



*Salud Infantil:*

**Understanding and Promoting the  
Nutritional Health of Latino Infants**

By:

**Lauren Toledo  
Krista Perreira  
Erin Stubbs  
Peggy Bentley**

Carolina Population Center  
University of North Carolina at Chapel Hill

11/06/2009

---

*Salud Infantil:* Understanding and Promoting  
the Nutritional Health of Latino Infants

---

By:

Lauren Toledo  
Krista Perreira  
Erin Stubbs  
Peggy Bentley



UNC  
CAROLINA  
POPULATION  
CENTER

Cover © Tom Swasey

Copyright © 2009. Krista Perreira, The Carolina Population Center. All rights reserved. Except for short quotes, no part of this report may be reproduced or used in any form or by any means, electronic or mechanical, including photocopying, recording, or by information storage or retrieval system, without written permission from the Carolina Population Center.

The Carolina Population Center is a community of scholars and professionals collaborating on interdisciplinary research and methods that advance understanding of population issues. Authors are listed alphabetically. The views expressed are those of the authors and should not be attributed to the Carolina Population Center or its funders.



## ABOUT THE AUTHORS

**Lauren Toledo** is a master's candidate in the Health Behavior and Health Education program at the University of North Carolina's Gillings School of Global Public Health. Her research interests include health inequities and the Latino immigrant population.

**Krista Perreira** specializes in research with Latino immigrant populations. Her work focuses on understanding the interrelationships between migration, acculturation, maternal health, and the development among both infants/toddlers and adolescent children. Dr. Perreira is an Associate Professor in the Department of Public Policy at the University of North Carolina.

**Erin Stubbs** recently graduated from the University of North Carolina at Chapel Hill with a BA in public policy and political science. While at UNC, she was an active member of the Roosevelt Institution's Center for Foreign Policy. Her primary research interests are juvenile justice and early intervention for high-risk youth.

**Peggy Bentley** is a nutritional and medical anthropologist with expertise in the use of ethnographic methods for reproductive and nutrition research. She has conducted infant feeding and nutrition research in a number of international settings and has also conducted research on parenting and infant feeding among African-Americans in Baltimore, Maryland and North Carolina. Dr. Bentley is a professor of nutrition at UNC's Gillings School of Global Public Health.



## ACKNOWLEDGEMENTS

We would like to thank the Carrboro-Chapel Hill Community Center WIC staff for supporting this research project. Without their help and support, we would not have been able to access the participants for our study.

In addition, we would like to acknowledge the contributions of several staff members who made this project possible. We thank Olivia Gage, Lauren Maxwell and Laura Price for their support with data collection. We also thank Stephanie Potochnick and Heather Wasser for their help and advice with data cleaning and analysis. Finally, this report would not have been possible without the tireless support of staff at the Carolina Population Center including Phil Bardsley, Mary Jane Hill, Valerie Hudock, Carolyn Schuft, and Tom Swasey.

Most importantly, we want to deeply thank the families who invited us into their homes and to the mothers who told us about their lives and parenting experiences.

Funding for this project was provided by the Center for Excellence in Children's Nutrition sponsored by Mead Johnson and Company and The University of North Carolina's Program on Ethnicity, Culture and Health Outcomes (ECHO). We greatly appreciate their support for this research.




## CONTENTS

<b>ABOUT THE AUTHORS.....</b>	<b>I</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>II</b>
<b>CONTENTS .....</b>	<b>III</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>PROJECT DESCRIPTION.....</b>	<b>3</b>
<b>METHODS.....</b>	<b>4</b>
<b>OVERVIEW OF STUDY PARTICIPANTS.....</b>	<b>6</b>
<b>MATERNAL HEALTH.....</b>	<b>11</b>
<b>HOUSEHOLD FOOD SECURITY, SHOPPING, AND EATING PATTERNS .....</b>	<b>15</b>
<b>MATERNAL INFANT FEEDING BELIEFS AND BEHAVIORS .....</b>	<b>22</b>
<b>INFANT HEALTH AND BEHAVIOR .....</b>	<b>32</b>
<b>CONCLUSIONS.....</b>	<b>37</b>
<b>RECOMMENDATIONS .....</b>	<b>38</b>
<b>LIMITATIONS .....</b>	<b>39</b>
<b>REFERENCES .....</b>	<b>40</b>
<b>APPENDIX 1: LIN SURVEY MEASUREMENTS.....</b>	<b>42</b>

## EXECUTIVE SUMMARY

This preliminary report focuses on the nutritional health of Latino infants and toddlers ages 7-18 months who were enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) between October 2008 and May 2009. In this report we provide an overview of the characteristics of these infants and their mothers. We then discuss key issues affecting infant health and nutrition including maternal health, household food security, maternal feeding beliefs and behaviors, and infant behavior. Some key findings of the report include:

- The average mother in the LIN study was 25 years old, did not work outside of the home (72%), and had not graduated from high school (52%). Nearly 90% of mothers reported living with a spouse or partner.
- Mothers in our study had an average household size of 5 and 92% of respondents reported a household income of less than \$30,000. The majority of mothers in our sample (77%) had experienced economic hardship at some point in the past year.
- 71% of mothers in our study were overweight or obese. 28.85% of the infants were over the 85<sup>th</sup> weight-for-length percentile and 15.38% were over the 95<sup>th</sup> percentile.
- Nearly all mothers (98%) emphasized the importance of fresh fruits, vegetables and meat when considering the foods they purchase for their families. Less than half of mothers (43%) reported the importance of convenience or prepackaged foods.
- The majority of mothers in our sample reported practicing responsive and restrictive styles of infant feeding. Several factors were found to be associated with maternal feeding practices and behaviors. These include:
  - Maternal Acculturation: 34% of mothers had lived in the US for less than five years. These mothers were more likely to have experienced economic hardship and food insecurity. Less acculturated mothers were also more likely to be depressed. These mothers were more likely to pressure their children to finish all of their food and were more likely to add cereal to their children's bottles in order to increase caloric consumption. Similarly, they were less likely to restrict the amount of food their children consumed compared to mothers who had lived in the US for more than five years.
  - Maternal Depression: An overwhelming 30% of the mothers interviewed reported experiencing symptoms of depression. Depressed mothers were more likely to be obese or overweight and experience food insecurity than non depressed mothers. They also reported higher levels of parental stress. These mothers were more likely to add cereal to their infants' bottles and were less likely to restrict the quantity or quality of foods that their infants consumed.

- 
- Maternal Stress: Although the majority of mothers did not report high levels of stress, those who reported higher levels of stress were less likely to restrict the amount of food their infant consumed, were less responsive to fullness cues and were more likely to allow their children to eat in front of the TV or eat junk food to make sure they consumed enough food.
  - Infant Temperament: Mothers generally reported that their infants were active, happy, and easy to soothe. Infants who smiled and laughed more often were more likely to have a mother who reported being responsive to fullness cues, and less likely to have a mother who engaged in indulgent feeding practices. Similarly, the expression of negative emotionality or distress due to limitations was negatively associated with mothers placing restrictions on the amount of food their infant consumed. Distress due to limitations was also associated with more indulgent feeding practices, such as allowing children to drink sodas, eat fast food or watch TV while eating.

WIC is in a unique position to help immigrant Latino families maintain healthy feeding practices that can contribute to the health of children. The recommendations outlined at the end of the report suggest ways that WIC can work with and support Latina mothers as they raise their infants and toddlers.



## PROJECT DESCRIPTION

Hispanics<sup>1</sup> living in the United States are at high risk for obesity. Beginning at the preschool level, disparities in overweight<sup>2</sup> exist for Latino children compared to their Non-Hispanic black and Non-Hispanic white peers. For the period 2003-2006, rates of overweight among U.S. children ages 2-5 years were 16.7%, 14.9%, and 10.7% for Hispanic, Non-Hispanic black, and Non-Hispanic white, respectively (Ogden et al., 2008). Similarly, in North Carolina, 2007 data show that the percentage of Hispanic children age 2-4 years who were overweight was 20.3% as compared to 12.8% for non-Hispanic children (NC-NPASS, 2007). Early childhood obesity rates among Latino children pose numerous health risks and lead to an increased likelihood for adult obesity. Although various studies have focused on overweight and obesity in young children and adolescents, this is the first comprehensive study of Latino immigrant women and their infants with a focus on infant feeding and obesity in a new immigrant receiving community.

Latino families who migrate to the United States have an increased risk for obesity through increased exposure to American diets and lifestyles that are obeseogenic; however, the reasons why Latinos adopt these obeseogenic diets and lifestyles are poorly understood. The development of healthful eating patterns begins during the infant and toddler years; therefore, early life feeding practices may help to explain the increased risk of overweight experienced by Hispanic pre-school children (Briefel et al. 2006).

The *Latino Infant Nutrition Study* (LIN) is the first study to examine the development of obeseogenic diets and lifestyles in Latino families with infants and toddlers. The LIN study aims to describe the dietary patterns and practices of new immigrant Latino families in North Carolina and explores the relationships among the acculturation structure of their daily lives, infant and toddler diet, and risk of obesity. The three main objectives of the LIN study are the following:

- (1) Describe the dietary patterns and infant feeding practices of Latino families in North Carolina and explore associations between acculturation, infant and toddler diet, and risk of obesity;
- (2) Identify Latina mothers with depressive symptoms and evaluate the relationship between maternal depressive symptoms and infant-toddler feeding patterns, infant-toddler diet, and infant-toddler behavior; and
- (3) Evaluate the feasibility of conducting a longitudinal, observational study of infant care, feeding practices, and the risk of obesity among Latino families.

---

<sup>1</sup> Throughout this report, the terms “Hispanic” and “Latino” will be used interchangeably to describe our study population. We recognize that these terms represent ancestries from many different countries and diverse cultures and culinary traditions.

<sup>2</sup> BMI  $\geq$  95th percentile

## METHODS

In the LIN Study, data were collected on 56 low-income Latina mothers and their infants who attended WIC clinics in Durham County and Orange County, North Carolina. Mothers with infants and toddlers ages 7-18 months who self identified as Hispanic or Latina were included in the sample.

This report provides preliminary findings to the staff of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) who assisted in the recruitment of study participants. The findings are based on a sample of 56 mothers. All data were collected between October 2008 and May 2009.

In order to obtain a sample of mothers with infants and toddlers across the full age spectrum of 7-18 months, we have included (1) 9 first-time mothers with infants 7-10 months, (2) 10 non first-time mothers with infants 7-10 months, (3) 8 first-time mothers with infants ages 11-14 months, (4) 10 non first-time mothers with infants ages 11-14 months, (5) 10 first time mothers with infants ages 15-18 months, and (6) 9 non first-time mothers with infants ages 15-18 months. Mothers were screened and recruited for participation at WIC clinics using convenience sampling. Eligible mothers were between the ages of 18 and 40 and had an infant or toddler between the ages of 7-18 months. Eligible children were born after 38 weeks gestation, weighed more than 1500 grams at birth and had no chronic or congenital illness that interfered with dietary intake, growth, or development. Children with Down's syndrome, epilepsy, cleft lip or palate, cerebral palsy, failure to thrive, or diagnosed mental retardation were not eligible to participate. If eligible after screening, mothers were asked if they were interested in participating in the study and their contact information was recorded. Mothers were then contacted by phone to arrange a meeting time and interviewers visited mothers in their homes to complete data collection. Of the 84 mothers who were eligible after screening, 28 (33%) refused to participate in the study. Common reasons for refusal included having to consult a spouse or partner, not being interested, or not having enough time to participate.

In a single home visit, mothers completed an interview-administered survey which gathered information regarding diet, physical activity, self-esteem and depression, infant feeding styles, and the home environment. In addition, each mother provided a dietary recall detailing the foods and drinks her child had consumed the day prior to the interview. Height, weight, and skin fold measurements were taken of both mother and child. All mothers received a \$40 thank you gift for their participation in the study.

After the initial home visit, 22 of the mothers agreed to participate in a second home visit interview. These mothers completed in-depth qualitative interviews regarding infant care beliefs and practices. Twenty-one of these mothers also allowed interviewers to observe and videotape their child during mealtime and filled out a brief seven-day daily diary questionnaire with yes/no questions related to work, family, shopping, meal patterns, and infant feeding. Mothers who participated in the daily diary questionnaire, qualitative interview, and videotaped feeding received an additional \$45 thank you gift.




Table 1 provides a summary of the content covered by each data source in the LIN study. This report presents information provided in the administered survey, daily diary entries, and data collected during the qualitative interviews. Additional reports will present the findings from the dietary recalls and videotaped feedings. Please refer to Appendix A for an in depth description of the instruments used in the interview administered survey.

**Table 1. LIN Data**

---

**Full Sample Content Areas (N = 56)**

- (1) Infant Health and Behavior
- (2) Infant Feeding Beliefs and Behaviors
- (3) Infant Anthropometry
- (4) Maternal Anthropometry
- (5) Maternal Health and Behavior
- (6) Maternal Employment and Income
- (7) Maternal Acculturation and Social Support
- (8) Obesogenic Environment, Shopping, and Eating Patterns
- (9) Neighborhood Environment
- (10) Biological Father
- (11) Dietary Recall (NDS-R)

**SubSample Content Areas (N = 21)**

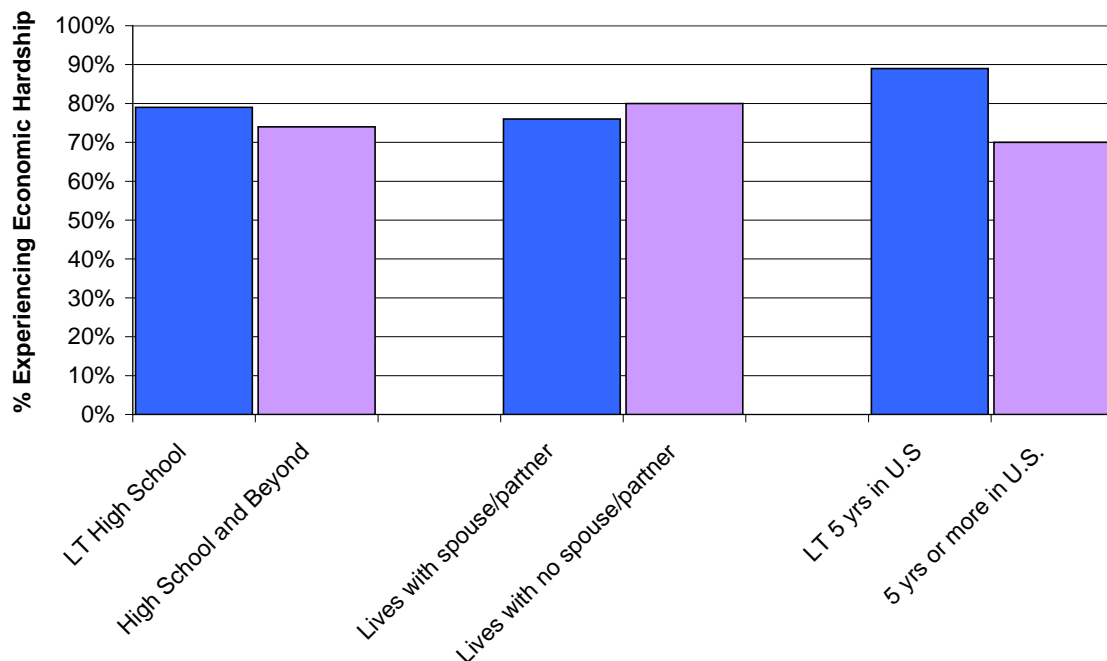
- (1) Videotaped Feeding Observations
  - (2) Daily Diary Checklist
  - (3) Qualitative Interview
-

## OVERVIEW OF STUDY PARTICIPANTS

The average mother in the LIN study was a little more than 25 years old and had relatively low levels of education (Table 2). Most mothers in our study had not graduate from high school (52%). While 39% of mothers received their high school diploma or GED, only 9% of our sample continued their studies past 12<sup>th</sup> grade. Although a majority of mothers (68%) had previously worked in the US, only 38% were employed during the study. Respondents cited difficulty finding work and preferring to stay home to care for their infant or toddler as reasons for their unemployment. Of those mothers who were employed, 10% of mothers worked early morning or late night shifts. Participants worked an average of 29 hours and an average of 4 days a week. When asked if work conflicted with family life or caused them stress, most mothers expressed that at times it was difficult to deal with a child care problem or handle family needs due to their work environment or schedule.

The majority of women (77%) experienced some form of economic hardship in the past 12 months. Our sample had an average household size of 5 and 92% of respondents reported a household income of less than \$30,000. Fifty-three percent of mothers had a household income between \$10,000 and \$20,000 and the majority of study participants were low-income or poor.

**Figure 1. Economic Hardship by SES and Acculturation**



Helping them to overcome economic hardship, most mothers (68%) received high levels of social support. Eighty-seven percent of mothers were living with their spouses or long-term partners, which offered some protection against hardship (Figure 1). In our sample, the

amount of time lived in the US was a significant indicator of economic hardship: 90% of mothers who had lived in the US for less than five years reported economic hardship compared to only 70% of mothers who had lived here for five years or longer.

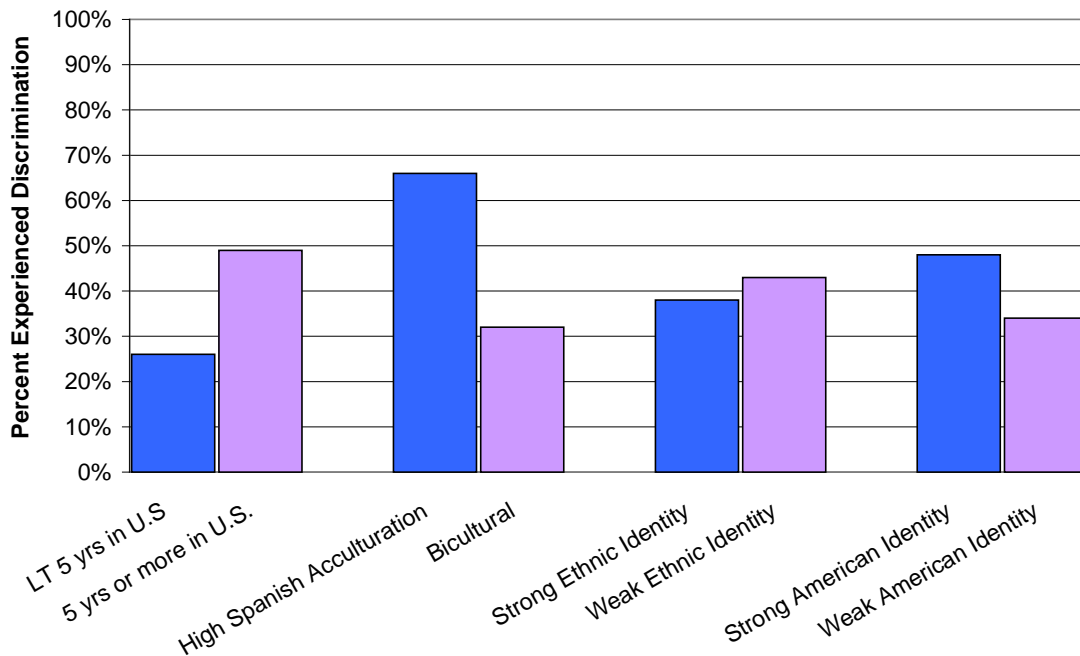
**Table 2. Selected Maternal Characteristics**

	%/Mean	N Observed	N Missing
<b>Maternal Education</b>			
Less than High School	52%	56	0
High School Diploma or GED	39%	56	0
Beyond High School	9%	56	0
<b>Maternal Employment</b>			
Ever worked in U.S.	68%	56	0
Currently Employed Part- or Full-time	38%	56	0
Work-Family Conflict Index (among employed range:1-4)	2.21	21	0
Works Early Morning or Late Night Shifts (among employed)	10%	21	0
Avg. hours worked per week (among employed)	29.24	21	0
Avg. days worked per week (among employed)	4.29	21	0
<b>Annual Household Income</b>			
\$10,000 or less	10%	51	5
\$10,001-20,000	53%	51	5
\$20,001-30,000	29%	51	5
\$30,001 or more	8%	51	5
<b>Family Environment and Social Support</b>			
Mother's Age	25.38	56	0
Youngest Child's Age (Months)	12.07	56	0
Household Size	4.91	56	0
Lives with Spouse or Partner	87%	54	2
Experienced Economic Hardship in past year	77%	56	0
Social Support Index (ISEL: range: 1-4, $\alpha=.83$ )	3.49	56	0
High Social Support (ISEL=3)	68%	56	0
<b>Maternal Heritage and Acculturation</b>			
Mexican Heritage	89%	56	0
U.S. Citizen	10%	51	5
Foreign-born	91%	56	0
Years in U.S. (among foreign-born)	6.31	51	0
Less than 5 years in U.S.	34%	56	0
Strength of Ethnic Identification (MEIM, range: 1-4, $\alpha=.81$ )	3.49	56	0
Strong Ethnic Identification (MEIM>3)	81%	56	0
Strength of American Identification (SAI, range: 1-4, $\alpha=.92$ )	2.97	56	0
Strong American Identification (SAI>3)	52%	56	0
BAS: High English Acculturation	2%	56	0
BAS: Low English and Spanish	0%	56	0
BAS:Bicultural	32%	56	0
BAS: High Spanish	66%	56	0
Experienced Discrimination in past year	41%	56	0
<b>Neighborhood Environment</b>			
Years at Current Address	1.68	56	0
Moderate to Heavy Traffic	50%	56	0
No Sidewalks	46%	56	0
No Public Recreation Facilities	36%	55	1
Neighborhood Safety Index (NSI, range: 1-5, $\alpha=.66$ )	3.50	56	0

Note: The Chronbach's Alpha ( $\alpha$ ) indicates how reliable a scale is (i.e. how consistently the items in a scale measure the construct indicated). It is not a measure of the construct's validity. Nunnally (1978) has indicated that reliable scales should have a Chronbach's Alpha of at least .70. While acceptable in some circumstances, a scale with a reliability of below .70 provides an inconsistent response more than 30 percent of the time on average.

Most mothers in our sample (89%) were either born in Mexico or had a parent with Mexican origins (Table 2). Over 90% of mothers were foreign born and only 10% were US citizens. Of those mothers born outside of the US, the length of time lived in this country averaged 6 years; however, 34% of the mothers in our sample had been in the US for less than 5 years. The majority of mothers (88%) reported having strong ethnic identification and over half of our sample strongly identified as American (52%). Language was used to measure acculturation status in the LIN study. Only 2% of mothers reported that they could read, write, and comprehend English well or very well. The majority of mothers in our survey (66%) reported understanding Spanish well or very well and 32% of mothers were bilingual. Previous research shows that Hispanic mothers who have lived in the US for shorter periods of time and use English less frequently are more likely to breastfeed their children (Sussner, Lindsay, & Peterson, 2008). This suggests that acculturation may have negative impacts on infant feeding practices.

**Figure 2. Discrimination by Acculturation & Ethnic Identification**



For mothers in the LIN study, acculturation and ethnic identification also influenced the amount of discrimination they experienced. Over 40% of all mothers in our sample reported experiencing some form of discrimination in the past year. Figure 2 demonstrates that the percentage of mothers who lived in the US 5 years or more who reported experiencing discrimination was nearly twice that of those living here for shorter periods of time (49% vs. 26%). Similarly, those with a strong American identification were more likely to face discrimination than those with a weak American identification (48% vs. 34%). This could be due to various factors, including that those who more strongly identify with American culture may have lived in the US for a longer period of time, thus providing greater exposure to

discrimination in this country. According to the mothers in our study, discrimination came not only from non-Hispanics but also from other Hispanics.

While the majority of mothers in our sample had not faced discrimination, the quotations below exemplify the experience of mothers who had confronted such situations.

**Quotation 1:**

R: It's not very easy to find work now because everyone is asking for papers and when we go to apply for jobs they know that we don't have them. They always say, "We'll give you a call." But they never call back.

I: How do they know that you don't have papers?

R: They know that the majority of the Latinos here are undocumented. Everyone has that impression and because we don't speak English well, that's how they know...When I go apply for a job I feel very insecure and afraid, like, "What are they going to ask me? What are they going to say to me?"...When you go apply for a job, I feel like they look at you differently. I only feel it then – when I am out running errands, I feel normal, like I was in my own country.

**Quotation 2:**

I: You told me that you experienced discrimination, how do you think that affects the way you raise your child?

R: I don't think it affects him because he was born here and he isn't being raised like we were...I think people discriminate against us because we're Latinos. They don't treat other people like that because others have a lot of support and can complain [if they are treated unfairly]. I think it has a lot to do with not knowing English.

**Quotation 3:**

I: Have you applied for food stamps?

R: I just applied last week; I still have to take them the envelope that they asked for. But the social worker was very rude to me. She treated me like a liar. I took my most recent checks and took all of the necessary paperwork and she asked me, "How are you going to tell me that you pay for all of your bills on the salary you earn?"... "How do you think I'm going to believe that the father doesn't live with you if your daughter is so young?"...She told me if I was lying she was going to sue me for fraud...I know that's her job, but I don't know why she had to be so rude to me. I have all the papers, I just need to take them back to her...I felt bad because I was asking for something that I really needed...I never asked for any support for my first child, but with my second child I have more bills.

Most mothers described experiencing discrimination while out shopping or in the workplace. Despite this, like the mother in Quotation 2, most mothers did not believe that discrimination affected how they raised their child. Many mothers attributed the discrimination they faced to not knowing English, and they felt that because their children would be bilingual, they would have a different experience. The last quotation illustrates how some mothers have difficulties navigating the social services system. While the mother in Quotation 3 understands that the social worker must ask her those questions, she felt the treatment she

received was unnecessary. These experiences can prevent mothers from seeking social services that provide crucial support for their families.

### **Neighborhood Environment**

Participants had lived an average of one year and eight months in their residence at the time of the interview. Half of mothers reported that their neighborhood had heavy to moderate traffic and nearly half (46%) of neighborhoods did not have sidewalks. When asked about the safety of their neighborhood, the majority of mothers either agreed that their neighborhood felt safe or were neutral (neither agreed nor disagreed) about the safety of their neighborhood.

The following quotation illustrates how neighborhood environment can affect a mother and child's daily life:

#### **Quotation 4**

R: Children there in Mexico have more freedom to go out and play. In Mexico you have your house, your yard, they can play with a ball and you can be inside, looking after the kids. Here, you say to yourself, "No, we're going to go outside, drop what you're doing because we have to be outside with the children," and in Mexico, it's not like that.

Children have more freedom because you can be in your house. For example, you can be in your house cooking and watching the children who are in the yard.

I: How is it different here? When the children go outside you have to be with them and in Mexico you may be in the house while the children are outside, because it's not as urban?

R: That's part of it, the other part is that here, you don't know anyone very well. So, whenever the kids are out playing, either my husband or I are out there with them. We always tell them, "We're watching you" but if I'm here inside, I won't hear if someone grabs my kids and takes them away. My husband tells me that I am not trusting, but I say that with our children, it's okay because we shouldn't trust people we don't know. In Mexico, though, you may not know someone but you know if they behave themselves, you know they are not going to do any harm to your children.

Although the majority of mothers reported that their neighborhoods felt relatively safe, like the mother in the quotation above, many respondents mentioned that their concern for safety and absence of relationships with neighbors restricted the amount of time they permitted their children to play outdoors. Several mothers said that children in their home countries had more freedom to run outside and play, in contrast to children in the US who spend more time indoors and watch television or play video games. Mothers who are unfamiliar with their neighborhood or feel they can not trust their neighbors will be less likely to let their children play outdoors, or spend time as a family outside, which could have negative implications for children's physical activity.



## MATERNAL HEALTH

The majority of mothers in our sample (52%) considered their health to be good or excellent and only 18% of mothers had been diagnosed with a health problem (Table 3). Seventy-one percent of mothers were classified as either overweight or obese based on their BMI scores.<sup>3</sup> According to their average waist-hip ratios, an overwhelming 92% of mothers were at high risk for heart disease and other illnesses associated with being overweight. While approximately a third of mothers (36%) classified themselves as “about the right weight,” more than half of mothers were actively trying to lose weight (55%).

**Table 3. Maternal Health**

	%/Mean	N Observed	N Missing
<b>Anthropometric Data</b>			
Maternal height (cm, avg of 3 measurements)	154.15	56	0
Maternal weight (lbs, avg of 3 measurements)	149.02	56	0
Maternal BMI	28.44	52	4
Overweight or obese based on BMI	71%	52	4
Maternal waist-hip ratio	0.9	47	5
High risk (waist-hip ratio>.80)	92%	52	4
Average Left-Right Subscapular Skinfolds (mm)	29.61	51	5
Average Left-Right Tricep Skinfolds (mm)	26.23	52	4
<b>General Health</b>			
Self-reported health good-excellent	52%	56	0
Avg. hours sleep during the week	7.64	56	0
Has diagnosed health problem	18%	56	0
Currently pregnant	5%	55	1
About the right weight (self-perception)	36%	56	0
Trying to lose weight	55%	56	0
Any vigorous activity in past month	14%	56	0
Avg. hours per week in light physical activity	12.20	56	0
Avg. hours per week in moderate physical activity	2.82	56	0
Avg. hours per week in vigorous physical activity	0.08	56	0
<b>Mental Health and Substance Use</b>			
CES-D score (range: 0-60, $\alpha=.93$ )	11.8	56	0
CES-D score $\geq 16$	30%	56	0
Smoker in household	8%	51	5
Avg. number of drinks in past month	0.11	56	0
0 drinks per week	95%	56	0
2 or fewer drinks per week	4%	56	0
3 or more drinks per week	2%	56	0

Note: Women who were pregnant at the time of the interviews were not included in the calculation of BMI and waist-hip ratios. Women who did not engage in a physical activity were reported as having 0 hours/wk engaged in the activity.

<sup>3</sup> BMI of 25.0-29.9 is considered overweight. Any BMI score over 30.0 is considered obese.

Few mothers participated in regular vigorous physical activity. Instead, most mothers cited cleaning and vacuuming as their weekly moderate physical activity. Participants averaged 2.8 hours of moderate physical activity per week, which is more than the 2.5 hours of moderate aerobic activity recommended by the CDC (CDC, 2009).

Mothers had an average score of 11.8 on the CES-D, a scale used to measure symptoms of depression. Thirty percent of mothers had a CES-D score of 16 or greater, which indicates that these mothers reported clinically significant depressive symptoms.<sup>4</sup> Depression in this population is not uncommon, due to the social isolation and economic hardship many Latinos experience when they immigrate to the US.

As is typically the case among Latina immigrants, few mothers reported smoking or drinking with regularity. The vast majority of our sample (95%) had not had a drink in the past week and only 2% had more than three drinks in the week prior to the interview. While most mothers did not smoke, 8% reported that someone in their household was a regular smoker. Our findings of little tobacco and alcohol use are consistent with other data on recent Latino immigrants.

**Figure 3. Maternal Health Status by Education Level**

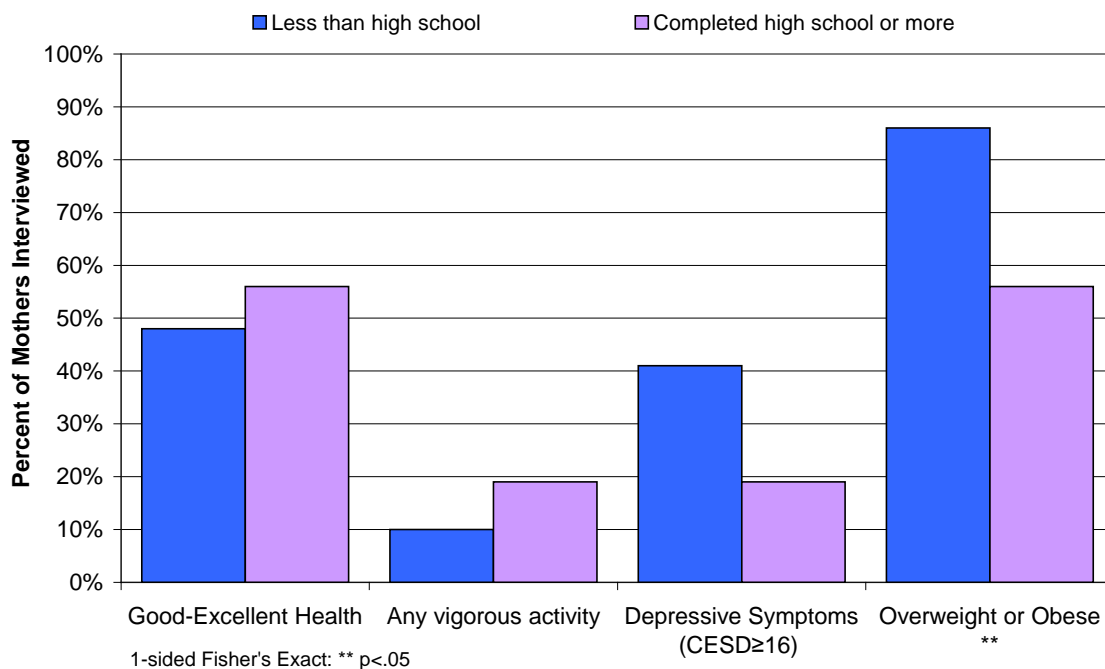


Figure 3 depicts four measures of health status by the education level of the mother. In general, mothers in our sample who had completed high school were healthier than mothers

<sup>4</sup> References to mental health agencies were provided to these respondents.

with less than a high school education. More educated mothers were less likely to have symptoms of depression (19% vs. 41%) and less likely to suffer from obesity or overweight (56% vs. 86%). These findings can be expected as mothers with higher levels of education may have more economic opportunities, providing them with leisure time to exercise. Mothers with less education may be more likely to stay at home with their children and may experience social isolation which can lead to depression.

**Figure 4. Maternal Health Status by Years in the US**

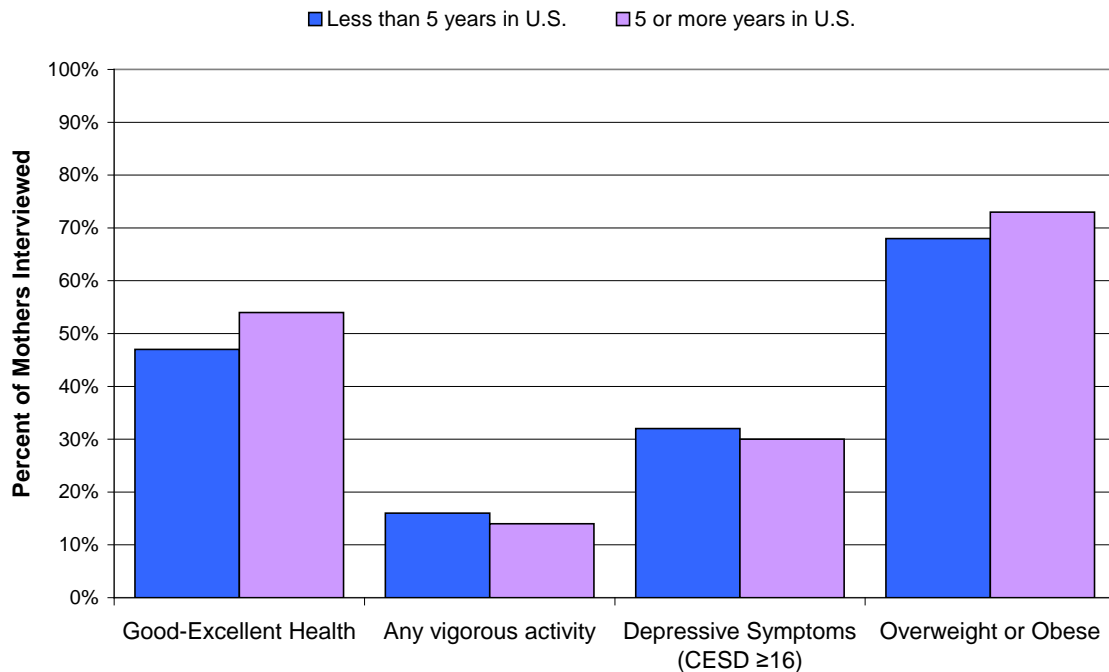
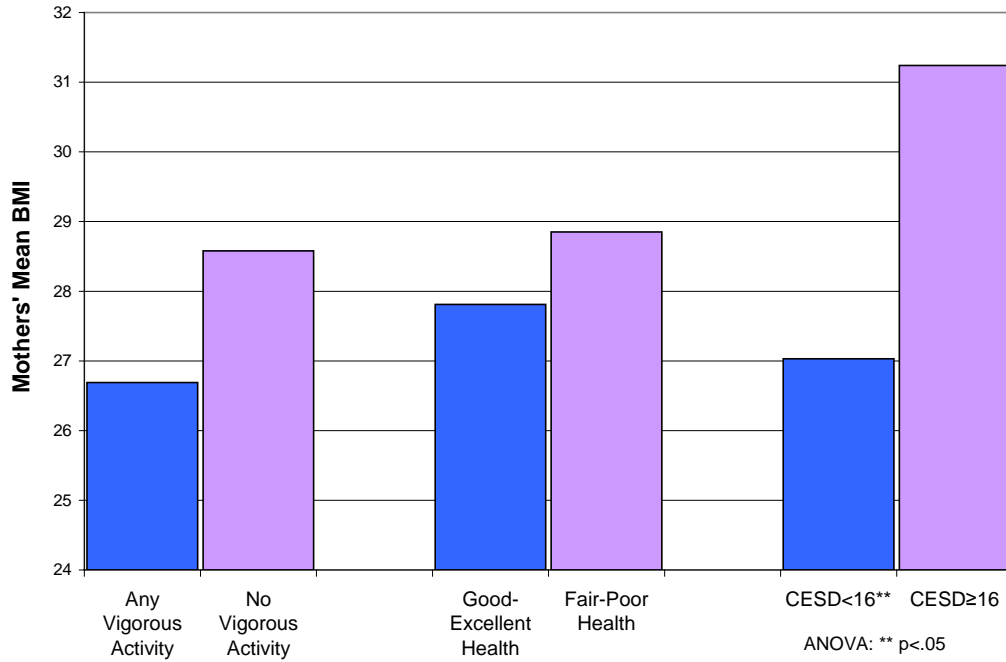


Figure 4 depicts maternal health status by years lived in the US. While those mothers who have lived in the US 5 years or more are more likely to consider themselves in good or excellent health (54% vs. 47%) and are less likely to report symptoms of depression (30% vs. 32%), they are also more likely than mothers who have lived for a shorter time in the US to be overweight or obese (73% vs. 68%). These findings support previous research on the mixed effects of acculturation in Latino populations. While acculturation may have negative effects on certain health outcomes such as diet and weight, acculturation tends to have positive effects on self-perception of health (Lara et al., 2005).

Figure 5 illustrates mothers' mean BMI score based on selected health characteristics. As could be expected, mean BMIs were slightly lower for mothers who reported any vigorous activity (26.69 vs. 28.58). Mothers who viewed themselves in good or excellent health were more likely to have a lower BMI than those who said they were in fair or poor health (27.81 vs. 28.85) and those scored less than 16 on the CES-D had a lower average BMI than those who reported depressive symptoms (27.03 vs. 31.24). Nevertheless, those mothers reporting

vigorous activity, good-excellent health, and no depressive symptoms all had an average BMI that is considered overweight.

**Figure 5. Mean BMI by Selected Health Characteristics**





## **HOUSEHOLD FOOD SECURITY, SHOPPING, AND EATING PATTERNS**

The majority of mothers in the LIN study reported having access to basic foods; however, 21% of mothers reported that they had trouble providing enough food for their family or themselves in the past year (Table 4). Children in food insecure households are at higher risk for childhood obesity and other developmental problems. Figure 6 describes mean levels of foods security based on maternal characteristics.

Adults in food insecure households are more likely to experience symptoms of depression than those who are food secure. Mothers in the LIN study who had a CES-D score of greater than 15 had significantly higher levels of food insecurity than those mothers who were not depressed (2.47 vs. 1.33). The relationship between food insecurity and depression may be cyclical: Mothers in food insecure households are more likely to be depressed which may prevent her from looking for employment or obtaining the resources to reach food security such as looking for employment or seeking out social services like the Federal Supplemental Nutrition Assistance Program (SNAP).

Many children in the LIN study were US citizens and therefore may qualify for SNAP.<sup>5</sup> Despite this, mothers in the LIN study expressed concern over seeking governmental assistance. The following quotations illustrate what mothers in the LIN study told us about SNAP:

**Quotation 5:**

R: ...There are a lot of myths that the children who receive help from the government will be charged when they get older. No one knows if it's true or not. So, we are afraid to ask for government assistance...I want to know if there are any repercussions of receiving assistance when they get older and want to work here [in the US].

**Quotation 6:**

R: Many say that if there is a war the government is going to enlist your child because they helped you. I didn't want to ask for WIC. I told my husband I wasn't going to ask for it. But he told me it wouldn't do any harm to check it out, that it was assistance. But I don't like the idea of selling one of your children [in order to receive help]. I don't know if it's true or not.

I: Where did you hear about that?

R: Women in Mexico who have lived here and had children here. I worked with a woman, she had a college degree and she was born here in the US, but when her mother found out she was pregnant with a boy, she returned to Mexico because she had received assistance and she didn't want her son to have to go to war one day. I don't know, this is probably not true, but it gets in your head... the less we ask for, the better.

**Quotation 7:**

R: I've heard that a lot...I think that usually Latino families, they're really ignorant. Not ignorant as in they're ignorant, but in the fact that, you know, if somebody tells them something, they're going to believe it and they're not going to go further and research about it. They're like, okay, they told me this, and I'm not going to do it. But with me, if somebody tells me no, then I'm going to try and find out why they told me no. So I don't think that later on, the US Military is going to come and get him or anything like that.

I: Who have you heard that rumor from?

R: My aunt's friends, some of my mom's friends, but my mom works with a social worker, so I talk to her. I'm like, is this true? She's like, no...

Like the mothers in the first two quotations, many of the mothers in the LIN study were wary of accepting government assistance due to rumors and misinformation. In contrast, mothers who have lived in the US for longer periods of time, like the mother in Quotation 7, have the resources and connections to investigate these rumors. These comments contribute to our finding that mothers who have recently arrived in the US are more likely to be food insecure. Despite the fact that many children are eligible for assistance, they do not receive it due to their parents' fear of any future consequences.

---

<sup>5</sup>Depending on income levels, all US citizens and most legal immigrants who have lived in the US for more than 5 years, are receiving disability related assistance or benefits regardless of entry date, and all children regardless of entry date are eligible for the SNAP program (USDA, 2009).

**Table 4. Household Food Security, Shopping and Eating Patterns**

	%/Mean	N Observed	N Missing
<b>Food Security</b>			
Food Security Index (FSI, range: 0-6)	1.68	56	0
Food Insecure Household (FSI>2)	21%	56	0
<b>Transportation</b>			
Has access to car	88%	56	0
Can ride bus to store if needed	61%	54	2
<b>Eating Out</b>			
Avg times/wk eats breakfast out	0.37	54	2
Avg times/wk eats lunch out	0.59	54	2
Avg times/wk eats dinner out	0.53	53	3
Avg times/wk eats any meal out	1.43	56	0
Eats out at restaurant most often	46%	56	0
Eats fast food most often	32%	56	0
<b>Factors Influencing Shopping Patterns</b>			
Accepts food stamps or WIC	73%	55	1
Close to home or work	68%	56	0
People at store speak Spanish	56%	54	2
<b>Factors Influencing Food Purchases</b>			
Costs	84%	56	0
Coupons	51%	53	3
Lowfat or Diet	56%	55	1
Convenience or Prepared Food	43%	56	0
Quick Energy	26%	54	2
Fresh	98%	55	1
Taste	95%	55	1

**Transportation**

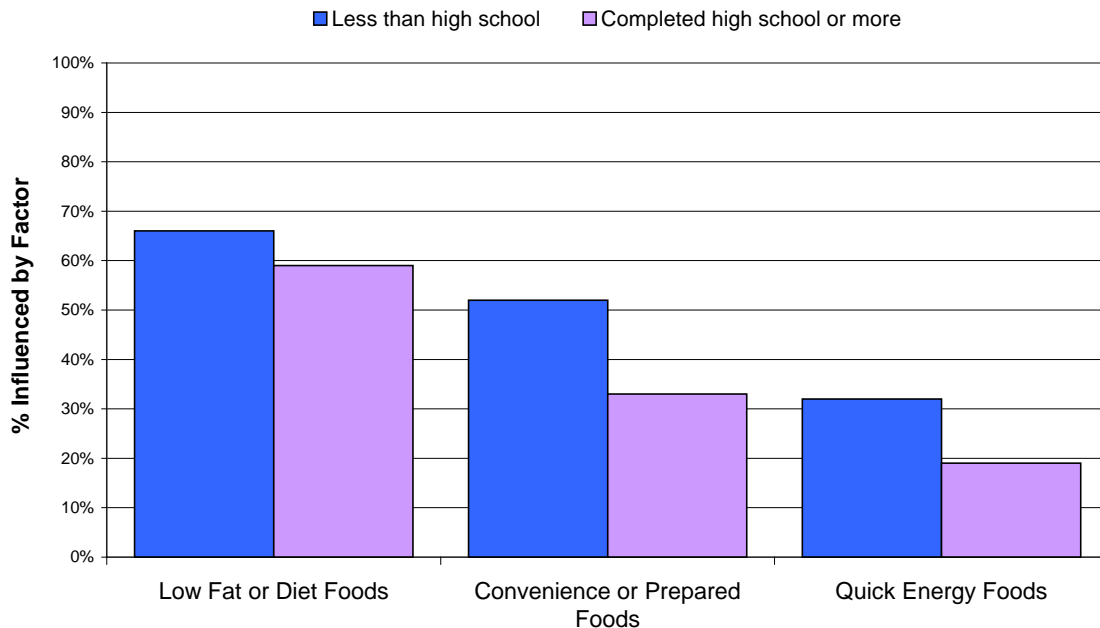
The majority of mothers reported having access to transportation (Table 4). Nearly all mothers had access to a car and could rely on friends or family members to drive them to the grocery if they did not drive. Over half of our respondents (61%) reported that it was possible for them to go to the grocery by bus, and for most mothers (68%), the location of the grocery store was an important factor when deciding where to shop. Mothers in the LIN study reported primarily shopping at large chains such as Wal-Mart or Food Lion and also reported shopping at local Hispanic food stores.

**Factors Influencing Food Purchases**

When thinking about the factors that influenced the types of foods mothers in our study purchased, nearly all respondents (98%) said that the freshness of meats, fruits and vegetables was an important consideration (Table 4). Mothers preferred fresh foods over processed or packaged food items. Mothers also noted that the taste of foods (95%) and the cost of foods (84%) influenced what foods they bought for their family. Mothers were less likely to report that quick energy foods like power bars or energy shakes (26%)

or convenience or prepared foods (43%) were important when considering what to purchase for their family. Figure 7 breaks down the selected factors influencing food purchases by maternal education.

**Figure 7. Selected Factors Influencing Food Purchases by Maternal Education**



Mothers with less education were more likely to purchase prepackaged foods such as low fat, diet foods (66% vs. 59%), convenience or prepared foods (53% vs. 38%), and quick energy foods (32% vs. 19%) than mothers with more than a high school education. As previously mentioned, less educated mothers in our study were more likely to be obese or overweight. Due to concerns about their weight, these mothers may be more likely to look for low fat options or options that appear healthy such as power bars. Additionally, mothers with less education and more economic hardship can have a more limited ability to purchase fresh foods. This is because fresh foods are generally more expensive than prepackaged, processed foods.

Figure 8 demonstrates factors influencing food purchased by mothers' acculturation or years in the US. Acculturation had interesting effects on food choices in our sample. Sixty-eight percent of mothers who lived in the US for more than 5 years reported that low fat or diet foods were an important consideration when making a food purchase, compared to only 53% of mothers living here for less than 5 years. As mothers become acculturated to US norms surrounding weight, they may feel an increased pressure to lose weight and therefore turn to foods labeled low fat or diet. Conversely, mothers who lived in the US less than 5 years were more likely to report the convenience or prepared foods (53% vs. 38%) were important to their purchase decisions. These results suggest that acculturation may decrease the



propensity of mothers to consume prepared foods. As mothers spend more time in the US, they learn where they can purchase the fresh foods that they were accustomed to in their home countries. Additionally, as mothers live longer in the US, they are less likely to experience economic hardship, which could contribute to decreased reliance on less expensive convenience foods.

**Figure 8. Selected Factors Influencing Food Purchases by Years in the US**

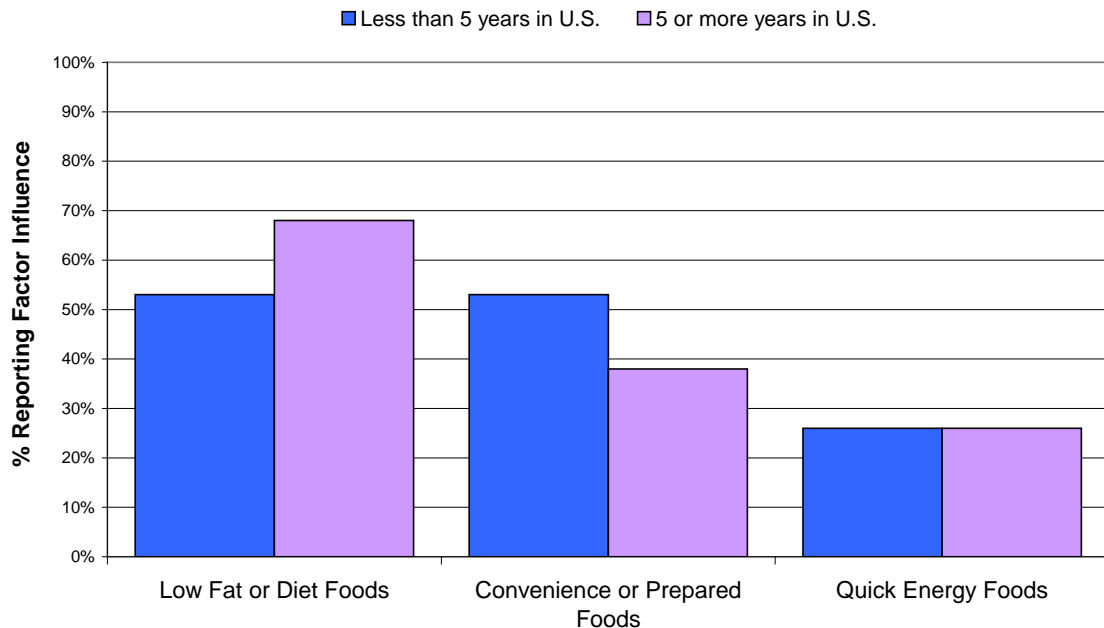
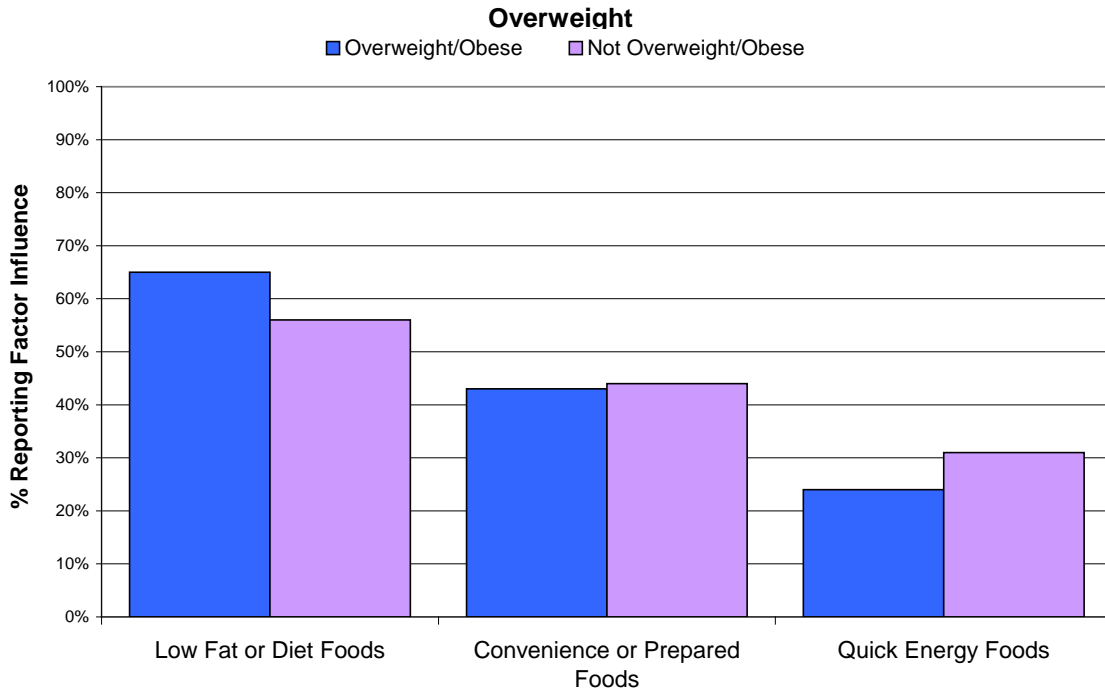


Figure 9 explains the selected factors influencing food purchases by mothers' weight. Obese and overweight mothers were more likely to consider whether a food was low fat or diet when making purchases than mothers with a BMI under 30 (65% vs. 56%). Mothers who are overweight or obese may be concerned with their weight and therefore purchase foods labeled low fat or diet. It is unsurprising that obese and overweight mothers were less likely than normal weight mothers (24% vs. 31%) to purchase quick energy foods such as power bars, that are marketed towards the more physically active.

**Figure 9. Selected Factors Influencing Food Purchases by Mother**



The following quotations highlight what mothers said about purchasing and eating foods.

**Quotation 8**


R: When children eat a lot of McDonalds, they don't feel good, they need to eat in their home. It's healthier to eat at home than to eat at restaurants...because fast foods are frozen and when you buy food at a grocery, you can get fresh meat. Sometimes you freeze the meat when you get home, but it's fresh meat and you can buy fresh vegetables. In a restaurant - I'm telling you this from experience because I work in a restaurant - all of the food comes frozen, everything. The lettuce comes already chopped and the food has a lot of...preservatives...The lettuce in a restaurant doesn't taste good. If you buy lettuce [in the grocery], you chop it up yourself and it tastes good

**Quotation 9**

R: I've held children who seem fat but they don't weigh a lot. It's because they only give them food that they sell that comes already prepared, that you heat up in a microwave...I think that because children eat that they get fat. Because it's food, but it's not food. I don't think it's healthy food...In Mexico, they don't sell that food. You have to take time to prepare your food.

**Quotation 10**

R: It's easier for a new mom to give her child a burger or just put something on to reheat...You have to teach a new mom to cook for her child. Sometimes I think it's so much easier to buy a can of soup and just add water, but you have to know that kids need to eat healthy things, and you have to make them food each day. If you don't, they



will learn to just eat junk food that isn't nutritious; they are just going to want sweets and junk.

The quotations above emphasize the importance mothers in our sample place on eating fresh foods prepared at home. While 43% of mothers reported that they consider the convenience of prepared foods when making purchases, most mothers stressed their preference for fresh foods during the qualitative interviews. Like the mother in Quotation 9, many respondents highlighted the difference between the availability of prepared foods in the US compared to their home country. Many mothers explained that fresh foods were healthier, had no preservatives, and were the best option for their children.

## MATERNAL INFANT FEEDING BELIEFS AND BEHAVIORS

### Feeding History

The American Dietetic Association (ADA) and American Academy of Pediatrics (AAP) recommend exclusive breastfeeding for the first six months of life and breast feeding with the addition of complementary foods through the first year (ADA, 2005; Gartner et al., 2005). The great majority (91%) of mothers in the LIN study reported that they had breastfed their infant for some time during the child's first year of life. Despite this high rate of breastfeeding, mothers only breastfed an average of 5 months and 91% of mothers gave their child infant formula. About a third (34%) of breastfeeding mothers breastfed for less than 6 months. Studies have demonstrated that infants who are bottle fed are less able to regulate food intake than breastfed infants and therefore may consume more calories later in life, contributing to overweight (Gidding, et al., 2005). While the majority of mothers in our sample had breastfed, the high prevalence of mixed feeding may lead to future overweight and obesity for their children.

The quotations below exemplify what mothers told us about breastfeeding:

#### Quotation 11:

R: I feel good when my child breastfeeds. He looks at me in my eyes and I feel a communication. He wants to tell me with that look, "Thanks mom for giving me this" and then he smiles...Breast milk helps your child stay healthy. His doctor tells me that babies grow up healthier and there is a stronger bond between mother and child [when they are breastfed]. [A child should breastfeed] about a year. Six months is okay, but the more you can do it, the better. Until one year.

I: Before you had your son, how did you plan on feeding him?

R: I always thought I'd give him breast milk and formula. The both of them because sometimes you go out and you can't be out in front of everyone breastfeeding. When you go to the store, take a bottle and you can just give it to him there, easily...or when you have to go to work and you leave them three or five hours, during that time they can have a bottle.


#### Quotation 12:

R: I breastfed 2 months but I didn't have enough milk, so I gave him formula. My breasts would not fill up and he would start sucking, he would grab my breast and would cry and cry. I felt like he wasn't getting full. I tried to pump but nothing would come out. I tried a lot of remedies to produce more milk but nothing [worked].

#### Quotation 13:

I: In general, why do you think that mothers should give their child formula?

R: There are mothers who don't produce milk, so they should give their child formula. Or when a mother goes to work too soon after the birth of the baby, then I think that you have to get the baby used to formula from the time they are born, but you should also give them breast milk. For example, if you work during the day, then you should give



your child breast milk at night and if you work in the night, give your child breast milk during the day so the child doesn't lose [the benefits of breastfeeding]. I think that breast milk is what gives babies the vitamins that make them stronger.

Most mothers in our sample desired to breastfeed their children and were aware of the benefits of breast feeding; despite this, mothers also relied on infant formula. Many mothers cited their work schedule, not wanting to breastfeed in public, and not producing enough milk as reasons for using formula. Other mothers said that it was important to introduce formula to their infant so they could more easily wean them off of breast milk once it was time and that formula was a way to insure that their children felt full. A few mothers mentioned that they had tried using a breast pump when they suffered an infection to maintain milk production, but most mothers seemed to rely on formula when they needed to feed their child in public or when going to work.

**Table 5. Maternal Infant Feeding Beliefs and Behaviors**

	<b>%/Mean</b>	<b>N Observed</b>	<b>N Missing</b>
<b>Feeding History</b>			
Ever breastfed Infant	91%	56	0
Avg. months of breast feeding among those that breastfed	5.27	37	0
Breastfed less than 6 months	34%	56	0
Ever fed infant formula	91%	56	0
Avg. age formula use began among formula users (months)	1.90	51	0
Avg. age other liquids introduced (months)	5.02	56	0
Avg. age solids introduced (months)	6.25	55	1
<b>Feeding Beliefs and Behaviors Index</b>			
Laissez-faire feeding			
Diet Quality (range:1-5, $\alpha$ =.53)	4.08	56	0
Diet Quality Indicator	95%	56	0
Attention (range: 1-5, $\alpha$ =.33)	2.20	56	0
Pressure/overfeeding			
Finish (range: 1-5, $\alpha$ =.73)	2.89	56	0
Finish Indicator	54%	56	0
Cereal ( range: 1-5, $\alpha$ =.56)	2.82	56	0
Cereal Indicator	41%	56	0
Soothing (range: 1-5, $\alpha$ =.64)	2.56	56	0
Soothing Indicator	20%	56	0
Restrictive feeding			
Amount (range: 1-5, $\alpha$ =.59)	3.82	56	0
Amount Indicator	79%	56	0
Diet Quality (range: 1-5, $\alpha$ =.60)	3.5	56	0
Diet Quality Indicator	80%	56	0
Responsive Feeding			
Satiety (range: 1-5, $\alpha$ =.70)	3.88	56	0
Satiety Indicator	89%	56	0
Attention (range: 1-5, $\alpha$ =.61)	3.75	56	0
Attention Indicator	82%	56	0
Indulgent Feeding			
Permissive (range: 1-5, $\alpha$ =.75)	1.93	56	0
Permissive Indicator	4%	56	0
Coaxing (range: 1-5, $\alpha$ =.79)	1.59	56	0
Coaxing Indicator	0%	56	0
Soothing (range: 1-5, $\alpha$ =.77)	1.66	56	0
Soothing Indicator	0%	56	0
Pampering (range: 1-5, $\alpha$ =.81)	1.66	56	0
Pampering Indicator	0%	56	0
<b>Sources of Advice about Infant &amp; Toddler Feeding</b>			
Pediatrician	95%	55	1
Books and magazines	82%	56	0
Friends	82%	56	0
Mother	87%	56	0

Note: Indicators are the percentage with an average score over 3. The Chronbach's Alpha ( $\alpha$ ) indicates how reliable a scale is (i.e. how consistently the items in a scale measure the construct indicated). It is not a measure of the construct's validity. Nunnally (1978) has indicated that reliable scales should have a Chronbach's Alpha of at least .70. While acceptable in some circumstances, a scale with a reliability of below .70 provides an inconsistent response more than 30 percent of the time on average.

Mothers in the LIN study reported introducing solids at an average age of 6.25 months. In the qualitative interviews, however, many mothers described allowing their infant to start solids at an earlier age. The following quotations describe how and when mothers began to introduce foods to their infant:

**Quotation 14:**

R: At 6 months I stopped giving him breast milk and... I started to give him tastes of food, [I gave him] fruit and then I gave him formula and an apple or banana. I started to let him try foods...at 4 months. I gave him fruit, apples, bananas, pears...natural fruit.

I: How did you decide to give him fruits?

R: In the WIC office, they always tell you at what age you can start giving foods...At four months I let him try vegetables too. I bought vegetables and boiled them.

**Quotation 15:**

R: I started giving foods other than formula at 3 months. Here, it's normal to do it at five or six months, and that seems okay to me, but I started her at 3 months because she was looking at food a lot. I gave her Gerber, water, juices, fruits and vegetables to try.

I: How does a mother know when to start giving foods to her child?

R: Well, my family or my mom started giving her children food at that age.

**Quotation 16:**

R: She didn't like Gerber. I started to give it to her but it made her gag and she didn't like it so I started to give her soup. I started to make homemade soup with vegetables or chicken.

I: What advice did your mother give you about what a baby should eat?

R: She always told me that a baby should eat a lot of vegetables and soups, pastas...my sisters told me the same, just vegetables and not a lot of bread or things with wheat.

Most mothers reported receiving advice about infant and toddler feeding from their pediatrician or their own mother. Like the mothers in the quotes above, most mothers expressed knowledge about the recommendation to start solid foods around 6 months, but many started solid foods slightly earlier either because of recommendations from friends or family or because their child appeared interested in solid foods. Mothers in the LIN study commonly introduced fresh fruits and boiled fresh vegetables in soup as first foods for their children, a practice that reflects their beliefs about the importance of fresh foods.

**Infant Feeding Beliefs and Behaviors Index**

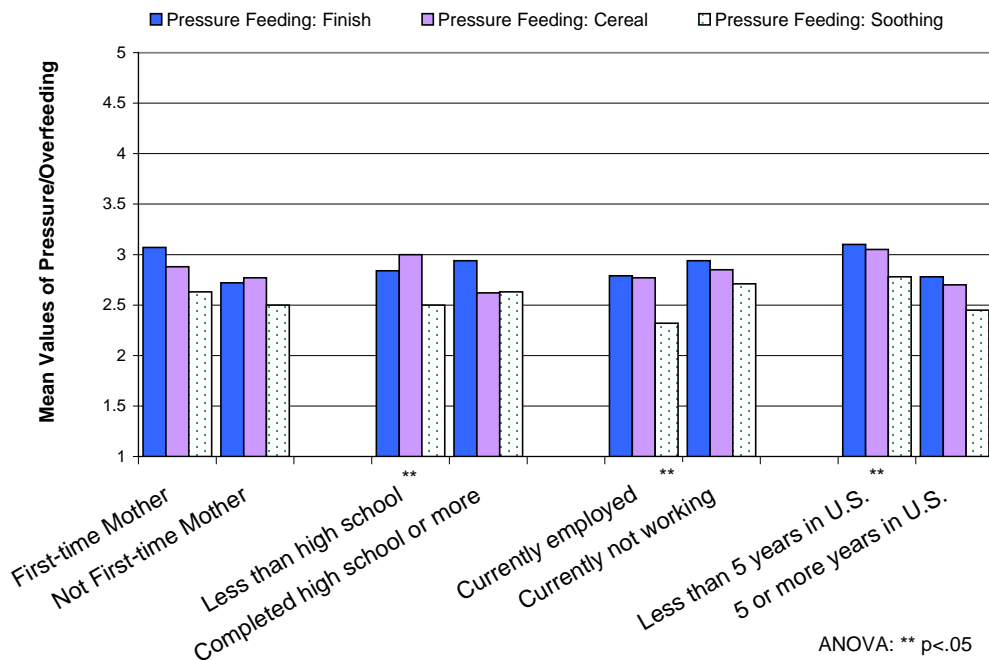
The Infant Feeding Style Questionnaire (IFSQ) is an instrument that assesses mothers' beliefs across 5 different areas of infant feeding. Different parenting styles regarding feeding may be associated with the development of childhood obesity. Previous research has documented that controlling feeding styles like restrictive and pressuring are associated with increased caloric intake and increased risk of childhood overweight (Thompson, et al. 2009).

Of the five feeding styles, mothers in the LIN study were least likely to report indulgent beliefs and practices (Table 5). Mothers were most likely to report a responsive attitude toward infant feeding.<sup>6</sup> Nearly 90% of mothers reported responsive characteristics regarding infant fullness and hunger cues and 82% reported paying attention to their children during mealtimes. Although these high percentages reflect the prevalence of responsive feeding in this population, they may also demonstrate the widespread awareness in our sample of healthy feeding attitudes and practices and the social desirability of providing “correct” answers to questions about infant feeding.

### *Pressuring Feeding Style*

Mothers in the LIN study were less likely to adopt a pressuring attitude than a responsive one toward infant feeding. Slightly more than half of mothers (54%) reported that they were concerned about their child finishing all of their food, formula or breast milk. Forty percent reported using cereal in a bottle as a way to increase their child’s food consumption or using cereal or other foods to help their child sleep. Only 20% of mothers thought it was appropriate to use food to soothe a crying or fussy child. Figure 10a provides details about pressure feeding based on maternal characteristics.

**Figure 10a. Mean Levels of Pressure or Overfeeding by Selected Maternal Characteristics**



<sup>6</sup> Although 95% of mothers reported a laissez-faire attitude regarding diet quality, this feeding style did not have a high degree of statistical reliability. Therefore, results regarding laissez-faire attitudes must be viewed with caution.



First-time mothers were more likely to report pressuring or overfeeding than non first-time mothers in all of the three sub categories of pressuring (Figure 6a). Inexperienced first-time mothers may be unsure about the proper amount of food their child should consume, or may have more time to focus on their infant or toddler than mothers with more than one child, which could contribute to this difference.

Mothers with less than a high school education were more likely to report using cereal in a bottle or using foods to help their child sleep than mothers with more education (3.00 vs. 2.62). Similarly, employed mothers were less likely to use food to soothe their child (2.32 vs. 2.71). This finding is somewhat surprising. Nevertheless, it is possible that because working mothers spend less time at home, they are not as likely to look for a quick remedy to soothe their fussy infant as mothers who spend the entire day with their child.

In general, mothers who have been in the US for longer engaged in less pressure feeding practices than recent immigrants to the US. Previous research has documented that in Latino communities, accelerated growth in infancy is viewed positively as a sign of healthy development (Worobey, et al., 2008). Mothers who have lived in the US for more than 5 years may begin to reject the idea that a chubbier infant is a healthier infant and therefore may be less likely to engage in pressure feeding behaviors. Additionally, mothers who live in the US may be less worried about diseases and illnesses more common in their home countries, such as diarrhea, which can be less severe if an infant is overweight.

**Figure 10b. Mean Levels of Pressure or Overfeeding by Selected Maternal Health Characteristics**

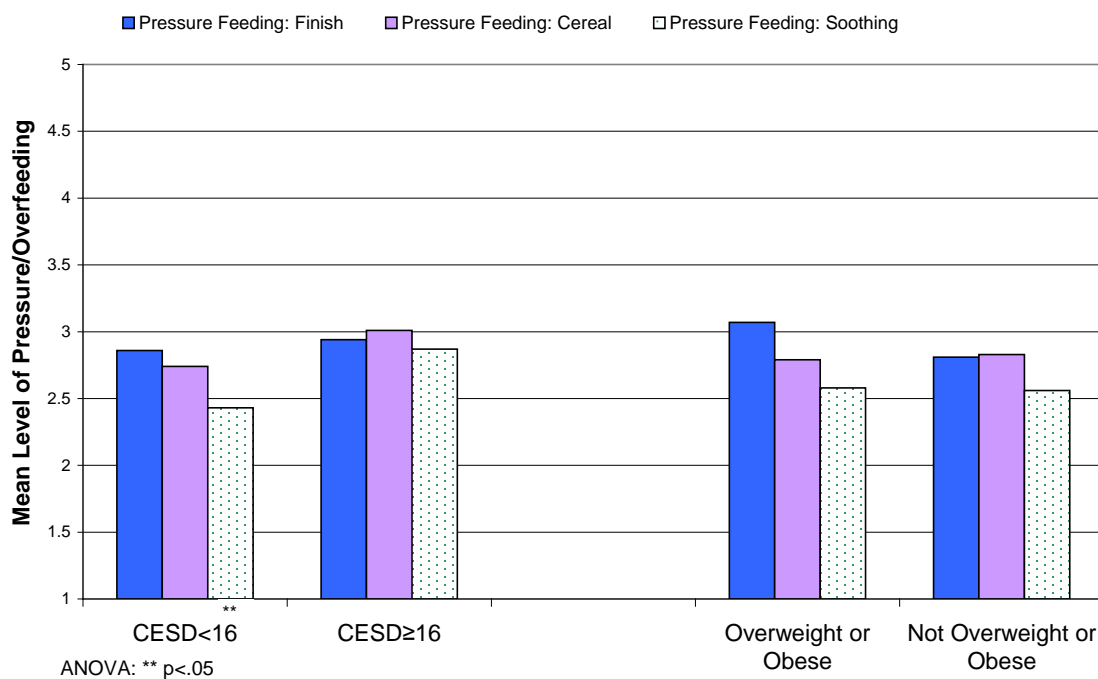


Figure 10b shows the relationship between pressure feeding practices and depression and mothers' weight. Depressed mothers were more likely to put cereal in a bottle or use foods to help a child sleep (3.01 vs. 2.74). They were also more likely to use foods as a way to soothe their child (2.87 vs. 2.43) than mothers who were not depressed. Mothers suffering from depression may use food to help a child sleep or stop crying as a coping mechanism when they feel overwhelmed. This relationship between maternal depression and pressuring feeding styles has been documented in previous studies with WIC mothers (Hurley et. al, 2008). Obese and overweight mothers were more likely to pressure their children to finish all of their food (3.07 vs. 2.81). These mothers may be repeating a feeding style used by their own caregivers: by overriding fullness cues in childhood, children may be more likely to suffer from overweight and obesity later in life.

The following quotations illustrate pressuring feeding behaviors of mothers in the LIN Study:

**Quotation 17:**

I: How is your child's appetite?

R: It's not very large. I've seen other children that eat a huge plate of food but people say it's okay that he doesn't eat as much because his stomach isn't as big. But I would like him to eat a huge plate of food. But then he would be fat and later it's difficult to lose weight.

**Quotation 18:**

R: Hispanics give their children solid food sooner, when they're very little. And here, the pediatrician told me to start giving purees at seven months. With my child, I started to give him purees at three months. Because I could tell that he wasn't getting full...I asked my mom and she told me to start at three months so that the baby could get full.

**Quotation 19:**

R: When he was really little I gave him cereal with the milk and mixed it together...He was much thicker [heavier]. It kept him full for longer periods of time...I didn't have formula as much and I felt that by using the cereal, then I would be saving more formula...I don't work, so the only income I receive is when my uncle has extra....Now I have food stamps and I can go buy whatever, but at that time, I didn't, so I had to make a way to feed him...

I: At that time were you getting food through WIC?

R: Yes, but I wasn't getting enough. I had my breast milk, and I had six cans of formula, but he ate so much that it wasn't enough. They had already given me more than what was expected, so they couldn't give me any more.

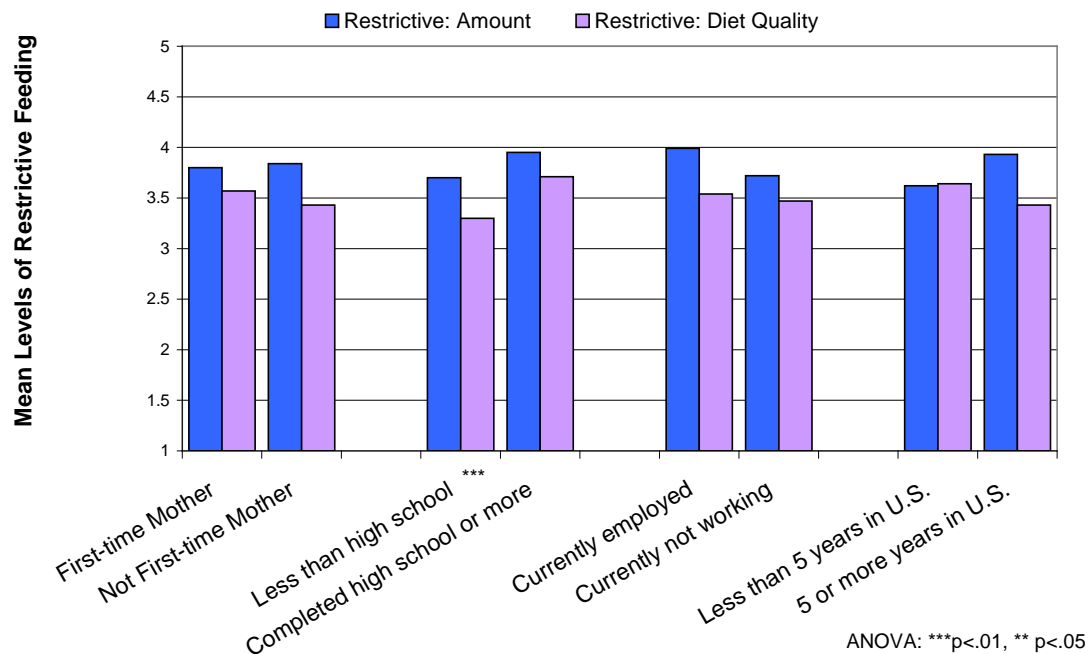
These quotations provide examples of maternal beliefs and practices that result in pressuring feeding behaviors. The mothers in Quotation 17 and 18 are concerned with the amount of food their children consume and want them to increase food intake. Mothers may introduce solids at an earlier date than recommended in order to increase the amount of food their child consumes. In the final quotation, the mother was concerned with feeding her child enough food and resorted to adding cereal in his bottle to keep him happier between meals and to keep him feeling full when she could not afford to purchase enough formula. This quotation

illustrates the relationship between food insecurity and maternal behaviors that can lead to childhood overweight and obesity.

### *Restrictive Feeding Style*

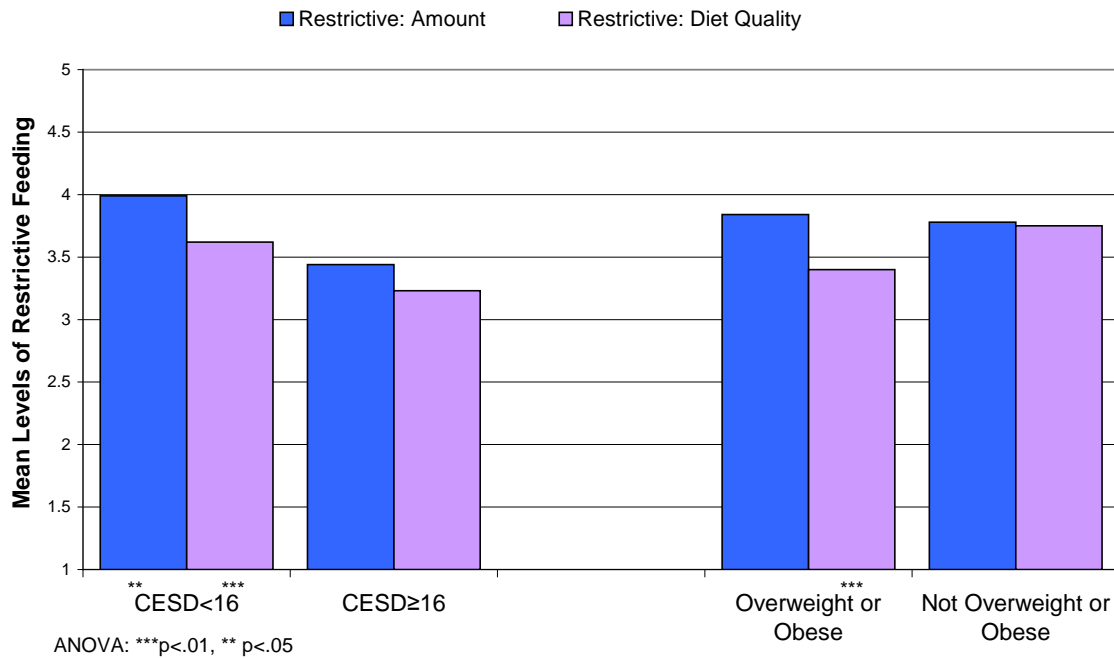
A majority of mothers in the LIN study reported using a restrictive feeding style. Seventy-nine percent of mothers restricted the amount of food their child consumed and 80% said they monitor and control the amount of fast food or junk food their child ate. Figure 11a displays restrictive feeding practices by selected maternal characteristics.

**Figure 11a. Mean Levels of Restrictive Feeding by Selected Maternal Characteristics**



More educated mothers were more likely than mothers with less than a high school education to restrict the amount of food their child consumed (3.95 vs. 3.70) and to insure that their children did not eat junk food or fast food (3.71 vs. 3.30). Similarly, working mothers were more likely to report restricting amount of food than unemployed mothers. Mothers living in the US for 5 years or more were more likely to restrict the amount of food their child ate than mothers who had lived in the US less time (3.93 vs. 3.62). More acculturated mothers may have experienced greater exposure to concerns about body weight and image, which could contribute to a higher prevalence of restrictive practices regarding the amount of food their children consume. This result supports the findings previously mentioned that more acculturated mothers were less likely to pressure their children to finish all of their food.

**Figure 11b. Mean Levels of Restrictive Feeding by Selected Maternal Health Characteristics**



In Figure 11b, we see that mothers with depressive symptoms were less likely to report restrictive feeding styles than mothers with no depressive symptoms. Mothers with a CES-D score of 16 or more were less likely to restrict on the amount of food (3.44 vs. 3.99) and on the quality of food (3.23 vs. 3.62) than mothers with CES-D scores of less than 16. Depressed mothers may have less energy or desire to focus on their child’s eating habits. Mothers who were not overweight or obese were more likely to prohibit their children from eating fast food or junk food than mothers with greater BMIs. Previous studies have shown a relationship between maternal depression and restrictive feeding practices when the mother perceives that her child has a fussy temperament (Hurley, et. al 2008) Overweight or obese mothers may be more likely to consume fast food or junk food, thereby increasing their child’s exposure to unhealthier foods. These results, together with those presented above, strongly suggest that depression and maternal overweight/obesity are related and together contribute to maternal feeding styles and behaviors.

The following quotations exemplify how mothers in the LIN study described restrictive feeding styles:

**Quotation 20:**

R: From the time they are small, if you teach them to eat pure junk food that isn’t going to nourish them, all they will think about is sweets and junk food.

### Quotation 21:

I: What is a healthy baby like?

R: ...A healthy baby doesn't have to be fat. I was fat since I was young and I worry about that. I think that my children will get fat and they will make fun of them at school, and so I make them food that I know doesn't have a lot of fat. I give my children a lot of different things to eat, but I try to give them to him to a certain limit...I don't want my children to be fat, that's why when my younger daughter was born I said, "I'm going to put her on a diet as soon as she's born." But my older child, he was chubby when he was born and now he's grown taller and stretched out, he doesn't look like a little ball.

I: Have you tried to regulate what your daughter eats since she was born?

R: No, no yet. I just try to give her things that will nourish her...They don't eat pizzas or hamburgers.

I: Have you talked to the pediatrician about your worries that your children will be fat?

R: I told my doctor that I didn't want my son to be fat and she told me that he wasn't fat, that he was growing well, healthy. She said I didn't need to worry.

The quotations above, along with Quotations 8-10 of the previous section, provide insight into the restrictive feeding practices of mothers in the LIN study. In general, mothers' desire to feed their child fresh foods may contribute to restrictive feeding practices based on quality. Quotation 21, by a mother who has lived in the US for more than 5 years, is an example of how acculturation can be related to restrictive feeding styles based on quantity. This mother experienced being overweight as a child and is conscious of the amount of food that her children eat in order to prevent them from gaining too much weight.

## INFANT HEALTH AND BEHAVIOR

Two scales were used to capture infant temperament in the LIN Study. The Revised Infant Behavior Questionnaire (IBQ-R) was used with mothers with infants ages 7-11 months and two subscales from the Infant-Toddler Social and Emotional Assessment (ITSEA) were used with mothers whose children were 12 months and older. Mothers of 7-11 month olds reported that their children were generally happy: they responded to soothing techniques (5.00), smiled or laughed in everyday situations (4.82), and were active infants (4.67). Mothers of 12-18 month olds echoed this and reported low levels of negative emotionality (0.74) and higher levels of compliance (1.08) in their toddlers.

**Table 6. Infant Health and Behavior**

	%/Mean	N Observed	N Missing
<b>Infant Anthropometry</b>			
Weight (lbs)	21.67	55	1
Weight (kg)	9.85	55	1
Recumbent length (cm)	75.60	55	1
Sum of Tricep Skinfold (mm)	20.84	56	0
Sum of Subscapular Skinfold (mm)	16.94	56	0
Sum of Abdominal Skinfold (mm)	78.33	56	0
CDC Weight-for-length Percentiles	59.13	52	5
Percentage over the 85th Percentile	28.85	52	5
Percentage over the 95th Percentile	15.38	52	5
CDC weight-for-length z-scores	-0.07	54	2
<b>Infant Temperament</b>			
IBQ-R Score (infants ages 7-11 months)			
Activity Level (range:1-7, $\alpha = .72$ )	4.67	23	0
Distress to Limitations (range:1-7, $\alpha = .76$ )	3.77	23	0
Duration of Orientation (range:1-7, $\alpha = .69$ )	3.81	23	0
Smiling and Laughter (range:1-7, $\alpha = .65$ )	5.24	23	0
Low Pleasure (range:1-7, $\alpha = .75$ )	4.82	23	0
Soothability (range:1-7, $\alpha = .86$ )	5.00	23	0
ITSEA-R Score (infants ages 12-18 months)			
Negative Emotionality (range:0-2, $\alpha = .75$ )	0.74	33	0
Compliance (range:0-2, $\alpha = .75$ )	1.08	33	0
<b>Short Parental Stress Index (PSI range:17-85 <math>\alpha = .85</math>)</b>			
Maternal Stress (range: 5-25, $\alpha = .73$ )	15.43	56	0
Parent-Child Dysfunction (range: 12-60, $\alpha = .88$ )	22.59	56	0

Note: The Chronbach's Alpha ( $\alpha$ ) indicates how reliable a scale is (i.e. how consistently the items in a scale measure the construct indicated). It is not a measure of the construct's validity. Nunnally (1978) has indicated that reliable scales should have a Chronbach's Alpha of at least .70. While acceptable in some circumstances, a scale with a reliability of below .70 provides an inconsistent response more than 30 percent of the time on average.

## Factors influencing maternal feeding behaviors

Table 7 provides the associations between infant feeding styles and infant temperament. In infants ages 7-11 months, there is a relationship between infant characteristics and how a mother approaches feeding her child. Indulgent feeding practices such as coaxing (0.55), soothing (0.55), pampering (0.49) and permissiveness (0.37) are all associated with the infant behavior distress to limitations. Children who exhibit distress when they are limited in the foods they can eat may provoke their mothers to be more indulgent in order to calm their child. Mothers who practice more indulgent feeding styles may also condition their child to expect foods or snacks when they convey distress. Similarly, infants' expression of smiling and laughter is associated with mothers' responsiveness to fullness cues (0.30) and negatively associated with indulgent feeding styles. Mothers may be more aware when their generally content infant expresses fullness cues through a negative reaction. Additionally, happy infants are easier to be around and may elicit more positive parenting styles.

Table 7. Correlations between Feeding Scores and Infant Temperament (corr)

Feeding Style	IBQ-R Score (infants ages 7-11 months)						ITSEA-R Score (infants ages 12-18 months)	
	Activity Level	Distress to Limitations	Duration of Orientation	Smiling and Laughter	Low Pleasure	Soothability	Negative Emotionality	Compliance
Laissez-Faire: Diet Quality	0.09	0.30	-0.09	-0.06	-0.37	0.09	0.14	-0.21
Laissez-Faire: Attention	-0.35	0.18	-0.02	-0.27	-0.33	-0.32	0.26	-0.17
Pressure Feeding: Finish	0.09	-0.02	0.02	-0.01	0.21	-0.01	0.12	-0.14
Pressure Feeding: Cereal	0.11	-0.07	0.12	-0.11	-0.27	-0.04	0.04	-0.06
Pressure Feeding: Soothing	-0.01	0.15	0.05	0.06	0.16	0.30	0.04	-0.12
Restrictive: Amount	-0.21	<b>-0.46</b>	0.01	0.02	0.11	0.02	<b>-0.43</b>	<b>0.38</b>
Restrictive: Diet Quality	-0.09	-0.07	0.23	-0.14	0.24	-0.11	-0.10	0.28
Responsive: Satiety	0.08	-0.39	-0.13	0.30	0.38	0.13	<b>-0.39</b>	0.32
Responsive: Attention	-0.29	-0.11	0.40	-0.02	0.29	-0.15	0.06	-0.02
Indulgent: Coaxing	-0.17	0.56	-0.03	-0.28	-0.16	-0.18	0.09	0.07
Indulgent: Soothing	-0.10	0.55	-0.09	-0.27	-0.13	-0.21	0.07	0.03
Indulgent: Pampering	-0.16	0.49	0.11	-0.20	-0.18	-0.20	0.11	-0.12
Indulgent: Permissive	0.03	0.37	-0.23	-0.17	-0.36	-0.16	0.15	-0.04

Note: Correlations (r) range from -1 to 1. A positive correlation of 1 indicates that two variables increase in perfect unison with each other. A unit increase in one is associated with a unit increase in the other. A correlation of -1 means that a unit increase in 1 is associated with a unit decrease in the other. A correlation of 0 suggests the variables do not move together at all. Bolded if significant at  $p < .05$

Among infants ages 12-18 months, the expression of negative emotionality is negatively associated with restricting the amount of food an infant eats (-0.43) as well as responsiveness to fullness cues (-0.39). This mirrors what we found in infants ages 7-10 months. Parents of toddlers who have a negative disposition may avoid upsetting their child by restricting the amount of food they consume and may also not be able to read fullness cues as easily as mothers who have happier infants. Previous research has shown that a child's temperament can influence parenting styles (Harkness & Super, 1996). However, other factors such as cultural beliefs about feeding, infant appetite, and body size may also contribute to infant feeding practices. A study of WIC mothers and their infants by Hurley et al. (2008) found that restrictive feeding styles were associated with maternal stress and depression only in mothers who perceived their infant to have a fussy temperament, suggesting that maternal perception of infant temperament may influence feeding styles.

## **Maternal Stress**

Elevated stress caused by the demands of parenting is associated with unhealthy parenting styles and may affect the health of children. In the LIN study, we measured mothers' stress using two scales that combine to form an overall maternal stress score. Maternal distress reflects a mother's perception of her competence as a parent. Parent-child dysfunction assesses a mother's perception that her child is meeting her expectations. Overall, mothers in the LIN study did not report high levels of stress (38.02/85). Mothers exhibited higher levels of maternal stress (15.43/25) than stress caused by parent-child dysfunction (22.59/60) which suggests that while mothers' expectations of their infant or toddler were being met, they did not feel as competent as a parent or experienced stress associated with the restrictions placed on other life roles as a result of parenthood.

Figure 12 shows mean levels of maternal stress by selected characteristics. As can be expected, those mothers exhibiting symptoms of depression were more likely to have higher levels of stress than non-depressed mothers (44.06 vs. 35.38). The amount of stress that a mother experiences can affect the way she approaches caring for and feeding her child, which may in turn have effects on an infant's weight and health. Table 8 highlights the association between maternal stress and infant feeding characteristics.



**Table 8. Correlations between Feeding Scores and Parental Stress (corr)**

Feeding Style	PSI
Laissez-Faire: Diet Quality	0.09
Laissez-Faire: Attention	0.19
Pressure Feeding: Finish	0.07
Pressure Feeding: Cereal	0.04
Pressure Feeding: Soothing	0.04
Restrictive: Amount	<b>-0.27</b>
Restrictive: Diet Quality	-0.16
Responsive: Satiety	<b>-0.40</b>
Responsive: Attention	0.10
Indulgent: Coaxing	0.20
Indulgent: Soothing	0.12
Indulgent: Pampering	-0.10

Note: Correlations (r) range from -1 to 1. A positive correlation of 1 indicates that two variables increase in perfect unison with each other. A unit increase in one is associated with a unit increase in the other. A correlation of -1 means that a unit increase in 1 is associated with a unit decrease in the other. A correlation of 0 suggests the variables do not move together at all. Bolded if significant at  $p < .05$

Higher levels of stress were negatively associated with restricting the amount of foods children consumed and was also negatively associated with responsiveness to hunger or fullness cues. The presence of stress was positively associated with indulgent feeding practices, such as allowing children to eat in front of the TV or giving them sweets or sodas. Stressed mothers may not have the time or patience to focus on their child’s hunger cues or to restrict how much a child eats. Instead, stressed mothers may try to avoid upsetting their children by allowing them to eat when and where they please. A previous study conducted with WIC mothers confirms these findings. These correlations indicate that interventions focusing on the well being of the mother, including how to manage stress and treating depression, could have an impact on feeding practices and the health of infants.

The average infant in the LIN study weighed a little over 21 pounds, was 75.6 centimeters long, and had a weight for length z-score of -0.07 (Table 6).<sup>7</sup> Nearly 29% of the children in our sample were above the CDC’s weight for length percentiles, indicating that they are overweight. Fifteen percent of the infants were above the 95 percentile indicating that they are at risk for obesity. While it is encouraging that the majority of the children in our sample

<sup>7</sup> A z-score is a way of standardizing a score based on known population data. In this case, the z-score is standardized to the U.S. population based on the mean weight-for-length of babies born in the U.S. and the standard deviation of their weight-for-length. Therefore, a mean z-score of 1 indicates that the mean for the infants in this study is 1 standard deviation *higher* than the mean for all infants born in the U.S. A mean of -1 would indicate that the mean for infants in this study was 1 standard deviation *lower* than the mean for all infants born in the U.S.

are of a healthy weight for their height, the data also indicate that overweight and obesity are a problem for many of these infants as they grow older.

**Figure 13. Mean Weight-for-Length Z Scores by Selected Maternal Characteristics**

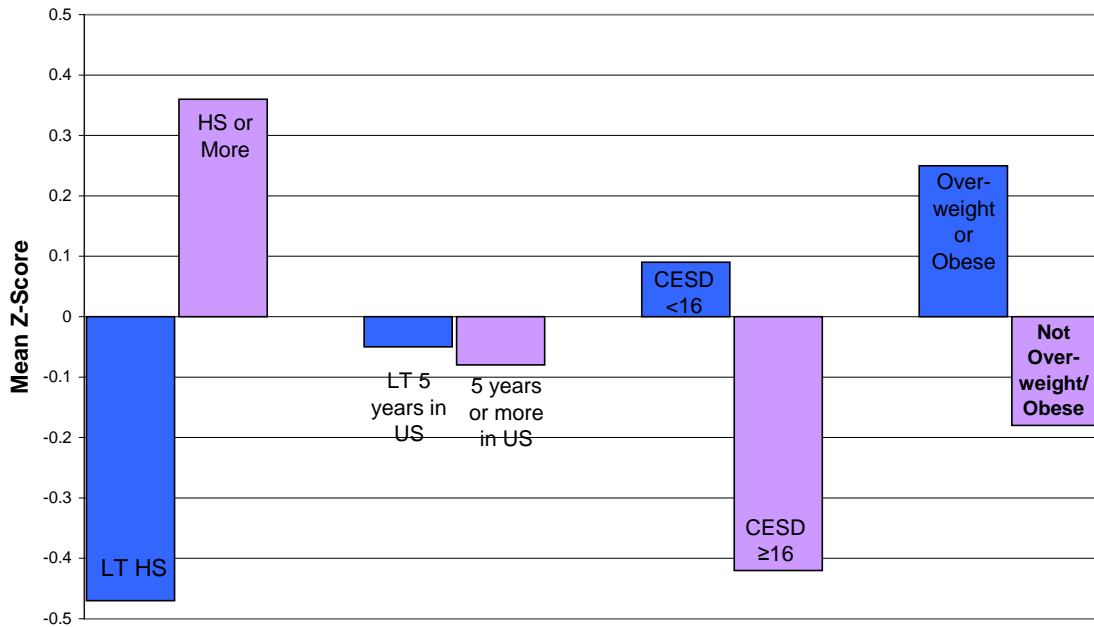


Figure 13 highlights the mean weight-for-length z-scores by selected maternal characteristics. In our sample, the greatest difference in child's weight for height occurred by mothers' education: mothers with less than a high school education were more likely to have children who weighed less than mothers with more education. Mothers with depressive symptoms were also more likely to have children who weighed less than non-depressed mothers. Despite these variations, the differences in z-scores when comparing maternal characteristics were never greater than 1, indicating that maternal characteristics were not highly associated with infant weight for height.



## CONCLUSIONS

This preliminary report has shown that Latina mothers engage in many encouraging child care practices that can positively influence the health of their infant and toddler. Mothers emphasized the importance of fresh fruits and vegetables and reported responsive infant feeding practices. Despite these positive behaviors, there are factors that are associated with less healthy practices. A majority of Latino families experience economic hardship, especially within the first years of arriving in the United States. Latina mothers are also at a high risk for depression and overweight or obesity. These factors are all related and are associated with controlling feeding practices, such as putting cereal in infants' bottles, pressuring children to finish their food. The cumulative effects of controlling feeding practices may have effects on children's weight as they grow older.

For children to be healthy, it is critical that we focus on the health of the mother. Supporting mothers' mental health and helping them become familiar with resources available to their families will be important in insuring the nutritional health of Latino infants. WIC can play an influential role in reinforcing maternal behaviors that lead to healthy nutritional practices in the Latino population.

## RECOMMENDATIONS

### **Increase awareness of mother's mental health**

A third of the mothers in the LIN study reported symptoms of depression. Given the effects of depression on child care practices, mothers who have access to mental health services will be better able to attend to the nutritional needs of their children. Many mothers in this population are unfamiliar with the mental health services available in Orange and Durham Counties. Identifying those mothers with symptoms of depression may be a challenge for the WIC office, but providing a Mental Health resource list in Spanish to all Latina clients will help begin to address this issue in the population.

### **Promote the use of breast pumps for working mothers or mothers who spend time outside of their home.**

While the majority of mothers in the LIN study reported breastfeeding their infant or toddler, high rates of mixed or exclusive formula feeding also existed in our sample. While most mothers already possess the knowledge of the importance and benefits of breast feeding, many mothers resort to formula when they go to work or when they do not want to be seen breastfeeding in public. While more research needs to be done about the use of breast pumps in this population, more attention devoted to counseling mothers about what to do when they cannot breast feed and explaining how to use breast pumps could increase rates of exclusive breast feeding in the population.

### **Orient mothers to the Social Services system**

Immigrants to the US, especially those who have recently arrived, may have difficulties navigating the complicated social services system. Several mothers shared with us rumors that exist in the Latino community regarding the food stamp program and required military service. This puts WIC in a unique position to help mothers understand what services are available for their children and their entire family. WIC staff should continue to direct mothers towards services available to them and help clarify any misinformation that exists in the community surrounding social services.

### **Encourage existing positive feeding practices**

Our findings suggest that Latina mothers practice many positive behaviors regarding their children's nutrition, but that some of these practices decrease as they spend more time in the US. WIC should continue to encourage and support mothers who are responsive to their children during mealtimes and who emphasize the importance of providing their children with fresh fruits and vegetables.



## LIMITATIONS

As with any study, there are some limitations to our research that should be noted. This study relies on a small convenience sample of mothers who attended WIC clinics. Because mothers were not randomly selected to participate in the study, results cannot be generalized to all mothers in the Latino immigrant population. Due to our relatively small sample size, we were unable to detect certain relationships that would have emerged with a larger sample size. In addition, due to the small sample size, slight changes in the distribution of responses can change the significance level of our results. Therefore, significant results must be interpreted cautiously. Although results presented in this report are largely descriptive and correlational, they provide a strong basis for future work with this community. As our research continues, we hope to expand the data collection, collect longitudinal data, and utilize more advanced statistical methods that can better assess the strength and depth of the relationships and trends identified in this report.

## REFERENCES

- American Dietetic Association. (2005). Position of the American Dietetic Association: Promoting and supporting breastfeeding. *Journal of the American Dietetic Association*, 105(5), 810-818.
- Briefel, R., Ziegler, P., Novak, T., & Ponza, M. (2006). Feeding infants and toddlers study: Characteristics and usual nutrient intake of Hispanic and non-Hispanic infants and toddlers. *Journal of the American Dietetic Association*, 106(1 Suppl 1), S84-95.
- Carter, A. A. S., Briggs-Gowan, M. J., Jones, S. M., & Little, T. D. (2003). The infant-toddler social and emotional assessment (ITSEA): Factor structure, reliability, and validity. *Journal of Abnormal Child Psychology*, 31(5), 495-514.
- Centers for Disease Control and Prevention. (2008). *How much physical activity do adults need?* <http://www.cdc.gov/libproxy.lib.unc.edu/physicalactivity/everyone/guidelines/adults.html>
- Gartner, L. M., Morton, J., Lawrence, R. A., Naylor, A. J., O'Hare, D., Schanler, R. J., et al. (2005). Breastfeeding and the use of human milk. *Pediatrics*, 115(2), 496-506.
- Gartstein, M. A., & Rothbart, M. K. (2003). Studying infant temperament via the revised infant behavior questionnaire. *Infant Behavior & Development*, 26(1), 64.
- Gidding, S. S., Dennison, B. A., Birch, L. L., Daniels, S. R., Gillman, M. W., Lichtenstein, A. H., et al. (2005). Dietary recommendations for children and adolescents: A guide for practitioners: Consensus statement from the American Heart Association: Endorsed by the American Academy of Pediatrics. *Circulation (New York, N.Y.)*, 112(13), 2061-2075.
- Harkness, S., & Super, C. M. (1996). *Parents' cultural belief systems: Their origins, expressions and consequences*. New York: The Guilford Press.
- Hurley, K. M., Black, M. M., Papas, M. A., & Caufield, L. E. (2008). Maternal symptoms of stress, depression, and anxiety are related to nonresponsive feeding styles in a statewide sample of WIC participants. *The Journal of Nutrition*, 138(4), 799.
- Lara, M., Gamboa, C., Kahramanian, M. I., Morales, L. S., & Bautista, D. E. (2005). Acculturation and Latino health in the United States: A review of the literature and its sociopolitical context. *Annual Review of Public Health*, 26, 367-397.
- Loyd, B. H., & Abindin, R. R. (1985). Revision of the parenting stress index. *Journal of Pediatric Psychology*, 10(2), 169.

- Marin, G. G., & Gamba, R. J. (1996). A new measurement of acculturation for Hispanics: The bidimensional acculturation scale for Hispanics (BAS). *Hispanic Journal of Behavioral Sciences*, 18(3), 297-316.
- North Carolina -- Nutrition and Physical Activity Surveillance System (NC-NPASS). (2003). *Table 2. overweight (BMI >=95th percentile). children by age, hispanicity, and gender.* <http://www.eatsmartmovemorenc.com/Data/Texts/2007%20Tables.pdf>
- Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.
- Ogden, C. L., Carroll, M. D., & Flegal, K. M. (2008). High body mass index for age among US children and adolescents, 2003-2006. *JAMA : The Journal of the American Medical Association*, 299(20), 2401-2405.
- Radloff, L. L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385-401.
- Reitman, D. D., Currier, R. O., & Stickle, T. R. (2002). A critical evaluation of the parenting stress index-short form (PSI-SF) in a head start population. *Journal of Clinical Child and Adolescent Psychology*, 31(3), 384-392.
- 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. *Journal of Biosocial Science*, 40(5), 673-696.
- Thompson, A. L., Mendez, M. A., Borja, J. B., Adair, L. S., Zimmer, C. R., & Bentley, M. E. (2009). Development and validation of the infant feeding style questionnaire. *Appetite*,
- US Department of Agriculture Food and Nutrition Service. *Supplemental assistance nutrition program: Eligibility.* [http://www.fns.usda.gov.libproxy.lib.unc.edu/FSP/applicant\\_recipients/eligibility.htm](http://www.fns.usda.gov.libproxy.lib.unc.edu/FSP/applicant_recipients/eligibility.htm)

## APPENDIX 1: LIN Survey Measurements

In the interview administered survey, information was collected on maternal depression, maternal acculturation, maternal physical activity, parenting stress, infant behavior and infant feeding styles using the following instruments:

*Maternal depression symptom severity* was evaluated using the 20-item **Center for Epidemiological Studies Depression Scale – Spanish version (CES-D)**. In the CES-D, respondents rate symptom frequency in the previous week. Items include statements such as *I was bothered by things that don't normally bother me* and *I felt sad*. Each item is scored 0 to 3 (Rarely or none of the time, some or little of the time, occasionally or a moderate amount of time, most or all of the time) with total scores ranging from 0 to 60. A score of 16 or above indicates clinically significant symptoms; as the score increases, there is greater likelihood that the mother suffers from a major depressive disorder (Radloff, 1977).

*Mother's acculturation* to the U.S. was measured using the Linguistic Proficiency subscale of the **Bi-dimensional Acculturation Scale for Hispanics (BAS-LP)** (Marin & Gamba, 1996). The BAS-LP measures linguistic proficiency in two domains, Spanish and English, using 6 items for each language. The 6 items in each domain are averaged for every respondent providing two scores of acculturation for each mother. The possible score range is 1-4. Scores above 2.5 indicate a high level of adherence to the domain and scores above 2.5 in each domain indicate biculturalism.

*Mother's physical activity* was measured by assessing all levels of physical activity, light, moderate or vigorous for a normal week. Each mother reports the number of days per week and hours per day she participates in a list of activities arranged by intensity levels. Total hours participating in each level of physical activity are summed and averaged for the week.

*Parenting Stress* was measured using the short form (17-item) version of the **Parental Stress Index – PSI-SF** (Loyd & Abidin, 1985; Reitman, Currier, & Stickle, 2002). Parents use a 5-point scale (Strongly agree-Strongly disagree) to indicate the degree to which they agree with each statement. The short form provides a total parenting stress score as well as two subscales – modified parental distress and parent-child dysfunctional interaction. The parental distress subscale reflects a parent's perception of child rearing competence, conflict with her spouse or partner, social support, and stresses associated with the restrictions placed on other life roles. The Parent-Child dysfunctional Interaction subscale assesses a parent's perception that her child is not meeting her expectations. The scores on each subscale are summed and added together to provide the total parenting stress score. The total Parenting Stress score ranges from 17 to 85; the modified parental distress score ranges from 5 to 25; and the parent-child dysfunctional interaction score ranges from 5 to 60.

Information about *Infant Behavior* was obtained using two instruments. For infants 7-11 months, the LIN Study used the **Infant Behavior Questionnaire-Revised (IBQ-R)** (Garthstein & Rothbart, 2003). In the IBQ-R, on a scale of 1-7 (Never to Always),



caregivers report the frequency of infant reactions to specific occurrences in the past week or past two weeks. The instrument assesses various domains including (1) *Activity Level*: Movement of arms and legs, squirming and locomotor activity; (2) *Distress to Limitations*: Baby's fussing, crying or showing distress while a) in a confining place or position; b) involved in caretaking activities; c) unable to perform a desired action; (3) *Duration of Orienting*: The baby's attention to and/or interaction with a single object for extended periods of time; (4) *Smiling and Laughter*: Smiling or laughter from the child in general caretaking and play situations; *Low Intensity Pleasure*: Amount of pleasure or enjoyment related to situations involving low stimulus intensity, rate, complexity, novelty, and incongruity; and (5) *Soothability*: Baby's reduction of fussing, crying, or distress when the caretaker uses soothing techniques.

For toddlers 12-18 months, two scales from the **Infant-Toddler Social and Emotional Assessment (ITSEA)** were used (Carter, et al., 2003). In the ITSEA, adults or caregivers report on social-emotional problems and competencies in toddlers ages 1-3. Mothers were asked to report on a scale of 0-2 (Not true, somewhat true, Very true) the frequency that their child exhibited *negative emotionality* and *compliance*. The score from each instrument were averaged for each infant or toddler and then an average was calculated for the entire sample to obtain a score for each domain.

*Parental Feeding styles* evaluated by the **Infant Feeding Styles Questionnaire (IFSQ)**, a 83-item that measures feeding beliefs and behaviors of mothers of infants and young children (Thompson, et al. 2009). The IFSQ defines five feeding styles (1)*Laissez-faire*: Parent does not limit their infant's diet quality or quantity and shows little interaction with their infant during feeding; (2) *Pressuring/Controlling*: Parent is concerned with increasing the amount of food their infant consumes and uses food to soothe the infant; (3) *Restrictive/Controlling*: Parent limits the infant to healthful foods and limits the quantity of food consumed; (4) *Responsive*: Parent is attentive to their child's hunger and fullness cues and interacts with their infant during feeding; and (5) *Indulgent*: Parent does not set limits on the quantity or quality of the food their infant consumes. Given scenarios for each domain, mothers answered on a scale of 1-5 (Strongly Disagree-Strongly Agree) regarding feeding beliefs and a scale of 1-5 (Never-Always) regarding infant behaviors. The answers for each domain were averaged for each infant or toddler and then an average was calculated for the entire sample to obtain a score for each domain.

Several instruments were used to collect the *Anthropometric measurements* of the mother and child. Infant weight was taken using the Tanita BD-585 Digital Baby Scale, the O'Leary length board was used to record infant length. Harpenden Skinfold calipers were used to measure skin-folds of both mother and child. Mother's hip and waist circumference were measured using a measuring tape, her height was measured using a Harpenden pocket stadiometer, and her weight was measured by an analog scale. All measurements were taken and recorded three times and then averaged together.