Decisions about infant feeding:
A comparative study of women of higher and lower education levels

WG106
Abstract

Breastfeeding has been shown to have short and long term health perks for both the mother and child. Some researchers have concluded that women of lower education levels are likely to initiate breastfeeding based on the success or failure of a close friend or relative. Research states that women with a lower education levels learn skills through apprenticeship as opposed to theoretical knowledge gained through literature. This same research also makes the assumption that women of higher education levels make decisions solely based on theoretical knowledge, because they are accustomed to learning through reading and applying fact-based information. This assumption may or may not be true and, therefore, represents a gap in the literature. The goal of my study was to find evidence on how women of both higher and lower education levels make the decision to breastfeed or bottle-feed. I created a survey that contains thirty questions, and was divided into three sections: Decision-making, Background, and Breastfeeding History. I received IRB approval from both Byram Hills High School and Montefiore Hospital. I had three hundred and one (n=301) subjects from both online and paper surveys. Then I used SPSS to analyze the data using Chi Square, Phi, Cramer's V, and Spearman's Rho tests. I concluded that women of higher education level are more likely to breastfeed then women of low education level (P = .033). In addition, my paper provides evidence to confirm the assumption that women of higher education levels are more likely to breastfeed based on theoretical knowledge, and women of lower education levels are likely to breastfeed based on embodied knowledge. In addition a women is more likely to breastfeed if her mother or sister breastfed, or she has read a book or took a class about the benefits of breastfeeding. The implication of this research is for health care official to be able to more effectively target women to breastfeed based on education levels, with the ultimate goal of increasing breastfeeding rates.
I began my literature search in the fall of 2012. After I read the article *Qualitative study of decisions about infant feeding among women in the east end of London* (Hoddinott & Pill, 1999), I noticed that the research performed discussed how women of higher education levels make decisions based on theoretical knowledge but there was no citation to validate this assumption. My paper provides evidence to confirm and expand upon this assumption.

**Review of Literature**

Overwhelming evidence has shown that breastfeeding has many short and long-term health benefits for both mother and child. Yet, breastfeeding rates in the United States remain relatively low. Only 35% of children in the United States are exclusively breastfed after three months. There have been numerous initiatives by the Center for Disease Control (CDC) and the American Academy of Pediatrics (AAP) to encourage women to breastfeed; but they have been met with minimal success. These initiatives have failed because most women feel they do not have a support system to encourage them to continue to breastfeed when they reach a problem (Odom, Li, Scanlon, Perrine, & Grummer-Strawn, 2013). When a woman encounters problems, such as poor latch or poor milk supply, she may not have anyone reliable to ask for advice, and thus, she is likely to abandon breastfeeding.

We do know that women of lower education approach decisions about breastfeeding differently from women of a higher education level (Hoddinott & Pill, 1999). Some researchers have concluded that a woman of lower education level is likely to initiate breastfeeding based on the success or failure of a close friend or relative, as opposed to a woman of higher education level who is more likely to base decisions on what she has learned through literature. Research has suggested that a woman of a lower education level learns skills through apprenticeship (hands-on) rather than through theoretical knowledge (defined as knowledge gained through literature or from an authority) because this woman is accustomed to learning hands-on rather than through books (Hoddinott & Pill, 1999). While this association has been demonstrated, there is a need for replication of this study in a different setting with a larger sample size. The literature makes the assumption; on the other hand, that women of higher education levels may make decisions based on theoretical knowledge. This assumption has not been tested. The goal
of my study is to quantify the relationship between education level and a mother's decision to breastfeed.

**The case for breastfeeding**

Breastfeeding has been shown to be the most valuable form of infant nutrition, for at least the twelve months of life (Odom et al., 2013). Short and long term health benefits for both mother and child include; better nutrition, decreased risk of diabetes, and more bonding connection with the mother. Infants who are breastfed receive protection from bacterial infections, diarrhea, hypernatremia, and under nutrition (Wirihana and Barnard, 2011). They are also protected from several childhood chronic diseases such as asthma, allergies, becoming overweight or obese, and diabetes. In addition, breastfed infants have a decreased rate and/or a decreased severity of a wide variety of infectious diseases including bacterial meningitis, bacteremia, gastrointestinal illnesses, respiratory tract infection, necrotizing enterocolitis, otitis media, urinary tract infection, and late-onset sepsis in preterm infants. (Allen & Hector, 2005; AAP, 2005; Khoury et al., 2005; Pan American Health Organization, 2002). Babies who are not breastfed are also at an increased risk of autoimmune disease, sudden infant death syndrome, type II diabetes, and obesity (Odom et al., 2013).

Breast-feeding mothers have a decreased risk of cancer, such as breast, ovarian, and endometrial cancers; a delay of ovulation, and a better psychological bond with their child. More benefits for a mother are increased child bonding, earlier return to pre-pregnancy weight, and possibly, decreased risk of hip fractures and osteoporosis in the postmenopausal period. (Allen & Hector, 2005; AAP, 2005; American Dietetic Association, 2005; Khoury et al., 2005; Pan American Health Organization, 2002).

**Recommendation for breastfeeding duration**

According to a 2010 CDC report, mothers should exclusively breastfeed their child for at least the first six months of life because breast milk alone is sufficient to support optimal growth and development of the infant. The America Association of Pediatrics (AAP) recommends that after six months the mother should continue to breastfeed for at least one year, while the World Health Organization (WHO) recommends continued breastfeeding up to two years of age or beyond. There is no evidence of risk from prolonged and/ or exclusive breastfeeding for a child. The downside is nil.
Low breastfeeding rates in the United States

Despite the widely documented health advantages, breastfeeding initiation rates remain low in many developed countries. Women who are less likely to initiate breastfeeding are those who are young, African American, primiparous (A women who has given birth to one child), primigravida (a woman who is pregnant with first child.), of low socioeconomic status, or low education (Odom et al., 2013).

From 2004 to 2008 there has been a plateau in the number of mothers that breastfeed in the United States (Figure 1). While the 2012 CDC Breastfeeding Report Card reported that breastfeeding rates increased by two percent points each year since 2010, low rates of breastfeeding initiation are still evident in America (Dyson et al., 2014). Low breastfeeding initiation rates are not only found in the United States, but in regions around the world (e.g. East/Southern Africa, East Asia/Pacific, Latin America/Caribbean, Central Europe/Russian Republics) (UNICEF, 2010). In 2012, The World Health Organization (WHO) said that, globally, less than 40% of infants under six months of age are exclusively breastfed. Only 35% of children in the United States were exclusively breastfeed for three months between 2004 and 2012 (Figure 2). Other developed countries such as Italy and the United Kingdom have even lower breastfeeding rates then the United States (after three months).

![US National Breastfeeding Rates (Exclusive Breastfeeding)](chart.png)

Figure 1. Percent of children breastfed as a function of year of birth, 2004 to 2008. The graph shows that breastfeeding rates in the United States have remained relatively constant. (kellymom.com)
As previously stated, the 2012 CDC breastfeeding report card states that breastfeeding rates increased about two percentage points each year for breastfeeding initiation, breastfeeding at six months, and breastfeeding at twelve months. Reasons for this small increase maybe due to new CDC initiatives such as programs, programs for new fathers and grandmothers, strengthening of mother-to-mother support, support for new mothers after they leave the hospital and support of breastfeeding from community groups. Only five states have met the CDC’s three (3), Healthy People 2010 Breastfeeding Objectives (Ogbuanu, C., Probst, J., Laditka, S., Liu, J., Baek, J., & Glover, S. 2009): that 75% of women in the US would initiate breastfeeding, that at six months 50% of them would still be breastfeeding, and that after twelve months 25% of these mothers would continue to breastfeed. Some of the reasons mothers may stop breastfeeding include, but are not limited to, not enough milk produced, breast pain or other breast problems, poor weight gain, embarrassment about feeding, or a lack of time to keep up breastfeeding (Wirihana and Barnard, 2011). According to Table 3., even though only five states meet the 2010 healthy people objectives, it was enough to bring the 2009 breastfeeding averages for the United States above the projected amounts in two out of the three categories. Therefore, the CDC created new healthy people objectives for 2020 to continue to increase breastfeeding rates.
Table 1. Breastfeeding rates in the United States in 2009. Despite the recommendation, as a child gets older, the less likely his/ her mother is to breastfeed him/ her. The goal is to have the same number of mother’s breastfeeding their children at six and twelve months, as the amount that initiated breastfeeding. A decline would naturally occur after twelve months. (northeastern.edu)

<table>
<thead>
<tr>
<th></th>
<th>Current Rate</th>
<th>HP 2020 Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever breastfed</td>
<td>76.9%</td>
<td>81.9%</td>
</tr>
<tr>
<td>Breastfed at 6 months</td>
<td>47.2%</td>
<td>60.6%</td>
</tr>
<tr>
<td>Breastfed at 1 year</td>
<td>25.5%</td>
<td>34.1%</td>
</tr>
<tr>
<td>Exclusively breastfed through 3 months</td>
<td>36.0%</td>
<td>46.2%</td>
</tr>
<tr>
<td>Exclusively breastfed through 6 months</td>
<td>16.3%</td>
<td>25.5%</td>
</tr>
</tbody>
</table>

Why have rates remained consistently low across different populations?

The questions remain why breastfeeding rates have remained consistently low across different populations. For example between 1999 and 2006 Breastfeeding rates were higher among women with higher income (74%) compared with those who had lower income (57%) (McDowell et al., 2010). It could be that mothers don't breastfeed for as long as they anticipate because of health concerns, or they cannot perform the processes associated with breastfeeding (Odom et al., 2012). Additionally, programs are being created to give women options when it comes to infant feedings so they do not feel forced into one method of feeding (breast or bottle feeding) due to economic reasons. The Women, Infant, Child (WIC) program gives women of lower economic status formula and supplementary foods to feed their infant. The goal of the WIC program is to give women options they may have not had due to lack of funds. WIC helps mothers by providing breast pumps, classes, education, and formula to mothers who need to supplement. If there is more exposure to these WIC services that encourage breastfeeding it will help to improve breastfeeding rates among a low-income diverse population of women. (Metallinos-Katsaras et al., 2014)

Breastfeeding rates as a function of knowledge of benefits and associations.

Women of lower education levels are more likely to learn through embodied knowledge. These women learn skills primarily through apprenticeship, and thus may gain knowledge about breastfeeding through direct exposure. This may be more influential to them than theoretical.
knowledge. (Hoddinott & Pill, 1999). The supposition is that the more ownership the mother has, the more likely she is to apply the knowledge. Ownership of knowledge was defined as a woman being more confident in her answers about the benefits of breastfeeding during the focus group. Hoddinott stated that all of the women in the 1999 study were aware that there were some health benefits of breastfeeding, but their sense of the ownership of the knowledge varied. For example, women who intended to initiate breastfeeding used more personal pronouns when describing their breastfeeding knowledge, than those who did not intend to breastfeed. When a woman who intended to formula feed talked about her decision not to breastfeed, she suggested that she did not fully understand the benefits of breastfeeding. Women of low education levels breastfeeding decisions’ are influenced by past experiences of a close friend or relative. Ownership of embodied knowledge helps to explain why previous feeding behaviors are the strongest predictor of future feedings. The knowledge, confidence, and commitment necessary to breastfeed may be gained more effectively through antenatal apprenticeships with a breastfeeding mother, then from advice given in consultation or from books. (Hoddinott & Pill, 1999).

Women in low-income households in the United States, who typically have low breastfeeding initiation rates, have increased initiation rates if exposed to breastfeeding education, compared to standard care provided by a doctor. Regardless of ethnicity and feeding intention, formal antenatal education sessions were effective in terms of increasing breastfeeding rates among women from low-income households. The investigators concluded that health education and peer support interventions could help to increase the number of women initiating breastfeeding. (Dyson et al., 2014)

The literature makes an important assumption, however: That women of higher education levels make decisions based on theoretical knowledge, because they are accustomed to learning through reading and by applying fact-based information (Hoddinott & Pill, 1999). This assumption may or may not be correct, and therefore prevents us from drawing clear conclusions. The goal of my study is to quantify and compare how women of both higher and lower education levels make the decision to breastfeed or bottle-feed, in order to understand how educational background influences how women make decisions about infant feeding. Once the information is quantified, education levels can be used to help determine how to best target women to make informed decisions regarding breastfeeding.
**Hypotheses**

H₀: Women of lower education levels are influenced to breastfeed based upon the success or failure of a close friend, or relative, and not by literature, and women of higher education levels base decisions on theoretical knowledge because they are more familiar with learning and making decisions on the basis of knowledge.

H₁: Women of all education levels tend to have success or failure with breastfeeding based on the success or failure of close friend or relative

**Objectives**

1. To create a unique survey to measure how women of higher and lower education levels make decisions on infant feeding
2. To locate samples of women from different socio economic status (SES)/ education levels to survey and to compare the data to draw a conclusion

**Methods**

**An overview of my role in the study**

I generated the hypothesis based on what I believed to be a gap that I found in the existing literature, based upon my reading of 23 journal articles on the topic. I created a survey and questions that would help me to draw a conclusion about how to more effectively target women, based on education level, to breastfeed. I independently contacted my mentor, Dr. Emily Oken of Harvard Medical School, through email. She reviewed my survey prior to use, and made invaluable comments and suggestions. I then emailed my survey to Dr. Talitha Bruney, who heard about my research from another doctor, at Montefiore Hospital, Bronx, NY, and Dr. Bruney assisted me in gaining IRB approval at the hospital. I also personally recruited subjects in the Metropolitan NY area through both email and word of mouth. I administered the final survey on Survey Monkey, and in printed form. I performed all statistical analyses at home and at my school using SPSS. Then I independently drew conclusions.

**Subjects**

The subjects for this study were women (n=301) over the age of 18 who had given birth to at least one child and read and speak English. They took the survey online (n=153), or in paper
form at Montefiore Hospital in the Bronx, NY (n=148). The online surveys were sent to women who were either mothers of children in my school district or to female faculty at my school. Most online subjects resided in locations in Westchester Country, NY. I choose these subjects because they represented what is typically regarded as a more educated demographic, as illustrated by local school records which report that approximately 99% of each graduating class attends college. The subjects at Montefiore Hospital generally represent a lower education level, as confirmed by Dr. Bruney from records at the hospital. In either case, education level was verified within the survey, in order to avoid assumptions.

**Survey creation and questions**

The survey contains thirty questions and is divided into three sections: Decision-making, Background, and Breastfeeding History. The first section of the survey, decision-making questions, contained two questions (Figure 3). The goal of this section was to see how the women make decisions, unrelated to breastfeeding.

The second section of the survey contained ten questions. These questions were related to demographics that would help to indirectly measure SES (Figure 4). They included residency, education level, employment, household income, age, marital status, race, and ethnicity. It was important that questions were worded carefully in order to determine suitability for categories without being intrusive. For example, to gain a sense of socio economic status (SES) information about household income is important. However, people may not want to share this information (even in an anonymous survey); therefore, this question was optional.

A question about employment was included to gain further information if a woman did not answer the questions about household income. All women did answer this question regardless if they answered the questions about income. From the employment questions one could hypothesize the socio-economic status of the respondent.

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**Figure 3.** Question one and two of survey (WG106, 2014)

**Figure 4.** Question five of survey (WG106, 2014)
The most important background questions concerned education (Figure 5). The question gave options about all the types of education levels the woman could have received, ranging from no schooling to PhD. As shown in question four, all the options were listed. After all data was collected education level was classified as high or low - Education level was defined as high if women had received any type of college degree (Hoddinott & Pill, 1999).

The third and final part of the survey, breastfeeding history, contained 18 questions with multiple parts. The first question asked was how old a woman was she when she had her first child. Then subjects were asked if she and/or her siblings were breastfed (Figure 6). Boxes and arrows were used to show questions progression. The arrows made progression easier to follow, and the boxes made the questions stand out. This method was utilized for the following question, “Do you have any siblings”. As shown below, if the subject answered, “Yes” she would be directed to answer the question “Did your mother breastfeed your siblings”. If she answered “no” then she was instructed to move on to the next question. The box and arrow method was helpful in keeping my survey organized and making it easy to complete for the subjects.

The next questions ask about a women’s comfort level breastfeeding in public. While these are not directly related to the hypotheses, they were used as exploratory variables. Next the women were asked if their sister, mother, and sister in law, or mother in law breastfed (Table 2). A chart was created for these questions because it saved space and was easier to read. The women circled which answer choice applied to them for each question in the chart.
The next set of questions in Breastfeeding History concerned the subjects' experience with breastfeeding. The first question in this part asked how many children the woman had. The next question asked if she breastfed or not, using boxes and arrows to expand on her answers (Figure 7). Again, this method made the questions easier to understand. When formatting the survey, this question was at the end of the page. To utilize all the space at the end of the page, the question “Did WIC program provide supplementary foods for your child?” which is in the “yes” category, was put under the “no” category. Putting this question under the “no” category caused a problem because some women who answered “no”, ended up answering “did WIC program provide supplementary foods for your child?”. Another problem with the layout of this part was there wasn’t enough stress on the “any of your children” so many women answered both “yes” and “no”. But for analysis, if they put both, the “yes” answer was used.

After general questions about any of the subject’s children, the questions pertained to each individual child and the reasons why or why not she choose to breastfeed that child (Figure 8). The box and arrow method was used to organize the questions. Two of the children questions took up one page with the option for the questions to be answered for the first five children. The first question was “did you breastfeed your first child”, answer choice being yes or no. Starting with questions about the second child a not applicable (“N/A”) answer choice was included for women who only had one child.

The last questions of Breastfeeding History were about the individual who was the biggest influence in subjects’ decision to breastfeed or bottle-feed their children. It also asked
about the doctor’s recommendation to breastfeed or not. The last question was “would you breastfeed future children?” If the mother decided she didn’t want future children, there was a question added about a mother’s opinion on having more children. A box and arrow were used to point to “would you breastfeed future children?”

A school-based Institutional Review Board granted approval of the survey in the spring of 2014.

**Recruiting**

There was a study information sheet provided to participants that explained the goal of the research, that it was optional, that answers would not end up in their medical record, and that answer would not affect medical care. Consent was implied by completion of the survey. I personally contacted subjects of to participate in the survey via email. My school sent a mass email with the link to my survey to the faculty in all the schools in my home district. The email contained a brief biography of me, and an explanation of the purpose of the survey. I also recruited mothers residing in Westchester County, NY at the annual 2014 Science Research Symposium held at my school. I created handouts with an explanation of my work and the link to the survey.

I gained IRB approval at Montefiore Hospital in June 2014, and worked with Dr. Bruney and her staff to distribute the survey. I needed two IRB approvals because the hospital needed to approve my survey to be used in hospital-affiliated clinics. Survey completion was low for the first two weeks. Most women who took the survey were sitting in the hospital waiting room. I visited the waiting room, and noticed how small it was and that there were many distractions such as children running around and a loud television. I concluded that the length of the survey (approximately 14 pages) may have deterred mothers from wanting to participate. Although I had previously tested the time it takes to complete the survey and found it to have been less than five minutes, I thought if a woman sees the length, she may think it takes longer then it really does. Therefore, I reformatted the survey in mid-July of 2014, shortening it to six pages just by changing the layout, thereby making it appear less daunting to complete. Less than 50 surveys had been completed by mid-July prior to my revising the survey: but after the shortened form of the survey, I received a total of 147 completed surveys in less than one month.
I ended survey collection in the middle of August 2014, and analyzed the data using SPSS. The primary outcome was the affirmation of breastfeeding and the primary exposure was education level. Other confounding variables include mother breastfed, sister breastfed, family member breastfed, read book about the benefits of breastfeeding, and took classes about the benefits of breastfeeding. In the main analysis I examined relationships between exposures and outcome separately for women with at least a college degree vs. those with lower education level. I analyzed the data using regression analysis with dichotomous outcomes or with outcomes that have several categories. Alpha was set at .05.

**Demographic data, summarized descriptively**

Three hundred and one (n=301) women, each who have had at least one child, took part in this survey. One hundred and forty eight (n=148) women took the survey by hand at Montefiore Hospital in the Bronx, and one hundred and fifty three women (n=153) took the survey online through surveygizmo.com. One hundred and sixty eight (n=168) women are of high education level (have received a college degree), and one hundred and thirty three (n=133) women are of low education level. Table three describes the characteristics of both women who took the survey online and at Montefiore Hospital without looking at any associations.

<table>
<thead>
<tr>
<th>Residence</th>
<th>Online Surveys</th>
<th>Paper Surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westchester</td>
<td></td>
<td>The Bronx</td>
</tr>
<tr>
<td>Education</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Household income</td>
<td>$100,000 - 400,000</td>
<td>$10,000-$40,000</td>
</tr>
<tr>
<td>Age</td>
<td>45 - 54 years</td>
<td>25 - 34 years</td>
</tr>
<tr>
<td>Martial status</td>
<td>Married or domestic partnership</td>
<td>Married or domestic partnership</td>
</tr>
<tr>
<td>Age had first child</td>
<td>25 - 34 years</td>
<td>25 - 34 years</td>
</tr>
<tr>
<td>Region</td>
<td>Suburban</td>
<td>Urban</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>Black or African American</td>
</tr>
<tr>
<td>Mother Breastfed</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sister Breastfed</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Book about the benefits of breastfeeding</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Class about the benefits of breastfeeding</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Grouping of variables for analysis**
Variables were grouped together in order to perform statistical analysis. When analyzing if a woman’s sister or mother breastfed, or if a woman took a class about breastfeeding, or read a book about the benefits of breastfeeding, the answers were classified as “yes” or “no”. When analyzing if a family member breastfed, women who had either a mother or a sister who has breastfed, or both a mother and a sister who has breastfed were classified as “yes”. Women who had neither a mother nor a sister breastfeed were classified as “no”.

When analyzing education level, women were classified as “high education” if they had a college degree of any type (e.g., associate degree, bachelor’s degree, master’s degree, professional degree, or doctorate degree). Women were classified as “low education” if they did not have a college degree (e.g., no schooling, 8th grade, some high school, no diploma, high school graduate/ GED, some college credit, no degree, or trade, technical, or vocational training).

When analyzing who influenced a woman’s decision to breastfeed, a woman who was influenced by a mother, father, friend, sister, sister- in law, mother- in law, husband, or father of the child, were classified as “family/ friends influence”. A woman who was influenced by books that she had read, OB/GYN, family doctor, or nurse were classified as “doctor/ reading influence”.

When analyzing if a woman makes decisions about breastfeeding based on theoretical or embodied knowledge, a woman who was influenced by a mother, father, friend, sister, sister- in law, mother- in law, husband, father of the child, OB/GYN, family doctor, or nurse were classified as “Embodied knowledge ”. A woman who was influenced by books that she had read, or their knowledge of science were classified as “theoretical knowledge”.

Statistics

Pairs of variables were analyzed for association using Person Chi Squared. Phi and Cramer’s V were used to determine the strength of association.

**Results & Discussion**

Table 4- Results of Person Chi Squared analyzes

<table>
<thead>
<tr>
<th>Education Level (college, &lt; college) associated with decision to breastfeed</th>
<th>Person Chi Squared</th>
<th>Phi and Cramer’s V</th>
</tr>
</thead>
<tbody>
<tr>
<td>For women with high education level</td>
<td>P= .033*</td>
<td>.123</td>
</tr>
<tr>
<td>For women with low education level</td>
<td>P= &lt;.001**</td>
<td>.512</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woman’s mother breastfed associated with woman’s decision to breastfeed</th>
<th>Person Chi Squared</th>
<th>Phi and Cramer’s V</th>
</tr>
</thead>
<tbody>
<tr>
<td>For women with high education level</td>
<td>P= .068</td>
<td>.141</td>
</tr>
<tr>
<td>For women with low education level</td>
<td>P= &lt;.001**</td>
<td>.512</td>
</tr>
<tr>
<td>Woman’s sister breastfed associated with woman’s decision to breastfeed</td>
<td>For women with high education level</td>
<td>For women with low education level</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>P=.035*</td>
<td>.162</td>
<td></td>
</tr>
<tr>
<td>Woman read a book about the benefits of breastfeeding associated with woman’s decision to breastfeed</td>
<td>For only women with high education level</td>
<td>For only women with low education level</td>
</tr>
<tr>
<td>P=.006*</td>
<td>.214</td>
<td></td>
</tr>
<tr>
<td>If a woman took classes about the benefits of breastfeeding associated with her decision to breastfeed</td>
<td>For women with high education level</td>
<td>For women with low education level</td>
</tr>
<tr>
<td>P=.014**</td>
<td>.189</td>
<td></td>
</tr>
<tr>
<td>Woman’s biggest influence (family/doctor) associated with education level</td>
<td>P=.009*</td>
<td>.227</td>
</tr>
<tr>
<td>Woman used theoretical or embodied knowledge when making decisions about breastfeeding associated with education level</td>
<td>P=.002*</td>
<td>.270</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I observed a strong association between a woman’s education level and her decision to breastfeed (P = .033). Women were more likely to breastfeed if they had a high education level (Figure 9). Women who are more educated would typically be more aware of the benefits of breastfeeding, as there is an abundance of literature about the benefits of breastfeeding. This means that efforts should be focused more on how to encourage women of low education level to breastfeed differently then what has been done.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother breastfed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>There was a weak association between a more educated woman’s mother having breastfed and the same woman’s decision to breastfeed (P = .068). Yet, there was a strong association between a woman of low education level’s mother having breastfed and her decision to breastfeed (P = &lt;.001). If a mother breastfed, then her daughter is more likely to breastfeed. Women who were college graduates were likely to breastfeed regardless of whether they were breastfed themselves (Figure 11). If a mother did not breastfeed and her daughter had a low education level, her daughter was more likely not to breastfeed (Figure 10). This could be because women of higher education level had the time and resources to go to breastfeeding support groups and classes even if their mother did not breastfeed, whereas poor women who</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
were not breastfed could not afford the time and money. The implication of this the ability to better target women of lower education levels by creating support groups or classes that teach about the benefits of breastfeeding, or creating more public exposure (e.g., ads, posters, and commercials). If a woman does not have a mother who has breastfed and she is involved in a support group or apprenticeship with a woman who has breastfed, she will be able to turn to this woman with questions and for support. This is because women of low education level make decisions based on embodied knowledge. The goal of this would be that women would be more like to initiate breastfeeding because they are able to learn from the experience of others.

![Figure 10. Breastfeeding association with mother breastfed](image)

**Sister breastfed**

There was a strong association between a more educated woman’s sister having breastfed and the same woman’s decision to breastfeed ($P = .035$). And, there was a strong association between a less educated woman’s sister having breastfed and the same woman’s decision to breastfeed ($P = < .001$). A woman is more likely to breastfeed if she has a sister who has breastfed (Figure 11). Therefore, if a women has seen her sister successfully breastfeed, she is more likely to initiate because she learned from her sisters experience. To encourage women who do not have a sister who has breastfed, to breastfeed, support networks or apprenticeships should be created with women who have been successful with breastfeeding. These women can help show a new mother how to overcome problems or just encourage them to initiate and persist.
Books about the benefits of breastfeeding

I observed a significant relationship between woman reading a book about the benefits of breastfeeding and the same woman’s decision to breastfeed (High education level $P = 0.006$ and low education level $P = 0.002$). If a woman read a book or multiple books about the benefits of breastfeeding, she is more likely to breastfeed (Figure 12). An implication of this would be for health care providers to provide books or other reading materials to all women who are having a child. Also they should have these materials available in waiting areas or offices. According to this data if all women read the books about the benefits of breastfeeding, breastfeeding rates will increase.
Classes about the benefits of breastfeeding

There is a strong association between women who are highly educated and attend a breastfeeding class and their subsequent choice to breastfeed ($P = .014$). These women were significantly more likely to breastfeed. Similar for women who are of low education level there is a strong association between whether she attended a class and her decision to breastfeed ($P = .009$). Interestingly, regardless of education level whether a woman attends a class to learn about the benefits of breastfeeding, she is more likely to breastfeed (Figure 13). This shows the importance of classes that teach about the benefits of breastfeeding. Therefore, classes about the benefits of breastfeeding should be more easily accessible to help educate women, and help them make informed decisions for their children.

Influence to Breastfeed

There is a strong association between who influenced a woman to breastfeed or not breastfeed and her education level ($P = <.001$). Based on existing literature I hypothesized that women of higher education should be more influenced by doctor’s recommendations and what they read in the literature (Hoddinott, 1999). Yet women of higher education
level were similarly influenced to make decisions about infant feeding based on friends and family recommendations as they were by doctor’s recommendations and readings. Conversely, and according to hypothesis, women of lower education levels were more influenced by what their family and friends recommended as opposed to what the doctor recommends or what they read in books. (Figure 14). Implications of this would be to create support groups of women who have breastfed for women of lower education to help them make informed decisions.

**Theoretical or embodied knowledge**

When education level was associated with whether a woman is influenced to make decisions about infant feeding based on theoretical or embodied knowledge, the association was strong (P = <.001). The data supports the original assumption in Hoddinott (1999) that women of higher education levels are more likely to make decisions based on theoretical knowledge, and women of lower education levels are more likely to make decisions based on embodied knowledge (Figure 15).

Therefore, this study fails to reject the null hypothesis. Implications of this would be to use the recommendation that Hoddinott, 1999 suggested as a strategy to more effectively target women of different educational levels to initiate and continue breastfeeding for six months. The suggestions are that a woman of higher education level is more likely to make decisions based on what she has learned through the literature and from health care professionals, because she is use to learning in this style. It is more likely for a woman of lower education level to initiate breastfeeding if she has support from both her family, friends, and other women who were successful in breastfeeding. If all health care providers follow these recommendations, and if women of different education levels are targeted effectively, then breastfeeding rates will increase.
Conclusion

This study met all objectives. I fail to reject the null hypothesis. Hoddinott's (1999) assumption that women of higher education levels learn to breastfeed based on theoretical knowledge was confirmed through quantitative research. The results also offer clear statistical support for the following five measures to end the plateau of breastfeeding rates in developed nations and allow rates to rise. First, that family support will encourage women to breastfeed. If women do not have family support, they can join a support group, breastfeeding classes, or centering pregnancy (These are parental care groups where woman have visits with a groups and can share experience and support each other with breastfeeding.). Lastly, women can learn to breastfeed by educational media (e.g., books, ads, commercials, and posters).

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