

WIC PROGRAM PARTICIPATION AND RACIAL DISPARITIES IN BREASTFEEDING AMONG LOW-INCOME WOMEN

DIANNA WILLIAMS, SWARTHMORE COLLEGE

RESEARCH GUIDED BY:

GENEVIEVE KENNEY, MARLA MCDANIEL, ARIEL KLEIN, IRENE HEADEN

INTRODUCTION

Healthy People 2010, a national health agenda proposed by the U.S. Department of Health and Human Services (DHHS), includes goals to increase the initiation and duration of breastfeeding among American women. More specifically, these goals involve “increasing to 75% the proportion of women who initiate breastfeeding, increasing to 50% the proportion of women who continue breastfeeding their babies until 6 months of age; and increasing to 25% the proportion of women who breastfeed until 1 year of age” (Bentley et. Al 2003). Additionally, the American Academy of Pediatrics (AAP) recommends that mothers feed their infants breast milk exclusively until 6 months of age and that mothers continue to breastfeed their infants up to 1 year in age (K.M. Hurley et al. 2008). The promotion of breastfeeding by the DHHS and the AAP is unsurprising given the numerous health benefits of breastfeeding for mothers and their infants.

Breastfeeding has been linked to a host of positive physiological, cognitive, and emotional outcomes for mothers and infants. For example, infants who are breastfed are less likely to develop asthma, gastroenteritis, diabetes, obesity, childhood leukemia and have a reduced likelihood of falling victim to Sudden Infant Death Syndrome (SIDS) (Spaulding and Gore 2009). Mothers who breastfeed, additionally, have lower rates of ovarian cancer, breast cancer, and type II diabetes (Division of Nutrition and Physical Activity: Research to Practice Series No. 4. 2007). The maternal benefits of breastfeeding are not purely physiological, however, as breastfeeding has been associated with lower incidences of Post Partum Depression (PPD) (Dennis et al. 2009). Mothers who suffer from PPD put their infants at increased risk since the illness impairs mother-infant interactions and depressed mothers find it more difficult to gauge and respond to their infant’s needs. Moreover, infant cognitive, behavioral, and emotional outcomes are partially tied to maternal mental health.

Given the numerous health benefits of breastfeeding, the low-incidences of breastfeeding initiation as well as short breastfeeding duration that have been documented among certain sub-groups such as African American women could have serious long-term health implications for them and their children. For instance, only 45% of African-American women initiate breastfeeding as compared to 68% of White women and 66% of Hispanic women, and at 6 months postpartum only 19% of African American women continue to breastfeed compared to 31% of White women and 28% of Hispanic women (U.S. Department of Health and Human Services, Office on Women's Health 2000). Multiple studies find a consistent gap between breastfeeding initiation and duration rates between White women and African American women, but breastfeeding patterns among Hispanic women are more complex. The longer Hispanic women spend in the United States, the less likely they are to initiate breastfeeding and the shorter the average duration of exclusive breastfeeding (Gill 2009). Research also indicates that each additional year a Hispanic woman lives in the United States is associated with a 4% drop in breastfeeding initiation rates. Breastfeeding duration among Hispanic women is also negatively associated with time spent in the United States as each additional year in the United States is associated with a 3% drop in breastfeeding exclusively for at least 6 months (Gibson-Davis et al. 2006 and Gill 2009).

THE WIC PROGRAM

The Special Supplemental Program for Women, Infants, and Children (WIC) has instituted policies consistent with the Healthy People 2010 goals to promote breastfeeding among its

participants. WIC primarily promotes breastfeeding in three fashions: awareness, support, and incentives (Food and Nutrition Service, 2010). WIC increases awareness concerning the benefits of breastfeeding by providing participants with educational materials regarding breastfeeding and informational counseling. WIC also provides financial assistance and support for breastfeeding moms by providing access to breast pumps ("a mechanical or electronic device for withdrawing milk from the breast"), breast shells ("hollow plastic disks worn inside the brassiere to protect the nipple from becoming flattened...may be used to protect engorged or sore nipples during breastfeeding"), and nursing supplements (other items such as prenatal vitamins, creams, lotions, and nursing pads used to prepare and aid the mother for breastfeeding) (Mosby, 2008 and Alexander, J.M. et al., 1992). In addition, WIC provides breastfeeding mothers with psychological support by follow up support via peer counselors. Finally, WIC provides program incentives for mothers to breastfeed by offering larger food packages to breastfeeding moms and by allowing mothers who breastfeed to participate in the WIC program longer than moms who bottle feed. However, while the WIC program has implemented changes that encourage WIC mothers to breastfeed, the program still provides large incentives to bottle feed by providing formula free of charge to mothers who opt to bottle feed their infants.

WIC participants are disproportionately African-American and Hispanic. 19.6% of WIC participants classify themselves as African American, while 41.6% of WIC program

participants identify as Hispanic¹ (Food and Nutrition Service, 2006). By contrast, the United States Census indicates that only 12.4% of the total United States population is African American and that only 14.7% of the US population is Hispanic (2005-2007 American Community Survey). The overrepresentation of African Americans and Hispanics in the WIC program implies that the structure of program packages and incentives could have a disproportionately large impact on these communities. Additionally, 45% of all infants born in the United States are enrolled in the WIC program, and therefore, the design of WIC program packages could have long-term implications for health costs for the nation as a whole (Food and Nutrition Service, 2010). Due to the large potential impact of the WIC program on breastfeeding initiation and duration on a national level, my research examines breastfeeding behaviors among WIC participants and non-participants. Moreover, due to the overrepresentation of African American and Hispanic women in the WIC program, this study analyzes racial differences in breastfeeding in relation to WIC program participation.

RESEARCH QUESTIONS

1. Are there racial and ethnic differences in breastfeeding rates among low-income women?

Previous research has indicated that income is positively associated with breastfeeding initiation and duration (Phillip and Jean-Marie

¹ People of Hispanic origin/ethnicity may be of any racial category (White, Black/African American, Asian/Pacific Islander, American Indian/Alaskan Native, Multi Racial or Other)

2007). Additionally, race is also correlated with income as Whites have higher incomes than African Americans and Hispanics on average. Therefore, when examining racial and ethnic disparities in breastfeeding, only a sub-sample of low-income women was analyzed to control for income effects.

2. After adjusting for other factors do racial and ethnic differences in breastfeeding still persist?

Other factors such as years of education, marital status, nativity, and adequacy of prenatal care have been shown to be associated with the initiation and duration of breastfeeding. Additionally, it is likely that these factors also differ along racial lines. As such, racial and ethnic differences are analyzed to determine if they are simply a function of other factors associated with breastfeeding or if such differences persist when other factors are accounted for.

3. To what extent does WIC program participation appear to explain some of the racial differences in breastfeeding among low-income women?

Another key covariate that could be associated with breastfeeding initiation and duration is participation in the WIC program due to the incentives as well as the disincentives the program provides to mothers with regard to breastfeeding. Additionally, since African American and Hispanic women are disproportionately represented in the WIC program, due in part to lower average income levels and increased likelihood of meeting WIC program eligibility criteria, WIC program participation may be able to explain some of the racial gaps in breastfeeding initiation and duration. It should be noted that since women

are not randomly assigned into the WIC program, any analysis on WIC program participation among low-income women is subject to selection bias.

METHODOLOGY

DATA AND SAMPLE

Research relied on data from the 2001 Early Childhood Longitudinal Survey – Birth Cohort (ECLS-B). Data from the baseline survey (9-months) and the subsequent survey (2-year) were analyzed to determine breastfeeding initiation and duration patterns in relation to WIC program participation. Since income determines WIC program eligibility (mothers must have a household income that is at most 185 percent of the federal poverty level), the sample was restricted to include only low-income women in order to more accurately determine the correlation between WIC program participation and breastfeeding patterns. Low-income households were classified as households with incomes below 200% of the federal poverty level. The classification of low-income does not completely overlap with the WIC income eligibility requirement, however, this cutoff still likely produces a sample in which low-income WIC non-participants share similar characteristics as WIC program participants.

The racial categories that were analyzed included: White, non-Hispanic; African American, non-Hispanic; and Hispanic (any race). Asian (including Pacific Islander) were included as a race variable, but approximately 90 percent of Asian participants were born outside of the United States, which created concerns of possible multicollinearity between

foreign status and Asian descent.² Additionally, all other racial categories (Native American, Alaskan Native, and Multiracial) were collapsed into the Other category. The following covariates were believed to be correlated with race as well as with breast feeding initiation and duration: WIC program participation, mother's fulltime work status, non-parental care of child, household income below the federal poverty line, adequacy of prenatal care, mother's education, mother's marital status, foreign birth status, breastfeeding advice received, low-birth weight infant, mother's age, and number of live births (not including the sampled infant). These covariates were included in multivariate analyses.

KEY VARIABLES

Breastfeeding patterns were the dependent variable in all models. Breastfeeding initiation was a dichotomous variable that determined whether a mother had ever breastfed her infant. Breastfeeding duration was a continuous variable that determined the amount of time (months) that a mother breastfed her infant. Women who never breastfed their infant were also included in the breastfeeding duration variable and received a value of 0. Additionally, interaction terms were created between mother's race and WIC program participation to analyze whether the association between WIC program participation and observed breastfeeding patterns differed by race.

² Additional evidence for multicollinearity between Asian descent and foreign birth status is the fact that the coefficient on Asian was negative, when it was expected to be positive as descriptive statistics indicated that Asians initiated breastfeeding at the highest rates.

Table 1. Key Variable Sample Characteristics of Low-Income Mothers³

Race	Initiated Breastfeeding (%)	Average Duration of Breastfeeding ⁴ (Months)	On WIC (%)
White, Non-Hispanic (n=1600)⁵	53.4	4.4	79.3
African American, Non-Hispanic (n=1250)	42.7** ⁶	3.8	81.8
Hispanic (any race) (n=1250)	75.3**	5.7**	83.8*

METHODS

RESEARCH QUESTIONS

1. Are there racial and ethnic differences in breastfeeding rates among low-income women?

The sample was restricted to include only low-income women (women with household incomes at or below 200% of the federal poverty level). For breastfeeding initiation, differences in the percent of mothers who had ever breastfed their infant were observed by racial category. White women were selected as the control group. Significance for racial

³ Sample only includes low-income women for whom WIC information was collected

⁴ This calculation of breastfeeding duration excluded mothers who never breastfed their infants; Tobit analysis in Table C (Appendix) relied on a breastfeeding duration variable that included mothers who never initiated breastfeeding

⁵ All sample size values listed within this report have been rounded to the nearest 50, per disclosure requirements of the National Center for Education Statistics.

⁶ * Significantly different than White, Non-Hispanic mothers at the 5% level; ** Significantly different than White, Non-Hispanic mothers at the 1% level

differences in breastfeeding initiation rates, therefore, was determined by differences in breastfeeding initiation among white women and non-white women of a particular racial category.

A similar method was used to analyze racial differences in the duration of breastfeeding. The sample was restricted to include only low-income women and White women were selected as the racial control group. Significance for differences in breastfeeding duration was determined by differences in the average rate of breastfeeding duration among White women and non-White women of a particular racial category. In cases where breastfeeding initiation and/or breastfeeding duration and WIC program participation was analyzed, the sample was restricted to only include low-income women for whom WIC program participation information was collected.

2. After adjusting for other factors do racial and ethnic differences in breastfeeding among low-income mothers still persist?

The following control variables were used to conduct a multivariate analysis on racial differences on breastfeeding patterns among low-income women: WIC program

participation, Mother's fulltime work status, non-parental care of child, household income below the federal poverty level, adequacy of prenatal care, mother's education, mother's marital status, foreign birth status of mother, breastfeeding advice received, low birth weight infant, mother's age, and number of live births (not including the sampled infant). Multivariate regressions including these control variables were analyzed to determine whether or not racial differences in breastfeeding patterns persisted when factors associated with race/ethnicity and breastfeeding were included in models. Both linear and logistic multivariate models were utilized to determine the significance of racial and ethnic differences related to breastfeeding initiation rates, when controlling for other factors. A Tobit multivariate model was utilized to determine the significance of racial and ethnic differences on breastfeeding duration, when controlling for other factors. A Tobit model was used to account for the large number of women who never initiated breastfeeding. White women were classified as the control racial group in all models.

3. To what extent does WIC program participation appear to explain some of the racial differences in the initiation of breastfeeding?

Interaction terms were created between WIC program participation and each racial category to determine whether WIC program participation explained some of the racial/ethnic differences in the initiation of breastfeeding. Both logistic and linear multivariate regression models with WIC interaction variables were utilized to determine whether WIC program participation explained some of the racial/ethnic

differences in breastfeeding initiation, controlling for other factors.

The dependent variable in models 1, 2, 3, and 4 in Tables A and B was breastfeeding initiation. Models 1 and 2 in Table A utilized a linear probability regression, while Models 3 and 4 in Table B utilized a logistic regression model. Model 2 and Model 4 in Table A and Table B, respectively, include interaction terms between WIC program participation and race. Results for breastfeeding duration rates are shown in Model 5 in Table C.⁷ National population sample weights were used to estimate more accurate standard errors and to account for the complex nature of the sample design.⁸

RESULTS

RESULTS: RESEARCH QUESTION 1

Among low-income mothers, 59.0% of White mothers initiated breastfeeding, 44.1% of African American mothers initiated breastfeeding, and 75.3% of Hispanic mothers initiated breastfeeding. White mothers were selected as the control group. Therefore, the results of bivariate analysis show that African American mothers are significantly less likely to initiate breastfeeding than White mothers, while Hispanic mothers are significantly more likely to initiate breastfeeding than White mothers.

⁷ Models 1,2,3,4, and 5 can be found in Tables A, B, and C in the Appendix

⁸ It should be noted that stratum 89 was dropped from all regression analysis as the sub-population analyzed contained no population members.

Table 2. Percent of Low-Income Mothers who Have Ever Breastfed Their Infants

Race	Percent
White, Non-Hispanic (n=2250) ⁹	59.0
African American, Non-Hispanic (n=1400)	44.1** ¹⁰
Hispanic (any race) (n=1500)	75.3**

Table 3. Average Duration of Breastfeeding among Low-Income Women who Initiated Breastfeeding¹¹
12

Race	All Mothers	On WIC
White, Non-Hispanic	4.4 (n=1600) ⁹	4.3 (n=700)
African American, Non-Hispanic	3.8 (n=1250)	3.6** ¹⁰ (n=450)
Hispanic (any race)	5.7 (n=1250)**	5.8** (n=800)

It is observed that among low-income mothers who initiated breastfeeding and for whom WIC information was collected, White mothers, on average, breastfed their infants for 4.4 months, African American mothers breastfed their infants for 3.8 months and Hispanic mothers

⁹ All sample size values listed within this report have been rounded to the nearest 50, per disclosure requirements of the National Center for Education Statistics.

¹⁰ * Significantly different than White, Non-Hispanic mothers at the 5% level; ** Significantly different than White, Non-Hispanic mothers at the 1% level

¹¹ Duration of Breastfeeding is measured in months

¹² Sample only includes low-income women for whom WIC information was collected

breastfed their infants for 5.7 months. White mothers were selected as the control group. Bivariate analysis shows that White mothers did not breastfeed for significantly longer durations than African American mothers. Bivariate analysis does, however, show that White mothers breastfed for significantly shorter durations than Hispanic mothers.

When the sample is restricted to include low-income mothers who were classified as WIC program participants and who initiated breastfeeding, White mothers, who breastfed for an average of 4.3 months, were shown to breastfeed for significantly longer durations than African American mothers (3.6 months) and were shown to breastfeed for significantly shorter durations than Hispanic mothers (5.8 months).

RESULTS: RESEARCH QUESTION 2

Table 4. Racial Differences in Breastfeeding Initiation Among Low-Income Mothers Controlling for Other Observed Factors

Variable	Coefficient
African, American, Non-Hispanic	-.082** ¹³
Hispanic (any race)	.136**
WIC	-.011

Refer to Model 1 and Model 3 in Table A and Table B (Appendix), respectively, for full multivariate results utilizing linear and logistic regression methods.

¹³ * Significantly different than White, Non-Hispanic mothers at the 5% level; ** Significantly different than White, Non-Hispanic mothers at the 1% level

Research results from multivariate linear analysis households indicate that among low-income households, African American mothers are 8.2% less likely to initiate breastfeeding than White mothers, while Hispanic mothers are 13.6% more likely to initiate breastfeeding than White mothers. Observed racial differences in the initiation of breastfeeding among low-income mothers were found to be statistically significant. WIC program participation was found to have no significant impact on breastfeeding initiation among low-income mothers.

Table 5. Racial Differences in Breastfeeding Duration Among Low-Income Mothers Controlling for Other Observed Factors

Variable	Coefficient
African American, Non-Hispanic	-1.156** ¹³
Hispanic (any race)	1.436**
WIC	-0.323

Research results from Tobit modeling indicates that among low-income households, African American mothers breastfeed, on average, for significantly shorter periods of time than White mothers, while Hispanic mothers, on average, breastfeed for significantly longer durations than White mothers. Racial differences in the duration of breastfeeding were found to be statistically significant. Participation in the WIC program while pregnant was shown to not have a significant association with breastfeeding duration.

RESULTS: RESEARCH QUESTION 3

Refer to Model 2 and Model 4 in Table A and Table B (Appendix), respectively, for full multivariate results utilizing linear and logistic regression methods.

Table 6. Effect of Race and WIC Interaction Variables Controlling for Other Observed Factors

Variable	Coefficient
African American X WIC	0.085
Hispanic X WIC	0.297

Interaction terms were created to see if WIC program participation while pregnant significantly changed the likelihood that low-income White mothers initiated breastfeeding at different rates than low-income African American and Hispanic mothers. Results above from multivariate linear regression analysis show that both interaction terms for African American mothers and Hispanic mothers with WIC program participation were insignificant. Our findings show, therefore, that the association of racial differences in the initiation of breastfeeding as it relates to WIC program participation among low-income mothers cannot be determined from the data.

DISCUSSION FOR INITIATION OF BREASTFEEDING

Controlling for other observed factors in this low-income sample using both linear probability and logistic models, one finds that African-American mothers are still significantly less likely to initiate breastfeeding than White mothers and that Hispanic mothers are still significantly more likely to initiate breastfeeding. Factors that were positively associated with initiating breastfeeding included having adequate or adequate plus prenatal care, increased educational attainment, being married, and being born outside of the United States (including United States territories). Factors that were negatively correlated with the initiation of breastfeeding included having a primary

caregiver other than the mother and having a low birth weight infant. Factors that had no association with the initiation of breastfeeding in these specifications included having a mother that worked more than 35 hours a week, having family income below the federal poverty level, having a doctor that discussed breastfeeding during a prenatal visit, mother's age, and the number of live births not including the infant. Of particular importance, being enrolled in the WIC program while pregnant was not associated with initiation of breastfeeding. The coefficients on race and WIC interaction variables were insignificant, indicating that the association between WIC and breastfeeding is not different between White and African American mothers and between White and Hispanic mothers.

DISCUSSION FOR DURATION OF BREASTFEEDING

Similar patterns were found for the duration of breastfeeding. Estimates from the Tobit model indicates that among low-income households, African American mothers who initiated breastfeeding, breastfed for significantly shorter periods of time than White mothers, while Hispanic mothers breastfed significantly longer than White mothers. Factors that were positively associated with the duration of breastfeeding included having adequate or adequate plus prenatal care, increased educational attainment, being married, being foreign born, being older. Factors that were negatively associated with the duration of breastfeeding included having a primary caregiver other than the mother and having a low birth weight infant. Factors that were not found to be correlated with the duration of breastfeeding included whether a mother worked full time, living below the poverty line, a mother's number of live births

not including the sampled infant, and having a doctor discuss breastfeeding with the mother. Importantly, WIC program participation was found to not have a significant impact on how long a woman decided to breastfeed.

CONCLUSIONS

WIC program participation was not found to have a significant association with the initiation and duration of breastfeeding and thus does not appear to explain racial differences in the initiation and duration of breastfeeding among low-income women. WIC program participation may, however, be able to explain breastfeeding patterns among all women. This study focused specifically on low-income women in order to control for some of the confounding association between income and WIC program participation. However, it should be noted that since women are not randomly selected into the WIC program, the coefficient on WIC program participation may be biased (selection bias). For example, Table 1 indicates that among low-income women for whom WIC program participation information was collected, participation in the WIC program is relatively high for mothers of all racial groups, ranging from 79.3% for White women to 83.8% for Hispanic women. Thus, the select minority of women of all racial groups who opt to not participate in the WIC program may systematically differ in their breastfeeding behaviors in ways that cannot be captured with the methodology used in this study. Further, though African American and Hispanic women are overrepresented in the WIC program, with respect to their overall makeup within the American population, among low-income women, there are relatively minor racial differences in WIC program participation.

Restricting our sample to only include low-income women, therefore, likely reduces the magnitude of racial differences in breastfeeding as it relates to WIC program participation, since racial differences in WIC program participation among low-income women are small.

It is also possible that the lack of significance found for WIC program participation may be the result of the mixed batch of incentives and disincentives WIC provides to breastfeed. For example, though the program has increased the promotion of breastfeeding to mothers who participate, the program still offers a huge disincentive to breastfeed by providing formula free of charge to mothers who choose to not breastfeed their infant(s). Moreover, since such a high percentage of low-income mothers (mothers with household incomes below 200% of the federal poverty line) are enrolled in WIC it may be the case that low-income WIC non-participants have a different set of preferences than WIC participants, biasing the coefficient and possibly rendering it insignificant. Finally, the WIC variable analyzed only measured whether or not a mother received WIC food vouchers while pregnant, which may not be a strong enough indicator of WIC program participation and involvement after the birth of an infant. A WIC variable that measured WIC program participation during a child's infancy may have provided stronger evidence for a link between WIC program participation and breastfeeding trends.

Of great importance is the fact that when a host of factors associated with both race and the initiation and duration of breastfeeding are taken into account, racial differences in breastfeeding persist. Research indicates that a link between maternal, infant, and future child health is

connected to breastfeeding practices. Therefore, low incidences of breastfeeding among African American women could have large health implications for this group. Factors that may explain differences in breastfeeding among African American and women of other racial and ethnic groups include: "political economic factors that lead to health disparity and poverty; marketing by infant formula companies, including free formula samples provided to women in hospitals; hospital policies and health provider practices; community and environmental factors that support or discourage breastfeeding; and the role of family, kin and knowledge and beliefs" (Bentley et al. 2003). While the WIC program does have the potential to address some of these factors via education, counseling, and increased access to breastfeeding aids, it is possible that both structural changes in the overall healthcare system as well as attitude shifts among African American women, families, and communities may be needed to address racial differences in breastfeeding. Outside studies cite the potential healthcare cost savings that could be achieved if breastfeeding initiation and duration rates increased (Phillipp and Jean-Marie 2007). Therefore, increasing the promotion of breastfeeding for all women, with a particular focus on African American women may result in long-term healthcare savings for the nation as a whole.

APPENDIX TABLES

Table A: Summary of Hierarchical Linear Probability Regression Analysis for Variables Predicting Breastfeeding Initiation (N = 4400^a)

Variable	Model 1				Model 2			
	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>P > t </i>	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>P > t </i>
<u>Mother's Race</u> ¹								
Black	-.082**	.026	-3.23	0.002	(dropped)			
Hispanic	.136**	.029	4.74	0.000	.200**	.068	2.94	0.004
Asian	-.070	.042	-1.67	0.098	-.016	.091	-0.17	0.863
Other Race	-.046	.054	-0.85	0.395	-.280	.149	-1.87	0.065
On WIC	-.011	.020	-0.58	0.561	-.003	.034	-0.11	0.911
Fulltime Employment	-.012	.022	-0.52	0.602	-.013	.023	-0.57	0.568
Non-Primary Caregiver	-.044*	.020	-2.16	0.033	-.044*	.020	-2.15	0.034
Income < Poverty Line	.004	.020	0.18	0.860	.004	.020	0.20	0.840

Adequate Prenatal Care	.057**	.017	3.25	0.002	.058**	.017	3.33	0.001
<u>Education²</u>								
High School Graduate	.057**	.022	2.66	0.009	.057**	.021	2.65	0.010
Some College	.179**	.023	7.88	0.000	.177**	.023	7.83	0.000
Bachelor's Degree or Higher	.218**	.061	3.55	0.001	.215**	.061	3.51	0.001
Married	.054**	.018	2.99	0.004	.056**	.018	3.07	0.003
Foreign Birth Status	.208**	.032	6.46	0.000	.208**	.032	6.45	0.000
Received breastfeeding advice	-.008	.033	-0.25	0.803	-.006	.033	-0.19	0.846
Low Birth-Weight Infant	-.052*	.021	-2.49	0.015	-.051*	.021	-2.49	0.015
<u>Mother's Age³</u>								
21-25	.022	.022	1.00	0.318	.023	.022	1.03	0.304
26-30	.019	.029	0.65	0.519	.020	.029	0.69	0.492
30-35	-.028	.033	3.55	0.406	-.031	.033	-0.95	0.345
35+	.062	.043	2.99	0.154	.063	.043	1.46	0.149

<u>Number of Live Births⁴</u>								
1	-.038	.023	-1.62	0.108	-.039	.023	-1.68	0.097
2	-.050	.026	-1.92	0.058	-.052	.026	-1.99	0.050
3+	-.032	.032	-1.00	0.321	-.036	.032	-1.10	0.272
Black x On WIC					.085	.060	0.32	0.749
Hispanic x On WIC					-.297	.056	-0.97	0.303
Asian x On WIC					-.207	.072	-0.60	0.544
Other Race x On WIC					.853	.116	-0.57	0.100
R^2		.1286				.1299		
$F(23,66)$		20.33**				.		

Table B: Summary of Hierarchical Logistic Regression Analysis for Variables Predicting Breastfeeding Initiation (N=4400^a)

Variable	Model 3				Model 4			
	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>P > t </i>	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>P > t </i>
<u>Mother's Race¹</u>								
Black	-.344**	.112	-3.05	0.003	-.440	.313	-1.41	0.163
Hispanic	.625**	.132	4.72	0.000	.971**	.342	2.84	0.006
Asian	-.418	.217	-1.92	0.058	-.159	.438	-0.36	0.718
Other Race	-.185	.229	-0.81	0.421	-1.193	.653	-1.83	0.071
On WIC	-.057	.093	-0.61	0.541	-.027	.149	-0.18	0.857
Fulltime Employment	-.066	.104	-0.63	0.528	-.072	.105	-0.68	0.496
Non-Primary Caregiver	-.202*	.093	-2.16	0.034	-.203**	.094	-2.16	0.034
Income < Poverty Line	.019	.095	0.20	0.841	.022	.095	0.23	0.821
Adequate Prenatal Care	.269**	.083	3.23	0.002	.275**	.083	3.29	0.001
<u>Education²</u>								

High School Graduate	.272**	.100	2.72	0.008	.271**	.100	2.71	0.008
Some College	.813**	.106	7.65	0.000	.806**	.106	7.59	0.000
Bachelor's Degree or Higher	1.087**	.379	2.87	0.005	1.076**	.379	2.84	0.006
Married	.248**	.086	2.89	0.005	.259**	.087	2.98	0.004
Foreign Birth Status	.1050**	.178	5.91	0.000	1.054**	.179	5.90	0.000
Received Breastfeeding Advice	-.041	.153	-0.27	0.791	-.032	.152	-0.21	0.834
Low Birth-Weight Infant	-.234*	.095	-2.48	0.015	-.233*	.094	-2.47	0.015
<u>Mother's Age³</u>								
21-25	.097	.101	0.96	0.341	.099	.101	0.98	0.332
26-30	.089	.136	0.66	0.514	.093	.135	0.69	0.493
30-35	-.150	.155	-0.97	0.334	-.171	.155	-1.10	0.273
35+	.304	.215	1.41	0.162	.308	.217	1.42	0.159
<u>Number of Live Births⁴</u>								
1	-.176	.111	-1.59	0.115	-.185	.112	-1.65	0.103

2	-.239	.124	-1.92	0.057	-.248	.125	-1.98	0.051
3+	-.152	.154	-0.98	0.328	-.168	.155	-1.08	0.283
Black x On WIC					-.085	.265	.32	0.749
Hispanic x On WIC					-.297	.287	-1.04	0.303
Asian x On WIC					-.207	.340	-0.61	0.544
Other Race x On WIC					.852	.513	1.66	.100
<i>F</i> (23,66); (27,62)		13.05**				10.48**		
<i>Prob > F</i>		0.00				0.00		

Table C: Summary of Tobit Regression Analysis for Variables Predicting Breastfeeding Duration (N=4300^a)

Model 5				
Variable	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>P > t </i>
<u>Mother's Race</u> ¹				
Black	-1.156**	.343	-3.37	0.001
Hispanic	1.434**	.368	3.91	0.000
Asian	-1.889**	.607	-3.11	0.002
Other Race	-.443	.726	-0.61	0.543
On WIC	-.323	-.333	-0.97	0.335
Fulltime Employment	-.286	.348	-0.82	0.414
Non-Primary Caregiver	-1.121**	-.316	-3.55	0.001
Income < Poverty Line	-.032	.311	0.10	0.917
Adequate Prenatal Care	.687*	.269	2.55	0.012

<u>Education²</u>				
High School Graduate	.527	.325	1.62	0.108
Some College	2.221**	.401	5.54	0.000
Bachelor's Degree or Higher	2.930**	.881	3.33	0.001
Married	1.312**	.322	4.07	0.000
Foreign Birth Status	3.954**	.430	9.20	0.000
Received breastfeeding advice	-.344	.478	-0.72	0.473
Low Birth-Weight Infant	-1.316**	.274	-4.80	0.000
<u>Mother's Age³</u>				
21-25	.732*	.313	2.34	0.021
26-30	.603	.603	1.45	0.151
30-35	-.448	.448	0.78	0.440
35+	1.156*	.540	2.14	0.035

<u>Number of Live Births⁴</u>				
1	-.588	.343	-1.71	0.090
2	-.170	.387	-0.44	0.661
3+	-.082	.513	-0.16	0.873
<i>F (23, 66)</i>	18.14			
<i>Prob > F</i>	0.00			

Notes:

a - All sample size values listed within this report have been rounded to the nearest 50, per disclosure requirements of the National Center for Education Statistics.

1 – Excluded Racial Category = White

2 – Excluded Education Category = Less than High School Degree

3 – Excluded Age Category = Less than 21 years old

4 – Excluded Number of Live Births Category = 0

* Significant at the 5% Level

** Significant at the 1% Level

REFERENCES

- Alexander, JM; et al. (Apr 1992). "Randomized controlled trial of breast shells and Hoffman's exercises for inverted and non-protractile nipples,". *British Medical Journal*. 304 (6833): 1030–2.
- Beal, A.C., Kuhlthau, K., & Perrin, J.M. (2003). Breastfeeding Advice Given to African American and White Women by Physicians and WIC Counselors. *Public Health Reports*, 118, 368-376.
- Bentley, M.E., Dee, D.L., & Jensen, J.L. (2003). Breastfeeding among low income African-American women: power, beliefs and decision making. *The Journal of Nutrition*, 305-309.
- Chatterji, P., & Brooks-Gunn, J. (2004). WIC participation, breastfeeding practices, and well-child care among unmarried, low-income mothers. *American Journal of Public Health*, 94(8), 1324-1327.
- Dennis, C., & McQueen, K. (2009). The Relationship between infant-feeding outcomes and postpartum depression: a qualitative systematic review. *Pediatrics*, 123(4), E736-E751.
- Division of Nutrition and Physical Activity: Research to Practice Series No. 4. (2007). Does breastfeeding reduce the risk of pediatric overweight? *Centers for Disease Control and Prevention*.
- Food and Nutrition Service, (2010, August 05). *Benefits & Services: Breastfeeding Promotion and Support in WIC*. Retrieved from <http://www.fns.usda.gov/wic/Breastfeeding/breastfeedingmainpage.HTM>
- Food and Nutrition Service, (2010, March 08). *About WIC: WIC at a Glance*. Retrieved from <http://www.fns.usda.gov/wic/aboutwic/wicataglance.htm>
- Food and Nutrition Service, (2006, April). *WIC Participant & Program Characteristics: Summary*. Retrieved from <http://www.fns.usda.gov/ora/menu/Published/WIC/FILES/PC2006Summary.pdf>
- Freeman, K., Bonuck, K.A., & Trombley, M. (2008). Breastfeeding and infant illness in low-income, minority women: a prospective cohort study of the dose-response relationship. *Journal of Human Lactation*, 24(1), 14-22.
- Gibson-Davis, C.M., & Brooks-Gunn, J. (2006). Couples' immigration status and ethnicity as determinants of breastfeeding. *American Journal of Public Health*, 96(4), 641-646.
- Gibson-Davis, C.M., & Brooks-Gunn, J. (2007). The Association of couples' relationship status and quality with breastfeeding initiation. *Journal of Marriage and Family*, 69(5), 1107-1117.
- Gill, S.L. (2009). Breastfeeding by Hispanic Women. *Journal of Obstetric Gynecologic and Neonatal Nursing*, 38(2), 244-252.
- Hurley, K.M., Black, M.M., Papas, M.A., & Quigg, A.M. (2008). Variation in breastfeeding behaviors, perceptions, and experiences by race/ethnicity among a low-income statewide sample of special supplemental nutrition program for women, infants, and children (WIC) participants in the United States. *Maternal and Child Nutrition*, 4, 95-105.
- Jackowitz, A., Novillo, D., & Tiehen, L. (2007). Special supplemental nutrition program for women, infants, and children and infant feeding practices. *Pediatrics*, 119(2), 281-289.
- Kent, G. (2006). WIC's promotion of infant formula in the United States. *International Breastfeeding Journal*, 1(8)
- Kirsten, G.F. (2009). Does Breastfeeding prevent atopic disorders? *Current Allergy & Clinical Immunology*, 22(1), 24-26.
- Kotelchuck, M. (1994). Overview of adequacy of prenatal care utilization index. *Department of Maternal and Child Health: The University of North Carolina at Chapel Hill*

- L.A. Health. (2004). *L.A. Health Breastfeeding Practices*. Los Angeles, CA: County of Los Angeles Department of Health Services.
- McCann, M.F., Baydar, N., & Williams, R.L. (2007). Breastfeeding attitudes and reported problems in a national sample of WIC participants. *Journal of Human Lactation*, 23(4), 314-324.
- Mickens, A.D., Modeste, N., Montgomery, S., & Taylor, M. (2009). Peer support and breastfeeding intentions among black WIC participants. *Journal of Human Lactation*, 25(2), 157-162.
- Mosby. (2008). Breast Pump. (2008). *Mosby's Medical Dictionary*. Elsevier.
- Ogbuanu, C.A., Probst, J., Laditka, S.B., Liu, J., & Baek, J., Glover, S. (2009). Reasons why women do not initiate breastfeeding: a southeastern state study. *Women's Health Issues*, 19, 268-278.
- Philipp, B.L., & Sheina, J. (2007). African-American women and breastfeeding. *Joint Center for Political and Economic Studies Health Policy Institute*, 1-26.
- Ryan, A.S., & Zhou, W. (2006). Lower breastfeeding rates persist among the special supplemental nutrition program for women, infants, and children participants, 1978-2003. *Pediatrics*, 117(4), 1137-1146.
- Singh, G.K., Kogan, M.D., & Dee, D.L. (2007). Nativity/immigrant status, race/ethnicity, and socioeconomic determinants of breastfeeding initiation and duration in the United States, 2003. *Pediatrics*, 119, S38-S46.
- Spaulding, D.M. (2004). The Importance of breastfeeding in improving the health of African-Americans: a health policy perspective. *The Journal of Multicultural Nursing & Health*, 10(3), 24-27.
- Swann, C.A. (2007). The Timing of prenatal WIC participation. *The B.E. Journal of Economic Analysis & Policy*, 7(1), 1-25.
- U.S. Department of Health and Human Services, Office on Women's Health. (2000). *HHS Blueprint for Action on Breastfeeding*.



DIANNA WILLIAMS

Graduated from Swarthmore College in 2010. Ms. Williams is a member of the 2009 class of the UI Summer Academy.

RESEARCH MENTORS

GENEVIEVE KENNEY

Dr. Kenney is a Senior Fellow in UI's Health Policy Center.

MARLA MCDANIEL

Ms. McDaniel is a Research Associate in UI's Center on Labor, Human Services, and Population.

ARIEL KLEIN

Ms. Klein is a Research Associate in UI's Health Policy Center.

IRENE HEADEN

Ms. Headen was formerly a Research Assistant in the Urban Institute's Health Policy Center.

The Summer Academy is an initiative of the **Urban Institute** created to address the underrepresentation of minorities and persons from distressed communities in public policy research. It is an intensive eight-week program of technical skills training and career exposure targeted to promising college juniors. The program takes place on location at the Urban Institute in Washington, D.C. For more information, go to <http://summeracademy.urban.org>.



The Urban Institute

GATHERS data,
CONDUCTS research,
EVALUATES programs,
OFFERS technical ASSISTANCE
 overseas, and
EDUCATES Americans on social
 and economic issues
 — to foster sound public policy
 and effective government.

2100 M Street NW
 Washington, DC 20037
www.urban.org

The UI Summer Academy is supported by a generous grant from the Ford Foundation.