, while creating a sense of anonymity and privacy for the participants (Tolstikova and Chartier 2009).

Nevertheless, because the researchers may not see the participants, the reliability and validity of internet-based surveys may be questioned. However, studies have examined their efficacy by comparing results from different survey methods. One study examined the test-retest reliability of an online survey verses a pencil and paper survey (Basnov et al 2009). The intra-class correlation coefficient was used to assess test-retest reliability, and Cronbach's alpha was used for internal consistency (Basnov et al 2009). Both surveys fell between 0.63 and 0.92 for test-retest reliability, and between 0.75 and 0.93 for the internal consistency (Basnov et al 2009). The researchers concluded that there was no significant difference in test-retest reliability and

internal consistency between the two types of survey (Basnov et al 2009). Another study by Tolstikova and Chartier (2009) validated the use of the Core Bereavement Items inventory between online and paper surveys. The study found that the demographic characteristics were not significantly different between the online survey group and the paper survey group, and there were no significant differences found in the psychometric properties of the Core Bereavement Items inventory, suggesting that the online survey is a suitable and valid alternative to a paper survey (Tolstikova and Chartier 2009).

Rationale, Hypothesis, and Specific Aims of Research

Consortia, such as *Healthy People 2020*, are working to increase breastfeeding initiation, duration, and exclusivity among mothers and their newborns in the United States (US Department of Health and Human Services 2010). Women who breastfeed share overlapping demographics with women who are practicing vegetarianism. However, no study to date has examined the breastfeeding intentions and practices of vegetarian women. The research presented in Chapter 3 seeks to examine any associations between the type of vegetarianism and the intention or practice of breastfeeding. The findings from this research may inform the public health community of other potential targets in their attempt to increase the breastfeeding rate. The research question to be investigated is, "Does the type of vegetarianism affect breastfeeding intentions and practices among women in the United States?" The overall hypothesis is that the type of vegetarianism influences the breastfeeding intentions and practices among vegetarian women in the United States. The specific aims are: 1) to assess the breastfeeding intentions and practices among vegetarian women in the United States; and 2) to examine the differences in breastfeeding intentions and practices among the different groups of vegetarian women in the United States.

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CHAPTER 3

BREASTFEEDING INTENTIONS AND PRACTICES AMONG THE DIFFERENT VEGETARIAN GROUPS IN THE UNITED STATES

METHODS

Abstract

This study assessed breastfeeding intentions and practices among vegetarians in the United States. Study aims were to examine the potential differences in feeding intentions and practices of the vegetarian types. This was a cross-sectional online survey of female vegetarians (N = 266) with the survey link emailed to vegetarian listservs administrators for membership completion. Participants were primarily Caucasian (77%) and an average age of 33.8±11.1 years. Overall, participants' breastfeeding intention, including exclusive breastfeeding, was higher than actual breastfeeding practice, irrespective of vegetarian type. Being a pesco vegetarian was associated with higher likelihood of intention to breastfeed (OR = 6.60, 95% CI: 1.12-38.60) compared to being a flexitarian. There was no significant difference between breastfeeding practices by vegetarian type. Future studies of a larger and a more heterogeneous sample are needed to ascertain breastfeeding practices among vegetarians to inform the design of effective interventions aimed at promoting breastfeeding among vegetarians.

INDEX WORDS: Vegetarian, Breastfeeding, Online survey

Introduction

Breastfeeding is indisputably the preferred method of optimum infant feeding for the first six months of life (James and Lessen 2009). Not only does breast milk provide nourishment for

the infant, but it is also associated with illness protection, improved cognitive functioning, a reduced risk for sudden infant death syndrome (SIDS), a decreased risk for overweight and obesity later in life, among many other health benefits (James and Lessen 2009). Respected national and international organizations such as the Academy of Nutrition and Dietetics, the American Academy of Pediatrics, the World Health Organization (WHO), and the blueprint for the health of Americans, *Healthy People 2020,* support breastfeeding and strive to increase the breastfeeding rate among mothers in the United States (Ogbuanu et al 2009, US Department of Health and Human Services 2010, Mehta et al 2012). In fact, a key objective in *Healthy People 2020* is increasing breastfeeding initiation, duration, and exclusivity among mothers and their newborns by the year 2020 (US Department of Health and Human Services 2010). Although all breastfeeding goals for *Healthy People 2010* were not met, projected trends for breastfeeding among the general population were to modify the SMART (specific, measurable, achievable, realistic, and timely) objectives for *Healthy People 2020*. The projections for *Healthy People 2020* target increases in breastfeeding initiation from 75% in 2010 to 81.9%, 60.6% continued breastfeeding through 6 months compared to 50% in 2010, and 34.1% continued breastfeeding through 12 months postpartum versus 25% in 2010 (US Department of Health and Human Services 2010). The target for exclusive breastfeeding is to increase the duration through 3 months to 46.2% from 33.6% in 2010, and duration through 6 months to 25.5% from 14.1% in 2010 (US Department of Health and Human Services 2010).

Despite its recognition as the gold standard for infant feeding, many mothers choose not to engage in it. In fact, in comparison to most nations, the United States has a much lower rate of breastfeeding initiation and duration (James and Lessen 2009). Approximately one-third of infants in developing countries are exclusively breastfed for the first six months of life; however,

only 16% of infants in the US are exclusively breastfed for that same duration (CDC 2007, James and Lessen 2009). According to the Centers for Disease Control and Prevention's National Immunization Survey (2010), less than half (43%) of US women were breastfeeding at 6 months, and 16% were exclusively breastfeeding at 6 months. While roughly 45% of Caucasians were breastfeeding for 6 months, only 28% of African Americans breastfeed for that amount of time (CDC 2007). Comparatively, Asian/Pacific Islanders have a 6-month breastfeeding rate of 56% while the rate of Hispanic/Latinos is about 46% for the 6-month duration (CDC 2007). Breastfeeding a child has also been associated with an increase in age (James and Lessen 2009). Approximately 22% of women younger than 20 years of age, 33% of women between the ages of 20-29, and 50% of women over the age of 30 breastfed for the recommended 6 months (CDC 2007). Similar trends are seen with maternal education as well (James and Lessen 2009). While only 31% of high school graduates breastfed for 6 months, 60% of college graduates continued breastfeeding through 6 months (CDC 2007). In addition, women who were unmarried in this study had a much lower breastfeeding rate at 6 months compared to their married counterparts (25% and 56%, respectively) (CDC 2007).

Prior studies have identified high-risk groups (overweight and obese women, African American women, low-income, and other minority groups) who are less likely to breastfeed their infants (CDC 2007, Persad and Mensinger 2008). Whereas women who practice vegetarianism, comprising a minority group in the United States who tend to be well educated, of higher-income status, and of a healthy BMI (Dyett et al 2013, Newby et al 2005, Ruby 2012), may be low-risk. Surprisingly, no study to date has examined the relationship between vegetarianism and breastfeeding. With the increasing prevalence of vegetarianism in the United States, and efforts by health organizations to improve breastfeeding rates, understanding the influence that

vegetarianism has on breastfeeding intentions and practices could be beneficial in targeting vegetarian women for breastfeeding promotion and support. Currently, there are no studies that have focused on the infant feeding behaviors of vegetarian mothers. Therefore, the purpose of this study is to fill an important gap in the literature regarding infant feeding practices among vegetarians. This study aimed to examine the breastfeeding intentions and practices among and between the different groups of vegetarian women in the United States.

Methods and Design

Study Design and Subjects

A cross-sectional online survey was used to examine the breastfeeding intentions and practices among and between the different groups of vegetarian women in the United States. For the purpose of this study, a vegetarian is defined as a person whose diet consists of grains, legumes, nuts, seeds, vegetables, and fruits, with or without dairy products and eggs, while excluding meat from the diet (Vegetarian Society 2013). Pesco vegetarians are persons who include fish in their basic vegetarian diet (Vegetarian Society 2013), whereas a flexitarian is defined as one who consumes a normal vegetarian diet, but will occasionally consume organic meat and other animal products (Vegetarian Society 2013). A Lacto vegetarian is one who includes dairy products (such as milk, cheese, yogurt, and butter) in the diet, but excludes eggs (Vegetarian Society 2013). An ovo vegetarian, however, consumes eggs in addition to the basic vegetarian diet, but excludes dairy products (Vegetarian Society 2013). A combination of these two types (a lacto-ovo vegetarian) includes both dairy products and eggs in addition to the basic vegetarian diet (Vegetarian Society 2013). Of all vegetarian types, vegans are considered to be the most dietary restrictive in their selection of food (Vegetarian Society 2013). Vegans maintain the basic vegetarian staple diet, but exclude all animal products and animal-derived substances,

eggs, dairy products, and even in some cases honey (Vegetarian Society 2013). A total of 293 female self-identified vegetarians responded to the online survey; however, 27 of them were excluded because of incomplete data, leaving a total of 266 participants included in the final analysis. The study protocol was approved by the Institutional Review Board for Human Subjects at the University of Georgia.

Questionnaire

An online questionnaire consisting of 25 questions, hosted and distributed via the Qualtrics Software (Qualtrics software version 37, Provo, UT) was used to gather information about dietary practice, demographics, race/ethnicity, educational level, employment status, smoking and alcohol use, breastfeeding intentions and practices, and residency of vegetarian women in the United States. The participants self-identified themselves according to the following, most common, options for the types of vegetarian: i.e., flexitarian, pesco vegetarian, lacto-ovo vegetarian, ovo vegetarian, lacto vegetarian, or vegan.

Survey Distribution

On January 30, 2013, survey invitations using the Qualtrics Software were emailed to administrators of vegetarian listservs around the country as well as individually identified vegetarians. In the Qualtrics Software, the number of emails that were sent were recorded, in addition to the number of surveys completed in correspondence to the emails sent. The first emails were sent to a combination of administrators and individually identified vegetarians. After the initial email invitation, 1-2 email reminders were sent to those who were not marked under finished surveys after several days. The general trend for reminders was that one follow-up reminder was sent to the administrators, while two follow-up reminders were sent to individuals. The survey closed on August 30, 2013. Vegetarian listserv administrators were identified

through online sources such as websites and magazines, and contacted in each region of the United States.

Before completing the survey, each participant had the opportunity to read the consent form and agree to participation by checking a box. The participants were made aware that because the survey was internet-based, security and confidentiality was limited, but once the responses are received in the software they become anonymous. Once the participant clicked "Yes" to the "I agree to participate in this survey" after reading the consent description for the survey, they were ready to take the survey. The data was downloaded and directly imported into SPSS for statistical analysis.

Statistical Analyses

Statistical analyses were performed using SPSS software for Windows (Version 21 for Windows, Chicago, IL). Descriptive analyses of frequencies and proportions using a chi-squared test for categorical variables, as well as means and standard deviations for continuous variables were performed to describe the participants. Binary logistic regression analyses were used to explore the likelihood of intention to breastfeed between the vegetarian groups and results are reported as odds ratios (ORs) and their respective 95% confidence intervals (CIs). The dependent variables were feeding intentions and feeding practices. The primary independent variable was the type of vegetarianism. Covariates explored in the analysis included: participants' region of residence, age, race, highest educational attainment, occupation, and marital status. Statistical significance was set at $p < 0.05$. Because of the small sample of participants, responses were re-coded to combine "exclusive breastfeeding" and "mixed feeding" as breastfeeding, because no differences were observed when coded separately. Breastfeeding was then compared to formula feeding.

Results

Characteristics of Participants

Table 3.1 presents the demographic characteristics of the participants. Most (82.1%) of the participants had higher education, with 48.1% attaining a graduate degree. The average age of the participants was approximately 34 years. The majority of the participants were Caucasian, while only 0.8% self-identified themselves as Black/African American. Over 80% of the participants reported to work full or part-time, and 64% were married or cohabiting. Approximately 4% of the participants reported to smoke, and over half consumed alcohol. The majority of participants categorized themselves as either vegan or lacto-ovo vegetarian, while a smaller percentage of participants reported to be flexitarian and ovo vegetarian (Table 3.1). The mean duration as practicing vegetarianism was 13 years for participants in this study. Almost three-fourths of the participants reported having been breastfed as a child, with nearly 70% intending to exclusively breastfeed for at least 6 months. Furthermore, of the 78% who were pregnant at the time of data collection and intended to breastfeed, the majority (~80%) planned to exclusively breastfeed (EBF) for 6 months, while 20% planned to mix feed (MF) for 6 months. Nevertheless, the breastfeeding duration varied for these women. From the almost 90% of participants who reported past breastfeeding experience, nearly 10% exclusively breastfed for 3 months, over 50% exclusively breastfed for 6 months, and the rest practiced mixed feeding (Table 3.1).

Table 3.1 shows that overall, the proportion of participants who intended to breastfeed was higher than those who have actually breastfed a child in the past, irrespective of vegetarian type. While intentions for exclusive breastfeeding for 6 months was nearly 70%, just over half of the participants reported to have exclusively breastfed a previous child for 6 months. Figure 3.1

shows over 78% intended to breastfeed should they have a child. Figure 3.2 shows that although less than half of the participants reported to have given birth to a child or children, ~90% of them breastfed for 12 months.

Infant Feeding Intentions and Practices

Table 3.2 shows that intended breastfeeding duration varied among the participants. Of the 55.5% of vegans who intended to breastfeed, 94.6% planned to exclusively breastfeed (EBF) for 6 months, while 5.4% planned to mix feed (MF) for 6 months. Out of the 22.8% lacto vegetarians who intended to breastfeed, 78.6% planned to EBF for 6 months, and 21.4% planned to MF for 6 months. From the 74% of lacto-ovo vegetarians who intended to breastfeed, 77.3% planned to EBF for 6 months, and 22.7% planned to MF for 6 months. Although only 7.1% of ovo vegetarians had the intentions to breastfeed, 75% of them planned to EBF for 6 months, and 25% planned to MF for 6 months. Even though 25% of the practicing pesco vegetarians reported their intentions to breastfeed, 91% planned to EBF for 6 months, and the remaining 9% planned to MF for 6 months. Out of the 15.7% flexitarians who planned to breastfeed, 80% intended to EBF for 6 months, and 20% intended to MF for 6 months.

Table 3.3 shows the likelihood for intention to breastfeed was over 6 times among pesco vegetarians (OR = 6.60, 95% CI = 1.12-38.60, p = 0.03) compared to flexitarians, but not the other vegetarian types.

Actual breastfeeding practice varied among the women as shown in Table 3.4. For the 86.4% of vegans who have breastfed a previous child (or previous children), 10.5% exclusively breastfed for 3 months, 71.1% exclusively breastfed for 6 months, while the rest mixed fed. Of the 80% of lacto vegetarians who reported past breastfeeding experience, 25% EBF for 3 months, 50% EBF for 6 months, and 25% MF for 3 months. Of the 94.1% lacto-ovo vegetarians who

reported to have breastfed a child, 3.1% EBF for 3 months, 68.8% EBF for 6 months, while the remaining 28.2% mixed fed. Out of the 80% of ovo vegetarians who have breastfed in the past, 75% EBF for 6 months, and 25% MF. Of the 83.3% of pesco vegetarians who breastfed a previous child, 20% EBF for 3 months, and 60% EBF for 6 months. All participants who self-identified as flexitarians reported to have breastfed a previous child with 20% EBF for 3 months, 40% EBF for 6 months, and the rest mixed feeding.

According to Figure 3.3, more than 80% of the participants were employed. Half of those in administration and industry breastfed or intended to breastfeed, while less than one-third in the other occupations chose to breastfeed or planned to breastfeed in the future. While a greater percentage (90%) of participants older than 30 years had breastfed a previous child and intended to breastfeed (40%), only 10% and 50% of participants between 20 and 30 years of age, respectively, had breastfed or intend to breastfeed. Caucasians reported higher intention (75%) and practice (80%) of breastfeeding more than other ethnicities; however, 77% of the participants were Caucasians. Breastfeeding intention was highest among those who had a bachelor's degree, while breastfeeding practice was highest among those who had at least a master's degree. Breastfeeding intention and practice was highest among those who were married compared to single or cohabiting women. Figure 3.4 shows breastfeeding intention was highest in the Southeast (33.3%), while breastfeeding practice was highest in the Southwest (31.5%).

Discussion

Human breast milk, in its pure and unique design is recognized as the optimal source of nutrition for infants (James and Lessen 2009). In fact, both national and international health authorities strongly encourage mothers to exclusively breastfeed their infants for the first six

months of life (American Academy of Pediatrics 2005, James and Lessen 2009). Nevertheless, despite its recognition as the gold standard for infant feeding, many mothers choose not to engage in it. In comparison to most nations, the United States has a much lower rate of breastfeeding initiation and duration (James and Lessen 2009). Identifying sub-groups of the population that fail to meet the set standards can help agencies implement appropriate and effective interventions to reduce the disparity gap (US Department of Health and Human Services 2010). Likewise, identifying groups who meet these standards can also provide valuable learning opportunities for organizations as to why some women breastfeed and how they overcome breastfeeding barriers (US Department of Health and Human Services 2010). The present study sought to assess and examine the breastfeeding intentions and practices among vegetarians in the United States. The main findings in this study show that vegetarians have a higher rate of breastfeeding compared to the U.S. national average. This study also found that the type of vegetarianism may influence the breastfeeding intentions of the individual.

Findings from this study show that the majority of vegetarians intend to, and actually practice breastfeeding; however, their intention to exclusively breastfeed for 6 months is higher than actual exclusive breastfeeding practice. Our findings also show that pesco vegetarians are more likely to intend to breastfeed compared to flexitarians, but not other types of vegetarians. However, no significant difference was found when examining the actual practice of breastfeeding among the types of vegetarians. It is unclear why pesco vegetarians (and possibly vegans) had a higher likelihood to intend to breastfeed, as there is very little comparative literature about pesco vegetarians. One possibility could be a connection to fish—a major food included in the pesco vegetarian diet that is a well-known source for omega-3 fatty acids and has many health benefits for both adults and infants (EPA/FDA 2004, Yaktine et al 2008). Pesco

vegetarians may utilize breastfeeding as a way to transfer omega-3 fatty acids to the infant for the benefit of their health and development. However, in addition to its nutrients, seafood is also known for contaminants such as methylmercury (EPA/FDA 2004, Yaktine et al 2008). Methylmercury accumulates in the body, and in some cases can take up to one year to remove (Yaktine et al 2008). If a pesco vegetarian does not vary the mercury containing seafood in her diet, and either becomes pregnant during that time or breastfeeds, the infant could suffer developmentally or incur neurological toxicity (Yaktine et al 2008). Even if the methylmercury level is at an acceptable level in the mother, it may not be an acceptable level for the infant due to their smaller body size (Yaktine et al 2008). While pesco vegetarians may have a strong desire to breastfeed, actual breastfeeding could potentially be harmful to the infant if the individual does not carefully plan their seafood consumption.

In comparison to breastfeeding trends in the US, our data show that vegetarians as a whole have a higher rate of breastfeeding. National data show that less than half of US women breastfeed through 6 months (CDC 2007), compared to 89% of vegetarians in this study who breastfed (Figure 3.2). In fact, the rate of breastfeeding was over 80% irrespective of the type of vegetarian (Table 3.4). National data show that 16% of women exclusively breastfed for 6 months (CDC 2007), however in this study, 71% of vegans, 50% of lacto vegetarians, 69% of lacto-ovo vegetarians, 75% of ovo vegetarians, 60% of pesco vegetarians, and 40% of flexitarians reported to have breastfed exclusively for 6 months. These findings could be a result of an individual's motivation to become a vegetarian. As the literature suggest, majority of individuals who choose vegetarianism do so based on the health benefits of the vegetarian diet. This same health benefit may be the reason for the high breastfeeding rates and intentions observed in the current study. Lindeman and Sirelius (2001) argue that life-style decisions,

including food choices, are a means for people to express personal and philosophical commitments. The vegetarian life-style is connected to dietary choices, as well as beliefs, values and commitments (Fox and Ward 2008). Therefore, the underpinning philosophy of the vegetarian may be a trajectory foreshadowing of other life-style commitments, such as breastfeeding. However, few studies have examined the nutritional impact of a vegetarian diet and the practices of individuals in other life-choices, and none have examined breastfeeding intentions and practices.

An interesting observation from this study is the association between vegetarianism and breastfeeding intentions. For the purpose of this study, the motives for practicing vegetarianism were categorized by aesthetics, environment, ethics, health, and religion. Out of those who planned to breastfeed, the majority were ethical vegetarians. Perhaps this observation was due to the large number of ethical vegetarians in the current study (almost half), or, perhaps their underlying dietary motivation has influenced yet another life-choice because it stems from a firm belief, value, or commitment of the individual. It is possible that because human breast milk is recognized globally as the nutritional standard for infants, ethical vegetarians may view providing breast milk substitute as unethical. Likewise, those who are vegetarians for health reasons may strive to provide the highest nutritional value to their infant so that their infant may also have good health. Not only does human breast milk serve as a golden nutritional source for infants, it is also the most economically efficient way to feed the infant (Bartick and Reinhold 2010). It is free for the mother, and because of its immunological benefits, protects the infant from infectious diseases leading to healthcare savings (Ball and Wright 1999). By meeting the *Healthy People 2020* set objectives, the United States could save over $10.5 billion per year and

prevent over 741 infant deaths (Bartick and Reinhold 2010). Environmental vegetarians choice to breastfeed may be as a result of the environmental friendliness of breastfeeding.

A surprising finding from this study is the higher breastfeeding rate among vegetarians in the Southeast region of the United States. This observation is inconsistent with the breastfeeding trends of the general population in the United States. Ryan et al (2002) examined breastfeeding rates by region of the United States and reported that at 6 months of breastfeeding, the South had the lowest breastfeeding rate (28.8%) and the West had the highest (42.5%). Other studies that used nationally representative samples also observed higher breastfeeding rates in the West and Northwest regions of the United States while the Southern region recorded low rates of breastfeeding (Kogan et al 2008, Li et al 2002). For this study, it could be that these mothers residing in the Southeast were involved in environments (i.e., resources or services in health facilities, communities, or workplaces) conducive to breastfeeding (Ahluwalia et al 2003).

Although vegetarian women in their 20s reported the highest (50%) breastfeeding intention, their counterparts (30 years and older) had low breastfeeding intention but the highest previous breastfeeding experience. A similar pattern has been shown in the general population, i.e., as age increases, so does the likelihood of breastfeeding (James and Lessen 2009). Half of the women in the United States over the age of 30 years tend to choose to breastfeed compared to 33% of women in their 20s (CDC 2007). In this study, mothers who were older and chose to breastfeed may have been exposed to breastfeeding through peers or education resources as they aged compared to younger women who had not been exposed to, or educated about breastfeeding as much.

Caucasians in this study had the highest breastfeeding intention (75%) and practice (80%) compared to the other ethnicities, while African Americans had both the lowest intention and

practice rate (< 5%). This could be largely due to the over representation of Caucasian participants in our sample and under representation of other ethnicities. In addition, the Caucasian mothers may have sought out prenatal care or had a breastfeeding support group in place to encourage their breastfeeding intention and practice. This trend among vegetarians is similar to what has been observed among the general population in which women of Caucasian ethnicity have been found to breastfeed more than other ethnicities, while African Americans have the lowest breastfeeding rates (CDC 2007, James and Lessen 2009, Li et al 2002, Ogbuanu et al 2009, Visness and Kennedy 1997). However, this trend is not worldwide. Mothers in developing countries, such as Africa, breastfeed to ensure that their infant receives nutrients that they otherwise would not receive due to poverty or food scarcity. Moreover, breastfeeding is a socially acceptable norm in many countries and is recommended for optimal health of the baby, regardless of food security. Globally, the average age for weaning is around 4 years old (WHO 2014). The World Health Organization recommends breastfeeding coupled with complementary foods through a minimum of 2 years of age (WHO 2014).

Educated individuals are more likely to participate in healthy life-choices, such as breastfeeding (Taveras et al 2003). A notable trend that has been observed is that the more education attained, the more likely one is to breastfeed (CDC 2007, James and Lessen 2009, Li et al 2002). Participants in this study who received less than a college education had lower rates of intention to breastfeed and breastfeeding practice compared to those with higher education (Figure 3.3). Those who receive more education may be more aware of breastfeeding benefits, or they seek out support groups or read more literature supporting breastfeeding. It is no surprise then that more educated participants in this study intended to, or practiced breastfeeding.

The 1988 National Maternal and Infant Health Survey showed that of the women who returned to work after delivery but still continued to breastfeed their child, 73.6% were considered professional, defined as occupations such as managers, writers, lawyers, and registered nurses (Visness and Kennedy 1997). The study also showed that 51.3% of those continuing to breastfeed were either technicians in fields other than health and science, those selling personal goods and services, or those in a clerical occupation such as secretaries and stenographers. The Technical/sales/administrative professions were the only ones with a decreased likelihood of breastfeeding regardless of having a college education (OR = 0.64, 95%CI: 0.47-0.88). However, the main point of interest in the Visness and Kennedy 1997 study was that women who had a college degree, but chose to stay at home, were more likely to continue breastfeeding than those who had employment. In an earlier study, women in professional occupations were reported to have significantly longer breastfeeding duration than women in sales, clerical, and technical occupations (Kurinu, et al 1989). Heck et al (2006) observed that women in sales, service, support, or technical professions were twice as likely not to breastfeed compared to those in professional occupations (OR = 2.10, 95%CI: 1.72, 2.57). However, after adjusting for method of delivery, low birth weight, parity, postpartum length of stay, trimester of prenatal care initiation, smoking during pregnancy, alcohol consumption during pregnancy, marital status, and language spoken at home, the association between breastfeeding and women's occupation was no longer significant (Heck et al 2006).

Notably, over 80% of married women in this study breastfed and almost half of married women intended to breastfeed. For single women, however, only 40% intended to breastfeed while only 10% reported actually breastfeeding a previous child. This could be due to a lack of support in the homes of single women as has been observed among women in the general

population. Marital status has been associated with the likelihood of breastfeeding (CDC 2007, Traveras et al 2003, Visness and Kennedy 1997). Approximately 81% of married women in this study chose to breastfeed. Irrespective of risk-group classification (i.e., high or low-risk), mothers who have a breastfeeding support group (including their partner) are more likely to breastfeed (Bonuck et al 2005, Ogbuanu et al 2009, Persad and Mensinger 2008).

There were several limitations to this study. Vegetarians are a minority group in the United States with only 3 to 4% of the population claiming to be vegetarian (Vegetarian Resource Group 2009). Targeting a small subset of the general population proved to be challenging, and resulted in a smaller than expected sample size. It is important to note that the participants were largely homogenous: most had a higher level of education, were Caucasian, employed, married, and did not smoke. These characteristics could have a 2-fold effect on the study. First, these characteristics have been found in national level studies with a stronger likelihood of breastfeeding (CDC 2007, McDowell et al 2008). This may have had a stronger influence on breastfeeding intentions and practice than the dietary lifestyle of the participants. Second, the homogenous nature of our participants makes it not representative of the general population in the United States. Selection bias is a problem because the vegans (n = 102) and lacto-ovo vegetarian (n = 81) groups out numbered the participants in the other vegetarian groups (n = 79). This could have affected the internal validity of our findings as well as the generalizability of the results to the vegetarian sub-population in the United States.

Despite these limitations, this study did have several strengths. To the best of our knowledge, this cross-sectional survey is the first to collect information about vegetarians and their breastfeeding intentions and practices across the United States.

In summary, this study showed that the majority of vegetarians did, or did intend to, breastfeed, and that pesco vegetarians were more likely to intend to breastfeed than flexitarians. There were no statistical differences in the practice of breastfeeding between the vegetarian groups. This study also observed that the Caucasian participants, and those who were more educated, married, resided in the Southwest, and who had a professional occupation, were more likely to breastfeed. Future research in this area is warranted in order to assess potential implications for public health with regards to breastfeeding among the various vegetarian groups. Ideally, studies should have larger sample size with equal proportions of participants within each vegetarian type, and within each ethnicity. Having a more diverse sample of participants will help to determine which individual characteristic influences one's breastfeeding intentions and practice. Future studies could also compare vegetarian intention and practice of infant feeding with those who are not vegetarian. Lastly, studies should focus on the underlying motive for vegetarianism and how that may influence infant feeding choices. Understanding such groups of women can help reduce the gap between breastfeeding intentions and breastfeeding practice, which will ultimately close the disparity gap in the *Healthy People 2020* objectives for breastfeeding.

Table 3.1: Baseline sociodemographic characteristics of participants (N= 266)

	Mean±SD
Age (years)	33.8 ± 11.1
Years of education (years)	16.2 ± 4.8
Years practicing vegetarianism (years)	13.2 ± 10.9
	n (%)
Highest level of education	
High school or less	28 (10.7)
Associate's degree	19 (7.3)
Bachelor's degree	89 (34.0)
Master's degree	86 (32.8)
Doctoral degree	40 (15.3)
Ethnicity	
Caucasian	204 (77.0)
Hispanic/Latino	14 (5.3)
Asian/Pacific Islander	31 (11.7)
Black/African American	2 (0.8)
Other	14 (5.3)
Vegetarian type	
Vegan	102 (38.9)
Lacto vegetarian	19 (7.3)
Ovo vegetarian	12 (4.6)
Lacto-ovo vegetarian	81 (30.9)
Pesco vegetarian	29 (11.1)
Flexitarian	19 (7.3)
Plan to become pregnant	
Yes	154 (59.2)
No	106 (40.8)
Prior pregnancy	
Yes	116 (61.3)
No	148 (56.1)
Parity	
Nulliparous	163 (61.3)
Primiparous	42 (15.8)
Multiparous	61 (23.0)
Infant feeding intention	
EBF 6 months	130 (67.7)
FF 6 months	1 (0.5)
MF 6 months	21 (10.9)
Undecided	40 (20.8)
Previous feeding practices	
EBF 3 months	9 (8.9)
EBF 6 months	59 (58.4)
MF 3 months	6 (5.9)
MF 6 months	4 (4.0)

MF 9 months	2 (2.0)
MF 12 months	10 (9.9)
Only formula feed	11 (10.9)
Subject breastfed as a child	
Yes	193 (74.5)
No	66 (25.5)
If yes, duration	
< 3 months	16 (6.1)
3-6 months	62 (23.3)
6-12 months	34 (12.8)
> 12 months	7 (2.7)
Not sure	147 (55.3)
Current employment status	
Work full time	157 (59.5)
Work part time	55 (20.8)
Currently unemployed	52 (19.7)
Marital status	
Single	95 (36.0)
Married	141 (53.4)
Cohabiting	28 (10.6)
Current smoker	
Yes	10 (3.8)
No	251 (96.2)
Current alcohol consumer	
Yes	154 (58.6)
No	109 (41.4)

EBF, exclusive breastfeeding
FF, formula feeding
MF, mixed feeding

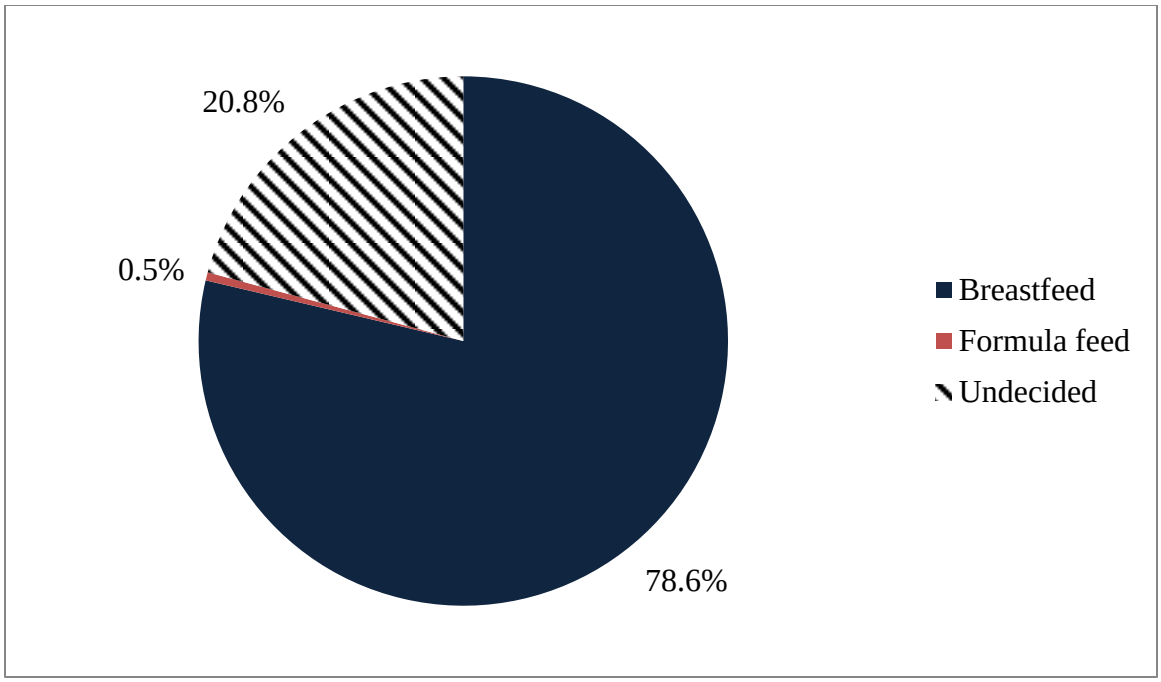

Figure 3.1: Infant feeding intentions of vegetarians

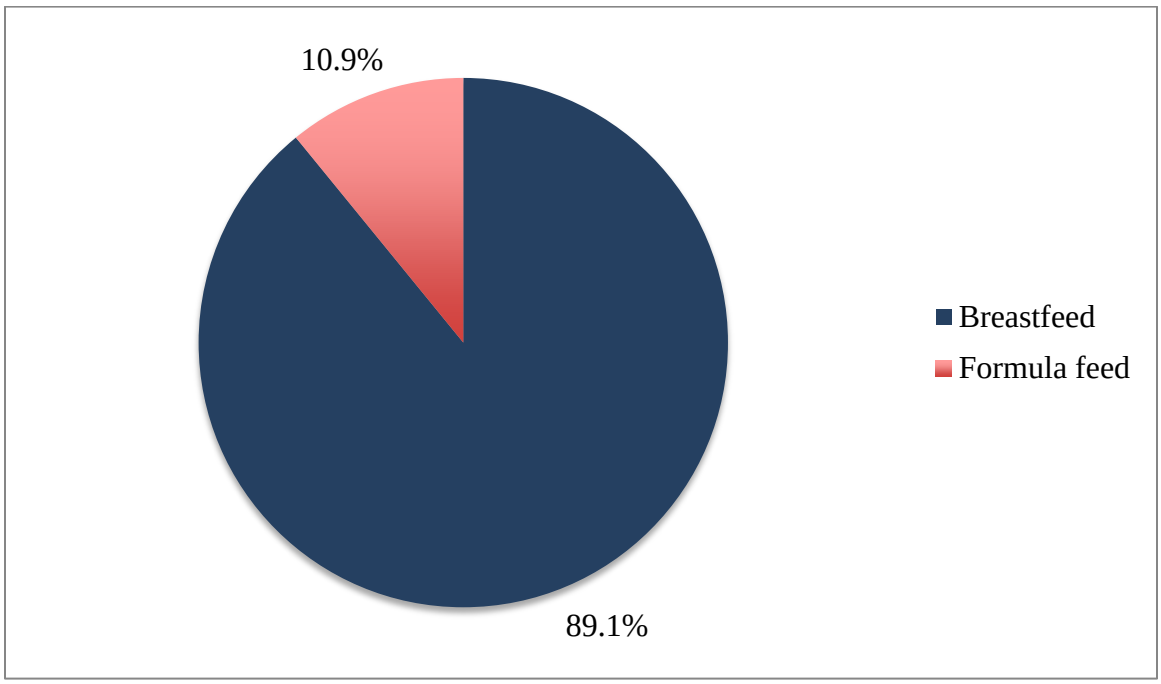

Figure 3.2: Infant feeding practice of vegetarians

Table 3.2: Infant feeding intentions by vegetarian type

	Breastfeed n (%)	**Formula feed n (%)**	**Undecided n (%)**	**P-value**
Vegan	56 (83.6)	0 (0.0)	11 (16.4)	0.152
Lacto vegetarian	14 (82.3)	0 (0.0)	3 (17.6)	
Lacto-ovo vegetarian	44 (75.8)	1 (1.7)	13 (22.4)	
Ovo vegetarian	4 (50.0)	1 (12.5)	4 (50.0)	
Pesco vegetarian	22 (91.6)	0 (0.0)	2 (8.3)	
Flexitarian	10 (62.5)	0 (0.0)	6 (37.5)	

Table 3.3: Binary logistic regression predicting intent to breastfeed

	OR	**95% CI**	**P-value**
Vegan	3.05	0.91-10.15	0.06
Lacto vegetarian	2.80	0.56-13.95	0.20
Lacto-ovo vegetarian	1.88	0.58-6.12	0.29
Ovo vegetarian	0.60	0.10-3.33	0.56
Pesco vegetarian	6.60	1.12-38.60	0.03
Flexitarian	1.00	-	-

Table 3.4: Infant feeding practice by vegetarian type

	Breastfeed n (%)	**Formula feed n (%)**	**P-value**
Vegan	38 (86.4)	6 (13.6)	0.840
Lacto vegetarian	4 (80.0)	1 (20.0)	
Lacto-ovo vegetarian	32 (94.1)	2 (5.9)	
Ovo vegetarian	4 (80.0)	1 (20.0)	
Pesco vegetarian	5 (83.3)	1 (16.7)	
Flexitarian	5 (100.0)	0 (0.0)	

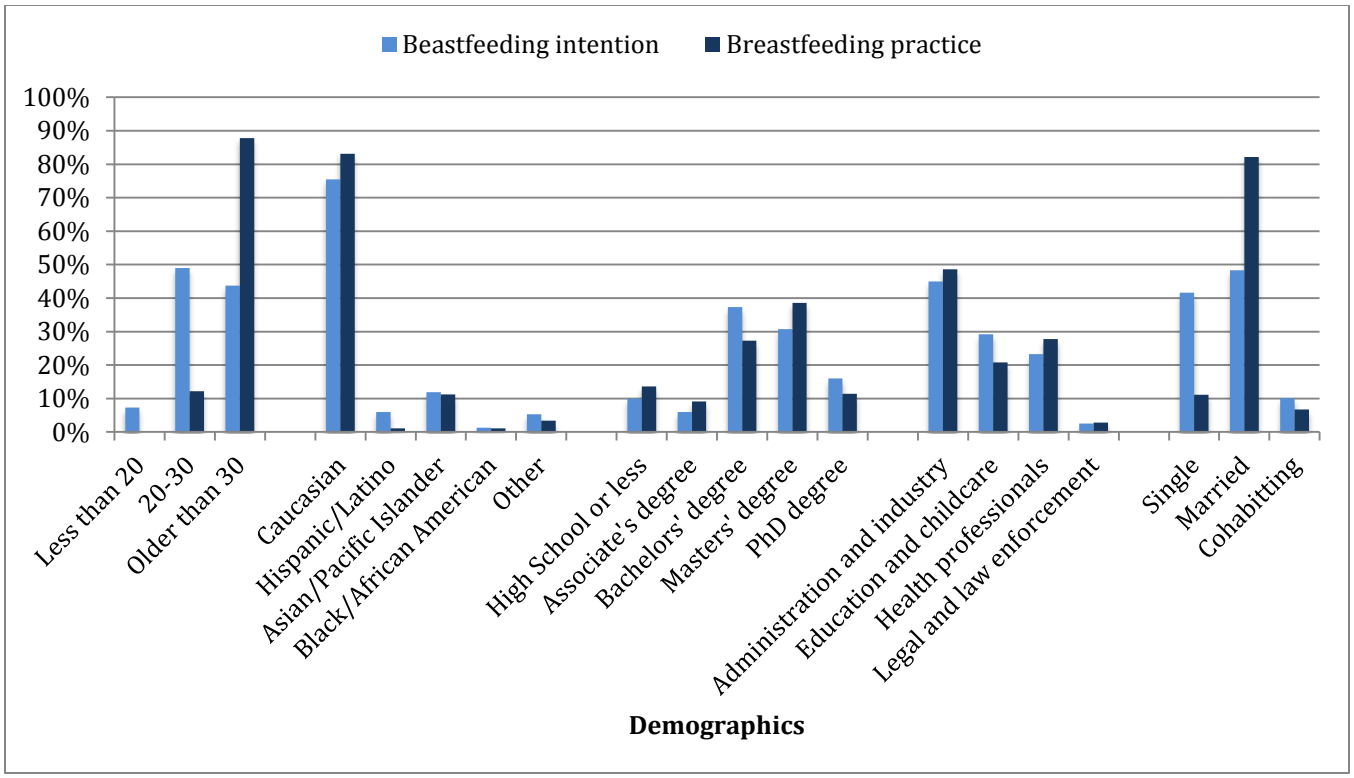

Figure 3.3: Breastfeeding intentions and practices by demographic characteristics. Administration and industry includes occupations revolving around sales, food, finances, entertainment, and so forth. Education and childcare includes tutors, teaching assistants, students, teachers/professors, historians, and nannies. The health professional category includes occupations revolving around healthcare, medicine, clinical work, and charity/nonprofit organizations. The legal and law enforcement includes lawyers, child support enforcement investigators, department of public health agents, politicians, and police dispatchers.

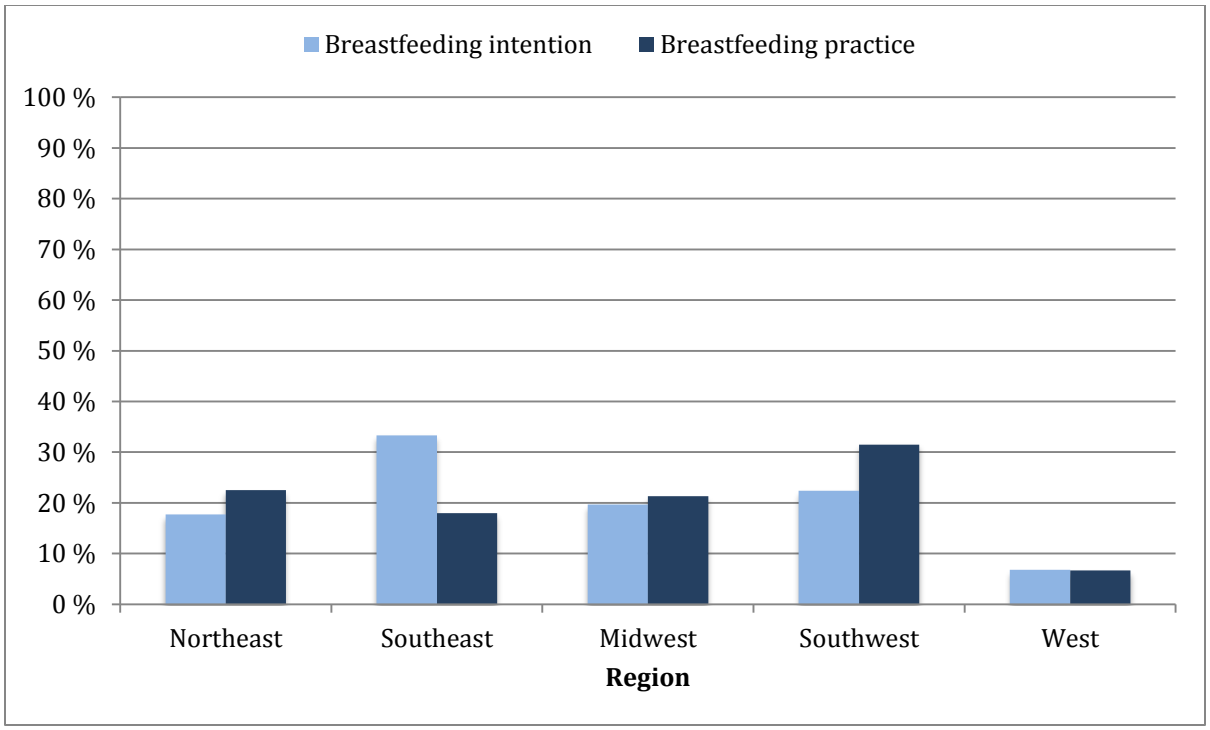

Figure 3.4: Breastfeeding intentions and practices of vegetarians by the region of the United States

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CHAPTER 4

CONCLUSION

The purpose of this study was to assess the breastfeeding intentions and practices among vegetarian women, and between the different types of vegetarian women in the United States. The overall hypothesis was that the type of vegetarianism influences the breastfeeding intentions and practices among vegetarian women in the United States. The specific aims were first, to assess the breastfeeding intentions and practices among vegetarian women in the United States, and second, to examine the differences in breastfeeding intentions and practices among the different groups of vegetarian women in the United States. To the best of our knowledge, this is the first study to be conducted on this topic.

The results from this study suggest that there is a potential positive link between practicing vegetarianism, and in particular, a specific type of vegetarianism, and breastfeeding intention and practice. Women who choose to breastfeed and women who choose to engage in a vegetarian life-style have common demographic characteristics. They both tend to be more educated, Caucasian, physically active, have a healthier BMI, and a higher socioeconomic status (Bailey and Wright 2011, CDC 2007, Dyett et al 2013, Mehta et al 2012, Newby et al 2005, Northstone et al 2007, Rimal 2002) compared to women who do not breastfeed or practice vegetarianism. Research has shown that women from these demographic groups are more likely to breastfeed (CDC 2007, Heck et al 2006, James and Lessen 2009, Li et al 2002, Taveras et al 2003, Visness and Kennedy 1997).

Data from this study showed that exclusive breastfeeding intention was higher than actual exclusive breastfeeding practice regardless of vegetarian type. Because vegetarians tend to have healthier life-styles and make healthier choices (Dyett et al 2012, Northstone et al 2007), it would be expected then that vegetarians would also intend to, and practice exclusive breastfeeding due to its health benefits to the infant. Even though there was a gap between breastfeeding intention and practice, the majority of the participants who had at least one child did in fact breastfeed. If a pregnant or lactating vegetarian does not have a well-planned diet to ensure all nutrient needs are being met, the breast milk could be deficient in nutrients that are vital for the infant's growth and development. For this reason, vegetarians should be encouraged to take supplements to help them meet their nutritional needs for the infant. In addition, pesco vegetarians should be advised to limit and vary methylmercury-containing seafood if planning to become pregnant, or if currently pregnant or nursing.

The results from this study suggest that the type of vegetarianism, especially pesco vegetarians and vegans in particular, may positively influence breastfeeding intentions. Nevertheless, no statistical differences were observed between vegetarian type and breastfeeding practice because of our small sample size.

Due to the relatively homogenous participation in this study, it was difficult to differentiate between the demographic influence on breastfeeding and the influence of the vegetarian life-style on breastfeeding in this study.

It is without question that breastfeeding provides many important benefits such as immunological protection and economical efficiency. Agencies such as the Academy of Nutrition and Dietetics and the American Academy of Pediatrics recognize this and recommend that mothers exclusively breastfeed their children for at least the first six months of life

(American Academy of Pediatrics 2005, James and Lessen 2009). Several governmental and non-governmental groups seek to implement breastfeeding protection and promotion in the population for the purpose of increasing breastfeeding rates among mothers. Although a number of studies have contributed to the scientific literature concerning high-risk groups and breastfeeding (Bonuck et al 2005, Mehta et al 2012, Ogbuanu et al 2009, Persad and Mensinger 2008, Taveras et al 2003, Wojcicki 2011), none have reported on vegetarians—a minority group in the United States. Understanding various groups' intentions and practices of breastfeeding in the United States will help agencies implement appropriate targeted interventions and promotions to encourage breastfeeding. Future research should aim to reach heterogeneous participation among various demographics (such as ethnicity and education level) when assessing breastfeeding intentions and practices of vegetarian women in the United States. In addition, a larger sample size should be sought to provide the statistical power needed to answer the research question. These key factors could provide valuable insight into vegetarians' intention and practice of breastfeeding, and if their dietary life-style is a significant contributing factor to their breastfeeding decisions.

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APPENDIX

APPENDIX A

SURVEY

1. Consent

Dear participant,

I, Anne Armstrong, and Alex Anderson, associate professor of Nutrition in the Department of Foods and Nutrition at The University of Georgia, invite you to take part in a national research survey called "Breastfeeding intentions and practices among the different vegetarian groups in the United States." The purpose of the survey is to examine and document the infant feeding intentions and practices of vegetarian women in the United States as there is currently no such information or data on vegetarian mothers.

To take part in this survey, you must be 18 years of age or older.

Taking part in the survey will involve answering socio-demographic information and infant feeding practices related questions and it should only take about 10-20 minutes. Participating in the study is voluntary, and you may choose not to take part or stop at any time without penalty or loss of benefits to which you are otherwise entitled.

Since the survey is internet based, it is important to understand that internet communications are not always secure and there is a limit to the confidentiality that can be guaranteed due to the technology itself. However, once the survey responses are received, you will remain anonymous. The results of the survey may be published and presented at conferences, but your name will not be used. In fact, the published results will be presented in summary form only.

The findings from this survey will be used to develop infant feeding promotion and education intervention targeting vegetarians. There are no known risks or discomforts associated with this research.

If you have any questions about this survey, please feel free to call either Anne Armstrong (706-542-7611) or Alex Anderson (706-542-7614) or send an e-mail to annea@uga.edu, or fianko@uga.edu, respectively. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 612 Boyd GSRC, Athens, Georgia 30602-7411; telephone (706) 542-3199; email address irb@uga.edu.

By clicking YES (I agree to participate in this survey) below, you are agreeing to participate in the above described survey.

Thank you for your consideration! Please print and keep this letter for your records.

Sincerely,

Anne Armstrong, MS, Project Coordinator

Alex Anderson, PhD, MPH, CPH

*1. I agree to participate in this survey.

- ○ Yes
- ○ No

Thank you for taking the time to complete this survey. The information that you share may help with infant feeding promotion and education interventions targeting vegetarians.

Here are some instructions to help you with the survey:

There are 25 questions in this survey.
After reading each question and the answers, move the cursor onto the circle or box in front of your chosen answer(s) and click, or type your response. Keep answering the questions, all the way down the page, then click on "Next". You will move on to the next page. All questions MUST be answered because your answers are very important. If you cannot move forward to the next page, it is because you did not answer a question. The unanswered question will be marked in red. Go back to the question and answer it, and then click on "Next". You can move back, if you need to change an answer by clicking "Prev" on the bottom of the page.

It is best to finish the survey in ONE session, which will take about 10-20 minutes. All your answers are important and you will remain anonymous. You may chose not to answer any question that you do not feel comfortable answering. Be sure you click on "Done" when you finish the survey.

Please answer the following questions openly and truthfully. Thank you, again.

How old are you?

What is the highest level of education completed, or in progress of completing?

- ○ Less than high school
- ○ High School
- ○ Associate degree
- ○ Bachelor's degree
- ○ Graduate school--Master's
- ○ Graduate School--PhD

How many years of formal education have you had up to date?

What is your ethnicity?

- ○ Caucasian
- ○ Hispanic/Latino
- ○ Asian/Pacific Islander
- ○ American Indian
- ○ Black/African American
- ○ Other

How long have you been a practicing vegetarian?

With which category of vegetarianism do you associate?

- ○ Vegan
- ○ Fruitarian
- ○ Lacto-vegetarian
- ○ Lacto-ovo-vegetarian
- ○ Ovo-vegetarian
- ○ Pesce-vegetarian
- ○ Pollo-vegetarian
- ○ Flexitarian
- ○ Other

What is your reason for becoming a vegetarian?

Are you currently pregnant?

- ○ Yes
- ○ No

Do you plan to become pregnant at some point during your life?

- ○ Yes
- ○ No

If you plan on becoming pregnant in the future, what are your primary infant feeding intentions?

- ○ Breastfeeding only for the first six months postpartum
- ○ Formula feeding only for the first six months postpartum
- ○ Mixed feeding (breast milk and formula) for the first six months postpartum
- ○ I am not sure, or not decided

Have you ever been pregnant?

- ○ Yes
- ○ No

How many children have you given birth to?

If you are pregnant, or plan on becoming pregnant, what is your primary infant feeding intentions for the first six months after delievery?

- ○ Breastfeeding only
- ○ Formula feeding only
- ○ Mixed feeding (breast milk and formula)
- ○ I am not sure, or not decided

If you have been pregnant before how did you feed your child/children?

- ◯ Exclusively breastfeed for up to 3 months
- ◯ Exclusively breastfeed for up to 6 months
- ◯ Mixed feeding for up to 3 months
- ◯ Mixed feeding for up to 6 months
- ◯ Mixed feeding for up to 9 months
- ◯ Mixed feeding for up to 12 months
- ◯ I did not breastfeed my infant (only formula feeding)

If you have been pregnant before and formula fed, what was your duration for formula feeding?

- ◯ Formula feed for up to 3 months
- ◯ Formula feed for up to 6 months
- ◯ Formula feed for up to 9 months
- ◯ Formula feed for up to 12 months
- ◯ I did not exculsively formula feed my infant

If you did breastfeed your infant, how long was it after birth before you started breastfeeding?

Do you know if you were breastfed as a child?

- ◯ Yes
- ◯ No

If you were breastfed as a child, how long were you breastfed?

What is your current employment status?

- Work full-time
- Work part-time
- Currently unemployed
- Home-maker

If you work, what is your occupation?

What is your martial status?

- Single
- Married
- Cohabitting

Do you smoke?

- Yes
- No

Do you drink alcohol?

- Yes
- No

In which state of the United States do you iive?

In which region of the United States do you live?

- Northeast
- Southeast
- Midwest
- Southwest
- West