

BREASTFEEDING AMONG U.S. LATINAS: SUBGROUP ANALYSIS
OF THE NATIONAL IMMUNIZATION SURVEY

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ABSTRACT

Diana N. Derige: Breastfeeding among U.S. Latinas:
Subgroup Analysis of the National Immunization Survey
(Under the direction of Bruce Fried)

In 2011, the U.S. Surgeon General, Dr. Regina Benjamin, released the *Call to Action to Support Breastfeeding (Call to Action)*. The *Call to Action* documents the positive maternal and infant health impacts associated with breastfeeding, and recommends a series of steps aimed at increasing breastfeeding initiation and duration in the United States. While Latino women currently have the highest breastfeeding initiation and duration rates in the United States¹, little investigation has been conducted to understand differences in breastfeeding practices among Latina subgroups.

Using secondary data from the National Immunization Survey 2011-2013, this study sought to:

1. To examine differences in breastfeeding behaviors (initiation and optimal breastfeeding) among U.S. Latino women subgroups using a national sample.
2. To explore the intervening factors associated (acculturation, education, income and WIC participation) with breastfeeding behaviors (initiation and optimal breastfeeding) among U.S. Latino women.
3. To develop a plan to inform public health policy makers and advocates on U.S. Latino breastfeeding behavior and its implication.

With regards to those who had ever breastfed, the overall analysis found: for Latina mothers, WIC was associated with less breastfeeding; speaking English was associated with less breastfeeding than speaking Spanish; and higher education was associated with a greater

likelihood of breastfeeding when all other variables were controlled. Non-Hispanic/Latina mothers were less likely to breastfeed than all other groups except Puerto Rican mothers. Mexicano mothers were more likely to breastfeed than Mexican American or Puerto Rican mothers. Puerto Rican mothers were less likely to breastfeed than Central American, South American, and Spanish Caribbean mothers.

With regards to optimal breastfeeding, the overall analysis found: WIC usage is associated with less likelihood of optimal breastfeeding, while greater income was associated with a higher likelihood of optimal breastfeeding. Looking at pairwise differences between levels of Hispanic origin, only two differences were statistically significant, indicating that Non-Hispanic/Latina mothers were more likely to optimally breastfeed than Puerto Rican and Mexican American mothers.

To Alia and Mia, my breastfeeding babies for keeping me real,
Luis for his undying support and to my grandfather
“Grandpa there’s finally a ‘doctor’ in the family.”

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
MCH	Maternal and Child Health
NIS	National Immunization Survey
PRAMS	Pregnancy Risk Assessment Monitoring System
WIC	Women, Infants and Children

CHAPTER 1: INTRODUCTION

Breastfeeding is both an immediate and long-term protective factor for infants and mothers.²

While Latino women currently have the highest breastfeeding initiation and duration rates in the United States³, little investigation has been conducted to understand differences in breastfeeding practices among Latina subgroups.

Breastfeeding

In 2011, the U.S. Surgeon General, Dr. Regina Benjamin, released the *Call to Action to Support Breastfeeding (Call to Action, 2011)*. Supported by the 2007 systematic review and meta-analyses of breastfeeding and maternal and infant health published by the Agency for Healthcare Research and Quality (AHRQ), the *Call to Action* documents the positive maternal and infant health impacts associated with breastfeeding, and recommends a series of steps aimed at increasing breastfeeding initiation and duration in the United States. In 2012, the American Academy of Pediatrics (AAP) reissued its policy on breastfeeding.⁴ The AAP recommends exclusive breastfeeding for the first six months of life and continuation for at least the first year after birth. The Healthy People 2020 goal for 6-month exclusive breastfeeding is 25.5%.⁵

The benefits of breastfeeding are well documented. Optimal breastfeeding is associated with lower risk of otitis media and gastrointestinal infection, lower levels of hospitalization for lower respiratory tract diseases in the first year of life, and decreased incidence of sudden infant death syndrome. Lower rates of Type 2 diabetes mellitus have also been documented among full term infants who were breastfed, and lower levels of necrotizing enterocolitis for

preterm infants.⁶ In addition, a recent analysis identified a reduction of breast and ovarian cancer, Type 2 diabetes mellitus, and hypertension in mothers as a result of appropriate breastfeeding.⁷

Optimal breastfeeding has also been found to have economic benefits. A pediatric cost analysis conducted by Bartick and Reinhold found that *“If 90% of U.S. families could comply with the medical recommendations to breastfeed exclusively for 6 months, the United States could save \$13 billion/year and prevent an excess 911 deaths annually...”*⁸

The Call to Action outlined 20 strategic steps to support increased breastfeeding in the United States. These steps focused on changing cultural norms, and developing and implementing processes to support mothers, infants, and families. Special emphasis was placed on reducing the disparity in breastfeeding rates among African American mothers. The 2013 Morbidity and Mortality Weekly Review of 2008 data reported that while “ever” breastfeeding rates among African Americans increased 11% over an eight-year period, disparities among racial and ethnic groups still exist and more targeted programs need to be in place to support breastfeeding.⁹

Research has confirmed that breastfeeding practices (initiation and duration) are positively associated with increased education of the mother, increased family income, and most recently, enrollment in the Women Infant and Children’s program (WIC).¹⁰ The National Center for Data Statistics found that breastfeeding rates in 1999-2006 were significantly higher among those with higher income (74%) compared with those who had lower income (57%).¹¹ Between 2003 and 2006, 85% of mothers who were four-year college graduates and 75% of mothers with some college or an associate degree ever breastfed, compared to 65% of high school graduates. Further, a 1992 review of the national WIC program found that WIC participants who reported receiving advice to breastfeed their babies from the WIC clinic were more likely to breastfeed than other WIC participants or eligible nonparticipants.¹² Those factors help inform both prevention and intervention strategies and can help build stronger causal

breastfeeding models.

There are disparities in breastfeeding rates between African Americans and their White counterparts. Eight percent of African American women report exclusive breastfeeding to six months compared to 16% of White woman.¹³ While over the last decade breastfeeding rates have increased overall, there has not been a decline in the level of disparity in 6-month exclusivity between African American women and White women.¹⁴

Latinos in the United States

The 2010 U.S. Census defines Hispanic or Latino as a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. This definition incorporates at least 28 distinct countries with unique cultural and social practices, as well as different modes of immigration to the United States. Similarly, the terms “Hispanic” and “Latino” refer to an ethnicity, meaning that a person can be of one or more races and still identify as Latino. Important to any health conversation is the recognition that people identified as Latino are not a homogenous group. Differences among groups are important in understanding the unique health histories of Latino women, and developing programs that address their cultural norms and experiences.

According to the 2010 Census, there were 50.5 million Latinos in the United States, accounting for 16% of the total population. They self-identified as falling into several groups: Mexican (63%), Puerto Rican (9.6%), and Cuban (3.5%). The other 28.4% were from other countries of origin. Latinos represent a relatively young demographic group compared to their non-Latino counterparts with nearly one in three Latinos in the United States under the age of thirty. While the Pew Research Institute noted a decline in the birth rate of foreign and U.S.-born Latino women between 2007 and 2010, the 2008 birth rate for Latino women was still considerably higher than the national birth rate: 22.2 births per 1,000 compared to the national average of 14 live births per 1,000.¹⁵ It is predicted that by 2020, one in four children in the U.S.

will be Latino.

The Hispanic Paradox

There is a general understanding that the association between race and socioeconomic disadvantage leads to increased risk of poor birth outcomes.¹⁶ However, in general, this does not hold true for most U.S. Latino women, specifically newly immigrated Mexican women. This phenomenon of relatively positive Latino birth outcomes (compared to African American counterparts) despite social disadvantage is often referred to as the Hispanic Paradox.¹⁷ Likewise, the Healthy Immigrant Theory posits that the healthiest Latinos are those most likely to emigrate to the U.S., thus resulting in positive birth outcomes regardless of poverty and barriers to healthcare. Both theories recognize those protective factors associated with healthy birth outcomes seem to erode with subsequent generations.¹⁸

Research has found that favorable birth outcomes (including but not limited to optimal birth weight and lower infant mortality) are associated with protective factors, in particular, culture and social support networks that lessen the stressors and risk behaviors associated with poverty.¹⁹ Further, the idea of both informal and formal support networks that reduce stress and support positive birth outcomes are asserted through the Life Course Perspective²⁰. The model is one of cumulative impact and maintains that a woman's cumulative level of chronic stress (allostatic load) results in the depression of the body's adaptive system, thus resulting in declining health of the woman and increases her offspring's vulnerability to poor birth outcomes, pre term labor and low birth weight.²¹ This cumulative stress is often linked to factors associated with racism, interpersonal and structural, as well as experienced or perceived racism. As race is a social construct, one can postulate that as Latino women spend more time in the United States and experience increased and prolonged exposure to chronic stress in the form of racism their birth outcomes and those of their offspring could be negatively impacted. This may also have an impact on how we recognize acculturation.

Acculturation is thought to play an important role in determining health outcomes. According to several scholars and a report from the Institute of Medicine, the acculturation process plays a key role in understanding ethnic disparities in health, making measures of acculturation just as important as measures of race and ethnicity.^{22 23} Acculturation has been associated with a number of negative health outcomes and health risk factors including poor diet, smoking, substance abuse, and reduction in breastfeeding. A phenomenon documented and associated with acculturation is “los dos,” which refers to the combination feeding practice found particularly among Mexican immigrants. This is characterized by the idea that formula provides needed nutrients missing from breastmilk.²⁴

U.S. Latino Women and Breastfeeding

Aggregate national data show that Latino women overall have higher rates of breastfeeding initiation and duration than the general population.²⁵ However, these rates differ among Latina subgroups. For example, breastfeeding rates on the island of Puerto Rico are lower than rates of Puerto Rican women living on the United States mainland.²⁶ Similarly, breastfeeding initiation and duration rates are lower among Puerto Rican mothers living in the United States in comparison with other U.S. Latina mothers. In addition, while breastfeeding initiation rose by 3.4 percentage points for Whites and 9 percentage points for Blacks between 2000 and 2008, there was only a 2.4 percentage point increase among Hispanics during the same time period.

Therefore, breastfeeding initiation and duration have not been considered problems in this population. However, the breastfeeding data available for Latino women are heavily skewed due to the over-representation of Mexican Americans in the Latino population.²⁷ When disaggregated by country of origin, some subgroups have health outcomes that are less favorable than their Mexican American counterparts. Some Latina subgroups (e.g. Puerto Rican, and Dominican), experience preterm birth and low birth weight and less than optimal

breastfeeding practices, similar to those of African Americans, which are consistently lower than non-Latino Whites.²⁸ I hypothesize that this same variation will emerge from national survey data with Latina subgroup delineation.

Hispanic Paradox²⁹ contends that Latino women, particularly newly immigrated Mexican women, have relatively positive birth outcomes when compared with African American women with similar social economic status and facing similar barriers to health services. In addition, the Healthy Immigrant theory posits that the healthiest immigrants (in this case Latinos) are those most likely best able to emigrate to the U.S. Those health benefits are often associated with protective factors, which seem to erode with subsequent generations.³⁰ If we suggest the relatively large number of Mexican American Latino women hide sub-group differences in breastfeeding practices, and if we apply the Healthy Immigrant and Hispanic Paradox Theory to breastfeeding, as well as the understanding that chronic stress experienced by women of color in the U.S. can have generational impacts in both health outcomes and behavior, we could conclude that the U.S. may see significant increases in morbidity among Latinos as they continue to be acculturated into American society.

Research shows a link between acculturation and breastfeeding among Latino women.³¹
³² Compared with U.S.-born mothers, foreign-born mothers have been shown to have significantly higher rates of intention to breastfeed exclusively. Previous research has also shown that less acculturated women were more likely to initiate breastfeeding and breastfeed for longer.³³

Breastfeeding is well documented as a key protective factor and important determinant of health outcomes³⁴ and its variation among Latina subgroups can have important health implications. This study focuses on variations in breastfeeding practices among Latina subgroups, and when possible, the impact of intervening factors (education, income, WIC participation and acculturation) on breastfeeding behaviors among Latino women as compared to their non-Hispanic Black and non-Hispanic White counterparts.

Research Purpose and Specific Aims

The intent of this research is to add to the field of knowledge about breastfeeding practices by examining these practices among Latina subgroups. Through this formative research, it may be possible to build a more fully developed model for Latino maternal child health policy. This first step seeks to identify differences in breastfeeding using a national sample in breastfeeding of U.S. Latino women.

Using secondary data, from the National Immunization Survey, the aims of this research are:

1. To examine differences in breastfeeding behaviors (initiation and optimal breastfeeding - six months exclusive) among U.S. Latino women subgroups using a national sample.
2. To explore the intervening factors associated (acculturation, education, income and WIC participation) with breastfeeding behaviors (initiation and optimal breastfeeding -6 months exclusive) among U.S. Latino women.
3. To develop a plan to inform public health policy and advocacy on U.S. Latino breastfeeding behavior and its implications.

CHAPTER 2: REVIEW OF LITERATURE

Terminology used in literature search

Latino(s): referring to Latino/Hispanic women with ancestry in Central and South American, islands of the Caribbean and/or the Iberian Peninsula.

U.S. Latinas: Latino women residing in the United States its commonwealths and territories.

Acculturation: a continuous process where individuals simultaneously learn and adopt aspects of a new culture while modifying facets of their culture of origin³⁵

Infant nutrition: feeding associated with a child 0-3 years

Breastfeeding: human milk feeding, often discussed in terms of initiation, duration, and exclusivity

Optimal breastfeeding: 6 months exclusive breastmilk as recommended by the American Academy of Pediatrics and the United States Breastfeeding Committee

Literature Review Methodology

To facilitate a literature review, I searched the literature for the term Latino and/or Hispanic. I also included a search for the sub-population “Mexican American.”

Latinos/Hispanics who identify as Mexican or of Mexican origin represent over 60% of the total U.S. Latino population. Further, I concluded that searching both for the term “breastfeeding” as well as the general term “infant nutrition” increased the number of scholarly articles and offered a fuller perspective of the effects of acculturation on early feeding habits of infants.

The studies included in the literature review ranged in scale, methodology and scope. Included in this literature review were systematic reviews, observational studies, randomized

control trials, meta-analyses, and comparative studies, as well as scholarly commentary on the relationship of acculturation and U.S. Latino women on initiation, duration and exclusivity of breastfeeding. A summary of the studies is included in Table 1. Inclusion criteria for this literature review include publication in peer-reviewed journals.

Publications were excluded if they were published in a language other than English, or were based on a non-U.S. population. The exclusion criteria are specific to the author's native language and acknowledge that language plays an important role in nuance, culture and meaning; thus, any translated materials may lose some content due to translation. Further, exclusion of studies conducted outside the United States support the tenet of acculturation: *a process in which members of one cultural group adopt the beliefs and behaviors of the dominant group*. In this case, the dominant culture being examined is U.S. based, and thus study location is relevant.

Literature Review Results

Most of the information has limited generalizability since it focused primarily on the experiences of Mexican Americans, as they are the largest of the U.S. Latino subgroups. However, over time researchers have come to recognize that Latinos are not monolithic. Of note, Chapman and Escamilla Perez assessed the effects of acculturation on breastfeeding behavior among low-income Latino women.³⁶ Using a multidimensional assessment of acculturation, the authors examined the acculturative type and breastfeeding behaviors among low-income U.S. Latino women. The authors identified three specific subgroups: Mexican, Puerto Rican, and other. The authors found that the low acculturation group was significantly more likely to continue breastfeeding than the traditional Hispanic, assimilated, and integrated-acculturation groups. They further noted, "Multidimensional assessments of acculturation may prove useful in better tailoring future breastfeeding promotion interventions."

This literature review identified only one randomized controlled trial (RCT). This is likely

because breastfeeding rates in the Latino population are already considerably higher than rates in the general population. As a result, the assumption may be that there is limited need to develop new interventions to encourage breastfeeding. However, as the acculturated population begins to show variations or disparities in morbidity and mortality associated with suboptimal breastfeeding, we may expect to see more funded prevention studies.

Hopkinson and Konefal Gallagher conducted a RCT and found that breastfeeding practices could be influenced through programming and support regardless of acculturation level.³⁷ This suggests that more research should be conducted to build the evidence base around best practices in breastfeeding promotion within the Latino community to counter some of the negative implications associated with acculturation and maximize the health benefits of breastfeeding for this population.

Literature Review Discussion

As noted earlier, studies of breastfeeding practices have been primarily focused on Latino women of Mexican descent. Table 1 includes the results of the literature review including findings, methodology, and data set. This limits the ability to make generalizations and broad recommendations for Latino women and breastfeeding. The lack of diversity among the participants in the extant research suggests a general acceptance among health services researchers of continuing to view Latinos as a homogenous group. The insights into Latino health offered by disaggregated data are rarely available. The use of aggregated data limits our ability to fully understand variations among subgroups and begin to compare to contrast and understand those differences. While Mexican Americans constitute over 80% of the Latino population in the U.S., we know that the diversity of the population is growing.³⁸ Further, Latino subgroups are often clustered in geographic areas, which create subgroup cohorts and could be easily included in study designs.

Acculturation in this context refers to the experience of individuals or groups as they

move from home of origin to a society of settlement as outlined by Redfield and Berry.

Acculturation theory as it relates to public health also asserts that through acculturation the immigrant group's health status worsens with each consecutive generation. Acculturation has been measured using a variety of different methodologies from Marin's acculturation scale³⁹ to proxy acculturation measures. Acculturation was most often measured using static models and common proxies such as: dominant language spoken by family; years of residency in the United States; primary language spoken at home; and generational status in the U.S. Language spoken remains the most consistent way of measuring acculturation

Both the study results and commentary in this literature review indicate a common understanding that acculturation of Latino women has some association with the initiation and duration of breastfeeding. Gorman et al ⁴⁰ was the only article included that associated breastfeeding exclusivity with acculturation. The information found in this literature review regarding the association between acculturation and breastfeeding, coupled with data on the health benefits of breastfeeding, the growing Latino population, and the relatively high fertility rate among Latinos, has both research and policy implications. There is a potential for increased morbidity within the Latino community should acculturation continue to dictate breastfeeding practices.

Literature Review Conclusion

In summary, the current knowledge in the field regarding initiation, duration and exclusivity of breastfeeding among U.S. Latino women is evolving, with limited information on the differences in breastfeeding practices among subgroups, and the role that acculturation and other moderating factors may have on behaviors and risk factors. Further, it can be concluded that acculturation plays some role in the breastfeeding habits of U.S. Latino women. However, little is known about subgroup differences in breastfeeding habits. While it is acknowledged that Mexican Americans breastfeed at higher rates than their Puerto Rican counterparts, there has

been little discussion of the implications of these differences. An anthropologic hypothesis suggests Puerto Ricans are further along the spectrum of acculturation, thus increasing their level of acculturative stress, including exposure to racism. One explanation for the negative health behaviors and outcomes (e.g., substance use, low birth weight) associated with the acculturation process is the acculturative stress.⁴¹ Acculturative stress refers to the psychological, somatic, and social difficulties that may accompany acculturation processes, often manifesting in anxiety, depression, and other forms of mental and physical maladaptation. Thus, being exposed to specific social and structural imbalances in health outcomes (increased morbidity and mortality) more similar to African American than their first generation Mexican counterparts.

Table 1: Literature Summary Table

Author	Title	Methodology	Findings	Notes	Coded
Ahluwalia, I. B., D'Angelo, D., Morrow, B., & McDonald, J. A. (2012)	Association between acculturation and breastfeeding among Hispanic women: Data from the pregnancy risk assessment and monitoring system	Retrospective study	Breastfeeding initiation and duration were significantly higher among less acculturated and higher acculturated	PRAMS	Acculturation Specific(1)
Chapman, D. J., & Perez-Escamilla, R. (2011)	Acculturative type is associated with breastfeeding duration among low-income Latinas	Randomized trial	Breastfeeding continuation rates vary significantly across acculturation types		Acculturation Specific(1)
Gorman, J. R., Madlensky, L., Jackson, D. J., Ganiats, T. G., & Boies, E. (2007)	Early postpartum breastfeeding and acculturation among Hispanic women.	Retrospective study	Exclusive Breastfeeding rates were significantly different across acculturation group; women in low acculturation group were more likely to breastfeed exclusively at discharge than those in a high acculturation group	San Diego Birth Center Study	Acculturation Specific(1)
Harley, K., Stamm, N. L., & Eskenazi, B. (2007)	The effect of time in the U.S. on the duration of breastfeeding in women of Mexican descent.	Cohort Study	Increased years of residency in the US was associated with decreased breastfeeding initiation and shorter duration		Acculturation Specific(1)
Kimbrow, R. T., Lynch, S. M., & McLanahan, S. (2008)	The influence of acculturation on breastfeeding initiation and duration for Mexican-Americans.	Retrospective study	low levels of acculturation protect Mexican immigrants from choosing to formula feed	Fragile Families and Child Wellbeing Study	Acculturation Specific(1)

Sussner, K. M., Lindsay, A. C., Greaney, M. L., & Peterson, K. E. (2008)	The influence of immigrant status and acculturation on the development of overweight in Latino families: A qualitative study	Cohort Study	Difference in breastfeeding practices compared to their native country		Acculturation Specific(1)
Sussner, K. M., Lindsay, A. C., & Peterson, K. E. (2008)	The influence of acculturation on breast-feeding initiation and duration in low-income women in the US.	Cohort Study	Mother's exclusive use of their native language were ore likely to breastfeed and Mother's parent's nativity significant predictor of breastfeeding duration		Acculturation Specific(1)
Bartick, M., & Reyes, C. (2012)	Las dos cosas: An analysis of attitudes of Latina women on non-exclusive breastfeeding.	Cohort Study	Common reasons for introducing formula were treatment for insufficient milk, to keep the baby fuller longer, and planning to return to work	Dominican women	Latina/Hispanic Specific (2)
Faraz, A. (2009)	Clinical recommendations for promoting breastfeeding among Hispanic women.	Literature Review	Imperative to develop culturally specific guidelines.		Latina/Hispanic Specific (2)
Gill, S. L. (2009)	Breastfeeding by Hispanic women.	Systematic Literature Review	Newly immigrated women have longer initiation and duration of breastfeeding than more acculturated women		Latina/Hispanic Specific (2)
Kaufman, L., Deenadayalan, S., & Karpati, A. (2010)	Breastfeeding ambivalence among low-income African American and Puerto Rican women in north and central Brooklyn	Ethnographic review	Women's intention does not systematically explain breastfeeding explain	Puerto Rican women	Latina/Hispanic Specific (2)

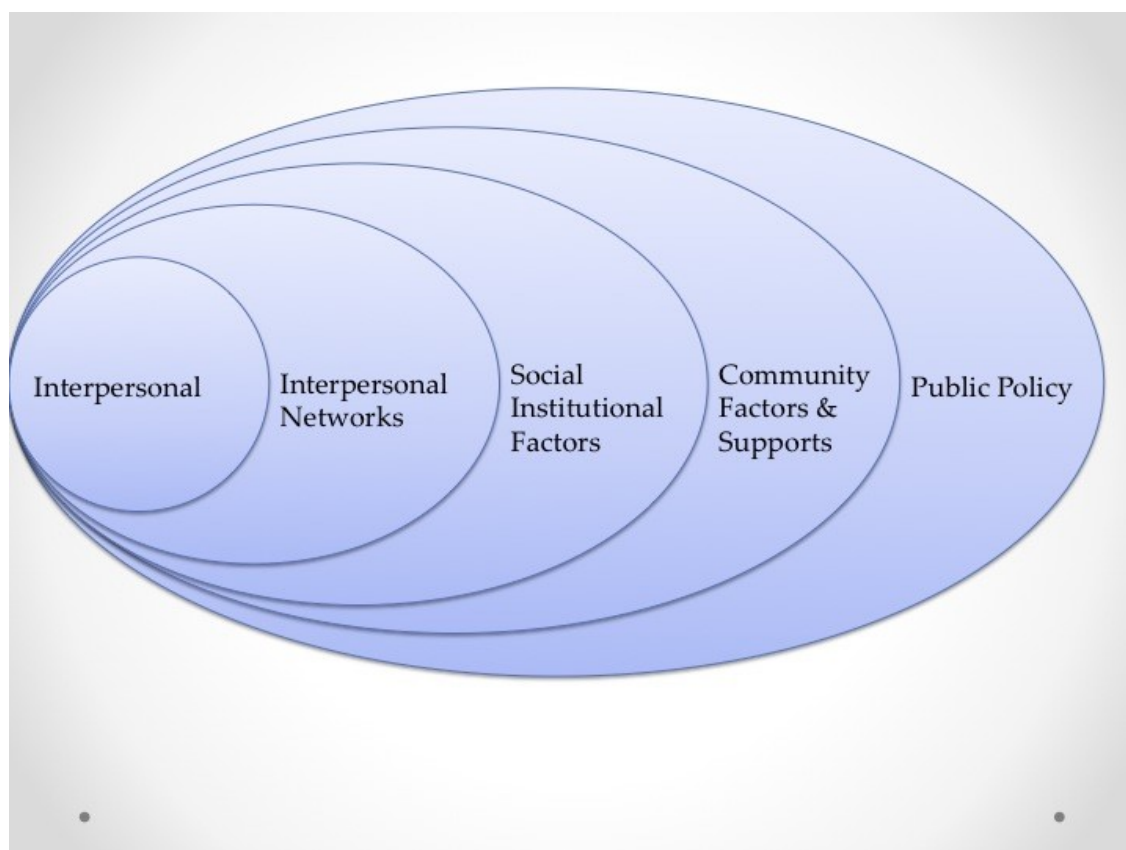
			breastfeeding outcomes		
Newton, K. N., Chaudhuri, J., Grossman, X., & Merewood, A. (2009)	Factors associated with exclusive breastfeeding among Latina women giving birth at an inner-city baby-friendly hospital.	Retrospective study	Factors associated with exclusive breastfeeding included maternal age, us-born mother, and birth sister		Latina/Hispanic Specific (2)
Rios, E. (2009)	Promoting breastfeeding in the Hispanic community.	Conference Address	Overview of the needs of breastfeeding in the Hispanic Community		Latina/Hispanic Specific (2)
Vaughn, L. M., Ireton, C., Geraghty, S. R., Diers, T., Nino, V., Falciglia, G. A., Mosbaugh, C. (2010)	Sociocultural influences on the determinants of breast-feeding by Latina mothers in the Cincinnati area	Cohort Study	foreign-born Latina women share similar breastfeeding determinants with the general population	Cincinnati Area	Latina/Hispanic Specific (2)
Anderson, A. K., Damio, G., Chapman, D. J., & Perez-Escamilla, R. (2007)	Differential response to an exclusive breastfeeding peer counseling intervention: The role of ethnicity.	Retrospective review of RCT	non-Puerto Ricans had a significantly great response to the intervention than Puerto Ricans	Puerto Rican population	Latina/Hispanic Intervention (3)
Hopkinson, J., & Konefal Gallagher, M. (2009)	Assignment to a hospital-based breastfeeding clinic and exclusive breastfeeding among immigrant Hispanic mothers: A randomized, controlled trial.	Randomized control trial	Intervention group was more likely to exclusively breastfeeding compared to the control group regardless of acculturation level		Latina/Hispanic Intervention (3)
Sandy, J. M., Anisfeld, E., & Ramirez, E. (2009)	Effects of a prenatal intervention on breastfeeding initiation rates in a Latina immigrant sample.	Cohort Study	Intervention had no effect on reported breastfeeding but an effect on exclusive breastfeeding		Latina/Hispanic Intervention (3)

Forste, R., & Hoffmann, J. P. (2008)	Are US mothers meeting the healthy people 2010 breastfeeding targets for initiation, duration, and exclusivity? the 2003 and 2004 national immunization surveys.	Retrospective study (NIS)	Hispanic children had higher odds of breastfeeding	NIS	Racial/Ethnic difference (4)
Sparks, P. J. (2011)	Racial/ethnic differences in breastfeeding duration among WIC-eligible families.	Retrospective study	WIC-eligible foreign-born Mexican origin Hispanics mothers were most likely to breastfeed for 6 months	WIC	Racial/Ethnic difference (4)
Nommsen-Rivers, L. A., Chantry, C. J., Cohen, R. J., & Dewey, K. G. (2010)	Comfort with the idea of formula feeding helps explain ethnic disparity in breastfeeding intentions among expectant first-time mothers.	Cohort Study	Formula feeding comfort had the greatest impact on breastfeeding initiation		Racial/Ethnic difference (4)
Ogbuanu, C. A., Probst, J., Laditka, S. B., Liu, J., Baek, J., & Glover, S. (2009)	Reasons why women do not initiate breastfeeding: A southeastern state study.	Retrospective study	Hispanics had 3x the odds of citing circumstances then whites	Arkansas PRAMS	Racial/Ethnic difference (4)
Lee, H. J., Elo, I. T., McCollum, K. F., & Culhane, J. F. (2009)	Racial/Ethnic differences in breastfeeding initiation and duration among low-income, inner city mothers.	Retrospective study	Both foreign born black and Hispanic mothers were significantly more likely to breastfeed their infants	Philadelphia survey	Racial/Ethnic difference (4)

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

Conceptual Model and Hypotheses

Figure 1. The Ecological Model

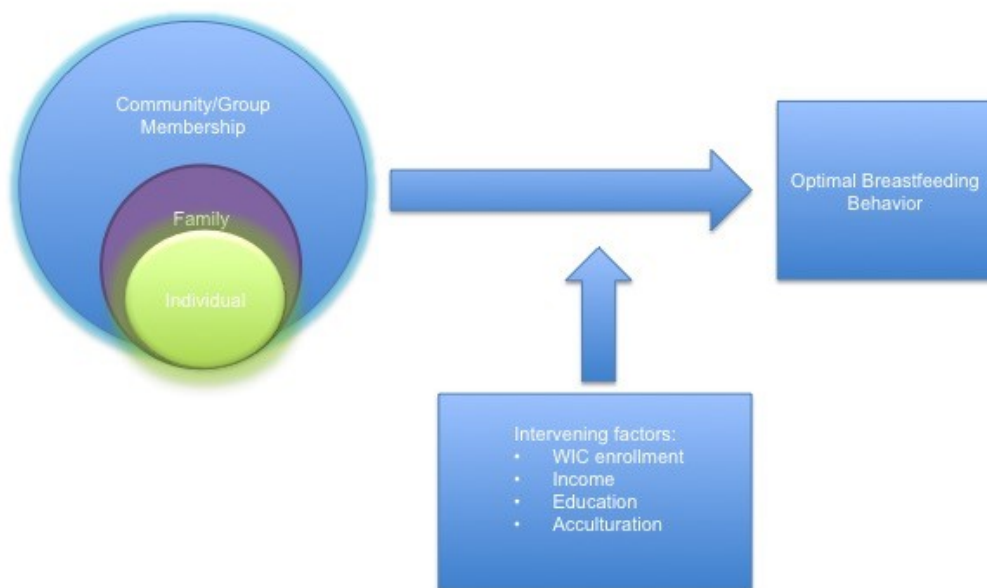


To guide this research, I will use the ecologically based conceptual model. Developed using the McLeroy, Steckler, Bibeau and Glanz⁴² model (Figure 1) as a basis for understanding breastfeeding behaviors among Latinos. This model recognizes that the health of an individual and a community is directly impacted by social factors outside of simple disease exposure and

individual health response. Further, the model recognizes that an individual exists within a family and community structure (ethnic social relations have been noted as part of the Marin acculturation scale).⁴³

Understanding the ecological model will help to better conceptualize breastfeeding among U.S. Latino women. Figure 2 recognizes that acculturation may occur at the individual family and community level to create social networks and collective behavior that influence individual behaviors such as attitudes. Although acculturation occurs at multiple levels, it will ultimately have an intervening effect on optimal breastfeeding, as will income, education, and WIC participation. Of direct impact on community/family is the concept of group membership

Figure 2: Intervening Factors of U.S. Latina Breastfeeding Behavior



history (subgroup membership), which may create a subconscious or collective behavior that has been developed as a coping mechanism for current or prior trauma. This could but does not always manifest as an expression of the cultural norms from the origin homeland. This group membership history may influence help seeking, trust, and other interpersonal relationships all of which are important elements in understanding health behavior in this case breastfeeding behavior. The current data set does not let us explore this concept but should be considered for further development in later inquiries.

My analysis of breastfeeding behaviors among U.S. Latino women will be informed by national data that, to date, has been restricted and unavailable for public use. I will use a multi-stage methodological approach to support my thesis through:

- Examining differences in breastfeeding behaviors (initiation and optimal breastfeeding (6 months exclusive)) among U.S. Latino women subgroups, and
- Exploring the intervening factors associated (education, WIC participation, income and acculturation) with breastfeeding behaviors among U.S. Latino women

My hypotheses are as follows:

- 1) U.S. Latina subgroups will have differing breastfeeding behaviors
- 2) Increased educational attainment is associated with increased initiation and optimal breastfeeding behavior in U.S. Latino women.
- 3) WIC participation is associated with increased initiation and optimal breastfeeding behavior in U.S. Latino women.
- 4) Increased family income is associated with increased initiation and optimal breastfeeding among U.S. Latino women.
- 5) Increased acculturation is associated with a decreased level of optimal breastfeeding (>6months exclusive) among U.S. Latino women.

Study Design

To examine these hypotheses, it was necessary to perform an individual analysis of the breastfeeding behaviors of each Latina subgroup as well as a comparative one across all of the subgroups. To account for the multi-level modeling and to establish a sample size that supports the analysis, a three year combined NIS survey dataset was employed. Using multiple years (2011, 2012, 2013), the secondary data source provided a large enough sample to allow for some generalizable and comparable assertions about Latina breastfeeding behaviors and was used for completion of the proposed analysis.

Since 1994, the National Immunization Survey (NIS) has monitored childhood immunization coverage in the United States. NIS is sponsored by the National Center for Immunizations and Respiratory Diseases (NCIRD) and conducted jointly by NCIRD and the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention. The NIS is a list-assisted random-digit-dialing telephone survey followed by a mailed survey to children's immunization providers and their parents. The target population for the NIS survey is children 19-35 months of age living in the United States. And its original intent was to monitor childhood immunization coverage. NIS does include specific questions related to breastfeeding initiation, duration and exclusivity as well as demographic information including but not limited to race, ethnicity, education and household income. It is important to note that no data for the commonwealth of Puerto Rico is included in the NIS.

As part of the formative development of this research and to have comparable breastfeeding data by which to develop some commentary based on national standards, I made a special request to the Center for Disease Control- National Center for Chronic Disease Prevention and Health Promotion, authors of the CDC's Annual Breastfeeding Report Card for a run of the dual frame breastfeeding rates by national, racial/ethnic (interactive web categories), and Hispanic sub-group as listed on the NIS survey instrument) level for NIS survey year 2012 to estimate the crude sample size, weighted percentage and 95% CI (upper and lower) for the

following eight breastfeeding indicators: ever breastfeeding, any breastfeeding at six months and at 12 months, exclusive breastfeeding through three months and exclusive breastfeeding through six months, formula supplementation within two days, three and six months. The variables identified are part of the CDC Breastfeeding Report Card and are national measurers in Healthy People 2020 but this run has never been conducted or published prior to this request. Preliminary findings are shown in Table 2 and Table 3.

Table 2: Percent of Mothers Who Initiated Breastfeeding

Demographic	Total	% Initiate BF
NATIONAL	25163	76.8
Non-Hispanic White	14695	78.6
Non-Hispanic Black	2582	61.8
Hispanic	4906	80.3
MEXICAN	1000	82.1
MEXICAN/AMERICAN	2121	80.6
CENTRAL AMERICAN	408	82.2
SOUTH AMERICAN	286	91.6
PUERTO RICAN	525	71.9
CUBAN/AMERICAN	90	90.6
SPANISH CARIBBEAN	100	85

Latino Subgroups shaded

Table 3: Percent of mothers who Exclusively Breastfeeding at 6 months (Optimal)

Demographic	Total	% Exclusive BF at 6 months
NATIONAL	24712	17.1
Non-Hispanic White	14429	18.4
Non-Hispanic Black	2540	13.2
Hispanic	4826	16.4
MEXICAN	986	14.2
MEXICAN/AMERICAN	2089	17.6
CENTRAL AMERICAN	399	14.9
SOUTH AMERICAN	281	15.7
PUERTO RICAN	518	14.4
CUBAN/AMERICAN	88	14.6
SPANISH CARIBBEAN	101	14

Latino Subgroups shaded

Survey Instrument

The NIS 2011-2013 data sets were collected the year prior and include an annual approximate total sample of 27,305 respondents. The 2012 survey results included 4,735 (17%) self-identified as Hispanic and a total of 1,834 (6.7%) of the surveys were conducted in Spanish, which can serve as a proxy for acculturation. The NIS data sets proposed for this research 2011-2013 include the following variables related to the analysis:

- Mother's education
- WIC enrollment
- Family Income
- Acculturation proxy (survey conducted in Spanish)

Since the NIS 2011-2013 public use data sets do not include Latino subgroup variables (C8_A_06Q3), a special request for the restricted subgroup data was requested from and granted by the National Center for Health Statistics.

Data Analysis Plan

As the Latina subgroup data was a restricted data set, a special application and review process took place to access the data. Once the application and investigators were approved, a data analysis plan was submitted as all analysis runs were conducted by a NCHS/Research Data Center associate. All output was then reviewed and released to the third party (myself.) It should be noted this process from initiation to final receipt of data was in excess of five months. There was considerable missing data. In addition, the data is from a complex survey design with weights and strata taken into account in order to account for the sampling design. When weights are missing or negative, then the analysis excludes these cases. This was true for the Dominican subjects in the survey analysis. While there at least 59 in the data set, the analyses using the weights and strata eliminate them due to missing weight values.

The research design consisted of three distinct parts: (1) univariate analysis of each variable to identify central tendency and other descriptive statistics; (2) bivariate regression to understand the strength and directions of the relationships between the dependent variable, Latina breastfeeding behavior, and each of the independent variables, mother's education, WIC participation, and acculturation; (3) and multivariate analysis to examine the performance of the independent variables as explanatory factors for the dependent variable.

As the examination of breastfeeding practices is the primary interest of this analysis, I used the categorical data provided in the National Immunization Survey to create a dichotomous variable to represent: optimal breastfeeding (exclusive and <6months; yes-1) and ever breastfed (initiated breastfeeding and non-exclusive and/or and >6months; no-0). The measures used to assess breastfeeding are: *"Was (child) ever breastfeed or fed breastmilk?"* (Dichotomous, 0-No, 1-Yes; *"How old was (child) when (child) completely stopped breastfeeding or being fed breast milk?"* (Continuous); *"How old was (child) when (child) was first fed formula?"* (Continuous) information on these data points can be found in Table 4.

The data analysis supported the examination of my thesis hypotheses and two major

aims.

Aim 1: To examine differences in breastfeeding behaviors among Latina subgroups in the U.S.

Hypothesis (1): U.S. Latino subgroups will have differing breastfeeding behaviors.

Data Analysis

- Breastfeeding initiation rates were calculated for each subgroup and compared
- Breastfeeding exclusivity at six months was calculated for each subgroup and compared. These data were used to test the hypotheses of whether differing breastfeeding behaviors exist among U.S. Latino subgroups. Data from the survey used to identify Latina participants and construct subgroups came from a question on participant ethnicity: “*Are you/is the mother Hispanic or Latino?*” (Dichotomous, 0-No, 1-Yes). The restricted data set included ten variables on ethnicity information about the mother, as noted above the weighting scheme eliminated the Dominican group from analysis. In order to have clear comparisons among subgroups I created a nine level variable: Not Latina/Hispanic=1, Mexicano/Mexican =2, Mexican-American=3, Central American=4, South American=5, Puerto Rican=6, Cuban/Cuban American=7, Spanish Caribbean=8, Other Spanish=9 (see Table 7). Given the weighted scheme of the data I performed pairwise tests for “ever breastfed” and “optimal breastfeed” to find out the statistical significance of these differences between sub- groups using Rao-Scott χ^2 and Benjamini-Hochberg.

Aim 2: To explore the intervening factors associated (e.g., acculturation, education, income, and WIC enrollment) with initiation and less than optimal breastfeeding among U.S. Latino women.

Hypothesis (2): Increased educational attainment is associated with increased initiation

and optimal breastfeeding among U.S. Latino women.

Hypothesis (3): WIC participation is associated with increased initiation and optimal breastfeeding among U.S. Latino women. WIC participation will have the strongest association with breastfeeding initiation among US Latina subgroups.

Hypothesis (4): Increased family income is associated with increased initiation and optimal breastfeeding among U.S. Latino women.

Hypothesis (5): Acculturation will have the strongest association with optimal breastfeeding among US Latina subgroups. Increased acculturation is associated with a decreased level of optimal breastfeeding (>6 months exclusive) among U.S. Latino women.

Data Analysis

Multiple-stage (i.e. univariate, and multivariate) analyses were used to understand factors influencing Latina breastfeeding behaviors and contributing to differences across subgroups. Given the weighted scheme of the data, significance was established using Rao-Scott χ^2 . Income and maternal education attainment were treated as continuous variables in the analysis. Data from the survey used for single variable and multivariable analysis are listed and defined in Tables 4 and 5.

Data Management Plan

All data was analyzed in collaboration with a contracted statistician, I managed all analysis, and my methods advisors, Drs. Torres and Skinner, provided insight and guidance as it relates to the contract statistician. The statistician's primary function was to review the CDC data request and perform the multi-level logistic regression modeling. In addition to directing specific data manipulation requests to the statistician, I interpreted and analyzed the implications of the statistical findings.

Table 4: Dependent and Independent Variables

Dependent Variables			
Question#	Variable	Type	Question
CBF_01_X	Breastfeeding initiation	BF	Was (child) every breastfeed or fed breastmilk
CBF_021_X	Breastfeeding duration	BF	How old was (child) when (child) completely stopped breastfeeding or being fed breast milk?
CBF_03_X	Breastfeeding exclusivity	BF	How old was (child) when (child) was first fed formula
Independent Variables			
Question#	Variable	Type	Question
CWIC_02_X	Breastfeeding education	D	Has (child) ever received WIC
C6_06Q3_X	Maternal educational attainment	D	What is the highest grade or year of school (child's) mother has completed
CFAMINC	Family Income	D	Please think about your total combined family income during 2012 for all members of the family
Language	Language	A	Language in which interview was conducted
C8_06Q3_X	Ethnicity	D	Are you/is the mother Hispanic or Latino
C8_A_06Q3	Latino-Subgroup membership	D	Mexican/Mexicano, Mexican-American, Central American, South American, Puerto Rican, Cuban/Cuban American, Spanish-Caribbean, Other Spanish/Hispanic (Specify), Don't know, Refused
Key: Type: A= Acculturation Proxy BF= Breastfeeding D=Demographic Based on 2012 NIS Survey Code Book			

Table 5: Dichotomous Variables

Variable	Code
Initiation	
Did not initiate breastfeeding	0
Initiated Breastfeeding	1
Optimal Breastfeeding	
Less then optimal	0
Optimal	1
Latino Ethnicity	
Not Latina	0
Latina	1
WIC Participation	
Ever used WIC	0
Never Used WIC	1
Acculturation	
Acculturation Low	0
Acculturation High	1

The univariate analysis consisted of descriptive statistics and measures of association was completed to summarize demographic and acculturation characteristics and breastfeeding behaviors, including measures of central tendency and of dispersion. The analysis supported the construction of categorical variables for appropriate levels of “Mother’s education.” As noted earlier only income remained a continuous variable.

The bivariate analysis examined the influence of each factor – maternal education, WIC participation, income, and acculturation – on the breastfeeding behaviors across all Latinas in the sample. Given the degree of variation in educational levels of this population, maternal education was defined using four categories (1 = < 12 years; 2 = 12 years; 3 = > 12 years, non-college graduate; 4 = college graduate). WIC participation had two variables for consideration

“ever used WIC” and “currently use WIC.” Given that the hypothesis was to explore WIC membership as an intervening factor, I concluded “ever used WIC” was the best variable. Thus, I created a dichotomous variable (0=no, 1=yes). I used the language preference in which the survey was conducted as a proxy for acculturation. A dichotomous variable was created to represent low acculturation (Conducted in Spanish; yes-1) and high acculturation (Conducted in English; no-0.) I performed a bivariate regression and used the findings to identify and interpret the data for all Latinas and Latina subgroups with each factor to determine the direction and strength of the relationship (based on the R-squared, coefficient of determination) between the intervening factor and the breastfeeding behavior for each subgroup.

This multivariate analysis examined the impact of each variable (education, WIC participation, income, and acculturation) using logistic regression modeling to better identify the constellation of factors that impact 1) breastfeeding initiation and 2) optimal breastfeeding among U.S. Latinas and within subgroup membership.

Table 6: Subgroup Variables

1	Not Latino/Hispanic
2	Mexican/Mexicano
3	Mexican-American
4	Central American
5	South American
6	Puerto Rican
7	Cuban/Cuban American
8	Spanish-Caribbean
9	Other Spanish

While the restricted data set includes 10 variables for this analysis 9 categories have been created eliminating “Don’t Know” and “Refused

CHAPTER 4: RESULTS

This chapter provides the results of my analysis of U.S. Latino women breastfeeding behaviors. Specifically, this chapter covers the data analysis related to meeting the aims of this study:

Aims

1. To examine differences in breastfeeding behaviors (initiation and optimal breastfeeding) among U.S. Latino women subgroups using a national sample.
2. To explore the intervening factors associated (including acculturation, education, income and WIC participation) with breastfeeding behaviors (initiation and optimal breastfeeding) among U.S. Latino women.
3. To develop a plan to inform public health policy and advocacy on U.S. Latino breastfeeding behavior and its implications.

The individual data analysis corresponds to the following hypotheses:

Hypothesis (1): U.S. Latino subgroups will have differing breastfeeding behaviors.

Hypothesis (2): Increased educational attainment is associated with increased initiation and optimal breastfeeding among U.S. Latino women.

Hypothesis (3): WIC participation is associated with Latina breastfeeding the following manners: (a) WIC participation is associated with increased initiation and optimal breastfeeding among U.S. Latino women and (b) WIC participation will have the strongest association with

breastfeeding initiation among US Latina subgroups.

Hypothesis (4): Increased family income is associated with increased initiation and optimal breastfeeding among U.S. Latino women. *Hypothesis (5):* Acculturation will be associated with Latina breastfeeding in the following manner: (a) Acculturation will have the strongest association with optimal breastfeeding among US Latina subgroups and (b) increased acculturation is associated with a decreased level of optimal breastfeeding (>6 months exclusive) among U.S. Latino women.

Most of the information about Latina breastfeeding behavior has limited generalizability since it is primarily focused on the experiences of Mexican Americans, as they are the largest of the U.S. Latino subgroups. However, over time, researchers have come to recognize that Latinos are not monolithic. Of note, Chapman and Escamilla Perez assessed the effects of acculturation on breastfeeding behavior among low-income Latino women.⁴⁴ Using a multidimensional assessment of acculturation, the authors examined the acculturative type and breastfeeding behaviors among low-income U.S. Latino women. The authors identified three specific subgroups: Mexican, Puerto Rican, and other. The authors found that the low acculturation group was significantly more likely to continue breastfeeding than the traditional Hispanic, assimilated, and integrated-acculturation groups. They further noted, “Multidimensional assessments of acculturation may prove useful in better tailoring future breastfeeding promotion interventions.”

The data analysis from this dissertation study confirms these prior findings and seeks to tease out less statically verified but important factors for future exploration. In addition, this study examines the impact of maternal educational attainment, income and WIC participation on initial and optimal breastfeeding rates. Data limitations remain an issue for this study, especially in terms of using weighted data to compare Latina subgroups.

The following analysis is based on the National Immunization Survey data from years 2011-2013. The Latina sub group data set is a restricted data set and thus the data is available

only in a closed system and all analysis, was done within the NIS closed system, reviewed and approved by an internal NIS team, and the results released to the researcher. The data set is large but there is considerable missing data. In addition, the data is from a complex survey design with weights and strata to be taken into account in order to account for the sampling design. When weights are missing or negative, then the analysis excludes these cases. The CDC provided the weight scheme. Also, due to restrictions from the data source (CDC), categories with observed frequencies of 5 or less are not reported in order to protect the identity of respondents.

Aim 1: To examine differences in breastfeeding behaviors among Latina subgroups in the U.S.

Hypothesis (1): U.S. Latino subgroups will have differing breastfeeding behaviors.

Ever Breastfed

The weighted logistic regression for Hispanic Origin was also significant, $\chi^2(8) = 31780.8662$; $p < 0.0001$. This analysis found that non-Hispanic/Latina mothers breastfeed less than everyone, although the difference with Puerto Rican mothers is not significant at a 95% confidence interval. (Table 7)

Mexicano mothers breastfeed significantly more than Mexican American, Central American, and Puerto Rican and Other Spanish mothers. Additionally, Mexican American mothers breastfeed less than South American mothers. Central American mothers breastfeed more than Puerto Rican mothers but less than South American mothers. South American mothers breastfeed more than Puerto Rican or other Spanish mothers. Finally, Puerto Rican mothers breastfeed less than Cuban/Cuban American, Spanish Caribbean, or other Spanish mothers. (Table 8)

Table 7: Percent of mothers initiating Breastfeeding (Ever Breastfed) by Latino Subgroup

Origin	N	Ever Breast fed %
1. Not Hispanic/Latina	2577	72.41
2. Mexicano	4203	85.97
3. Mexican American	2728	77.72
4. Central American	1025	80.60
5. South American	670	90.79
6. Puerto Rican	885	72.41
7. Cuban/ Cuban American	132	85.72
8. Spanish Caribbean	190	84.95
9. Other Spanish	712	80.88

Table 8: Pairwise differences Ever Breastfed between levels of origin univariate analysis p-values

Origin	1	2	3	4	5	6	7	8
1. Not Hispanic/Latina								
2. Mexicano	<0.0001#							
3. Mexican American	0.0201#	<0.0001#						
4. Central American	0.0063#	0.0170#						
5. South American	<0.0001#	0.0562	<0.0001#	0.0018#				
6. Puerto Rican	0.9964	<0.0001#	0.0624	0.0164#	<0.0001#			
7. Cuban/ Cuban American	0.0369	0.9586	0.1694	0.3713	0.2727	0.0421		
8. Spanish Caribbean	0.0112#	0.7828	0.1102	0.3419	0.1354	0.0153#	0.8978	
9. Other Spanish	0.0135#	0.0496	0.3147	0.9345	0.0038#	0.0256	0.4082	0.3919

Significant =p < 0.05

#: significant using Benjamini-Hochberg

Optimal Breastfeeding

For purposes of this study, optimal breastfeeding is defined as having breast fed for at least six months and not starting bottle-feeding until after six months. In other words, optimal breastfeeding is exclusive breastfeeding for the first six months.

Hispanic origin was significant related to optimal breastfeeding
(Rao-Scott $\chi^2(8) = 19.5793$; $p = 0.0121$).

Mothers who were not Hispanic/Latina were more likely to optimally breastfeed as were mothers from South America, the Spanish Caribbean, and other Spanish/Hispanic mothers whereas all others were less likely to do so. Using the Benjamini-Hochberg method, which minimizes the number of false positives, the findings subsequently suggest that non-Hispanic/Latina mothers were also more likely to optimally breastfeed than Mexican American mothers.

Table 9: Percent of mother who Breastfeed Exclusively at 6 months (Optimal Breastfed) by Latino Subgroup

Origin	N	Optimal Breastfeeding %
1. Not Hispanic/Latina	1826	35.37
2. Mexicano	3444	31.23
3. Mexican American	1999	25.69
4. Central American	817	25.61
5. South American	593	33.55
6. Puerto Rican	631	22.22
7. Cuban/ Cuban American	106	28.43
8. Spanish Caribbean	156	30.25
9. Other Spanish	563	32.08

Table 10: Pairwise differences Optimal Breastfeeding between levels of origin univariate analysis p-values

Origin	1	2	3	4	5	6	7	8
1. Not Hispanic/Latina								
2. Mexicano	0.1220							
3. Mexican American	0.0019 #	0.0360						
4. Central American	0.0150	0.0966	0.9810					
5. South American	0.6680	0.5452	0.0521	0.0833				
6. Puerto Rican	0.0004 #	0.0060	0.3137	0.3892	0.0106			
7. Cuban/ Cuban American	0.3925	0.7159	0.7135	0.7150	0.5446	0.4021		
8. Spanish Caribbean	0.5078	0.8931	0.5227	0.5318	0.6842	0.2609	0.8590	
9. Other Spanish	0.4813	0.8418	0.1457	0.1851	0.7857	0.0364	0.6694	0.8241

Significant = $p < 0.05$

: Benjamini-Hochberg correction

Aim 2: To explore the intervening factors associated (e.g., acculturation, education, income, and WIC enrollment) with initiation and less than optimal breastfeeding among U.S. Latino women.

Hypothesis (2): Increased educational attainment is associated with increased initiation and optimal breastfeeding among U.S. Latino women.

The education of the Latina mother was significantly related to ever breastfed using the weighted (Rao-Scott $\chi^2(3) = 45.5906$; $p < 0.0001$) analyses. Mothers with more education were more likely to breastfeed while mothers with less education were less likely to breastfeed.

The education of the Latina mother was significantly associated with optimal breastfeeding (Rao-Scott $\chi^2(3) = 33.9658$; $p < 0.0001$) Those with less than a high school education were less likely to optimally breastfeed while mothers with college degrees were more likely to optimally breastfeed.

Hypothesis (3): (a) WIC participation is associated with increased initiation and optimal breastfeeding among U.S. Latino women.

Latina mothers who ever used WIC was significantly associated to ever breastfed (Rao-

Scott $\chi^2(1) = 22.5539$; $p < 0.0001$). Mothers who had never used WIC were more likely to breastfeed than would be expected by chance while mothers who had used WIC were less likely to breastfeed.

Latina mothers and Ever used WIC was significantly associated with optimal breastfeeding (Rao-Scott $\chi^2(1) = 46.9110$; $p < 0.0001$) Mothers who said they had ever used WIC were less likely to optimally breastfeed while mothers who had not ever used WIC were more like to breastfeed.

(b) WIC participation will have the strongest association with breastfeeding initiation among US Latina subgroups.

It was determined that it was not possible to measure the variable with the strongest association. The association of WIC for a larger subgroup could have been examined using interaction terms or simultaneous models to draw some assumptions, however, I did not conduct that analysis. I did determine how subgroups related to optimal breastfeeding and how acculturation could relate to optimal breastfeeding.

To predict ever breastfed over and above subgroup, a weighted multivariable analysis was applied to the data, including acculturation (using language as a proxy) educational attainment of the mother, WIC participation, income, age group, and child gender to see if any variable has greater explanatory power compared to the other variables. The analysis for ever breastfed, shows that ever used WIC is significant at a 95% confidence interval, but so are all the other variable of interest.

Table 11: Multivariate analysis of Ever Breastfed

Effect	P-value
Hispanic Origin	<0.0001
Ever Used WIC	0.0389
Language (proxy for acculturation)	0.0002
Education	<0.0001
Income	0.0194

Significant = $p < 0.05$

Hypothesis (4): Increased family income is associated with increased initiation and optimal breastfeeding among U.S. Latino women.

Income was significantly associated with ever breastfed (Rao-Scott $\chi^2(11) = 40.335$; $p < 0.0001$) analyses. The Mantel-Haenszel test was also significant ($\chi^2(1) = 87.9685$; $p < 0.0001$), indicating some linearity in the relation, but the difference in chi-squares also indicated some deviations from linearity ($\chi^2(10) = 33.5148$; $p = 0.0002$). In general, those with higher incomes were more likely to breastfeed and those with lower incomes were less likely to breastfeed.

There was a significant association of income with optimal breastfeeding (Rao-Scott $\chi^2(11) = 34.9316$; $p = 0.0003$). The difference between the Pearson Chi-square and the Mantel-Haenszel Chi-square was not significant ($\chi^2(10) = 15.1077$; $p = 0.1282$), meaning that the relation was fairly linear, i.e. there were no significant deviations from linearity. Higher levels of income were associated with more optimal breastfeeding whereas less income was associated with less optimal breastfeeding.

Hypothesis (5):

(a) Acculturation will have the strongest association with optimal breastfeeding among US Latina subgroups.

While it was determined that it is not possible to measure the variable with the strongest association, it is possible to examine the association of acculturation (using language as a proxy) for a larger subgroup, using interaction terms or simultaneous models to draw some assumptions. However, I did not conduct that analysis. To predict optimal breastfeeding over and above subgroup, a weighted multivariable analysis was applied to the data, including

acculturation (using language as a proxy) educational attainment of the mother, WIC participation, income, age group, and child gender to see if any variable has greater explanatory power compared to the other variables. All of these variables, with the exception of age group and child gender, language and education were statistically significant in the analysis. This analysis indicated that acculturation was not significant at a 95% confidence level.

Table 12: Multivariate analysis of Optimal Breastfeeding

Effect	P-value
Hispanic Origin	0.0077
Ever Used WIC	0.0361
Language (proxy for acculturation)	0.0831
Education	0.0715
Income	0.0451

Significant = $p < 0.05$

(b) Increased acculturation is associated with a decreased level of optimal breastfeeding (>6 months exclusive) among U.S. Latino women.

Language (proxy for acculturation) was not significantly associated with optimal breastfeeding.

Overall Analysis

Ever Breastfed

With regards to ever breastfed the overall analysis found that for Latina mothers WIC was associated with less breastfeeding, speaking English was associated with less breastfeeding than speaking Spanish, higher education was associated with a greater likelihood of breastfeeding when all the other variables were controlled. As for Hispanic origin, there were 19 pairwise differences that were significant at the .05 level, fifteen of which met the more stringent criterion of the Benjamini-Hochberg correction. Non-Hispanic/Latina mothers breast-

feed less than everyone except Puerto Rican mothers. Mexicano mothers breast-feed significantly more than Mexican American, Central American, and Puerto Rican mothers and Other Spanish mothers. Mexican American mothers breastfeed less than South American mothers. Central American mothers breast-feed more than Puerto Rican mothers but less than South American mothers. South American mothers breastfeed more than Puerto Rican or other Spanish mothers. Puerto Rican mothers breast-feed less than Cuban/Cuban American, Spanish Caribbean, or other Spanish mothers. (Table 8)

Optimal Breastfeeding

With regards to optimal breastfeeding the overall analysis found that for Latina mothers optimally breastfeed when the weighted analysis model controlling for the design effects is used, the findings are that the likelihood ratio Chi-square is also significant ($\chi^2 (16) = 16950.7411$; $p < 0.0001$). Hispanic origin ($\chi^2 (8) = 20.7868$; $p = 0.0077$), Current WIC usage ($\chi^2 (1) = 4.3938$; $p < 0.0361$), and Income ($\chi^2 (1) = 4.0157$; $p = 0.0451$) were still significant predictors. The remaining variables were not. WIC usage is still associated with less likelihood of optimal breastfeeding while greater income was associated with more likelihood of optimal breastfeeding. Looking at pairwise differences between levels of Hispanic origin, only two differences was statistically significant using the Benjamini-Hochberg procedure indicating that Non-Hispanic/Latina mothers were more likely to optimally breastfeed than Puerto Rican and Mexican American mothers. Four more comparisons were significant at less than the .05 level, Mexicano mothers were more likely to optimally breastfeed than Puerto Rican or Mexican American mothers, and non-Hispanic/Latina mothers were more likely to optimally breastfeed than Mexican American or Central American mothers.

Study limitations

The NIS survey data has both benefits and limitations. Benefits include being a national

probability sample, significant sample size, and capturing subgroup identification. The data also allow for conducting analyses based on demographic characteristics including mother's education and WIC participation.

At the same time, the secondary data analysis as presented has many limitations. Specifically, the survey questions were not specifically designed to map onto the study's conceptual model. There is an inexact relationship between variables and the conceptual model. This is a common problem with secondary data analysis. For example, the survey does not include direct measures of acculturation and, thus, language is to be used as a proxy. Also, the proxy of language available for the NIS only allows for the creation of a dichotomous variable (i.e. high acculturation and low acculturation.) While this dichotomous variable has precedent and is appropriate as a standard measure of acculturation in health analysis, it does not support a more dynamic nor comprehensive measure, which Chapman and Escamilla Perez suggested was the optimal measure of acculturation.⁴⁵ Therefore, my research explored correlating relationships of acculturation and breastfeeding behaviors, and this study provides new directions for further examination rather than definitive explanations of behavior.

An additional limitation of the research is that the survey does not provide data or proxy data (except for WIC participation) on other potentially important contributing factors, such as social support, breastfeeding education, and environment. Given the ecological model of behavior change, we would expect to find that such factors as increased familial support (interpersonal networks) and/or community/cultural traditions (social institutional factors) supportive of breastfeeding would have a positive relationship with initiation and optimal breastfeeding. Likewise, community factors, such as linguistically and culturally relevant breastfeeding support groups, or Baby Friendly designated hospitals, would also show a positive relationship with breastfeeding initiation and optimal breastfeeding.

Although I hoped to better understand the breastfeeding behavior of Latina subgroup, the current available data only allowed me to examine breastfeeding practices among Mexican,

Mexican American, Central American, South American, Puerto Rican, Cuban, and Spanish-Caribbean sub-groups and Other Spanish. These categories aggregate Central American and South American subgroups. The ability to disaggregate to the country of origin level, specifically among those Latino women of Central and South American origin, may have allowed for better understanding of both culturally- specific issues (as noted in the ecological model) as well as issues associated with colonization (interpersonal networks in the form of group memory.)

Finally, the analysis required I make decisions on who would be included and excluded in the breastfeeding sample in order to ensure that I did not mix independent and dependent observations, the statistician only used the first child from each mother. There were families with more than one child in the study, since these would be dependent and therefore invalidate the assumption for logistic regression and chi-square; I only used the first child. If mothers were more likely to breastfeed their first child than the second or third, then there may have been an overestimate of the percent breastfeeding, but more importantly the analysis provided in this study should not be compared to any one year of NIS breastfeeding data for Latinas (Table 2 and Table 3.

CHAPTER 5: DISCUSSION

The study findings generally confirm the hypotheses. Significant differences in breastfeeding behavior across U.S. Latino women subgroups were observed in the study sample. These differences were particularly desperate in looking at initiation rates across subgroups compared to optimal breastfeeding rates across subgroups. In some of the analyses, these differences across subgroups remained even after controlling for sample size and intervening factors. In other instances, weighted data analyses made some variable insignificant or change direction of impact. Additionally, more exploration of acculturation needs to be done, as language alone is not robust enough as a proxy for this factor.

The U.S. Latino breastfeeding behavior data used in this study demonstrated that Latina mothers are not monolithic. All Latina subgroups, with the exception of Puerto Rican and Cuban, initiate breastfeeding at statically significant and higher rates than non-Hispanic/Latina women in the sample. The rates of Latina breastfeeding initiation ranged from 77.7% to 90.8% compared to 72.4% for non-Hispanic women. Mexicano initiation rates were significantly higher than Mexican American, Central American, and Puerto Rican subgroup's initiation rates. South American initiation rates were significantly higher than Mexican American, Central American, and Puerto Rican subgroups' initiation rates. In terms of optimal breastfeeding data, Mexican American, Central American, and Puerto Rican subgroups report statistically significant and lower rates than non-Hispanic women (35.4%). Latina optimal breastfeeding rates range from 22.2% to 33.6%. Mexicano optimal breastfeeding rates (31.2%) are statistically significant and higher than Mexican American and Puerto Rican subgroups. Also, South American optimal breastfeeding rates (33.6%) are statistically significant and higher than Puerto Rican subgroup

rates. Therefore, there is varying and significant differences across Latino subgroups. The analysis and process findings can be further grouped using the levels of the ecological model to understand their relationship to the individual and help better develop a plan of action to support healthy behaviors in breastfeeding.

Individual Level Factors

Intervening factors, such as maternal education attainment and household income, play a role in determining breastfeeding behavior for Latina mothers. Data analysis confirmed that U.S. Latino mothers with more education were more likely to initiate breastfeeding while U.S. Latino mothers with less education were less likely to report ever breastfeeding.

Correspondingly, U.S. Latino mothers with a college degree were more likely to optimally breastfeed, while U.S. Latino mothers with less than a high school education were less likely to optimally breastfeed.

Income was also significantly associated with ever breastfed. In general, those with higher incomes were more likely to breastfeed and those with lower incomes were less likely to breastfeed. There was also a significant association of income with optimal breastfeeding. There were no significant deviations from linearity; higher levels of income were associated with more optimal breastfeeding whereas less income was associated with less optimal breastfeeding.

Community/Family Factors

As previously mentioned, language was used as a proxy for acculturation and was limiting as a predictive element in understanding breastfeeding behavior of U.S. Latino women. In the data analysis, language was not a significant factor for optimal breastfeeding. Comparing Latina subgroups seems to yield more information about the possible effect of acculturation. For example if we assume that women who identified as Mexicano are women who were born in

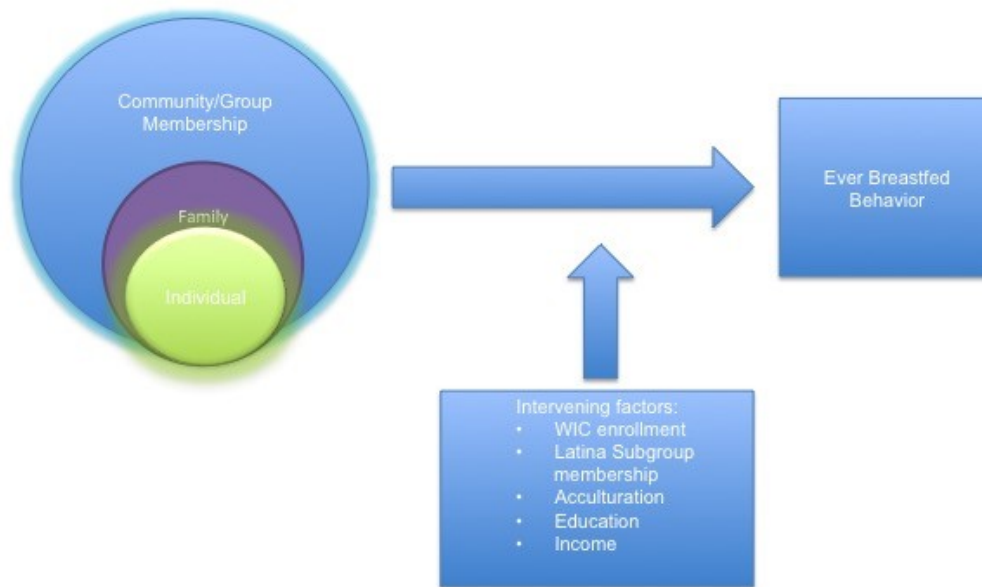
Mexico, newly arrived or who feel akin to specific cultural traditions, beliefs and practices and we assume that women who identified as Mexican American are women born in the U.S. or of Mexican descent and hold themselves to American traditions then the following is an interesting finding related to acculturation. In this study, the initiation and optimal breastfeeding rates of Mexicano mothers compared to Mexican American mothers varies and remains statistically significant. Also, Mexicano mothers have higher initiation and optimal rates of breastfeeding than Mexican American mothers. This would coincide with previous findings in which women with low acculturation initiated breastfeeding at higher rates than those with high acculturation.⁴⁶ Further, studies comparing specific groups, particularly when there is more specificity about acculturation and cultural nuances, may be more useful than proxy variables (e.g. language) in identifying and applying appropriate interventions to achieve public health goals.⁴⁷

Policy Level Factors

This study obtained unexpected results in terms of WIC participation. Data disproved the hypothesis that WIC participation is associated with increased initiation rates among U.S. Latino mothers. U.S. Latino mothers who had never participated in WIC were more likely to initiate breastfeeding and more likely to optimally breastfeed, while U.S. Latino mothers who had used WIC were less likely to report either ever or optimally breastfeeding. Available data did not allow a comparison across Latina subgroups of variances in breastfeeding behavior.

Thus, the NIS data analysis provides two models for understanding U.S. Latino women's breastfeeding behaviors and by which to explore policy implications at a variety of ecological levels (Table 3 and Table 4.).

Figure 3: Intervening Factors of U.S. Latina Breastfeeding Behavior (ever Breastfeed)



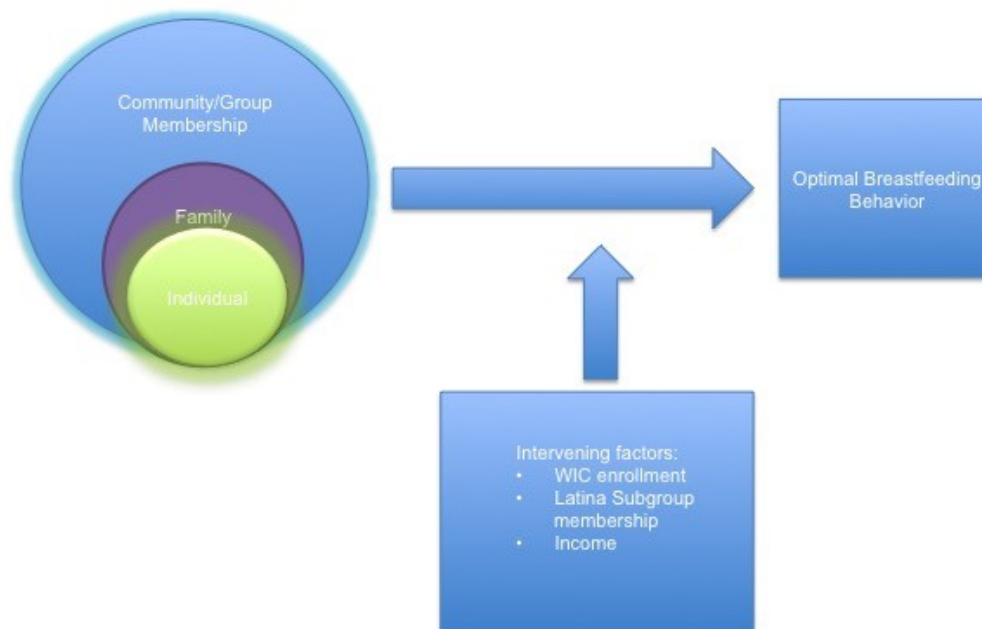
Policy Implications by Ecological Level

Individual Level Policy Implications (Interpersonal/Interpersonal Networks)

While breastfeeding offers us some insight into the larger arena of Latina maternal and child health, we recognize that the lack of Latino specific interventions is not limited to breastfeeding. One can speculate that because of the relatively positive birth outcomes among Mexican Americans, there has been insufficient investment in maternal and infant health services for U.S. Latino women in general and even less specific interventions for non-Mexican American Latino sub-groups. This phenomenon may be supported by the same structural racism that has led to disinvestment in African American maternal and infant health; the

consequences of this disinvestment could have similar dire outcomes for the health and well being of the Latino community, and the U.S as a whole. Addressing larger public policy, offers us a way to correct the structural barriers that impede proper support of U.S. Latino women.

Figure 4: Intervening Factors of U.S. Latina Breastfeeding Behavior (Optimal Breastfeeding)



Health System Level Policy Implications (Social Institutional)

Baby Friendly Designated Hospitals

Health facilities are a key in changing breastfeeding behaviors. A 2004 Cochrane review found that institutional changes in maternity care practices effectively increased breastfeeding initiation and duration rates.⁴⁸ The 2011 Surgeon General's Call to Action to Support

Breastfeeding step 7 is to “*Ensure that maternity care practices throughout the United States are fully supportive of breastfeeding.*”⁴⁹ One way to accomplish a change in maternity care practices while supporting a reduction of disparities is through Baby Friendly Hospital designation. The Baby-Friendly Hospital Initiative is a global program launched by the World Health Organization and the United Nations Children’s Fund. It recognizes and awards birthing facilities that successfully implement the *Ten Steps to Successful Breastfeeding (Ten Steps)*⁵⁰ and the International Code of Marketing of Breast-milk Substitutes⁵¹. One study found that adherence to the Ten Steps decreases racial, ethnic, and socio-cultural disparities in breastfeeding rates in U.S. hospitals.⁵² Thus, making it a useful tool in supporting breastfeeding behaviors for all women and educating providers on breastfeeding.

Health Care Providers

Previous research has documented that health care providers can influence a woman’s decision to breastfeed and her ability and desire to continue breastfeeding.^{53 54}

Recognizing the important role health providers play in the decision making of mother’s to breastfeed, the *Surgeon General’s Call to Action to Support Breastfeeding* also includes the provision to “provide education and training in breastfeeding for all health professionals who care for women and children” as well as “include basic support for breastfeeding as a standard of care for midwives, obstetricians, family physicians, nurse practitioners, and pediatricians.”⁵⁵

The Ten Steps includes education of the provider and medical staffs as a whole to support mother’s breastfeeding by ensuring providers and staff are educated, trained, and have a written policy on breastfeeding. The Ten Steps are evidence based and endorsed by a number of health associations including: American Academy of Family Physicians; American Academy of Nurses; American Academy of Pediatrics; American College of Nurse-Midwives; and Academy of Breastfeeding Medicine.

Further, understanding the role healthcare providers play in decision making it is

important for the providers to not only be trained in culturally competency and have available linguistically appropriate resources but to also practice active communication when educating about breastfeeding. A review of physician-patient communication to patient health outcomes, found a correlation between effective physician-patient communication and improved patient health outcomes.⁵⁶ Additionally, nurses and other medical staff that have regular interaction with mothers are key to influencing their health decision-making.⁵⁷

Public Policy

The Women Infant and Children (WIC) program reaches over 50% of all U.S. births. WIC's outreach programs in the form of breastfeeding support, education and community support could allow for the possibility of subgroup specific or regional (where we find large concentrations) modifications to best serve the specific needs of Latina subgroups. Thus, supporting the varying needs of Latinas and improving breastfeeding behaviors. As Figure 3 and 4 demonstrate the three shared intervening breastfeeding factors as it relates to "ever" and "optimal breastfeeding" are: Subgroup membership; WIC enrollment; and Income. The analysis demonstrates that WIC participation has a negative impact on the ability of Latina mothers to initiate and optimally breastfed, which would suggest further examination into the efficacy of WIC breastfeeding programming would offer us the biggest health policy win. Likewise, the ability to access and disaggregate data on the Latino population allows programming and policy makers to better understand the needs of the Latino community and with further study may offer us more tailored programming to meet the needs of this diverse population.

Community Level Policy Implications (Community Factors and Supports)

Finally, the importance of usable data in supporting community health cannot be overstated. As a student researcher, even with the help of a major University as my conduit the process, time, and financial investment needed to access the data was burdensome, making it

unlikely for community groups to access this data. If this is typical of other national health surveys, the ability to disaggregate and analyze information has a direct impact on the Latino community's ability to organize and advocate on behalf of itself. This structural impediment is one that reinforces colonization by marginalizing communities of color, in this case Latinos and limits their ability to tell their story (access and interpret data to influence policy) and threatens their future (limiting effective policy and programming and hindering positive health outcomes.) Thus, creating systems that: make the data inaccessible; do not fully understand the role of social factors like acculturation on health and include them in surveillance; and, aggregating data to create a monolithic group stifles the public discourse on the health of U.S. Latinos. Therefore, the current public health monitoring system, as demonstrated by the National Immunization Survey, perpetuates structural racism and will be ineffective in being proactive in preventing or eliminating health disparities in this and other population.

CHAPTER 6: PLAN OF CHANGE

Breastfeeding offers documented short-term and long-term health benefits for both mother and infant. Preliminary data suggest that breastfeeding also improves cognitive development in infants and could have long-term implications on educational attainment. Therefore, understanding the behaviors of the fastest growing population is key to securing a healthy population. This research offers insight into this particular health behavior using a nationally representative sample. While it is not a complete analysis, it supports further investment and investigation into understanding subgroup health behaviors, the protective factors of country of origin and the need for more culturally competent data gathering and analysis when developing national health and prevention agendas.

The Ecological model was used to inform a plan of action. The plan addresses the five levels of change of the Ecological model and was be used as a roadmap to develop program and policy interventions. Given the analysis, the following are examples of programming and policy concepts needed to support breastfeeding within the Latino community, and would support a new breastfeeding constellation. As the evidence suggests, optimal breastfeeding offers the most health benefit as duration and exclusivity add to a cumulative effect. As stated previously 'ever breastfed' is most often used as a proxy of intent to breastfeed. The analysis of ever breastfed found that between levels of Hispanic origin there were 19 significant pairwise differences. Further, multivariate analysis found that all intervening factors were significantly associated with ever breastfeeding. In contrast, Optimal Breastfeeding pairwise differences between levels of Hispanic origin, only found two significant differences, and only Hispanic origin, WIC, and Income were found significantly associated with optimal breastfeeding through

a multivariate analysis. Along with national data, this analysis would suggest Latinas overall and within subgroups have a strong conviction on breastfeeding intention and overwhelmingly intend to breastfeed. Given the dramatic drop at six months, exclusive (optimal) would suggest systematic barriers so entrenched even those with the strongest intention fall short of optimally breastfeeding.

Interpersonal

- Culturally competent programming (recognizing sub group affiliation)
- Linguistically appropriate programming
- Social media campaigns tailored to Spanish speaking families that are personal and not generalized

Interpersonal Networks

- Communications and outreach plans that support positive community norms around breastfeeding. This includes developing a cultural norm for breastfeeding and anchoring it in both traditional cultural practices in addition to creating new norms that include immediate and extended family

Social Institutional Factors

Programs developed specifically in communities of interest that incorporate cultural norms in the context of the population's unique history in the U.S.

Community Factors & Supports

- Cross Programming, including breastfeeding programming incorporated into other family and religious programming

- Health Provider cultural competency and breastfeeding education

Public Policy

- Inclusion of acculturation measurer in NIS and other data surveillance surveys including PRAMS
- Paid Family Leave
- Legislation requiring Baby Friendly hospital designation
- Review of WIC breastfeeding programming
- Both aggregated and disaggregated data for Latinos
- Data driven program and policy development
- Development of a national Center for Latino Maternal and Child Health
- Dissemination of this data and other Latino maternal health data
- Accessible data for analysis and community consumption

Using John Kotter's "8 Phases of Change"⁵⁸ and correlating them with recommendations derived from this analysis I developed a clear roadmap to establish sustainable change. While Kotter's model is usually reserved for change within an organization, its framework can be utilized as a way to organize around an issue in the broader public policy sphere.

Figure 5: John Kotter's "8 Phases of Change"



Diagram source: <http://holistika7.com/member/kotters-8-phases-change/>

These policy recommendations have been synced with Kotter's 8 phases of Change to support the successful transition of this work from research to a usable health policy framework. While Table 11 lists the recommendations with a "Phase Change," it is important to recognize that in general, policy and community advocacy is not a linear process and will be both cyclical and dependent of timing and opportunity (both within the field of Latino advocacy and MCH and also independent of those fields.) This framework is the starting point by which we can support improved health of the U.S. Latino population, which will in turn affect the future public, social, and economic health of the United States.

Table 13: Summary of Recommendations and Phases of Change

Phase(s) Changes	Recommendation
• Increase Urgency	• Dissemination of results • General conversation on Latina Maternal and Child Health within the public health sector and in the Latina Community
• Build Coalitions • Vision	• Accessible data for analysis and community consumption

• Communication	
• Enable Action	• Inclusion of acculturation measurer in NIS and other data surveillance surveys PRAMS • Both aggregated and disaggregated data for Latinos • Data driven program development
• Quick Wins	• Culturally component and linguistically appropriate programming • Programming that includes extended family • Programming that supports breastfeeding as a cultural norm rooted in both traditional and cultural practices beliefs
• Don't Let Up • Make it stick	• Development of a national advocacy center for Latino Maternal and Child Health

Step one is 'creating a sense of urgency' for change. Understanding the burgeoning U.S. Latino population and the implications of disease burden associated with suboptimal breastfeeding as outlined by Bartick et. al the urgency of the matter will be established. The findings from this study will be used to inform current discussions on Latina maternal health needs and the transformation in framing Latino maternal and child health.

Step two is 'assembling teams' that have the power and passion to lead the necessary change. For example, working with key allies involved in this project, including the Centers for Disease Control, the University of Houston, and the WK Kellogg Foundation to develop an initial action plan including funding to move the work of Latino maternal and child health forward through the initial lens of Latinos and breastfeeding. Thus, building the issues of Latino breastfeeding within a larger framework of Latino maternal and child health, limits the possibility of the work getting marginalized and thus hindering the effectiveness of the planning. This may allow for additional avenues for changing social institution factors.

Step three is 'developing a vision for the future' that can be widely shared. The goal is to create a vision that incorporates the urgency for change and a picture of the future. Currently,

Latino maternal and child health is noticeably missing from the national MCH discourse. Further, there is no national Latino maternal and child health organization, which is key to advocacy; therefore, it will be important to solicit support from other Latino “issue” groups as well as traditional maternal and child health organization in order to have meaningful conversation and influence policy and programming - all key to addressing Public Policy and Community Factors & Supports.

Step four is 'communication'. With any plan or study, dissemination of the findings and summary along with and policy recommendations are key to moving the conversation forward to action. Thus, sharing this information with like researchers at major public health venues including the American Public Health Association (journal and conference) Association of Maternal and Child Health Programs Annual Meeting, and within philanthropic publications, will help inform the general dialogue and seed public discourse.

Presenting these findings and recommendations on the current state of breastfeeding in the Latino community and its implications on long-term Latino health to the Congressional Hispanic Caucus Institute and the National Council of La Raza could also spur both dialogue on Latino infant and child health. The education of both allies and the community in general will be key to garnering support and the overall success of the work. Also, included in this step would be engaging the general media in order to influence interpersonal networks and individual attitudes.

The fifth step is 'enabling action', which involves removing obstacles to change and those things that undermine the vision. It will be important to develop steps towards action, including advocacy, programming, and policy change. This will be the culmination of efforts at all five levels of the Ecological model.

The sixth step is 'generating quick wins'. This may include the publication of the breastfeeding landscape for U.S. Latinos and recommendations, disaggregated data analysis and focus on Latino maternal and child health as a policy priority. Other wins could include garnering funding support for future research and program piloting. Currently, the WK Kellogg

Foundation provides some program support for breastfeeding and should be solicited to help in the development of this work. Further, other national foundations like the Robert Wood Johnson Foundation; Cultures of Health offers new opportunities for funding support. Finally, local partnership, including philanthropic organizations in areas with large Latino populations, may be interested in exploring synergistic opportunities. All of these outlined quick wins are dependent on the development and articulation of a clear plan, with measureable goals and objectives.

The seventh step is 'not letting up'. It will be important to find a champion for this work and thus the creation of a program, collaboration, or organization to hold the work of Latino maternal and child health including the sentinel work of breastfeeding will be essential.

The eighth step is 'making it stick'. By establishing a priority on Latina maternal and child health including but not limited to breastfeeding in the public health agenda, and a recognized public agenda with key partners, community advocacy and funding for initial startup projects and advocacy, then long term sustainability can be achieved.

APPENDIX I: DATA DICTIONARY

Q #	Type	Question	Code	Special Note
Language	Dichotomous	Language in which interview was conducted	English- 0 Spanish-1	Acculturation high=0 Acculturation low=1
C8_06Q3_X	Dichotomous	Are you/is the mother Hispanic or Latino	No-0 Yes-1	
C8_A_06Q3		Mexican/Mexicano	2	
C8_A_06Q3		Mexican American	3	
C8_A_06Q3		Central American	4	
C8_A_06Q3		South American	5	
C8_A_06Q3		Puerto Rican	6	
C8_A_06Q3		Cuban/Cuban American	7	
C8_A_06Q3		Spanish-Caribbean	8	
C8_A_06Q3		Other Spanish	9	
CBF_01_X	Dichotomous	Was (child) every breastfeed or fed breastmilk	No-0 Yes-1	
CBF_02L_X	Continuous	How old was (child) when (child) completely stopped breastfeeding or being fed	<6 months=0 >6mo-No=1	Optimal breastfeeding=0 Suboptimal breastfeeding=1
CBF_03_X	Dichotomous	How old was (child) when (child) was first fed formula	<6 months=0 >6mo-No=1	Optimal breastfeeding=0 Suboptimal breastfeeding=1
CWIC_02_X		Has the (child) ever WIC	No-0 Yes-1	
C6_06Q3_X	Continuous	What is the highest grade or year of school (child's) mother has completed	Open	

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