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Megha Patel

Wright State University - Main Campus, patel.951@wright.edu

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# Sociodemographic Differences in Breastfeeding Rates for Children Born between 2010-2015

Megha Patel

Jeannette Manger, PhD and Amber Todd, PhD, Department of Medical Education

Public Health, Population Health and Global Health

Scholarship in Medicine Proposal

**By checking this box, I indicate that my mentor has read and reviewed my draft proposal prior to submission**

## **Abstract**

Breastfeeding is a natural component of life and has proven to provide benefits to both the mother and the child. The mother's mental health as well as physical health including losing pregnancy weight are influenced by breastfeeding. The child receives immune system strengthening leaving them less susceptible to certain diseases in the short term and later in life. There are a variety of factors that have the potential to influence breastfeeding rates. In this study, seven of these factors were examined including sex of the baby, race of the baby, maternal education, poverty income ratio, marital status of the mother, birth order of the baby, and Women, Infants, & Children (WIC) assistance status. Each of these factors was considered for rates of breastfeeding for any length of time, breastfeeding nonexclusively until 6 months, and exclusively breastfeeding until 6 months. The goal of this study is to determine how each of the 7 factors mentioned above influence the breastfeeding rates in the three categories, ever breastfed,

breastfed at 6 months, exclusively breastfed at 6 months. The data were obtained from a publicly available data set from the CDC breastfeeding website. The data was collected via phone surveys and was compiled according to year of birth of the child. Analysis of the data included ANOVA tests. Results indicate there are significant differences in breastfeeding rates in all three categories (breastfeeding for any length of time, breastfeeding nonexclusively until 6 months, and breastfeeding exclusively until 6 months) in relation to race, maternal education, poverty income ratio, maternal marital status, and WIC assistance status. Sex of the baby and birth order of the baby show no significant differences in breastfeeding rates in any of the three categories.

Key Words: breastfeeding rates, race, poverty income ratio, maternal education, WIC assistance status

## Introduction/Literature Review

Breastfeeding is a natural method that a mother can utilize to provide her baby with the required nutrition for growth and development. Beyond the pure nutritional benefits, the benefits to both the mother and child are tremendous. Importantly, it provides a time for the mother and child to develop a special bond with one another.

In a review of the psychological effects of breastfeeding, evidence was provided to show breastfeeding during infancy impacted cognitive abilities into adulthood. This study controlled for confounding variables including education level of the mother, employment status of the mother, and birth factors such as the method of delivery and infant birth weight. Additionally, it has been shown that the duration of breastfeeding increases the timing of myelination, whole-brain volume, cortical thickness, and white matter volume. Furthermore, there is shown to be a negative correlation between the duration of breastfeeding and antisocial and aggressive behavior in children.<sup>1</sup>

In addition to the psychological benefits provided to the child through breastfeeding, there are also many physical benefits that are both short term and long term. The child's immune system is boosted through the passage of maternal immunity in the breastmilk that is irreplaceable. This immune system boosting has been thought to protect the child against development of asthma and other allergic conditions.<sup>2</sup> Children with longer durations of breastfeeding have decreased rates of lower respiratory infections, acute otitis media, and obesity.<sup>3</sup>

The benefits are not only limited to the child, but also extend to the breastfeeding mother. Breastfeeding has been related to improved maternal mental health postpartum, and breastfeeding mothers indicated reductions in anxiety, negative mood, and stress in comparison

to mothers using formula feeding.<sup>1</sup> Additionally, the mother experiences the physical health benefits of losing pregnancy weight more efficiently. Mothers reported that weight loss, regaining pre-pregnancy body shape, having good skin, good hair, and hormone regulation were the positive consequences of breastfeeding.<sup>4</sup> Breastfeeding has also been shown to prolong lactational amenorrhea, especially if the mother is exclusively breastfeeding.<sup>3</sup> This prolongation is beneficial in aiding in birth spacing of children. Also, breastfeeding as a protective factor against breast cancer has been shown for mothers that breastfeed.<sup>3</sup>

Breastfeeding duration is shorter in countries with high-income when compared to countries that have limited resources and are low-income.<sup>3</sup> This study mentions between-country differences, but it does not address within-country differences in breastfeeding rates according to income. The current study aims to fill this void through examining differences in breastfeeding rates according to poverty income ratio in the United States.

Considering the benefits that breastfeeding provides, many factors may influence the current rates and exclusivity of breastfeeding in the United States. There may be certain sociodemographic factors that may contribute to the different rates of breastfeeding. Family history of breastfeeding as well as race were found to be associated with differences in breastfeeding rates. Spanish-speaking Hispanic mothers had a greater breastfeeding initiation rate than white mothers as the Hispanic mothers had a greater maternal family history of breastfeeding. Black mothers had lower rates of breastfeeding compared to white mothers.<sup>5</sup> However, these results were found from data collected from 2008- 2010, and the current study will provide more current results for children born from 2010-2015. It is important to identify these factors in order for awareness to be brought to these factors in order to appropriately target improving disparities associated with breastfeeding rates. The factors that will be examined in

this study include sex of the baby, race of the baby, maternal education, poverty income ratio of the mother, marital status of the mother, birth order of the baby, and Women, Infants, & Children (WIC) assistance status.

### **Hypothesis/Specific Aims/Research Questions**

- RQ1: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and sex of the baby?
- RQ2: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and race/ethnicity of the baby?
- RQ3: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and maternal education?
- RQ4: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and poverty income ratio of the mother?
- RQ5: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and maternal marital status?
- RQ6: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and birth order of the baby?

- RQ7: For children born during the years 2010-2015, what is the relationship between breastfeeding rates (ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months) and WIC assistance?

## Methods

### *Context/Protocol*

The Centers for Disease Control and Prevention's (CDC) National Center for Immunizations and Respiratory Diseases (NCIRD) conducts the National Immunization Survey (NIS) through random-digit dialing to survey households with children and teens. Households with children from 19-35 months are asked about breastfeeding. The landline response rates from 2001-2017 were between 51.9% and 76.9% and cellphone rates from 2011-2018 were between 24.6% and 33.5%. In total, the number of households that completed the survey were between 20,000-26,000 for the time period of interest in this study. In 2018, the sampling frame was only cell phone sample and prior to 2011 was only landline sample. The data was collected via random-digit dialing phone surveys issued via both landline and cellphone. A set of questions were asked regarding breastfeeding. These questions included:

- Was (child) ever breastfed or fed breast milk?
- How old was (child's name) when (child's name) completely stopped breastfeeding or being fed breast milk?
- How old was (child's name) when (he/she) was first fed formula?
- This next question is about the first thing that (child) was given other than breast milk or formula. Please include juice, cow's milk, sugar water, baby food, or

anything else that (child) may have been given, even water. How old was (child's name) when (he/she) was first fed anything other than breast milk or formula?

Exclusive breastfeeding is defined as ONLY breast milk and the last two questions are used to estimate this value. Ever breastfed is estimated by the first question. Breastfeeding duration is estimated by the second question. Additionally, questions regarding race/ethnicity, maternal education, maternal age, poverty income ratio, marital status, birth order, and WIC assistance were also included. Data was fit into the categories of every breastfed, breastfed at 6 months, breastfed at 12 months, exclusively breastfed through 3 months, and exclusively breastfed through 6 months. Breastfeeding rates correspond to the year of birth and the rates are collected via the NIS survey for the two years following the birth year to report a final rate. The data was compiled by the original surveyors and statistically analyzed to report a total breastfeeding rate according to birth year for each variable and category.

#### *Data Collection*

All data used was from publicly available data via the CDC breastfeeding website. The data utilized in this study was for children born between the years of 2010-2015. The data was available as a national rates for each year, and within each year it was divided by various sociodemographic variables. Each of the variables, then had rates reports for categories of various lengths of breastfeeding, including the ones of interest in this study, any breastfeeding, exclusively breastfed at 6 months, and nonexclusively breastfed at 6 months. The CDC website had data available for 2009-2016, but 2009 and 2016 were both excluded. The reason for excluding these years is because for the 2009 data, methods changed for the way the breastfeeding rates were reported and changes were made that went into effect beginning in 2010. The endpoint of 2015 was chosen because the 2016 data set included information from



2018 surveys which were only single sampling via cell phones so they would not be able to be compared to the dual sampling (landline and cell phone) years accurately. The surveys collected more information than the information of interest for this project. The breastfeeding rates used for this project were only those reported for breastfeeding for any length of time, breastfeeding in any quantity nonexclusively until 6 months, and breastfeeding exclusively until 6 months. The sociodemographic variables examined included the seven that were consistently reported for each of the birth years, 2010-2015, that were of interest. These seven variables included sex of the baby, race, maternal education, poverty income ratio, marital status of the mother, birth order of the baby, and Women, Infants, & Children (WIC) assistance status.

### *Data Analysis*

For RQ1-RQ7, one-way ANOVAs with appropriate Bonferroni post-hoc tests were performed to relate each sociodemographic factor to the three categories of breastfeeding rates: breastfeeding for any length of time, breastfeeding in any quantity until 6 months, and breastfeeding exclusively until 6 months. An ANOVA was possible for each of the sociodemographic factors as they were divided into categories including poverty income ratio, which was reported in numerical categories: less than 100, 100-200, etc. For example, to address RQ2 regarding race/ethnicity, 3 separate ANOVA tests were conducted, one for breastfeeding for any length of time (ever breastfed), one for breastfeeding in any quantity for 6 months (breastfed for 6 months), and one for breastfeeding in exclusively until 6 months (exclusively breastfed for 6 months). Within each ANOVA the different race categories were compared to determine the influence of race on the rate of breastfeeding within each length of breastfeeding. Then, the differences within each of the 3 categories of length of breastfeeding were compared to one another to determine how the influence of race differed with length/exclusivity of

breastfeeding. The process was repeated for each of the seven sociodemographic factors to examine the differences in rates of breastfeeding for each sociodemographic factor as well as the differences in length/exclusivity of breastfeeding in relation to that factor.

## Results

For all seven of the research questions, one-way between subjects analysis of variances (ANOVAs) were conducted to determine the differences in rates of ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months. The seven variables examined in the seven research questions were sex of the baby, race/ethnicity, maternal education, poverty income ratio, maternal marital status, birth order of the baby, and WIC assistance.

The results of the analysis for differences in breastfeeding rates according to sex of the baby yielded no significant differences in breastfeeding rates in the three categories: ever breastfed ( $F_{1,10} = .01, p = .92$ ), breastfed at 6 months ( $F_{1,10} = .19, p = .67$ ), and exclusively breastfed at 6 months ( $F_{1,10} = .80, p = .39$ ).

Analysis conducted for race/ethnicity showed differences in all three categories of breastfeeding rates: ever breastfed ( $F_{6,35} = 22.20, p < .001$ ), breastfed at 6 months ( $F_{6,35} = 9.97, p < .001$ ), and exclusively breastfed at 6 months ( $F_{6,35} = 3.58, p = .007$ ). The results for differences in rate of ever breastfed according to race are shown in Table 1. For ever breastfed, the rates of breastfeeding in Non-Hispanic Black were statistically significantly lower than all of the other race/ethnicity categories. Additionally, the rates for both Hispanic and Non-Hispanic White were statistically significantly greater than those for Non-Hispanic American Indian/Alaska Native. Non-Hispanic Asian rates for ever breastfed were greater than and statistically different from those for both Non-Hispanic American Indian/Alaska Native and 2 or

more races. Table 2 displays the results for the differences in rates of breastfeeding at 6 months according to race. Non-Hispanic Asian breastfeeding rates for breastfed at 6 months were significantly greater than those for Hispanic, Non-Hispanic Black, Non-Hispanic/Pacific Islander, Non-Hispanic American Indian/Alaska Native, and 2 or more races. Also, Non-Hispanic White breastfed at 6 months rates were statistically greater than those for both Non-Hispanic American Indian/Alaska Native and Non-Hispanic Black. Table 3 shows the rates of exclusive breastfeeding at 6 months and the differences among the races. The rates for exclusive breastfeeding at 6 months for Non-Hispanic Black were significantly lower compared to rates for the categories of Non-Hispanic White and Non-Hispanic Asian.

**Table 1:** Rates of Ever Breastfed According to Race

	<b>Mean</b>	<b>Std. Deviation</b>
Hispanic <sup>a,b</sup>	82.98	2.02
Non-Hispanic White <sup>a,b</sup>	83.12	2.81
Non-Hispanic Black <sup>b,c,d,e</sup>	65.83	2.91
Non-Hispanic Asian <sup>d,e</sup>	84.67	4.47
Non-Hispanic Hawaiian/Pacific Islander	79.72	3.90
Non-Hispanic American Indian/Alaska Native	74.58	4.07
2 or more races	77.98	2.97

a: rate of breastfeeding is statistically different from rate for Non-Hispanic Black

b: rate of breastfeeding is statistically different from rate for Non-Hispanic American Indian/Alaska Native

c: rate of breastfeeding is statistically different from rate for Non-Hispanic Asian

d: rate of breastfeeding is statistically different from rate for Non-Hispanic Hawaiian/Pacific Islander

e: rate of breastfeeding is statistically different from rate for 2 or more races

level of significance:  $p < .05$

**Table 2:** Rates of Breastfed at 6 Months According to Race

	<b>Mean</b>	<b>Std. Deviation</b>
Hispanic <sup>a</sup>	50.10	3.13
Non-Hispanic White <sup>b,c</sup>	56.22	4.77
Non-Hispanic Black <sup>a</sup>	38.62	3.90
Non-Hispanic Asian <sup>c,d,e</sup>	65.92	4.87
Non-Hispanic Hawaiian/Pacific Islander	50.70	11.89
Non-Hispanic American Indian/Alaska Native	43.30	9.79
2 or more races	49.93	4.09

a: rate of breastfeeding is statistically different from rate for Non-Hispanic Asian

b: rate of breastfeeding is statistically different from rate for Non-Hispanic Black

c: rate of breastfeeding is statistically different from rate for Non-Hispanic American Indian/Alaska Native

d: rate of breastfeeding is statistically different from rate for Non-Hispanic Hawaiian/Pacific Islander

e: rate of breastfeeding is statistically different from rate for 2 or more races

level of significance:  $p < .05$

**Table 3:** Rates of Exclusively Breastfed at 6 Months According to Race

	<b>Mean</b>	<b>Std. Deviation</b>
Hispanic	19.98	2.73
Non-Hispanic White <sup>a</sup>	24.55	4.40
Non-Hispanic Black <sup>b</sup>	14.60	1.43
Non-Hispanic Asian	25.03	4.55
Non-Hispanic Hawaiian/Pacific Islander	20.00	8.77
Non-Hispanic American Indian/Alaska Native	17.35	5.37
2 or more races	20.35	2.24

a: rate of breastfeeding is statistically different from rate for Non-Hispanic Black

b: rate of breastfeeding is statistically different from rate for Non-Hispanic Asian

level of significance:  $p < .05$

Results according to levels of maternal education showed differences in breastfeeding rates in all three categories: ever breastfed ( $F_{3,20} = 111.65, p = <.001$ ), breastfed at 6 months ( $F_{3,20} = 91.74, p = <.001$ ), and breastfed exclusively at 6 months ( $F_{3,20} = 23.36, p = <.001$ ). For rates of ever breastfed, less than high school and high school graduate breastfeeding rates were both significantly different from and lower than those for both some college or technical school and college graduate. Some college or technical school breastfeeding rates were significantly different from and lower than college graduate rates. This same pattern was observed for rates of breastfed at 6 months and maternal education. The pattern was slightly different for rates of exclusively breastfed at 6 months where rates for less than high school, high school graduate, and some college or technical school were all statistically significantly different from and lower than rates for college graduate.

Breastfeeding rates according to poverty income ratio showed differences in all three categories: ever breastfed ( $F_{4,24} = 79.53, p = <.001$ ) (Table 4), breastfed at 6 months ( $F_{4,24} = 71.10, p = <.001$ ) (Table 5), and exclusively breastfed at 6 months ( $F_{4,24} = 13.38, p = <.001$ ) (Table 6) after data analysis. For ever breastfed rates, those with a poverty income ratio of less than 100 had significantly lower rates when compared to any of the other poverty income ratio levels. Those with a 100-199 poverty income ratio had statistically lower rates than for poverty income ratios greater than 199. Also, the 200-399 poverty income ratio level ever breastfed rates were significantly lower than for those with poverty income ratios 600 or greater. The same differences for breastfed at 6 months were seen with the addition of those with 200-300 poverty income ratios having statistically significantly lower rates from both 400-599 and 600 or greater poverty income ratios as opposed to just the 600 or greater ratios as seen for the ever breastfed. For exclusively breastfed at 6 months, the rates for those with a poverty income ratio less than

100 were significantly lower than those with a ratio of 200 or greater. Also, those with a ratio of 600 or greater had rates of exclusively breastfed at 6 months that were statistically greater than those for people with a poverty income ratio between 100-199.

**Table 4 : Rates of Ever Breastfed According to Poverty Income Ratio**

	<b>Mean</b>	<b>Std Deviation</b>
Less than 100 <sup>a,b,c,d</sup>	71.72	2.28
100 – 199 <sup>b,c,d</sup>	79.18	2.57
200 – 399 <sup>d</sup>	85.60	1.54
400 – 599	89.18	2.44
600 or greater	90.88	1.36

a: rate of breastfeeding is statistically different from rate for 100-199

b: rate of breastfeeding is statistically different from rate for 200-399

c: rate of breastfeeding is statistically different from rate for 400-599

d: rate of breastfeeding is statistically different from rate for 600 or greater

level of significance:  $p < .05$

**Table 5: Rates of Breastfed at 6 months According to Poverty Income Ratio**

	<b>Mean</b>	<b>Std Deviation</b>
Less than 100 <sup>a,b,c,d</sup>	39.58	2.58
100 – 199 <sup>b,c,d</sup>	48.25	4.10
200 – 399 <sup>c,d</sup>	59.45	2.99
400 – 599	65.85	4.66
600 or greater	69.02	2.38

a: rate of breastfeeding is statistically different from rate for 100-199

b: rate of breastfeeding is statistically different from rate for 200-399

c: rate of breastfeeding is statistically different from rate for 400-599

d: rate of breastfeeding is statistically different from rate for 600 or greater

level of significance:  $p < .05$

**Table 6:** Rates of Exclusively Breastfed at 6 Months According to Poverty Income Ratio

	Mean	Std Deviation
Less than 100 <sup>a,b,c</sup>	15.30	1.38
100 – 199 <sup>b</sup>	20.95	3.42
200 – 399	25.75	4.26
400 – 599	27.88	4.18
600 or greater	27.18	3.42

a: rate of breastfeeding is statistically different from rate for 200-399  
 b: rate of breastfeeding is statistically different from rate for 400-599  
 c: rate of breastfeeding is statistically different from rate for 600 or greater  
 level of significance:  $p < .05$

Maternal marital status results for breastfeeding rates showed statistically different rates of breastfeeding in all three categories with married mothers breastfeeding at greater rates than unmarried mothers in regards to ever breastfed ( $F_{1,10} = 122.31, p = <.001$ ), breastfed at 6 months ( $F_{1,10} = 172.22, p = <.001$ ), and exclusively breastfed at 6 months ( $F_{1,10} = 48.32, p = <.001$ ).

Analysis of the rates of breastfeeding in the three categories of ever breastfed ( $F_{1,10} = 4.22, p = .07$ ), breastfed at 6 months ( $F_{1,10} = .49, p = .50$ ), and exclusively breastfed at 6 months ( $F_{1,10} = .15, p = .70$ ) showed no statistical difference in breastfeeding rates according to the birth order of the baby.

The breastfeeding rates for ever breastfed ( $F_{2,15} = 114.44, p = <.001$ ) and breastfed at 6 months ( $F_{2,15} = 119.46, p = <.001$ ) followed the same pattern when analyzed according to WIC assistance. The rates for those receiving WIC assistance were lower and statistically different from the rates for those either eligible for assistance but not receiving assistance and those that were ineligible. Also, the rates for those that were eligible but not receiving assistance were also

lower and statistically different from those that were ineligible. For rates of exclusively breastfed at 6 months ( $F_{2,15} = 39.63$ ,  $p = <.001$ ), those receiving WIC assistance had lower and significantly different rates from those that were eligible but not receiving WIC and those that were ineligible.

## **Discussion**

The first research question was interested in the relationship between sex of the baby and breastfeeding rates. In respect to ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months, the breastfeeding rates did not vary depending on if the baby was male or female. This result was expected as it would be unlikely for a mother's decision to breastfeed vary depending on the sex of the baby.

The relationship between race and breastfeeding was the concern of the second research question. There were several differences in breastfeeding rates depending on the baby's race. The most significant finding was that the breastfeeding rates of Non-Hispanic Blacks were the lowest in all three categories, and for ever breastfed were significantly lower than all of the other races. Since the results were most significant for ever breastfed this shows that Non-Hispanic Blacks were least likely to perform breastfeeding for any length of time. This result is consistent with a previous study that also found that black mothers had lower rates of initiation and duration of breastfeeding when compared to other races/ethnicities.<sup>5</sup> This study also indicated black mothers experience greater poverty, lower levels of education, and were less likely to be married than white women.<sup>5</sup> In this current study, these factors were examined and potentially confounding factors like lower poverty income ratios, lower levels of education, and being unmarried were all found to be associated with lower rates of breastfeeding. The breastfeeding rates for Non-Hispanic Asians were higher than all other races and significantly greater than at



least one other race in all three categories of ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months. In another study, it was found that Spanish-speaking Hispanic mothers had the greatest rates and longest duration of breastfeeding when compared to whites, blacks, and English-speaking Hispanic mother.<sup>5</sup> This previous study did not examine Non-Hispanic Asians and in the current study Hispanic rates were not found to be the highest. However, the reasoning provided for the higher rates and duration may translate to the Non-Hispanic Asian population. The explanation for the greater rates and longer duration may be due to cultural tradition that lends to breastfeeding being favored and preferred. The previous study also stated that maternal family history of breastfeeding could have explained the difference in breastfeeding rates between Hispanic mothers and Non-Hispanic mother.<sup>5</sup>

The third research question examined maternal education and its influence on breastfeeding rates. Ever breastfed and breastfed at 6 months rates increased as maternal education increased with those receiving some college or technical school and those that were college graduates breastfeeding more than those receiving a high school education or less than a high school education. Mothers that are more educated may have a greater knowledge of the benefits that breastfeeding provides to both the mother and the child and thus may be more inclined to breastfeed and stick with it for a longer period of time. Additionally, only the college graduate mothers had higher rates of breastfeeding exclusively at 6 months compared to mothers with lower levels of education. College educated mothers may be granted longer leaves from work compared to mothers with lower levels of education. A past study reported that a major influence on mothers terminating breastfeeding early was because these working mothers were discouraged to breastfeed due to not being provided a sanitary place or break time to pump their breastmilk.<sup>6</sup> The results in relation to maternal education of this current study seem to align with

those of the past study that found that high-income, better-educated women breastfed for longer than those that were low-income and less-educated.<sup>3</sup> This result may suggest a link between maternal education and poverty income ratio, which was examined in the next research question.

Poverty income ratio and breastfeeding was the topic in the fourth research question. The rates for ever breastfed and breastfed at 6 months followed roughly the same pattern in which the rates for breastfeeding increased as the poverty income ratio increased. For rates of exclusively breastfed at 6 months, the rates varied less, but once again those with poverty income ratio less than 100 had lower rates of breastfeeding compared to those with poverty income ratios greater than 200. This result is interesting when considering the cost of formula, the expectation would be that in order to save money mothers would be more inclined to breastfeed. However, the results are exactly the opposite. Past findings suggest inequalities in breastfeeding related to wealth and found that poorer people tend to breastfeed for longer than wealthier people.<sup>3</sup> However, another study, found that the analysis of breastfeeding rates and the federal poverty line failed to reach significance and that there was no statistical difference between low and high income mothers.<sup>7</sup> These varying results suggests the relationship between poverty income ratio and breastfeeding is poorly understood and merits further investigation. This past study looked at several countries, but when examining within each of the countries they found that poorer people breastfed for longer. There may be other factors associated with lower poverty income ratios that could explain the discrepancy in the results, such as the two previously mentioned factors of race and maternal education as well as many others.

The relationship between breastfeeding rates and maternal marital status was the topic of the fifth research questions. For all three categories ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months, the rates of breastfeeding for married mothers were greater

than those that were unmarried. The reasoning behind this difference may be due to married mothers having greater emotional support from a spouse in breastfeeding. Former study results affirmed that breastfeeding is physically and emotionally demanding for the mother and that they require support in breastfeeding as well as emotional support from others to avoid postpartum depression which may additionally contribute to the termination of breastfeeding.<sup>6</sup> Additionally, unmarried mothers may have circumstances that require them to work, and they may work somewhere that is not supportive of breastfeeding mothers. Another study found that those that were more likely to breastfeed exclusively were white, married, college graduates women aged 30-34.<sup>8</sup> The results of this study seem to align closely with the results of the present study.

In the sixth research question examining breastfeeding rates and birth order of the baby, there was found to be no differences in breastfeeding rates in any of the three categories of ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months. This result is interesting in that mothers that breastfed with their first born were likely to continue to breastfeed their subsequent children. In contrast, those that did not breastfeed their first born also did not breastfeed their other children. A Danish study supported the result of the present study and found that the duration of exclusively breastfeeding with the first child was positively correlated with the duration of exclusive breastfeeding of the second child.<sup>9</sup> This information is useful to know that breastfeeding rates may improve if first-time mothers are more supported and encouraged to be successful in their first attempts to breastfeed. Additionally, resources can be targeted to helping mothers that had not breastfed their previous children by helping them feel more supported or helping alleviate some of the barriers that may prevent them from breastfeeding.

The seventh research question concerned WIC assistance and breastfeeding rates. Those that were receiving WIC assistance had lower breastfeeding rates in all three categories, ever breastfed, breastfed at 6 months, and exclusively breastfed at 6 months, compared to those that were not receiving WIC assistance. These results corroborate those of a previous study that found that the rates of breastfeeding at 6 months were higher in those that were WIC ineligible compared to those receiving WIC.<sup>10</sup> WIC assistance does cover the cost of a specified quantity of formula that varies according to each case, which may make this option to those receiving WIC assistance more plausible than those that are not receiving the assistance. Also, it is interesting that those that were eligible, but not receiving WIC had lower rates in ever breastfed and breastfed at 6 months than those that were ineligible. Those mothers that are WIC eligible may be influenced by several of the factors mentioned in the six previous research questions, specifically a certain poverty income ratio that makes them eligible for WIC assistance. For those mothers that are eligible but not receiving WIC, other life circumstances may prevent them from breastfeeding such as working as mentioned above. Additionally, for those that are ineligible they may fall into higher poverty income ratios which in research question four was shown to be associated with greater rates of breastfeeding. An alternative may be that mothers that are ineligible may still not be able to afford formula and have to breastfeed, which could also explain the higher rates of breastfeeding for those mothers that were WIC ineligible.

### **Limitation and Future Directions**

This study has several limitations that may impact the generalizability of these results. First, the survey was conducted via phone through random-digit dialing. This sampling method may have provided a sample of those only with phones and clear data was not collected to represent those without phones which may influence categories just at poverty income ratio. Second, the

data was available as averages for each year as the publicly available data set. It was not clear if any of the sampling points were excluded from these averages. Third, the total number of people surveyed was not made clear in the publicly available data set, making it difficult to determine the generalizability of these results. Fourth, without the individual data points no correlations could be made between the variables, but only within the variables in terms of duration and rates of breastfeeding. Future studies should repeat the variables examined in this study with a larger population size and different form of issuing the surveys besides via phone or a method to include the population without a phone. Another potential direction for study would be to examine the relationships between the variables in terms of duration and overall rate of breastfeeding, particularly the relationships between race, maternal education, poverty income ratio, and marital status.

## **Conclusion**

The study showed that there is a difference in breastfeeding rates and in the duration of breastfeeding according to several sociodemographic variables specifically, race, maternal education, poverty income ratio, marital status, and WIC assistance status. The results of this study have identified potential sociodemographic factors that can be targeted to improve breastfeeding rates and eliminate disparities. Breastfeeding has impacts on both the baby and the mother. It helps establish a bond and provides nourishment for the child that is shown to boost the immune system against diseases later in life. Also, both mother and child have added psychological benefits. The benefits provided from breastfeeding cannot be mimicked by formula feeding. This study provides areas to target in order to eliminate the disparities that currently exist in breastfeeding rates to ensure that more children and mothers are offered the benefits associated with breastfeeding.



## References

1. Krol KM, Grossmann T. Psychological effects of breastfeeding on children and mothers. *Bundesgesundheitsblatt - Gesundheitsforsch - Gesundheitsschutz*. 2018;61(8):977-985. doi:10.1007/s00103-018-2769-0
2. Ahmadizar F, Vijverberg SJH, Arets HGM, et al. Breastfeeding is associated with a decreased risk of childhood asthma exacerbations later in life. *Pediatr Allergy Immunol*. 2017;28(7):649-654. doi:10.1111/pai.12760
3. Victora CG, Bahl R, Barros AJD, et al. Breastfeeding in the 21st century: Epidemiology, mechanisms, and lifelong effect. *Lancet*. 2016;387(10017):475-490. doi:10.1016/S0140-6736(15)01024-7
4. Body Shape and Weight Loss as Motivators for Breastfeeding Initiation and Continuation. *Int J Environ Res Public Health*. 2017;14(7):754. doi:10.3390/ijerph14070754
5. McKinney CO, Hahn-Holbrook J, Chase-Lansdale PL, et al. Racial and ethnic differences in breastfeeding. *Pediatrics*. 2016;138(2). doi:10.1542/peds.2015-2388
6. Gianni ML, Bettinelli ME, Manfra P, et al. Breastfeeding difficulties and risk for early breastfeeding cessation. *Nutrients*. 2019;11(10). doi:10.3390/nu11102266
7. Wiener RC, Sambamoorthi U, Hayes SE, Chertok IRA. Association of Breastfeeding and the Federal Poverty Level: National Survey of Family Growth, 2011–2013. *Epidemiol Res Int*. 2016;2016:1-7. doi:10.1155/2016/9783704
8. Pitonyak JS, Jessop AB, Pontiggia L, Crivelli-Kovach A. Life Course Factors Associated with Initiation and Continuation of Exclusive Breastfeeding. *Matern Child Health J*.

2016;20(2):240-249. doi:10.1007/s10995-015-1823-x

9. Kronborg H, Foverskov E, Væth M, Maimburg RD. The role of intention and self-efficacy on the association between breastfeeding of first and second child, a Danish cohort study. *BMC Pregnancy Childbirth*. 2018;18(1):454. doi:10.1186/s12884-018-2086-5
10. Li K, Wen M, Reynolds M, Zhang Q. WIC participation and breastfeeding after the 2009 WIC revision: A propensity score approach. *Int J Environ Res Public Health*. 2019;16(15). doi:10.3390/ijerph16152645