

MATERNAL CHARACTERISTICS AND INFANT AND TODDLER
FEEDING PRACTICES IN THE SPECIAL SUPPLEMENTAL
NUTRITION PROGRAM FOR WOMEN, INFANTS AND
CHILDREN (WIC) IN SAN MARCOS, TEXAS

THESIS

Presented to the Graduate Council of
Texas State University-San Marcos
in Partial Fulfillment
of the Requirements

for the Degree

Master of SCIENCE

by

Hope M. van der Heijden, B.S.

San Marcos, Texas
August 2010

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Committee Members Approved:

Sylvia Crixell, Chair

BJ Friedman

Toni Watt

Approved:

J. Michael Willoughby
Dean of the Graduate College

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By

Hope Margaret van der Heijden

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ACKNOWLEDGEMENTS

First and foremost, I would like to express my gratitude to my committee chair, Dr. Sylvia Crixell, for leading me through this process. Her willingness to serve as my mentor and her ability to bring out the best in me has served as an inspiration to me throughout my time at Texas State University-San Marcos. I would also like to thank Dr. BJ Friedman and Dr. Toni Watt for serving on my committee and contributing to my success. Additionally, I appreciate Jesse Rogers, who guided me through the statistical analysis portion of my research. Finally, I am forever grateful for my family, for without their patience and loving support I would not have achieved this milestone.

This manuscript was submitted on July 7, 2010.

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CHAPTER I

INTRODUCTION

Children are dependent on parents to provide sustenance to support their growth and health, but the study of “feeding practices” of infants and toddlers encompasses the investigation of much more than what foods are offered and what nutrients are included in those foods. Feeding practices involve the establishment of the primary feeding relationship with an infant, which begins with the choice of whether or not to breastfeed, progresses to determining when, how often, and what “complementary foods” to include in the diet, and ultimately, how the transition to offering meals comprised solely of table foods will occur. The term “complementary foods” generally refers to food or liquids, other than breast milk and formula, which are added to an infant’s diet. This mutual exploration of the eating process is important for a variety of reasons. For example, feeding practices provide the basis for the development of the infant’s flavor and food preferences and his/her ability to distinguish hunger and satiety cues. Several researchers (1,2,3) have evaluated the complexities of feeding practices.

Recognition of the importance of early feeding practices has guided the generation of specific recommendations by the American Dietetic Association (ADA) (4) and the American Academy of Pediatrics (AAP) (5). Perhaps the most widely recognized recommendations are developed and published by the AAP, an organization that provides guidance to its 60,000 members through resources and evidence-based recommendations aimed at improving the health of children (6). The AAP recommends breastfeeding for at least the first 6 months of life, with the introduction of complementary foods when the infant is developmentally ready, usually between 4 and 6 months of age (5). In addition, the AAP encourages parents to delay introduction of 100% fruit juice until at least 6 months (7) and cow's milk until 12 months of age (8).

A particularly important aspect of feeding practices is that they lay the foundation for lifelong dietary habits, which profoundly affect the trajectory of health and well-being. The association between early feeding practices and risk for overweight in children is supported by a growing body of evidence (3,9,10,11,12). Specifically, early introduction of complementary foods (before 4 months) is associated with rapid weight gain in infancy (13,14), and some studies suggest that rapid weight gain in infancy is associated with overweight status in childhood (15,16). Despite the potential lifelong ramifications associated with feeding practices of infants and toddlers, systematic investigation of feeding practices was not given priority by researchers until the 1990's. Within the last 20 years, two series of studies,

the Infant Feeding Practices Studies (IFPS I and IFPS II) and Feeding Infants and Toddlers Studies (FITS 2002 and FITS 2008), have contributed significantly to the body of knowledge in this emerging field of research (17,18).

The IFPS I was a longitudinal study conducted from 1992-1993 by the US Food and Drug Administration (FDA), and IFPS II was conducted from 2005-2007 by the FDA in collaboration with the Centers for Disease Control and Prevention (CDC). These longitudinal studies focused on several feeding practices, such as breastfeeding, formula feeding and the addition of solid foods to the diet. The study sample for the IFPS II consisted of women in their third trimester of pregnancy recruited from a nationally distributed consumer opinion panel. Women experiencing generally low-risk or healthy pregnancies were eligible participants. Participation involved completion of one prenatal questionnaire and several postnatal questionnaires administered to mothers over the course of the infants' first year of life (17). In 2002, FITS, sponsored by Gerber Products Company, surveyed parents registered in the New Parent Database with children between 4 and 24 months of age to assess feeding practices and capture 24-hour dietary recall data (18). FITS 2008, sponsored by Nestlé Nutrition Institute, used an expanded sample size and included children from birth to 48 months (19). Specific results from the IFPS II and FITS 2008 relevant to the proposed research will be discussed in the literature review.

The findings from these landmark studies have enriched the body of knowledge in this growing field of research. However, as is true of most research, a critical analysis raises questions that support the need for future studies. Specifically, while the samples for both the IFPS II and FITS 2002 were geographically well distributed, the results cannot be generalized to the entire US population because both studies utilized samples that were not nationally representative, especially in the areas of average income and racial distribution (17,18). Although the findings cannot be generalized, the unique, well-conceptualized FITS methodology provides a solid foundation upon which to build future research involving specific groups of individuals, including at-risk populations. One such at-risk population of interest is the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC is a state-administered, federal government program that provides nutrition education and age-appropriate foods to low-income pregnant women, new mothers, and young children (20). Eligible participants are members of a household with an income at or below 185% of the federal poverty income level. For example, for a family of four to be eligible for WIC benefits, the annual income must not exceed \$40,793 (21). With over 9 million WIC participants in the United States, approximately a million of which live in Texas (22), sampling from a local WIC clinic is a practical way to evaluate feeding practices in a low-income sector of a community.

Considering the well-established association between early feeding practices and risk for childhood obesity (3,9,10,11,12,13,14,15,16), there is a need for evaluation of the potential factors associated with the higher than average childhood obesity rates in San Marcos, Texas (23). While the general assessment of feeding practices employed by a low-income population in San Marcos, Texas is valuable, evaluation of the maternal characteristics associated with certain feeding practices, such as breastfeeding and age of introduction of complementary foods, leads to a more sophisticated level of knowledge. Thus, a better understanding of these associations can facilitate identification of at-risk groups and development of targeted education and intervention programs related to infant and toddler feeding practices.

Research Objective

The aim of this research was to evaluate the associations between maternal characteristics and infant and toddler feeding practices, such as breastfeeding and introduction of complementary foods, in WIC participants in San Marcos, Texas. Employing methodology similar to FITS 2002 and 2008, the research assessed feeding practices with a 24-hour dietary recall and questionnaires, with additional survey questions included to capture information about maternal characteristics. Specifically, maternal characteristics, which can be divided into sociodemographic factors (age, level of education, marital status) and acculturation factors (language preference, country of birth, and length of residence in the United States) were evaluated

in association with the following feeding practices: breastfeeding initiation, breastfeeding duration, age of introduction of complementary foods, age of introduction of 100% fruit juice, and age of introduction of cow's milk. Based on current literature (24,25,26,27,28,29,30,31,32,33,34,35,36,37), with respect to breastfeeding, we hypothesized that: older women would be more likely to initiate and continue breastfeeding (26,27,28,30,31); women with higher levels of education would be more likely to initiate and continue breastfeeding (24,25,26,27,28,29,31); married women would be more likely to initiate and continue breastfeeding (24,26,27,28); and women with lower levels of acculturation, specifically recent immigrants who spoke Spanish in the home, would have higher rates of breastfeeding initiation and duration (32,33,34,35,36,37). With respect to feeding practices (24,25,38,39), we hypothesized that older (24,25,39), married, more educated (24,25,38,39) women would be more likely to comply with the AAP recommendations for introduction of complementary foods, 100% juice and cow's milk. Given the dearth of literature evaluating the association between maternal acculturation and introduction of complementary foods, 100% fruit juice and cow's milk, we did not propose hypotheses for these relationships. Instead, this study explored potential associations between maternal acculturation and these particular feeding practices.

CHAPTER II

REVIEW OF THE LITERATURE

Breastfeeding

Breastfeeding recommendations and current trends

The benefits of breastfeeding have been extensively studied (40,41, 42,43,44,45,46,47,48,49) and reviewed (4,5,49,50,51,52,53,54,55,56,57,58). Breastfeeding is associated with many benefits to the infant, including decreased risk of atopic eczema (43), asthma (48,51), gastrointestinal infections (41,43,58), and respiratory infections (42,49). Breastfeeding may also reduce the risk of developing type 2 diabetes (53), elevated blood cholesterol levels (57) and high blood pressure (50,54) later in life. In addition, several studies (40,44,45,46,47) and reviews (52,55,56) support a small but consistent protective effect of breastfeeding against obesity in children. The breastfeeding recommendations set forth by the AAP (5) and the ADA (4) underscore the importance of breastfeeding to infant development. The AAP (5) maintains that breast milk is sufficient to ensure proper growth and development of the infant through the first 6 months of

life and, thus, recommends early postpartum initiation of breastfeeding and exclusive breastfeeding for a duration of 6 months. Beyond 6 months, continued breastfeeding paired with age-appropriate complementary foods is advocated by the AAP (5). The ADA (4) echoes the position of the AAP and recommends exclusive breastfeeding for the first 6 months of life, and continued breastfeeding supplemented with complementary foods for at least 12 months (4). The importance of breastfeeding is evidenced by the inclusion of goals specific to breastfeeding in the national Healthy People 2010 (59) initiative. The goals included increasing the percentage of mothers who breastfeed: 1) in early postpartum period to 75%; 2) at 6 months to 50%; and 3) at 1 year to 25%. The baseline percentages, from 1998 data, were 64%, 29%, and 16%, respectively (59).

Researchers have assessed how close Americans are to meeting the Healthy People 2010 goals. Despite an increase in breastfeeding rates over the last decade, Americans still fall short of these goals. In an overview of findings from the National Health and Nutrition Examination Surveys from 1999 to 2006, McDowell et al. (60) reported that there was an increase in infants who were ever breastfed from 60% of infants born in 1993-1994 to 77% of infants born in 2005-2006. However, the rates of breastfeeding at 6 months of age remained consistent, about 30%, from 1993 to 2004 (60). According to the 2009 Breastfeeding Report Card (61) published by the CDC, 73.9% of infants born in the United States were ever breastfed, 43.4% were

breastfeeding at 6 months, and 22.7% were breastfeeding at 12 months. In addition, 33.1% of infants were exclusively breastfeeding at 3 months and 13.6% were exclusively breastfeeding at 6 months (61). According to this report, the national breastfeeding rates fall short of the Healthy People 2010 goals. In Texas, however, breastfeeding rates are more congruent with the Healthy People 2010 goals. Specifically, 78.2% of infants were ever breastfed and 25.3% were breastfeeding at 12 months. The 48.7% of infants breastfeeding at 6 months is just slightly under the Healthy People 2010 goal of 50% (61).

Although overall breastfeeding rates are on the rise, breastfeeding rates among WIC participants are persistently lower than non-WIC mothers. Data from the Ross Laboratories Mothers Survey, a national survey designed to evaluate patterns of feeding during infancy, revealed that from 1978 to 2003 rates of breastfeeding initiation among WIC participants were, on average, 23.6% lower than non-WIC participants (62). According to a facsimile from D. Villela, WIC Nutritionist (September 2009), among participants in the San Marcos WIC program, 75.8% of infants were ever breastfed, with breastfeeding rates dropping to 58% at 10 days postpartum.

Maternal characteristics associated with breastfeeding practices

Maternal age, education and marital status

Breastfeeding practices may be influenced by a variety of factors, including maternal characteristics such as age, education, and marital status. The associations between these maternal characteristics and breastfeeding have been evaluated by several groups of researchers (24,25,26,27,28,29,30,31). Hendricks et al. (24) performed a cross-sectional analysis of 2002 FITS data and investigated maternal characteristics associated with adherence to AAP infant and toddler feeding recommendations. Results of regression analysis, controlling for other measured variables, revealed that breastfeeding initiation was positively associated with maternal college education (OR: 2.8) and being married (OR: 1.7); breastfeeding initiation was negatively associated with having less than a high school education (OR: 0.4). Breastfeeding until at least 6 months was positively associated with being married (OR: 2.0) and having a college education (OR: 3.2). Continued breastfeeding to 12 months was positively associated with maternal college education (OR: 3.9). Maternal age was not found to be related to breastfeeding initiation or duration (24). In a similar analysis, Grummer-Strawn et al. (25) analyzed data from the IFPS II to examine maternal characteristics associated with infant feeding practices, including breastfeeding. In a sample of 1,782 respondents, the authors identified several factors associated with infant feeding behavior. When

adjusted for maternal demographic characteristics and other measured variables, breastfeeding initiation was positively associated with some college education and negatively associated with older maternal age. In addition, when compared to mothers with less education, college-educated mothers had higher rates of breastfeeding at 6 months (25).

In addition, data from two large ongoing surveys administered to households with young children, the Pregnancy Risk Assessment and Monitoring System and the National Immunization Survey (NIS), were analyzed for associations between maternal characteristics and breastfeeding practices. In an analysis of the 2000-2001 Pregnancy Risk Assessment and Monitoring System data from 32,694 new mothers in 31 states, Ahluwalia and colleagues (26) found that women who had less than a high school education or who were not married were less likely to initiate breastfeeding. In addition, women younger than 25 years of age were less likely to initiate and continue breastfeeding (26). The 2002 NIS data from 3,444 parents of children ages 19 to 35 months old was analyzed by Li et al. (27) for significant associations between maternal characteristics and breastfeeding initiation and continuation. Bivariate analyses revealed that older, more educated, and married mothers had higher rates of breastfeeding initiation and duration (27). Subsequently, Forste and Hoffman (28) analyzed data from a sample of 61,218 parents that participated in the 2003-2004 NIS. Logistic regression models revealed that the odds of initiating breastfeeding were lowest among

mothers with less than a college education and mothers who were never married or were divorced. Mothers with a college degree were more likely to initiate breastfeeding than mothers with less than a high school education (OR: 0.36, $p < .001$), a high school diploma (OR: 0.40, $p < .001$), or some college education (OR: 0.60, $p < .001$). Furthermore, married mothers were more likely to initiate breastfeeding than mothers who were never married (OR: 0.56, $p < .001$) or were divorced, separated, or widowed (OR: 0.72, $p < .001$). With respect to maternal education level and marital status, the results for breastfeeding duration were similar. Mothers with a college degree were more likely to breastfeed at least 6 months compared to mothers with less than a high school education (OR: 0.68, $p < .001$), a high school diploma (OR: 0.63, $p < .001$), or some college education (OR: 0.68, $p < .001$). Married mothers were more likely to breastfeed at least 6 months compared to mothers who were never married (OR: 0.77, $p < .001$) or were divorced, separated, or widowed (OR: 0.72, $p < .001$). While maternal age was not significantly associated with breastfeeding initiation, older mothers were more likely to continue breastfeeding. Teenage mothers (OR: 0.48, $p < .001$) and mothers 20 to 29 years old (OR: 0.80, $p < .001$) were less likely to breastfeed at least 6 months than mothers 30 years or older (28).

Similar analyses of maternal characteristics associated with breastfeeding have been performed in a few regional studies. Heck et al. (29) investigated socioeconomic factors associated with breastfeeding initiation by

evaluating data from 10,316 women who participated in the California Maternal and Infant Health Assessment between the years 1999 and 2001. The California Maternal and Infant Health Assessment survey was mailed to a random sample of women 10-14 weeks postpartum. Based on previous studies, the authors had hypothesized that maternal education would be positively associated with breastfeeding initiation. Results of unadjusted logistic regression models revealed that several characteristics, including young age and lower education level, were significantly associated with decreased likelihood of breastfeeding initiation. When the researchers adjusted for a variety of potentially confounding variables, including the method of delivery, low birth weight, parity, postpartum length of stay, trimester of prenatal care initiation, smoking during pregnancy, drinking alcohol during pregnancy, marital status, and language spoken at home, maternal age was no longer significantly associated with breastfeeding initiation. Therefore, only maternal education remained significantly associated with breastfeeding initiation. Mothers with less education were more likely to refrain from breastfeeding. Specifically, when compared to mothers with at least a college degree, mothers who did not finish high school (OR: 2.33) and those who finished high school/earned a GED (OR: 2.34) had more than two times higher odds of not breastfeeding (29).

Bolton et al. (30) evaluated maternal characteristics associated with longer breastfeeding duration in a sample of 5,067 participants in the

Michigan Breastfeeding Initiative. Stepwise multiple linear regression analyses revealed that, when controlled for education, birth weight, and gestational age, increasing maternal age was significantly associated with longer durations of breastfeeding in all participant groups (30). Hurley and colleagues (31) conducted a cross-sectional telephone survey to examine breastfeeding behaviors in a sample of 767 WIC participants in Maryland. Results of a logistic regression model revealed that maternal education level and age were significantly associated with breastfeeding initiation. Mothers with less than a high school education (OR: 0.51, $p = .001$) or only a high school diploma (OR: 0.48, $p < .001$) were half as likely to initiate breastfeeding as mothers with any college education. Increased maternal age (OR: 1.03, $p = .02$) was positively associated with breastfeeding initiation. With respect to breastfeeding duration, a series of Cox proportional hazards regression models were employed to evaluate the association between maternal characteristics and breastfeeding cessation. Compared to mothers with any college education, mothers without a high school education (HR: 1.87, $p < .001$) and mothers with only a high school diploma (HR: 1.56, $p = .001$) were more likely to stop breastfeeding. In addition, rates of breastfeeding cessation were higher in younger mothers (HR: 0.93, $p < .001$) (31).

Maternal acculturation

Acculturation is a multidimensional process that involves changes in an individual as a result of contact with individuals from a different culture (63). Given the complexity of acculturation, unidimensional instruments do not provide an accurate assessment of the degree of acculturation of an individual. Therefore, it is necessary to evaluate acculturation with several proxy measurements, such as country of origin, language use and preference, ethnic identification, and years of residence in the United States. For the past few decades, there has been considerable interest in acculturation as a major explanatory variable in the study of ethnic minorities, especially in the area of health behaviors (63). For example, The Fragile Families and Child Wellbeing Study is a longitudinal study that involves a cohort of nearly 5,000 children born in large US cities between 1998 and 2000 (64). Given that the sample contains a large number of minorities and immigrants, the data from this study can be useful in evaluating the influence of acculturation on feeding practices, such as breastfeeding.

Kimbro et al. (32) analyzed data from the Fragile Families and Child Wellbeing Study to evaluate whether and to what extent acculturation was associated with breastfeeding initiation and duration among Mexican-Americans. The researchers used traditional measures of acculturation, including immigrant generation and language preference, but also included such measures as church attendance, cultural engagement and traditional

gender views. Assuming a continuum of acculturation levels, the researchers categorized Mexican immigrants as the least acculturated and whites the most acculturated, with Mexican-Americans (i.e. born in the United States) falling somewhere in between. The researchers used logistic regression analysis in three different models to estimate the associations between acculturation and breastfeeding initiation and duration. Model One, which included only race/ethnicity and maternal nativity covariates, revealed that compared to white mothers, Mexican immigrants had three times the odds (OR: 3.02, $p < .001$) of initiating breastfeeding. When social characteristics such as age, education level, and WIC participation were added in Model Two, the odds of initiating breastfeeding for Mexican immigrants increased to 5.13 ($p < .001$). When, in Model Three, the acculturation variables were considered in addition to all variables used in Models One and Two, the odds of breastfeeding initiation for Mexican immigrants decreased by about 20% (OR: 3.84, $p < .001$). The results of Model Three suggest that acculturation is responsible for a modest portion of the differences between breastfeeding initiation rates in Mexican immigrant and white mothers. With respect to breastfeeding duration, the first model revealed that Mexican immigrants had lower odds of quitting breastfeeding than white mothers (OR: 0.80, $p < .01$). In the second model, the odds decreased (OR: 0.61, $p < .001$), but the significance disappeared in the third model. When considered together, the results from these models suggest that acculturation accounts for some of the

difference between whites and Mexican immigrants in breastfeeding initiation, and much of the difference for breastfeeding duration (32).

In another analysis of data from the Fragile Families and Child Wellbeing Study, Gibson-Davis and Brooks-Gunn (33) evaluated immigrant status in association with breastfeeding behavior. When controlling for several demographic characteristics, such as age, marital status, education, and income, logistic regression analysis revealed that immigrants were significantly more likely to breastfeed than nonimmigrants. Compared to immigrant mothers, those born in the United States had 85% lower odds of breastfeeding (OR: 0.150, $p < .01$), and 66% lower odds of breastfeeding at 6 months (OR: 0.3444, $p < .01$). In addition, each year of residency in the United States was associated with a decrease in the odds of initiating breastfeeding (OR: 0.958, $p < .01$) and continuing breastfeeding to 6 months of age (OR: 0.971, $p < .05$). Covariate-adjusted proportions results were consistent with the regression analysis results: immigrant mothers breastfed at much higher rates than nonimmigrant mothers (33).

In an analysis of data from the 1999-2000 National Health and Nutrition Examination Survey, Gibson and colleagues (34) evaluated breastfeeding practices in relation to acculturation status. Acculturation status among Hispanics was assessed using a validated language scale, and respondents were categorized as having low or high acculturation. Chi-square tests revealed that low acculturated women were more likely to breastfeed

than white women and highly acculturated women ($p = .028$). In the logistic regression analysis, when controlled for education, age, and income, highly acculturated women (OR: 0.23) were less likely to breastfeed than low acculturated women (34).

Using multiple measures of maternal acculturation (country of origin, parents' country of origin, years of US residence, and language use), Sussner et al. (35) evaluated the influence of acculturation on breastfeeding initiation and duration in a sample of more than 1,000 WIC participants in the northeastern United States. Multivariable logistic regression models were developed for two groups: immigrants only and all participants. Although breastfeeding initiation rates were similar among participants, within the immigrant group, mothers who exclusively used their native language had almost three times the odds (OR: 2.94, $p \leq .05$) of breastfeeding for at least 6 months compared with immigrant mothers with non-exclusive language use. Similarly, across participants, mothers with exclusive native language use had twice the odds of initiating breastfeeding compared to mothers with non-exclusive use (OR: 2.07, $p \leq .05$) (35).

Harley et al. (36) evaluated the association between years of residence in the United States and breastfeeding initiation and duration. For this study, 490 pregnant women were recruited in a region of California with a large population of people of Mexican descent. Each subject was interviewed during pregnancy, postpartum, and when her child was 6 months, 1 year, 2

years and 3.5 years of age. Chi-square tests revealed that women who had lived their entire lives in the United States had the lowest rates of breastfeeding initiation and women who had lived in the United States for less than 5 years had the highest rates of breastfeeding initiation ($p < .001$). With respect to duration, rates of breastfeeding at 6 months and 12 months decreased with increased years of residence in the United States ($p < .001$). Results of Cox proportional hazards regression models indicated that among women who initiated breastfeeding, lifetime residents were more than two times more likely (OR: 2.6, $p < .001$) to cease breastfeeding than women who had lived in the United States for 5 years or less (36).

Celi and colleagues (37) evaluated the impact of immigration status on breastfeeding initiation in a cohort of 1,829 pregnant women in Massachusetts. The subjects were interviewed within one month after delivery. The researchers used three logistic regression models to examine the association between immigrant status and breastfeeding initiation. Model One adjusted for maternal age only, Model Two adjusted for maternal age and socioeconomic status (measured by marital status, household income, and education level), and Model Three adjusted for participant's parents' immigrant status and whether the participant was breastfed as an infant in addition to the variables listed in Model Two. Model One revealed that foreign-born Hispanics were twice as likely (OR: 2.0) to initiate breastfeeding than U.S.-born whites. In Model Two, the odds of initiating breastfeeding for

foreign-born Hispanics increased to 3.6. Finally, in Model Three, when all potential confounding variables were considered, foreign-born Hispanics were 1.8 times more likely to initiate breastfeeding than U.S.-born whites. This association between immigrant status and breastfeeding initiation suggests that cultural factors are important components involved in the decision to breastfeed (37).

Addition of Complementary Foods

Recommendations for addition of complementary foods

For most infants, breast milk provides adequate nutrition through 6 months of age; between 4 and 6 months of age, complementary foods should be introduced into the diet (4,5). If chosen appropriately, complementary foods can provide necessary nutrients for the growing child. The appropriate age of introduction varies and can be determined based on assessment of the child's developmental stage. In general, a baby that can sit with support can be offered small amounts of complementary foods. Although the child may push the food out of the mouth with the tongue, this will gradually decrease with age. A child who sits independently is generally able to lean toward the food being offered and scrape food from the spoon with the upper lip (65).

The AAP and the World Health Organization define complementary foods as any food or liquid other than breast milk given to young children; this definition would include infant formula as a complementary food (65).

Given the low rates of exclusive breastfeeding and the popularity of infant formula, for the purpose of this research, complementary foods refers to any food or liquid, other than breast milk or formula, given to an infant in the first 12 months of life. The Dietary Guidelines for Americans does not address feeding recommendations for children under 2 years of age (66). However, the AAP recommends introduction of complementary foods around 6 months of age, with introduction no earlier than 4 months (5). In addition, introduction of 100% fruit juice and cow's milk should be delayed until at least 6 months and 12 months, respectively (7,8).

Maternal characteristics associated with addition of complementary foods

Maternal age, education and marital status

In the previously mentioned analysis of FITS data by Hendricks and colleagues (24), logistic regression analysis revealed that mothers with a college education were more likely to comply with the juice (OR: 1.4) and complementary food (OR: 2.0) recommendations. In addition, older mothers (OR: 1.05) were more likely to introduce complementary foods at the appropriate age (24). Grummer-Strawn et al. (25) found similar results in an analysis of IFPS II data; adherence to the recommendation to delay introduction of complementary foods was more common among college-educated mothers (OR: 2.42) and mothers at least 25 years old (OR: 1.46). However, compliance with complementary feeding recommendations was less

common among WIC participants (OR: 0.60) (25). Similarly, in an analysis of IFPS II data, Fein et al. (38) found that mothers with a high school education or less were more likely to be noncompliant with the recommendations for age of introduction of complementary foods, age of introduction of 100% juice, and age of introduction of cow's milk (38).

A systematic review by Wijnedaele et al. (39) evaluated the determinants of early introduction of complementary foods and early introduction of cow's milk. The review included 78 studies in developed countries, published between 1976 and 2008, that quantified the association between either feeding practice and its potential determinants. The strength of the evidence for each determinant was categorized as inconclusive, limited, moderate, or strong. Strong evidence indicated that the determinant was evaluated in three or more high-quality studies and $\geq 75\%$ of results were consistent. Strong evidence was found for young maternal age and low maternal education as determinants of early introduction of complementary foods. Additionally, strong evidence was found for low maternal education as a determinant for early introduction of cow's milk (39).

Maternal acculturation

A systematic literature search using MEDLINE was performed to locate studies investigating the association between maternal acculturation variables and feeding practices. The search included all possible combinations of the following keywords related to acculturation

(acculturation, immigrant, length of residence, birthplace, language, and language preference) and the following keywords related to feeding practices (feeding practices, complementary foods, cow's milk, milk, fruit juice, juice).

This systematic search did not yield any literature addressing maternal acculturation and these feeding practices.

CHAPTER III

METHODS

Overview

Following Institutional Review Board guidelines, over a 3 month period, researchers recruited 162 participants for this study at the WIC clinic in San Marcos, Texas. Participation involved completion of a telephone interview during which a 24-hour dietary recall of the infant/toddler and feeding practices, health history and demographic information were collected. Upon full completion of the interview, a thank you letter and a \$10 grocery gift card were mailed to the participant. All materials, including the screening form, consent form, thank you letter, and questionnaires were generated in English and then translated to Spanish. In addition, based on the preference of the subject, bilingual interviewers were available to perform telephone interviews in Spanish.

Subjects

Since WIC participants are required to attend a nutrition education class every 3 months, we recruited during weekly nutrition classes in pursuit

of a fairly representative convenience sample from the San Marcos WIC clinic. Between June 9, 2009 and September 29, 2009, bilingual researcher recruited 162 participants. Of the 162 participants recruited, 98 subjects completed the study. The remaining 64 did not complete the study for various reasons: 11 did not answer any of the 20 attempted phone calls; four had children who became older than 3 years of age and were no longer eligible for participation; three declined to participate when called; 46 did not participate because researchers had collected data from the target number of subjects (approximately 100) and, thus, ceased data collection.

Those eligible for recruitment were currently enrolled in WIC and had at least one child between the ages of 4 months and 2 years. Interested participants were given verbal and written explanations of the study and informed of the incentive for full participation, a \$10 grocery gift card. Those who wished to participate were asked to sign an informed consent contract (see Appendix A) and complete a screening form (see Appendix A) that included days and hours of availability and preferred language for a subsequent telephone interview. Each participant was provided with a signed copy of the consent form and a Food Amounts Booklet to be used during the interview. Upon recruitment, each participant was assigned a subject number and contact information was entered into a confidential database. A folder was created for each subject and all folders were maintained in a locked filing cabinet.

Within one week of recruitment, an interviewer attempted to contact the subject via telephone to conduct the interview. The date, time and status of each call was recorded in the telephone contact log in the subject folder. Additional calls were attempted up to 20 times; subjects who either did not answer the telephone or did not complete the interview were categorized as “lost.” When subjects answered, the interviewer followed a script (see Appendix B) that included a brief introduction and a reminder of the purpose of the call. If the subject said that it was a convenient time, the interviewer conducted a 24-hour dietary recall of what the infant/toddler ate during the previous day and asked questions included in the Demographic Questionnaire (see Appendix B), Health History Questionnaire (see Appendix B), and Feeding Practices Questionnaire (see Appendix B).

24-hour Recall

Dietary intake data was collected and analyzed using Nutrition Data System for Research (NDSR) software version 2009, developed by the Nutrition Coordination Center, University of Minnesota, Minneapolis, MN. NDSR, a 24-hour dietary recall collection software with a comprehensive food and nutrient database, is designed to assist researchers in the collection of 24-hour recalls and the analysis of food records, menus, and recipes. It features a multiple-pass approach that prompts for complete food descriptions, detailed food preparation methods, and additions. This detailed approach facilitates collection of complete and accurate recalls.

Before commencing the 24-hour recall portion of the interview, the interviewer asked the subject if the child was with him/her during the entire 24-hour recall period. If the child was in the care of someone other than the subject, the subject was asked if he/she had complete knowledge of what the child consumed. If the subject was uncertain, the interviewer asked permission to contact the caregiver to obtain missing recall data.

Then, following the prompts from NDSR, the interviewer proceeded to collect the 24-hour recall data. The first pass in the multiple-pass approach involved the recording of a “quick list.” The interviewer started by asking “What was the first thing your child had to eat after midnight yesterday?” Based on the subject’s response, the interviewer entered the following information for each meal: meal time, meal name, meal location, and each item (food and liquids) consumed during the meal. During the second pass, the interviewer reviewed all items in the quick list and confirmed accuracy with the subject. The third pass involved addition of descriptions and quantities for each food recorded in the quick list. Finally, the food record was reviewed and any necessary changes were made during the final pass.

At the conclusion of the recall, the interviewer asked the subject if he/she ever gives the child dietary supplements. If the subject answers “yes,” the interviewer entered the name of the supplement and amount given in the notes section of the recall. The interviewer also asked if the amount of food eaten by the child during the recall period was “usual,” “a lot more than

usual,” or “a lot less than usual.” If the subject responded that the intake was more or less than usual, the interviewer asked the subject to provide an explanation. This information was recorded in the notes section as well. At this point, the interviewer made a judgment regarding the reliability of the food and beverage information provided by the subject and selected “reliable” or “unreliable” in NDSR. For example, if a subject was noticeably distracted or unable to recall one or more meals, the interviewer might deem the recall unreliable. An explanation of the judgment with respect to reliability was included in the notes.

Food Amounts Booklet

During recruitment, subjects were given a Food Amounts Booklet to use as a guide for communicating the amounts of foods eaten to the interviewer during the 24-hour dietary recall. Subjects were asked to keep this resource near the telephone so that it would be readily available during the interview. The Food Amounts Booklet included pictures of squares, circles and wedges to assist the subject in identifying the size and thickness of food items. Pictorial representations of commonly used spoons (i.e. measuring, eating, and serving), measuring cups, multiple sizes of drinking glasses, including “sippy cups” and coffee mugs, and bowls with graduated lines were included to facilitate communication of recipe components and beverage amounts. The subject copy and interviewer copy of the Food Amounts Booklet differed with respect to the pictures: the subject copy had pictures with

graduated lines labeled only with letters, and the interviewer copy included amounts for each letter-labeled line. Thus, the subject needed only communicate the letter associated with the line on the picture, and the interviewer could calculate the amount consumed by the child.

Questionnaires

Upon successful completion of the 24-hour dietary recall, the interviewer informed the subject that the next phase of the interview would involve the completion of three questionnaires, the Feeding Practices, Demographic, and Health History questionnaires. To administer each questionnaire, the interviewer read each question with all possible answers and waited for the subject to respond. Each response was recorded on the questionnaire by the interviewer. Because of the nature of the questions, validation of the questionnaires was not necessary.

The Feeding Practices Questionnaire consisted of questions adapted from the FITS 2002 questionnaire and the CDC's NIS (67). It included questions about breastfeeding practices, such as initiation, duration, and reasons for and influences on breastfeeding cessation. Questions also addressed infant formula use, age of introduction of 100% fruit juice, and age of introduction of cow's milk. In addition, timing of introduction of specific complementary foods, such as infant cereal, fruit, vegetables, meats, sweets, and salty snacks were assessed. The Feeding Practices Questionnaire also

included age-appropriate questions about motor skills, such as the ability to sit without support, crawl, walk, and self-feeding skills, such as the ability to grasp food with hands, drink from a cup and self-feed with a spoon or fork.

The Demographic Questionnaire included questions about the subject, including age, relationship to the child, marital status, educational attainment, employment status and race/ethnicity. The subject was also asked questions related to acculturation, including language preference, country of origin and years of residency in the United States. If the subject was married, the demographic and acculturation information was also gathered for the spouse. With respect to the child, the following information was gathered: gender, first name, date of birth, and the age at the time of the interview.

The Health History Questionnaire included questions about whether the subject had any of the following conditions: diabetes, cardiovascular disease, lung disease, kidney disease, liver disease, asthma, and allergies. The subject was also asked for his/her height and weight and the body mass index were calculated after the interview. All of the above mentioned information was also collected for the spouse, if applicable. The subject was also asked if the subject and/or the child had medical insurance. The Health History Questionnaire included questions about gestational age, the child's birth weight, and the child's current weight and height. The subject also was

asked if the child had been sick in the past 2 weeks and if the child had any problems with specific foods, such as dairy, eggs, nuts, grains, or soy.

Quality Assurance

The quality assurance process involved review of two sets of data for each subject: the questionnaire data and the 24-hour dietary recall data. All questionnaire data were manually entered into a Statistical Package for the Social Sciences (SPSS) database by research assistants. Lead researchers reviewed each entry for accuracy. To verify the accuracy of the 24-hour dietary recalls, a “Foods Report” and a “Record Properties Report” were printed from NDSR for each subject. Following a checklist, lead researchers checked for unrealistic amounts by reading each food and beverage and visualizing the amounts entered. Lead researchers also confirmed that the date of entry and interviewer identification were entered correctly, and read all NDSR notes for completeness and accuracy. Upon completion of the quality assurance of the 24-hour dietary recalls, the NDSR data were transformed and imported into the SPSS database.

Researchers

Working under the tutelage of the principal investigator, two graduate students managed the daily operations of the research project. One graduate student completed training for NDSR at the University of Minneapolis and developed training materials that were used for all researchers involved in

the project. Several undergraduate students were selected to be interviewers in this research and were required to complete several training components, including online human subjects research training, NDSR training, and mock interviews, prior to having contact with the subjects. Human subjects research training was completed through an online course offered by Collaborative Institutional Training Initiative. Certificates of completion for all researchers were maintained on file in the research office. When the researcher was fully trained, he/she began conducting supervised interviews.

Statistical Analysis

Statistical analyses were conducted using SPSS (version 17.0). Tables 1 and 2 present the methods by which each feeding practice and maternal characteristics variable was measured. For univariate analyses, means and standard deviations were reported for interval/ratio variables and frequency distributions were reported for ordinal and nominal/categorical variables. With respect to bivariate analyses, the appropriate tests were chosen based on the level of measurement of the variables to be analyzed. Table 3 presents the specific tests used to assess the relationships between each maternal characteristic variable and each feeding practice variable.

Table 1. Feeding Practices Questionnaire questions to assess feeding practices variables			
Feeding practice	Question	Possible answers	Level of Measurement
Breastfeeding initiation	Was your child ever breastfed or fed breast milk?	Yes No	Dichotomous nominal/categorical
Breastfeeding duration	How old was your child when you completely stopped breastfeeding and pumping milk?	Age in weeks	Interval/ratio
Age of introduction of cow's milk	How old was your baby when he or she first had cow's milk or any other milk (rice, soy, goat or other)?	Before 4 months 4-6 months 7-11 months 12 months or older Never had it	Ordinal
	How old was your child when he/she was first fed cow's milk (not breast milk or formula) on a daily basis?	Age in weeks or months Never fed cow's milk	Interval/ratio
Age of introduction of 100% juice	How old was your baby when he or she first had 100% fruit or vegetable juice?	Before 4 months 4 months 5 months 6 months or more Never had it	Ordinal
Age of introduction of complementary foods	How old was your baby when he or she was first fed anything other than breast milk or formula?	Age in weeks or months Never fed anything other than breast milk/formula	Interval/ratio

Table 2. Demographic Questionnaire questions to assess maternal characteristics variables			
Maternal characteristic	Question	Possible answers	Level of Measurement
Age	Caregiver age?	Number in years	Interval/ratio
Level of education	What is the highest degree or level of school that you have completed?	Elementary school Middle school High school Associate's degree Bachelor's degree	Ordinal
Marital status	What is your marital status?	Now married Living with partner Widowed Divorced Separated Never married	Nominal/categorical
Language preference	What language do you most often speak when you are at home?	English Spanish Both	Nominal/categorical
Country of birth	Where were you born?	U.S. Mexico Other	Nominal/categorical

Table 3. Statistical tests used to assess relationships between maternal characteristics and feeding practices						
	Age	Education	Marital status	Language preference	Country of birth	Length of residence
Breastfeeding initiation	t-test	t-test	chi ²	chi ²	chi ²	t-test
Breastfeeding duration	correlation	correlation	ANOVA	ANOVA	t-test	correlation
Age of introduction of cow's milk	correlation	correlation	t-test	ANOVA	t-test	correlation
Age of introduction of 100% juice	correlation	correlation	t-test	ANOVA	t-test	correlation
Age of introduction of	correlation	correlation	chi ²	ANOVA	t-test	correlation

CHAPTER IV

RESULTS

Descriptive Statistics

While 98 subjects were interviewed for this study, only 94 were included in these analyses. Data for 4 subjects were eliminated because the study objectives were concerned with maternal caregivers. However, there was missing data for some subjects, so the number of subjects varies for some variables. Tables 4 and 5 present the means and standard deviations (SD) and/or frequencies for all maternal characteristic and feeding practices variables included in the analyses.

Bivariate Analyses

Association between maternal age and breastfeeding duration

A Pearson correlation test evaluated the relationship between maternal age and breastfeeding duration. This test revealed a weak, positive correlation between maternal age and breastfeeding duration (Pearson's $r = .343$, $p = .011$). This result indicates that older mothers breastfed for longer durations.

Table 4. Maternal characteristics of participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in San Marcos, Texas

	<i>n</i>	<i>mean ± SD^a</i>
Age (y)	90	27.3±5.3
Length of residence in U.S.	30	10.2±5.8
	<i>n</i>	%
Education	93	–
Elementary school	1	1.1
Middle school	16	17.2
High school	56	60.2
Associate's degree	13	14.0
Bachelor's degree	7	7.5
Marital status	94	–
Now married	48	51.1
Living with partner	14	14.9
Divorced	4	4.3
Separated	2	2.1
Never married	26	27.7
Language preference	94	–
English	55	58.5
Spanish	28	29.8
Both	11	11.7
Country of birth	94	–
U.S.	60	63.8

Table 5. Feeding practices of participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in San Marcos, Texas

	<i>n</i>	<i>mean ± SD^a</i>
Breastfeeding duration (wks)	57	22.4±25.1
Age of introduction of cow's milk on a daily basis (wks)	45	52.5±14.6
Age of first introduction of complementary foods (wks)	91	19.2±7.2
	<i>n</i>	%
Breastfeeding initiation	94	–
Yes	78	83
No	16	17
Age of first introduction of cow's milk	92	–
4-6 months	1	1.1
7-11 months	10	10.9
12 months or older	36	39.1
Never had it	45	48.9
Age of first introduction of 100% juice		
Before 4 months	3	3.3
4 months	8	8.7
5-11 months	20	21.7
12 months or older	41	44.3

Association between maternal country of birth and breastfeeding duration

An independent-samples t test compared the mean breastfeeding duration for Mexican-born mothers ($M = 35.47$, $SD = 17.01$) with those of US-born mothers ($M = 15.30$, $SD = 24.77$). This comparison was found to be statistically significant, $t(52) = -2.97$, $p = .005$. This result indicates that Mexican-born mothers breastfed, on average, 20 weeks longer than US-born mothers.

Association between maternal age and age of first introduction of cow's milk

A Pearson correlation test assessed the relationship between maternal age and age of first introduction of cow's milk. This test revealed a weak, negative correlation between maternal age and age of first introduction of cow's milk (Pearson's $r = -.216$, $p = .043$). This result indicates that younger mothers introduced cow's milk later than older mothers.

Association between maternal education level and age of introduction of cow's milk on a daily basis

A Pearson correlation test assessed the relationship between maternal level of education and age of introduction of cow's milk on a daily basis. This test revealed a weak, positive correlation between maternal level of education and age of introduction of cow's milk on a daily basis (Pearson's $r = .333$, $p =$

.027). This result indicates that mothers with higher levels of education delayed introduction of cow's milk on a daily basis.

Association between maternal education level and age of first introduction of 100% juice

A Pearson correlation test examined the relationship between maternal level of education and age of first introduction of 100% juice. This test revealed a weak, positive correlation between maternal level of education and age of first introduction of 100% juice (Pearson's $r = .231$, $p = .027$). This result indicates that mothers with higher levels of education delayed introduction of 100% juice.

Regression Analysis

Table 6 presents the B coefficients and P values for the model testing the association between breastfeeding duration and maternal age, education level, and country of origin. The results indicate that each year of maternal age was associated with a 1-week longer breastfeeding duration, each increase in education level was associated with a 10-week longer duration, and mothers born in Mexico breastfed almost 28 weeks longer than those born in the United States.

Table 6. Multivariate linear regression associations between maternal characteristics and breastfeeding duration in Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participants in San Marcos, Texas

Breastfeeding Duration (n=54)		
Characteristic	B Coefficient	P value
Age	1.28	0.027
Education level	10.12	0.026

CHAPTER V

DISCUSSION

The importance of breastfeeding is underscored by the AAP recommendations and the Healthy People 2010 objectives, but national studies reveal that breastfeeding practices are currently not meeting these standards. In this study of WIC participants in San Marcos, Texas, the breastfeeding initiation rate was 78%, which exceeds the Healthy People 2010 goal of 75% of mothers initiating breastfeeding. From another perspective, the women in this study that initiated breastfeeding had an average breastfeeding duration of 22 weeks, which does not comply with the AAP's recommendation to breastfeed at least 6 months. In addition to providing a better understanding of the general breastfeeding trends in San Marcos WIC participants, this study provides insight into the maternal characteristics that may influence breastfeeding practices. These findings suggest that in WIC participants, a relatively homogeneous population with respect to income, mothers that are older and mothers that have higher levels of education breastfed longer. For both maternal age and maternal education level and breastfeeding duration, the literature evaluating breastfeeding

duration is discordant. Our findings were consistent with several previous studies that found maternal age to be positively associated with breastfeeding duration (26,27,30,28,31). Similarly, with respect to maternal level of education, our findings were consistent with several previous studies that found a positive association between maternal education and breastfeeding duration (24,25,27,28,31).

The decision whether to breastfeed is influenced by a complex set of factors, and the investigation of maternal characteristics associated with breastfeeding practices represents a small area of this multifaceted issue. Thus, the discordant nature of the literature is not surprising. For instance, intent to breastfeed has been reported to be a primary determinant of whether a mother initiates breastfeeding (26,68,69). Additionally, previous experience with breastfeeding is another potentially important factor involved in successful breastfeeding outcomes (30,70). Finally, some factors may influence a woman's decision to cease breastfeeding. In fact, some studies have revealed that women reported that they stopped breastfeeding due to a concern that the infant was not getting adequate milk supply (26,31,71,72). Physical discomfort and breastfeeding difficulties, such as trouble with latching, were also often cited as reasons for breastfeeding cessation (26,31,71,72).

Our findings indicated that the maternal country of origin was relevant in a mother's feeding choice. In this study, Mexican-born mothers

breastfed significantly longer than US-born mothers. Our findings are consistent with some studies (32,33), but were not consistent with one study that found no association between maternal country of origin and breastfeeding duration (35). Differences in breastfeeding behavior may be influenced by how breastfeeding is perceived and the cultural acceptance of breastfeeding. In the United States, supplementing breast milk with formula early in an infant's life and early cessation of breastfeeding are common practices. However, immigrant women may retain the cultural norms of their home countries and may view breastfeeding as the common and accepted method of infant feeding (73). Thus, the influence of cultural norms may, in part, explain the difference in breastfeeding duration between Mexican-born and American-born mothers. Further research is needed to elucidate the complex dynamics of what happens to cultural traditions and how they may be abandoned during the process of acculturation.

While breastfeeding practices and trends have long been a subject of interest among researchers, and have been extensively reviewed (74,75,76,77,78,79,80,81,82), research investigating other areas of feeding practices, such as age of introduction of complementary foods, is a newer field of research. The AAP's recommendation to delay introduction of cow's milk until 12 months of age is supported by a significant body of research supporting the negative implications of early introduction of cow's milk (8). Although this recommendation is well-established, the investigation of

practices related to introduction of cow's milk is relatively new. In contrast with previous studies that found no association between maternal age and age of introduction of cow's milk (24,25,38) and a review that found strong evidence for young maternal age as a determinant of early introduction of cow's milk (39), this study found that older mothers were less likely to wait the recommended year to introduce cow's milk. Conversely, our study revealed a positive association between maternal education and age of introduction of cow's milk on a daily basis. The findings from studies evaluating maternal education and age of introduction of cow's milk are discordant (24,25,38,39). For example, one study (38) and a review (39) found that mothers with lower levels of education were more likely to be noncompliant with AAP recommendations for age of introduction of cow's milk, two other groups of researchers (24,25) found no association between maternal education and age of introduction of cow's milk.

The AAP recommends delaying the introduction of 100% juice until at least 6 months of age (7). In this study, several maternal characteristics were evaluated with respect to age of introduction of 100% juice. The findings indicate a positive association between maternal education and age of introduction of 100% juice. Although research is limited in this area, these findings agree with findings from two studies (24,38). The AAP's recommendation to delay introduction of 100% juice is based on the concern that, especially when introduced before solid foods, juice may replace breast

milk and/or formula in the diet, leading to inadequate intake of vital nutrients (7). Given that infants have an innate preference for sweet tastes and energy dense foods and beverages (9), introduction of 100% juice during infancy and toddlerhood may reinforce this preference for sweet and initiate a habit of regular consumption of sweet beverages. This habit may be sustained into childhood and adolescence and lead to regular consumption of energy dense beverages, such as sodas and other sugar-sweetened beverages. While a study conducted by Faith and colleagues (83) involving more than 2,000 low-income preschoolers found that increased fruit juice consumption was associated with excess adiposity gain in children who were initially at risk for overweight or overweight (83), some more recent studies have found no association between 100% juice consumption and overweight in children and adolescence (84,85). However, consumption of sugar-sweetened beverages is associated with overweight in children and adolescents (86,87,88,89,90) and increases the risk of developing chronic diseases such as type 2 diabetes and cardiovascular disease (90). Therefore, the concern about displacement of necessary nutrients coupled with the evidence supporting the long-term health implications make a powerful case against the early introduction of 100% juice to infants.

Several limitations may influence the results of this study. One limitation is the sample size. Although the sample size was chosen in advance to ensure adequate statistical power and allowed for significant

results in several areas, a larger sample size may have produced stronger correlations in a few areas. For example, the weak correlation between maternal age and breastfeeding duration was heavily influenced by a few outliers, and increasing the sample size may have limited the influence of the outliers. In addition, an important limitation to our study was the assumption that the sample was relatively homogenous with respect to income. In consideration of the sensitivity of the subject of income, questions about income were not included in the questionnaires. However, the fact that income data was not gathered made it impossible to rule out income as a confounding variable in our analyses.

One additional study limitation is the unavailability of data on the individual timing of enrollment in WIC. Ziol-Guest and colleagues (91) found that entry into the WIC program during the first or second trimester of pregnancy was associated with reduced likelihood of initiation of breastfeeding and early cow's milk introduction, and entry into the WIC program during the first trimester was associated with reduced duration of breastfeeding. Thus, asking about pregnancy stage at time of WIC enrollment may have further elucidated the impact of WIC participation on the complexities of feeding practices.

Finally, by nature, a retrospective study is subject to recall bias. While a prospective study would provide more accurate data on details related to feeding practices, the expense and labor involved precluded investigators

from employing this approach. A recent review of published studies suggests that maternal recall of breastfeeding initiation and duration is more reliable than recall of age of introduction of foods and fluids other than breast milk (92).

This study has several strengths, most notably the use of state-of-the-art methodology modeled after the FITS 2002 study. The assessment tools were specifically chosen and designed to meet the study's research goals and objectives. While 24-hour dietary recall collection is labor-intensive, the use of NDSR, well-tested dietary recall software, provided a standardized method for recall data collection. Furthermore, the Food Amounts Booklet was utilized to aid the participants in accurately estimating the amounts given to the child. The questionnaires were designed to provide a thorough assessment of feeding practices. The comprehensive set of questions included in the study questionnaires were based on questionnaires from national surveys and other studies of infants and toddlers. Another strength of this study was the consistent involvement of bilingual researchers. All recruiting was done by bilingual researchers, giving equal opportunity for both English and Spanish-speaking participants to be enrolled in the study.

Because of its comprehensive evaluation of feeding practices in a local WIC population, there are several potential applications for the results of this study. A serendipitous aspect of our study was the timing of data collection, with the end of data collection coinciding with the inception of the new WIC

food packages in Texas. In an effort to align the WIC food packages with the Dietary Guidelines for Americans and the feeding practices guidelines published by the AAP, effective October 1, 2009, the Texas WIC food packages were changed. Specifically, several changes were made to the infant food packages (birth to 11 months old), including delaying the inclusion of infant cereal until the infant is 6 months old and eliminating juice. In addition, several changes were made to provide better promotion and support for the establishment of long-term breastfeeding. These changes included increasing the amount of food given to exclusively breastfeeding women and increasing the amount of fruits and vegetables given to exclusively breastfeeding infants (93). The data from this study provide an excellent baseline for a future study evaluating the impact of the WIC food package changes in a specific community. Specifically, a future study could evaluate whether the changes made to the food packages were associated with higher rates of compliance with the AAP feeding practices recommendations.

Another future implication of this study relates to the opportunity for targeted educational programs for WIC participants. The findings related to age of introduction of cow's milk and 100% juice suggest that there is a critical need for interventions aimed at educating parents about the appropriate timing of these foods and potential implications of early introduction. WIC participants are required to attend two nutrition education classes per 6-month eligibility period, with the minimum requirements

including substance abuse information and breastfeeding information and support (94). Although appropriate timing of introduction of complementary foods is addressed in the WIC nutrition lesson plans provided by the Texas Department of State Health Services (95), it appears that these lessons may be merely provided as options and are not mandatory. Therefore, it is likely that there is considerable variation in the topics presented. Several researchers have noted that there is room for improvement in the nutrition education component of WIC services (96,97,98). One such potential area of improvement involves the systematic evaluation of the efficacy of nutrition education, which would provide WIC clinics with data to support positive outcomes and opportunities for growth and improvement. The data from this study and similar studies provide baseline data for the systematic investigation and evaluation of a nutrition education program addressing appropriate timing of complementary foods.

In summary, this study provides a valuable contribution to the limited body of knowledge in the area of infant and toddler feeding practices. The application of a comprehensive assessment of feeding practices to an at-risk population in a community makes this a unique study. Furthermore, the rigorous methodology provides a framework for future community-focused studies of this nature. Finally, the findings of this study provide direction for future studies and interventions aimed at improving infant and toddler

feeding practices and, ultimately, improving the health and well-being of the San Marcos, Texas community.

APPENDIX A

RECRUITMENT FORMS

Informed Consent Form

Screening Form

Consent Form to Participate in Research

Title: Feeding Patterns of Infants and Toddlers at WIC in San Marcos, Texas

Principal Investigator and Contact Information:

Texas State University – Department of Family & Consumer Sciences

- Dr. Sylvia Crixell, Professor
Phone: 512-245-2482 Email: scrixell@txstate.edu
 - Julia Von Bank, Graduate Student
Phone: 512-245-4685 Email: jv1210@txstate.edu
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Information

This form gives you information about the research. Please read this form and ask questions about anything you do not understand. Please ask questions before deciding if you would like to help in this research study. You will get a copy of this form.

Why we are asking you to help in this study:

We are asking you to help in a research study because:

- You are the mother of at least one child between the ages of 4 months and 5 years
- You use the WIC services in San Marcos

Your participation in this study is voluntary – that means you are volunteering to help, and can leave the study at any time. Participation in this study will not affect your current or future services received from WIC.

Why are we doing this research study?

The reason for this study is to learn about the way mothers feed their infants and toddlers in San Marcos, Texas.

How many people will be involved?

There will be about a minimum of 130 and up to 500 people, all women with children who use WIC services in San Marcos, TX.

What will happen if you help us in this research study?

1. We will call you on the telephone and ask 40 – 70 questions. It will take about 45 minutes. We will send you information through the mail before the interview, and we will call you when it is a good time for you.
2. When we call you, we will ask you questions about the foods your child ate on the day before the interview. We will ask you to tell us everything your child ate and drank for 24 hours, and it will be important to try to remember exactly what and how much your child ate. We will give you a packet that will help you figure out portion sizes when you talk to us.

3. When we call you, we will ask you general questions about breastfeeding or formula feeding or the foods your child ate.
4. When we call you, we will ask you questions about your personal and family medical history. For example, we will ask you about your child's medicines, vitamins, if your child has any food allergies. We will also ask about your family's health problems. We want to ask these questions to figure out the state of your health and the risk for disease. You do not have to answer any question(s), for any reason, if you do not want to.
5. When we call you, we will ask you questions about personal things like income and education level. You do not have to answer any question(s), for any reason, if you do not want to.
6. At the end of the phone call, we will ask you if you'd like to be called again for a second phone interview 3-14 days after the first one. This phone call will be shorter and will last about 20-30 minutes. We will ask you about 20-30 questions about what your child ate in one day. This is completely up to you. If you do not want to be called a second time, we will send you your gift. If you do want to be called again, we will send you your gift, and you will receive a second gift after completing the second interview.

What are the possible risks?

- There are no known risks in this study other than nervousness or slight anxiety in telling us your personal information.
- It is important to know that we are researchers from Texas State University, and are not affiliated with WIC.

What are the possible benefits to you or to other people?

- The knowledge gained from this study will help us understand how young children are fed. Researchers do not know how many children are fed.
- If you are interested, you can receive a report after the study is completed. If you would like to receive this report, please check here: _____.
- If you are interested, we will call you by telephone to give you the results of this study.

How will we protect your privacy and your records?

- All the records and information we get from you in this study will be kept in a locked file cabinet, in a locked room in the Family and Consumer Sciences Building at Texas State University. Only certain people will have keys to the file cabinets.
- All electronic information will be kept on a secure computer located within the Family and Consumer Sciences Building at Texas State University. A password must be used to access the information. Only certain people will have passwords to access the electronic data.
- Only certain people from Texas State University and the Institutional Review Board have the legal right to look at your records. These people must protect

those records by law. Your records will not be released unless you give consent, and unless required by law or a court order.

- If the results of this research study are published or presented at a scientific meeting or with WIC, we will not identify any person who gave us their personal information.
- When the data is analyzed for research purposes, it will be shredded and discarded at Texas State University.

Will the researchers get anything from your help in this study?

The researchers will not benefit from the study except to publish or present the results.

Will you receive compensation for your participation in this study?

After the phone call, you will receive a \$10 gift certificate to the HEB grocery store. It can be used at any HEB location. If you choose to be called again for a second phone call 1-2 months later, you will receive an additional \$10 gift certificate to the HEB grocery store.

If you have any questions about this study

- Call Dr. Sylvia Crixell at 512-245-2482.
- If you have any questions about your rights in this research study, you may call the Department of State Health Services Institutional Review Board #1 Office at 1-888-777-5037.

What if you don't want to continue in the study?

- If you decide to help in this study, it is on a volunteer basis.
- You have the right to refuse to be in this study.
- You can stop at any time after giving your consent. This decision will not affect in any way your current or future status with WIC or Texas State University.
- The study investigator may stop you from taking part in this study at any time if they decide it is in your best interest, or if you do not follow study instructions.

We will give you a copy of this consent form to keep.

If you're willing to volunteer for this research, please sign below.

Statement of Consent:

I have read the above information and clearly understand my role as a participant in the study. I have asked questions and have received answers. I, _____, consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

Screening Form
Feeding Patterns of Infants and Toddlers at WIC in San Marcos, Texas

What is your name? _____

Relationship to child: _____

How many children do you have? _____

Date of Birth: _____

How old is/are your child/children? (gender and age; first name if eligible)

1. _____

2. _____

3. _____

4. _____

5. _____

Are you able to receive a phone call from us for an interview? _____

Is your child cared for by someone else during the day? _____

Are you able to report what he/she eats throughout the day even if cared for by someone else? _____

Can we contact your child's day care provider about their diet? _____

When is the best day and time of the day to reach you? days _____
time _____

What phone number can we reach you at? _____

What is your address?

Thank you for your time and contribution to this research study!

We will contact you within the next 3-5 days.

Do with participant:

- 1. Consent form – 2 copies: keep a copy and give them a copy***
 - 2. FAB and explain***
 - 3. Receipt of Funds Form***
-

Complete Later:

Child to be studied:

Name _____ Age _____ Sex _____ Race _____

Language preferred for interview:***Researcher:******Date:******Class time:******Class type:******Class language:***

APPENDIX B

INTERVIEW FORMS

Interview Script

Demographic Questionnaire

Health History Questionnaire

Feeding Practices Questionnaire

Script for the Phone Interview Surveys and Dietary Recall

“Hello (), my name is (). I’m calling about the study you agreed to participate in through the local WIC clinic. Is this a good time for you?”

**If it is not a good time, reschedule the call. Ask a time and day of the week it would be convenient to receive a call, and make sure you have the best phone number to use at that time.*

“How are things going today?”

**Pause, wait for their response, spend a minute or so to establish rapport, and proceed:*

“Thanks again for agreeing to participate in this study. There isn’t much information known about what babies and toddlers eat, and we hope this study will help a lot of kids and families. After we complete the call, I’ll make sure we have your correct address, and your \$10 HEB card will go out to you today.”

“Keep in mind that your participation is totally voluntary, and that all the information you give is completely private. This study is separate from WIC, and no one there will know about the answers you give today.”

“For this interview, we want to ask about your (*age of child*)-old child. That child’s name is (), is that correct?”

“During this part of the call, I’m going to be asking you about what () ate and drank yesterday, and I’ll enter the information in my computer. This is easy, because it’s just about what (*he/she*) ate yesterday, and there are no right or wrong answers. Whatever (*he/she*) ate is okay. It’s really important that you try to give complete and accurate answers so that our study gets information we can use. Do you have any questions for me?”

**Pause, wait for their questions, respond briefly, and then say:*

“Feel free to ask questions at any time. Are you ready? I’m sure you’ll do a great job of helping me!”

Recording the 24-hour Recall

“What we’ll do first is to make a list of the foods and beverages (*child’s name*) had from midnight of the day before yesterday, which was (*day of the week*), until 12 pm last night. Were you with (*child’s name*) during that whole time yesterday?”

**If someone else provided childcare for part of the time during the 24-hour recall period, say:*

“Would it be okay if we called (*childcare provider name*) to find out what (*child’s name*) ate and drank during that time?”

**After receiving their permission to call, record the childcare provider’s contact information and make a note of the time(s) the child was in their care.*

“Okay, now we will record the list of all the things (*he/she*) ate and drank yesterday. This includes all meals, snacks, beverages, breastfeeding, and tap water, as well as tastes or samples of foods. It’s really easy to forget little snacks and drinks, so try to pay special attention to remembering things like juice, fruit, or crackers that you gave between meals.”

“I’ll need you to tell me about what time your child had each item. For example, ‘At 6am (*he/she*) had this, and at 8 am (*he/she*) had that.’ We’ll make a general list at first, and then we’ll go back and fill it in with more detail. Then we’ll go through the list once more to make sure we haven’t missed anything.”

Explaining the Food Amounts Booklet

“We have some ways to help estimate the amounts of food your child had yesterday, and I want to take a minute to explain them to you.”

“We’ll mostly use the Food Amounts Booklet that you got at WIC when you signed up. Do you have the booklet with you?”

**When they have the booklet with them, say:*

“These drawings will help estimate the amounts of foods and beverages your child had yesterday. For instance, on page 2, you can use the graph paper to tell me how big a square or rectangular food was, like a brownie, a cracker, or a piece of cake.”

“There are also pages for circles and other shapes that we can use as necessary, for things like tortillas or slices of pizza.”

“Page 5 will help you tell me how tall a food was, like a pancake or a cookie.”

“Pages 6 and 7 show how to estimate amounts of things that come in spoonfuls, like jelly, peanut butter, or sugar. You can see the difference between a level spoonful and a heaping spoonful, for instance.”

“Page 8 shows measuring cups.

“Starting on page 9, you can see different sizes of drinking glasses and cups. First choose the size of cup or glass you used, and then think about how much was in the glass. For example, you might say, „Yesterday my child had milk in a glass about like C3 and it filled the glass to Line D.”

“Then there are some pictures of typical servings of foods that are served in mounds or scoops, like mashed potatoes or refried beans, and you just tell me the number that looks like the amount you served.”

“There are also pictures of bowls that we can use. As you see on pages 17 and 18, Bowl 1 is very small and might be used to give your child their own serving of cereal or fruit. Bowl 4 might be used for foods that are often shared with others, like popcorn, chips, or salad. Just like with the cups, first tell me the size of bowl you used, and then choose the letter that shows how much you served your child.”

“At the end are some drawings of cuts of meat, like a chicken leg or piece of fish. Just choose the one that looks most like what you served your child, and let me know how much of it (*he/she*) ate.”

**Reassure the participant by saying:*

“I will be helping you with describing amounts when we get to this part of the interview. Any questions?”

**Respond to questions as needed before you get started.*

“Okay, let’s begin! Take a moment to think about yesterday, what you did, where you went, and so forth. Thinking about yesterday and what you did can help you to remember when you ate or drank.”

Entering the Quick List

“After 12 midnight on (*day of the week*), the day before yesterday, when was the first time (*child’s name*) had something to eat or drink?”

**Wait for a response and as needed follow up with:*

“What did (*he/she*) have at that time?”

“Did (*he/she*) have anything else at that time?”

**Repeat until the client has listed all reported meals and snacks. After completing the Quick List, say:*

“Now we will review what we have so far.”

Reviewing the Quick List

“If you think of anything else your child ate or drank yesterday, or if I have missed anything, let me know.”

“At *(insert time)* your child had *(read all foods)*. Can you think of anything else your child had at that time?”

**As needed, say:*

“I don’t have anything between midnight the night before last and *(insert time)* yesterday morning. Do you remember if your child got up during the night and had anything to eat or drink?”

“Did *(he/she)* have a beverage with that meal?”

“Did *(he/she)* have any snacks between meals or did your child sample food as you prepared for the meal?”

**Repeat until you have listed all foods for all meals and snacks. After completing the Quick List review, say:*

“Now we will fill in your list with more detail.”

Collecting Meal Information Detail

“Now, we’ll go over our list and I will ask you some questions about each food. You can use any of the drawings we talked about before to tell me how much (*child’s name*) had.”

**Complete the Meal Information window (ask the following according to what the participant said before):*

“What would you call the meal you had at *(insert time)*?”

“Was this *(his/her)* *(insert obvious meal name)*?”

“Where were you when *(he/she)* ate *(insert the meal name)*?”

**Asking About Additions (ask the additions question until you receive a “no” response):*

“The first thing on your list is *(insert the name of the food)*. Did you add anything to the *(insert the name of the food)*?”

**Collecting Complete Food and Amount Detail (refer to the label image packet as necessary, and ask, depending on the food):*

“What brand or type of (*insert name of the food*) was it?”

**Continue to describe the food, selecting food variables as required on each screen. Ask about the amount of food (how much or how many, depending on the food). As needed, refer to the Food Amounts Booklet and the serving size visual references sheet:*

“How much did your child (*eat/drink*)?”

**After quantification, be sure to confirm that the child finished the amount described.*

“Was your child able to finish that?”

**Provide positive reinforcement during the interview by saying:*

“You are doing a good job!”

Or

“Thanks for remembering that!”

**If it is necessary to ask the participant to repeat what he/she said, say:*

“Sometimes it’s hard for me to hear things. Could you please tell me that again?”

**If the participant can’t remember details and unknowns/defaults are available, say:*

That’s okay, I have an option to pick when people can’t remember.

Reviewing the 24-hour Recall:

“Now we will review, and tell me if I missed anything.”

“The first thing I have is at (*insert meal name and time*) when your child had (*insert food names*). Is this correct?”

**At the end of each meal ask:*

“Did (*he/she*) have anything else at that time?”

**When the interviewer notices a large gap, he/she should ask:*

“Did your child have anything to eat or drink between (*insert names of meals*)?”

Or ask:

“Anything (*before/after*) your child’s (*insert name of the meal*)?”

**Additional foods and meals are inserted at any time. If the participant hesitates and can’t remember eating anything for a long period of time, ask:*

“Can you think of what you were doing (*after work, at dinner/supper time, etc.*)? Sometimes if we think about where we were or with whom, it helps to remember what we ate.”

Collecting Supplement Information:

“Do you ever give your child supplements?”

If not, enter “no supplements” in the trailer. If so...

“Which ones?”

If given that day, enter supplement in the food recall if possible. If you cannot locate it or it is unavailable, enter the information in the notes of the trailer tab.

Completing the Trailer Tab:

“Now (*insert name of participant*), in terms of the amount of food your child ate, would you say this was close to the amount that (*he/she*) usually eats, a lot more, or a lot less than (*he/she*) usually eats?”

**This question refers to the overall amount of food for the day, not the type of food. If the participant reports a lot more, check “considerably more than usual” or a lot less than usual, check “considerably less than usual”. In either case, NDSR requires a note that briefly states why the intake was not usual. For example, a celebration meal with lots of food or a participant not feeling well and not eating much can result in eating a lot more or less than usual.*

**If needed, the interviewer can ask:*

“What makes you say it’s a lot more or less than usual?”

**Determine the reliability of the food and beverage information provided. If the dietary recall is unreliable because the participant was unable to recall one or more meals or for some other reason they were unreliable, select the appropriate NDSR button and add the required note. Do not ask the participant this question, or share your response.*

Completing the Demographic and Feeding Practices Surveys

“Okay (*insert participant’s name*), we are done with the food list. Now I just need to ask you some questions about your child’s health and usual diet, and some household information.”

**ASK QUESTIONS AND RECORD ANSWERS FOR*

- *FEEDING PRACTICES QUESTIONNAIRE*
- *DEMOGRAPHIC QUESTIONNAIRE*
- *HEALTH HISTORY QUESTIONNAIRE*

Finishing the Interview

“(*participant’s name*), this completes the interview. Thanks for your participation and time. You did a great job! Your \$10 HEB card will go out in the mail today, so I need to confirm your address. Is it (*insert address*)?”

“I also want to let you know that you have the option of completing a second phone interview within the next two weeks, and receiving a second \$10 HEB card. It wouldn’t have the survey questions again, just the information about the things your child ate and drank the day before. You will receive the card for today’s interview whether you do the second one or not. Are you interested in doing that?”

**(If they want to do the second interview, verify the best phone number to use and the best time to call. Let them know to expect the second call within 3-14 days of this interview.) Say:*

“You should expect the second call within two weeks, so be sure to keep your Food Amounts Booklet near the phone.”

“Thank you so much for your help today! It was nice to talk with you. Goodbye!”

Demographic Form

Feeding Patterns of Infants and Toddlers at WIC in San Marcos, Texas

Contact Information of Caregiver

1. First name _____
2. Last name _____
3. Caregiver Age _____
4. Street Address _____
5. City _____
6. ZIP _____
7. Main Phone _____
8. Alternate Phone _____
9. Relationship to child
 - a. Mother
 - b. Father
 - c. Grandmother
 - d. Other _____ (specify)

Infant or Toddler Information

10. Gender of child M F
11. First name of child _____
12. DOB of child (month, date, year) _____
13. Age of child (at time of interview) _____

Marital Status

14. What is your marital status?

- a. Now married
- b. Living with partner
- c. Widowed
- d. Divorced
- e. Separated
- f. Never married

Ask the following question only if subject has a spouse/partner:

What is your spouse's name? (to be used during interview) _____

15. Age of Spouse _____

Acculturation

16. What language do you most often speak when you are at home?

- a. English
- b. Spanish
- c. Both
- d. Other

17. Where were you born?

- a. U.S.
- b. Mexico
- c. Other

17.B. If born outside the U.S., how long have you lived in the United States? _____
(years)

Ask the following questions only if subject has a spouse/partner:

18. Where was your spouse/partner born?

- a. U.S.
- b. Mexico
- c. Other

18.B. If born outside the U.S., how long has your spouse/partner lived in the United States? ____ (years)

Education

19. What is the highest degree or level of school that you have completed? **(If currently enrolled, mark the previous grade or highest degree received).**

- a. Elementary school
- b. Middle school
- c. High school
- d. Associates degree
- e. Bachelors degree
- f. Post-graduate degree

Ask the following question only if subject has a spouse/partner:

20. What is the highest degree or level of school that your spouse/partner has completed? **(If currently enrolled, mark the previous grade or highest degree received).**

- a. Elementary school
- b. Middle school
- c. High school
- d. Associates degree
- e. Bachelors degree
- f. Post-graduate degree

Employment

21. Are you employed? Yes No

21.B. Is your employment part-time or full-time? PT FT

Ask the following questions only if subject has a spouse/partner:

22. Is your spouse/partner employed? Yes No

22.B. Is your spouse/partner's employment part-time or full-time? PT

Race/Ethnicity

23. Race of caregiver

- a. Non-Hispanic black/African American
- b. Non-Hispanic white
- c. Hispanic **(if Hispanic, ask next question)**
- d. American Indian or Native Alaskan

- e. Asian
- f. Native Hawaiian or Other Pacific Islander
- g. Other _____ **(specify)**

Ask the following question only if subject is Hispanic: 23.B. Ethnicity of caregiver

- a. Mexican
- b. Central and South American (Latino)
- c. Puerto Rican
- d. Cuban
- e. Other _____ **(specify)**

Ask the following questions only if subject has a spouse/partner:

24. Race of spouse/partner

- a. Non-Hispanic black/African American
- b. Non-Hispanic white
- c. Hispanic **(if Hispanic, ask next question)**
- d. American Indian or Native Alaskan
- e. Asian
- f. Native Hawaiian or Other Pacific Islander
- g. Other _____ **(specify)**

Ask the following question only if spouse/partner is Hispanic:

24.B. Ethnicity of spouse/partner

- a. Mexican
- b. Central and South American (Latino)
- c. Puerto Rican
- d. Cuban
- e. Other _____ (specify)

25. Race of child

- a. Non-Hispanic black/African American
- b. Non-Hispanic white
- c. Hispanic **(if Hispanic, ask next question)**
- d. American Indian or Native Alaskan
- e. Asian
- f. Native Hawaiian or Other Pacific Islander
- g. Other _____ (specify)

Ask the following question only if child is Hispanic:

25.B. Ethnicity of child

- a. Mexican
- b. Central and South American (Latino)

c. Puerto Rican

d. Cuban

e. Other _____ **(specify)**

Health History Form

Feeding Patterns of Infants and Toddlers at WIC in San Marcos, Texas

1. Do you have any of the following conditions **(list all conditions)**?

- | | | |
|---------------------------|-----|----|
| A. Diabetes | Yes | No |
| B. Cardiovascular Disease | Yes | No |
| C. Lung Disease | Yes | No |
| D. Kidney Disease | Yes | No |
| E. Liver Disease | Yes | No |
| F. Asthma | Yes | No |
| G. Allergies | Yes | No |

2. What is your weight? **(ask subject to guess if unknown)** _____ pounds

3. What is your height? **(ask subject to guess if unknown)** _____ feet/ inches

4. BMI **(calculate after interview)** _____

Ask the following questions only if subject has a spouse/partner:

5. Does your spouse have any of the following conditions **(list all conditions)**?

- | | | |
|---------------------------|-----|----|
| A. Diabetes | Yes | No |
| B. Cardiovascular Disease | Yes | No |
| C. Lung Disease | Yes | No |
| D. Kidney Disease | Yes | No |
| E. Liver Disease | Yes | No |
| F. Asthma | Yes | No |
| G. Allergies | Yes | No |

6. What is your spouse's weight? (**ask subject to guess if unknown**) _____
pounds
7. What is your spouse's height? (**ask subject to guess if unknown**) _____
feet/inches
8. Spouse/partner BMI (**calculate after interview**) _____

Medical Insurance

9. Does your child have medical insurance? Yes No
10. Do you have medical insurance? Yes No

Child Information

11. How many weeks were you pregnant before giving birth to this child? _____
weeks
12. What was your child's **weight at birth**? _____ pounds/ounces
13. What is your child's **current weight**? _____ pounds
14. What is your child's current height/length? _____ inches
15. Has your child been sick in the past 2 weeks? Yes No
16. Does your child have any dietary restrictions or any special dietary needs?
Yes No

16.A. Have any of the following foods caused a problem for your child (**read all categories**)?

1. Cow's milk, other dairy products (including formula made with cow's milk) Y N
2. Soy milk or other soy foods (including infant formula made with soy)
Y N
3. Eggs Y N

4. Peanuts, peanut butter, or peanut oil Y N
5. Nuts (such as almonds, pecans, walnuts) Y N
6. Sesame seeds, tahini, or sesame seed oil Y N
7. Fish, shellfish, or other seafood Y N
8. Beef, chicken, or turkey Y N
9. Wheat, gluten, or wheat starch Y N
10. Other grain or cereal (such as oats, barley) Y N
11. Fruit or fruit juice Y N
12. Vegetable Y N
13. Other foods _____ **(specify)**

Feeding Practices Questionnaire
Feeding Patterns of Infants and Toddlers at WIC in San Marcos, Texas

Section A

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

Yes **(go to section C)** No **(go to section B, skip C and D)**

Section B

2. What reasons led to your decision not to breastfeed your child **(check all that apply)**?

I am going to read you some answers. Please let me know which ones you agree with.

- ☐ A. My child was sick and could not breastfeed
 - ☐ B. I thought I would not have enough milk
 - ☐ C. A health professional said I should not breastfeed for medical reasons
 - ☐ D. I was sick or had to take medicine
 - ☐ E. I believe that formula is as good as breastfeeding or that formula is better
 - ☐ F. I thought that breastfeeding would be too inconvenient
 - ☐ G. I tried breastfeeding before and didn't like it or it didn't work out
 - ☐ H. I wanted to be able to leave my child for several hours at a time
 - ☐ I. I wanted to go on a weight loss diet
 - ☐ J. I wanted to go back to my usual diet
 - ☐ K. I wanted to smoke again or smoke more than I should while breastfeeding
 - ☐ L. I had too many household duties
 - ☐ M. I planned to go back to work or school
 - ☐ N. I wanted or needed someone else to feed my child
 - ☐ O. Someone else wanted to feed my child
 - ☐ P. I wanted my body back to myself
 - ☐ Q. The child's father didn't want me to breastfeed
 - ☐ R. The child's grandmother didn't want me to breastfeed
 - ☐ S. I wanted to use contraception that can't be used while breastfeeding
 - ☐ T. Other (specify)
-

Section C

3. Did you breastfeed in the hospital after delivery?
 Yes No
4. Are you currently breastfeeding or pumping milk?
 Yes (**go to section E**) No (**go to section D**)

Section D

5. How old was your child when you completely stopped breastfeeding and pumping milk?
 _____ days _____ weeks _____ months
6. What reasons led to your decision to stop breastfeeding (**check all that apply**)?

I am going to read you some answers. Please let me know which ones you agree with.

- ☐ A. My child had trouble sucking or latching on
- ☐ B. My child became sick and could not breastfeed
- ☐ C. My child began to bite
- ☐ D. My child lost interest in nursing and began to wean him/herself
- ☐ E. My child was old enough that the difference between breast milk and formula no longer mattered
- ☐ F. Breast milk alone did not satisfy my child
- ☐ G. I thought that my child was not gaining enough weight
- ☐ H. A health professional said my child was not gaining enough weight
- ☐ I. I had trouble getting the milk flow to start
- ☐ J. I didn't have enough milk
- ☐ K. My nipples were sore, cracked, or bleeding
- ☐ L. My breasts were overfull or engorged
- ☐ M. My breasts were infected or abscessed
- ☐ N. My breasts leaked too much
- ☐ O. Breastfeeding was too painful
- ☐ P. Breastfeeding was too tiring
- ☐ Q. I was sick or had to take medicine
- ☐ R. Breastfeeding was too inconvenient
- ☐ S. I did not like breastfeeding
- ☐ T. I wanted to be able to leave my child for hours at a time
- ☐ U. I wanted to go on a weight loss diet
- ☐ V. I wanted to go back to my usual diet

- ☐ W. I wanted to smoke again or more than I did while breastfeeding
- ☐ X. I had too many household duties
- ☐ Y. I could not or did not want to pump or breastfeed at work
- ☐ Z. Pumping milk no longer seemed worth the effort it required
- ☐ AA. I was not present to feed my child for reasons other than work
- ☐ BB. I wanted or needed someone else to feed my child
- ☐ CC. Someone else wanted to feed my child
- ☐ DD. I did not want to breastfeed in public
- ☐ EE. I wanted my body back to myself
- ☐ FF. I became pregnant or wanted to become pregnant again
- ☐ GG. Other (specify) _____

7. Did any of the following people want you to stop breastfeeding (**check all that apply**)?

- ☐ A. The child's father
- ☐ B. Your mother
- ☐ C. Your mother-in-law
- ☐ D. Another family member
- ☐ E. A doctor or other health professional
- ☐ F. Your employer or supervisor
- ☐ None of these

Section E

8. How old was your baby when he or she was first fed anything other than breast milk or formula?
 weeks _____ or months _____ never fed anything other than breast milk/formula

9. How old was your baby when he or she was first fed formula?
 days _____ or weeks _____ or months _____ or never fed formula _____
10. Has your baby ever had tea or herbal drinks?
 yes _____ or no _____
11. Have you ever added cereal or other solids to your baby's bottle?
 yes _____ or no _____
12. Did your child consume any foods before 4 months, including teas, water, juice, infant cereal besides breast milk or infant formula?
 Yes _____ No _____ Don't know _____

13. How old was your child when he/she was first fed infant formula on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
14. How old was your baby when he or she first had cow's milk or any other milk (rice, soy, goat, or other)?
a. before 4 months ____ d. 12 months or older
b. 4-6 months e. never had it
c. 7-11 months
- 14.b. How old was your child when he/she was first fed cow's milk (not breast milk or formula) on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
15. How old was your baby when he or she first had 100% fruit or vegetable juice?
a. before 4 months d. 6 months or more
b. 4 months e. never had it
c. 5 months
16. How old was your baby when he or she first had cereal?
a. before 4 months d. 6 months or more
b. 4 months e. never had it
c. 5 months
17. How old was your child when he/she was first fed cereal, including baby cereal, on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
18. How old was your child when he/she was first fed fruit, on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
19. How old was your child when he/she was first fed juice or sweetened beverages, on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
20. How old was your child when he/she was first fed vegetables, on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
21. How old was your child when he/she was first fed sweet foods or desserts, on a daily basis?
weeks ____ or months ____ or not on a daily basis ____
22. How old was your child when he/she was first fed meats, on a daily basis?
weeks ____ or months ____ or not on a daily basis ____

23. How old was your child when he/she was first fed dairy foods such as cheese, yogurt, or eggs, on a daily basis?

weeks ____ or months ____ or not on a daily basis ____

24. How old was your child when he/she was first fed salty snacks such as chips or popcorn, on a daily basis?

weeks ____ or months ____ or not on a daily basis ____

Section F

25. Were you breastfed when you were an infant or toddler?

yes ____ no ____ don't know ____

25.b. If so, how long were you were breastfed?

weeks ____ or months ____ or don't know ____

Section G

Ask the questions below if child is between 4-8 months

26. Does your child lift and support his/her head without help?

yes ____ no ____

27. Does he/she roll over on his/her own?

yes ____ no ____

28. Is he/she rolling over from front to back or back to front or both?

a. back to front ____ b. front to back ____ c. both ____

Ask the questions below if child is between 4-11 months

29. Does your child sit alone without support?

yes ____ no ____

30. Does he/she grasp food with his/her hand?

yes ____ no ____

Ask the questions below if child is between 4-14 months

31. Does your child crawl when left lying on his/her stomach?

yes ____ no ____

Ask the questions below if child is between 4-24 months

32. When he/she is being fed, does your child usually remove food from a spoon using his/her top lip or do you usually have to scrape the spoon into his/her mouth?

a. uses top lip ____ b. have to scrape food ____

Ask the questions below if child is between 7-24 months

33. Does your child feed himself/herself with a spoon without spilling much?

yes ____ no ____

34. Does he/she feed himself/herself with a fork without spilling much?
yes _____ no _____
35. Does your child drink from a sippy cup without help? (If asked, a sippy cup is a cup with a plastic cover that has a spout)
yes _____ no _____
36. Does he/she drink from a regular cup without help – that is, a cup without a lid?
yes _____ no _____
37. Does your child eat foods that require chewing?
yes _____ no _____
38. Does your child pull himself/herself to a standing position without help from another person?
yes _____ no _____
39. Does your child walk at least 2 steps with one hand held by someone or holding onto something?
yes _____ no _____
40. Does he/she walk at least 2 steps WITHOUT holding on to anything or another person?
yes _____ no _____
41. Does he/she walk across the room WITHOUT holding on to anything or another person?
yes _____ no _____
42. Do you consider your child: **(read the options)**
a. A very picky eater
b. a somewhat picky eater
c. not a picky eater
43. How many times do you offer a new food before you decide your child does not like it? **(read the options)**
a. once
b. twice
c. 3-5 times
d. 6-10 times
e. more than 10 times
f. likes everything
44. Does your child show a strong preference to using his/her right or left hand or does he/she show no preference?
a. No preference _____ b. shows preference/right or left _____

45. Does your child usually feed himself/herself?

a. Yes, child feeds self _____ b.

no, adult feeds _____ c.

both/switch off _____

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VITA

Hope Margaret van der Heijden was born in Nacogdoches, Texas, on December 26, 1975, the daughter of Jesse Elaine Brown and Thomas Alden McCulloch. After completing her work at Nacogdoches High School, Nacogdoches, Texas, in 1994, she entered Stephen F. Austin State University, Nacogdoches, Texas. She received the degree of Bachelor of Science from Stephen F. Austin in December 1997. During the following years she was employed in various industries including healthcare and technology. In 2009, she entered the Graduate College of Texas State University-San Marcos.

Permanent Address: 110 Roberts' Circle

Georgetown, Texas 78633

This thesis was typed by Hope M. van der Heijden