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Maternal Variables Influencing Duration of Breastfeeding Among Low-Income Mothers

Anne Chevalier McKechnie, RN, IBCLC, RLC, Audrey Tluczek, PhD, RN, and Jeffrey B. Henriques, PhD

Abstract: This study used a retrospective comparison of 2 naturally occurring groups, first to examine how exclusive versus partial breastfeeding relates to duration of breastfeeding and, second, to determine if factors such as age and body mass index are associated with exclusive versus partial breastfeeding duration. These factors were hypothesized to influence the amount of breastfeeding in a sample of 42 low-income mothers enrolled in the Supplemental Nutrition Program for Women, Infants, and Children of a predominately rural, Midwestern county. This study examined de-identified data from a state database spanning a calendar year. Breastfeeding behavior, age, and body mass index measurements for mothers giving birth within the first 6 months of that year were analyzed. Exclusive breastfeeding mothers breastfed longer, were of older age, and had lower body mass indexes than partial breastfeeding mothers. These findings further describe characteristics of low-income breastfeeding women. Understanding how factors associated with exclusive versus partial breastfeeding affect breastfeeding duration may inform clinicians and researchers of areas for future interventions.

Keywords: exclusive breastfeeding; partial breastfeeding; low income; WIC; BMI

The link between breastfeeding and positive health outcomes for infants and their mothers is well documented. The American Academy of Pediatrics recommends exclusive breastfeeding during the infant’s first 6 months of life and continued breastfeeding as other foods are introduced for at least the first year of life to provide protection against illness and allergy. Beyond 12 months, breastfeeding is recommended for as long as mutually desired by mother and child. In an effort to increase the prevalence of breastfeeding, the US Department of Health and Human Services established the following goals for breastfeeding by the year 2010: a 75% rate of initiation, a 50% rate of breastfeeding for 6 months, and a 25% rate of breastfeeding for 12 months. Two recently added objectives were to increase the proportion of mothers who choose exclusive breastfeeding for their infants through age 3 months to 40% and to increase to 17% the proportion of mothers who choose exclusive breastfeeding for their children through age 6 months. The Centers for Disease Control and Prevention (CDC) has also called for research to identify successful programs and policies to support exclusive breastfeeding, especially among these subgroups with the lowest rates.

“... low-income mother-infant dyads, who are at the highest risk for poor health, tend to have the lowest breastfeeding rates.”

While most of the breastfeeding research tends to focus on the physiological issues associated with breastfeeding, little attention has been paid to examining differences between mothers who engage in exclusive versus partial breastfeeding as well as duration and how it relates to low-income women. Demographic, physiological, and psychosocial aspects of breastfeeding lead to a multifaceted experience with factors that differentiate mothers who engage...
in exclusive versus partial breastfeeding. Such influences may include age and body mass index (BMI).

**Breastfeeding Among Low-Income Mothers**

Despite the well-established benefits, low-income mother-infant dyads, who are at the highest risk for poor health, tend to have the lowest breastfeeding rates.\(^5,7\) The CDC reported 2004 statistics from the United States National Immunization Survey showing that overall, 73.8% of mothers initiated breastfeeding, 41.5% breastfed for at least 6 months, and 20.9% continued to breastfeed for 12 months.\(^10\)

Upon a closer look at breastfeeding rates among mothers whose demographics most closely matched the population from which our sample was drawn, the findings revealed significant disparities among certain groups. Breastfeeding initiation and 6-month duration rates\(^11\) are shown in Table 1. Nearly all of these rates remained lower than the overall rates for mothers who reported ever breastfeeding. Nationally, far fewer mothers reported exclusive breastfeeding,\(^10\) and lower rates also existed for non-Hispanic white mothers reporting exclusive breastfeeding at 3 and 6 months,\(^12\) as shown in Table 2.

Many mothers in low-income populations participate in Supplemental Nutrition Program for Women, Infants, and Children (WIC) programs, and numerous studies have shown that these mothers are less likely to breastfeed as compared with non-participants of WIC programs.\(^13-19\) Even though a growing percentage of these mothers initiate breastfeeding, research\(^20\) has found that they were less likely to opt for exclusive breastfeeding and more likely to introduce formula in the first month than nonparticipants of WIC programs.

While researchers have examined potential barriers to breastfeeding, such as insufficient information and low self-confidence specific to breastfeeding;\(^21-26\) lack of support from family, partners, and health care providers;\(^21,25,26\) problems with breastfeeding in the early postpartum period; and lack of access to lactation assistance,\(^2,28\) there has been minimal focus on exclusive versus partial breastfeeding and duration among low-income mothers enrolled in WIC programs. Older maternal age is generally associated with higher rates of breastfeeding. However, the relationship between age and exclusive versus partial breastfeeding among low-income mothers has rarely been discussed.

**Body Mass Index**

BMI is a measure of body fat based on height and weight that applies to both women and men, with a normal range falling between 18.5 and 24.9 kg/m\(^2\). However, most nonpregnant women of childbearing age in the United States are either overweight (26% at 25-29.9 kg/m\(^2\)) or obese (29% at >29.9 kg/m\(^2\)), making this a growing public health concern in this population.\(^29\) Obesity may also adversely affect breastfeeding in several ways. First, mothers with a BMI at or above 30 kg/m\(^2\) may experience hormonal patterns that interfere with milk production.\(^29-32\) Second, the infants of obese and overweight mothers may have physical difficulty latching onto the breast.\(^31\) Finally, an elevated BMI may indirectly interfere with the initiation and duration of breastfeeding because obesity is also associated with complications of pregnancy and delivery, cesarean delivery, poor maternal self-esteem, maternal

| Table 1. Breastfeeding Initiation and 6-Month Duration Rates* |
|------------------|------------------|------------------|
| Group            | Breastfeeding Initiation, % | Any Breastfeeding at 6 Mo, % |
| Low-income poverty-to-income ratio <185% | 65.6 | 48.2 |
| Enrolled in WIC  | 59.9 | 39.5 |
| Age <20 y        | 43.1 | 31.1 |
| Rural            | 65.1 | 48.9 |
| Midwestern       | 69.5 | 52.7 |

WIC, Supplemental Nutrition Program for Women, Infants, and Children.

| Table 2. Exclusive Breastfeeding Rates* |
|------------------|------------------|------------------|
| Group            | Exclusive Breastfeeding at 3 Mo, % | Exclusive Breastfeeding at 6 Mo, % |
| United States, overall | 30.5 | 11.3 |
| Non-Hispanic white mothers poverty-to-income ratio <185% | 26.6 | 8.9 |
| Mothers <20 y old | 16.8 | 6.1 |
| Rural            | 23.9 | 8.2 |

*Data from the Centers for Disease Control and Prevention.\(^10,11,12\)
depression, and low socioeconomic status. A recent study found that mothers with a BMI ≥25 kg/m² were more likely to have discontinued breastfeeding before 6 months than normal-weight mothers. Thus, maternal BMI is gaining increasing interest as a parameter relating to breastfeeding duration among low-income mothers.

**Purpose and Hypotheses of This Study**

The purpose of this study was to identify factors associated with exclusive versus partial breastfeeding among low-income mothers who were also WIC recipients. More specifically, maternal age and BMI were analyzed in relation to these mothers’ decisions to engage in exclusive or partial breastfeeding.

The theoretical framework of the Situation-Specific Theory of Breastfeeding (STB) postulates that maternal decisions about breastfeeding are influenced by several situational contexts: maternal readiness and capacity, infant readiness and capacity, and environmental support systems. According to Nelson, 4 constructs contribute to the ongoing dynamic process of breastfeeding. “Maternal readiness and capacity” is composed of the biopsychosocial influences that the mother brings to the context of the feeding. These biopsychosocial influences are formed through the infant’s experience of the mother, the infant’s experience, and the mother’s readiness and capacity in an environmental support system. Nelson also described 2 additional constructs of “conflict” and “congruity” in relation to the aforementioned constructs and its contribution to the experience of the breastfeeding mother-infant dyad. This study was guided by the STB and tested the maternal component, specifically, the biopsychosocial variables of exclusive versus partial breastfeeding, maternal age, and BMI.

Mothers and infants who engage in exclusive breastfeeding may be healthier, possess differing characteristics, and perceive fewer conflicts and more congruity with the context of their family and community as compared with mothers who decide on partial breastfeeding. Mounting evidence suggests that excessive BMI measures can negatively influence both the physical and emotional readiness and capacity of the mother who wants to breastfeed. The increasing prevalence of obesity directly influences health and thus the readiness and capacity to breastfeed. Therefore, we hypothesized that mothers within a low-income population who chose exclusive breastfeeding would likely (a) continue breastfeeding longer than mothers who chose partial breastfeeding, (b) be of an older age than mothers who chose partial breastfeeding, and (c) have a lower BMI than mothers who chose partial breastfeeding.

If we better understand the factors influencing partial versus exclusive breastfeeding, we can tailor interventions that acknowledge and respect family goals and needs. In doing so, the STB suggests that breastfeeding initiation and duration will not only increase but will also feel particularly satisfying for mother and infant.

**Methods**

**Study Design and Setting**

This study involved a retrospective review of maternal records from an existing database. Breastfeeding behaviors of mothers enrolled in the state WIC program were tracked through the Real-Time Online State-Wide Information Environment (ROSIE). Within this Midwestern state, a mostly rural county was identified as having breastfeeding rates that remained well below the state’s average for both initiation and duration. According to Census 2000 data, the county’s population of 33,647 contains only 1 city, population 10,843, exceeding the US Census definition of rural as having a population of 2500. Ninety-eight percent of this county was white, with an average family income of approximately $50,000.

The data for this study were abstracted by a WIC nutritionist who de-identified information about mother-infant dyads who were enrolled in this county’s WIC program during the 2006 calendar year. A search of the database was initiated by defining a time parameter to include the first 6 months of 2006, when a participant was documented as receiving certification for postpartum WIC benefits required within 6 weeks after birth. To examine breastfeeding behavior and BMI history, mothers giving birth during the first 6 months, January 1 through June 30, 2006, were included in the study. Calculations of breastfeeding duration were determined by a mother’s first and last WIC clinic visit during 2006. The University of Wisconsin Health Sciences Institutional Review Board approved this study.

**Sample**

A total of 72 mothers, aged 18 years or older, who met the WIC qualification of having an income at or below 185% of the poverty level, gave birth and were WIC certified in this predominately rural county during the first 6 months of the 2006 calendar year. Within this sample, 58.3% (n = 42) initiated breastfeeding, and of these breastfeeding mothers, 9 reported exclusive breastfeeding and 33 reported partial breastfeeding. The mean maternal age was 24.7 years (SD = 4.7). The mothers’ self-identified racial/ethnic categories consisted of 2 groups; 88.1% (n = 37) white and 11.9% (n = 5) mixed. The mixed group included mothers who described themselves as white and Hispanic and 1 mother who self-identified as white, black, and Hispanic. Based on the US Census classification, 42.9% (n = 18) of the mothers lived in a rural setting and 57.1% (n = 24) of the mothers lived in a city setting. The initiation rate for these mothers was comparable to the national WIC rate for white, non-Hispanic participants at 59.9%. Likewise, duration rates at 6 months for the mothers who reported “breasted ever” in this study were 45.2%, which reflected a similar proportion to the overall national rate of 41.5% and a corresponding WIC rate of 39.5%.

**Measures**

Exclusive versus partial breastfeeding and duration. The WIC program defined exclusive breastfeeding for this study as the infant’s receiving breast milk only with no other liquids or solids given and is consistent with the recommendations of Labbok and Krasovec.
Partial breastfeeding was defined as an infant’s being fed any amount of breast milk on the average of at least once per day. This latter definition includes mothers who report “mostly breastfeeding” or “token breastfeeding,” as well as bottle-feeding human milk. The ROSIE database was searched and narrowed to those mothers who reported any, exclusive or partial, breastfeeding of the current infant under the category of “breastfed ever” in 2006. While this captured all mothers who initiated breastfeeding following birth, the database did not provide a category for length of exclusive breastfeeding for those mothers who may have initiated this but later reported partial breastfeeding. Thereafter, to view each mother’s history, data were retrieved from the last recorded WIC clinic visit for the remainder of 2006. Data fields were then queried for those WIC participants who reported exclusive or not exclusive breastfeeding, formula supplementation, currently breastfeeding, and breastfeeding duration for mothers who had discontinued within 2006. To quantify breastfeeding duration for those mothers who reported continuation of breastfeeding at the last clinic visit of 2006, the pregnancy outcome data were queried and de-identified by rounding down to the first day of the month. The difference between this date and the last clinic visit rounded to the nearest week were used to calculate ongoing breastfeeding duration. This information assisted in further sorting mothers into categories.

**Age**

Within the narrowed pool of mothers, an age category was queried. Maternal age was calculated within the database from the difference between the last clinic visit in 2006 and date of birth (measured in years).

**Body Mass Index**

Height and weight (measured in inches and pounds for computer-generated calculations) were collected and entered into the ROSIE database by WIC technicians during nutritional education clinic visits. In accordance with international definitions of normal, overweight, and obesity, normal weight was operationally defined as a BMI between 18.5 and 24.9 kg/m², overweight as a BMI of ≥25 kg/m², and obesity as a BMI of ≥30 kg/m². Data were retrieved from this sample of mothers for BMI measurement from the latest recorded WIC visit for new, renewed, or changed certification in 2006. The mean and mode of breastfeeding duration for mothers in exclusive and partial breastfeeding groups were calculated from the differences between the pregnancy outcome date, previously rounded down to the first day of their birth month, and the last WIC nutrition education visit, rounded to the nearest week, when the last BMI was recorded.

**Results**

**Exclusive Versus Partial Breastfeeding**

The 9 mothers who reported exclusive breastfeeding were compared with the 33 mothers who reported partial breastfeeding, and a significant difference was found between these exclusive and partial breastfeeding groups with regard to the length of time (in weeks) that these infants were provided breast milk. The mothers who reported exclusive breastfeeding did so significantly longer than the partial breastfeeding group, F(1, 40) = 6.90, P < .05. Based on the last available data points, the 9 exclusive breastfeeding mothers reported an average duration of 24.3 ± 11.8 weeks, with a range of 7 to 39 weeks, and the partial breastfeeding mothers reported an average duration of 11.6 ± 13.1 weeks with a range of <1 to 41 weeks (see Figure 1). The last available data from 2006 showed no change in status for any of the exclusive breastfeeding dyads who reported continued exclusive breastfeeding.

**Maternal Age**

Exclusive breastfeeding mothers were found to be significantly older than partial breastfeeding mothers. The older, exclusive breastfeeding group averaged 27.8 ± 5.2 years of age, while the partial breastfeeding group averaged 23.9 ± 4.3 years, F(1, 40) = 5.35, P < .05.

**Body Mass Index**

For both the exclusive and partial breastfeeding groups, the mean and mode data points for the BMI measurements were 23 weeks and 26 weeks postpartum, respectively. Exclusive breastfeeding was significantly associated with a lower BMI, F(1, 39) = 5.91, P < .05 and a mean ± SD of 23.9 ± 2.5 kg/m². In fact, all mothers but 1 in the exclusive breastfeeding group presented with a BMI ≤25 kg/m², indicating within or very near the guidelines of normal weight. None of the exclusive breastfeeding participants were documented as obese. Among partial breastfeeding mothers, BMI data were available for 32 of 33 participants. In contrast to the exclusive breastfeeding mothers, this group of 32 partial breastfeeding mothers presented with a mean ± SD BMI of 29.1 ± 6.3 kg/m². This mean BMI is quite near the upper bound of overweight borderline obesity. Closer examination of the partial breastfeeding group revealed that 10 (31.3%) were within or very near the guidelines of normal weight, 9 (28.1%) were overweight, and 13 (40.6%) were obese. Comparisons of age, BMI, and breastfeeding duration between these groups are shown in Table 3.

**Discussion**

An important finding of this study was that mothers who initiated exclusive breastfeeding and breastfed beyond 6 weeks continued to breastfeed significantly longer than those mothers who reported partial breastfeeding. There may be many biological and psychosocial reasons exclusive breastfeeding mothers...
continued to nurse their infants longer than those who combination fed. For example, exclusive breastfeeding establishes and protects milk supply. Mothers who choose exclusive breastfeeding may have certain internal and external resources to overcome the physical and societal obstacles that may preclude nursing their infants. The potential resources that differentiate these 2 groups of mothers warrant further study.

Li et al. Older maternal age is often associated with a longer duration of any breastfeeding. Even in countries where breastfeeding initiation has become nearly universal, maternal age has been found to be a consistent and significant predictor of breastfeeding duration. Older maternal age may serve as an important predictor for exclusive breastfeeding, cueing health care providers to recognize this as a potential strength/asset. It may be that older mothers have accrued experience breastfeeding previous children, achieved a higher level of education, and may be part of a supportive network. While younger mothers seem to be at a disadvantage and enhancing support for exclusive breastfeeding is being explored, numerous influences such as partners, family, peers, isolation, culture, media, and external needs and desires may exert unique effects from mother to mother.

This study also showed that exclusive breastfeeding among low-income mothers

Table 3.
Means ± Standard Deviations for Characteristics of Exclusive Breastfeeding and Partial Breastfeeding Mothers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exclusive Breastfeeding</th>
<th>Partial Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>27.8 ± 5.2</td>
<td>23.9 ± 4.3</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>23.9 ± 2.5</td>
<td>29.1 ± 6.3</td>
</tr>
<tr>
<td>Breastfeeding duration, wk</td>
<td>24.3 ± 11.8</td>
<td>11.6 ± 13.1</td>
</tr>
</tbody>
</table>

a. The group sizes were 9 exclusive breastfeeding and 33 partial breastfeeding.
was associated within a near-normal BMI range (mean ± SD BMI, 23.9 ± 2.5 kg/m²) while partial breastfeeding was associated with an average BMI bordering on obesity (mean ± SD BMI, 29.1 ± 6.3 kg/m²). These findings are particularly salient to the obesity problem in the United States, where 26% of nonpregnant women 20 to 39 years of age are overweight (25-29.9 kg/m²) and 29% are obese (>29.9 kg/m²). This increasing prevalence of unhealthy weights among women of childbearing age is a growing public health concern because women are entering pregnancy at higher weights and gaining in excess of the recommended gestational weight. Furthermore, obesity is disproportionately more prevalent among women in low-income and minority populations. Other research documents a link between a shorter breastfeeding duration and maternal obesity measured as BMI in a low-income, rural sample of mothers. However, further research is needed to determine to what extent the physiological processes resulting from obesity influence a mother’s ability to breastfeed. Mothers from lower socioeconomic communities, such as those in this study, may experience a disproportionate mismatch between environmental obstacles to breastfeeding relative to the psychosocial support required to overcome these barriers. These mothers may feel pressured by the medical community to initiate breastfeeding, yet continuing to do so becomes impossible in their social contexts. Even in countries in which breastfeeding initiation approaches universal status, duration is often still cut short, which points to evidence of persistent and powerful barriers to exclusive breastfeeding. Such barriers identified in the literature include maternal attitude, breastfeeding difficulties at <4 weeks postpartum, return to employment, preferences and support of partner/family, formula supplementation for nonmedical reasons, and pacifier use.

**Conclusion**

Breastfeeding is a complex issue with lifelong consequences for both mother and infant. This study found that factors, such as exclusive breastfeeding, older maternal age, and lower BMI, were associated with longer breastfeeding duration. These findings move us closer to understanding the unique needs of low-income, WIC, breastfeeding mothers and support the notion that maternal readiness and capacity for breastfeeding are influenced by dynamic biopsychosocial processes.

**References**


