4-14-2022

Food Insecurity and Infant Feeding Methods Among Mothers with Infants in Children's Hospital

Sara Brobeck
Nova Southeastern University, sb3230@mynsu.nova.edu

Sara Brobeck

NUT 6801

3/27/2022

Food Insecurity and Infant Feeding Methods Among Mothers with Infants in Children's Hospital

Abstract

Introduction: Although breastfeeding is more sustainable and affordable compared to infant formula, mothers who are food insecure are shown to breastfeed less and turn to formula more. This paradox may result from beliefs surrounding diet and breastfeeding. For example, evidence shows that mothers may believe that the quality of their breastmilk may be negatively affected by insufficient diet and stress which is caused by food insecurity.

Objective: The objective was to find an association between food insecurity and method of infant feeding (breastfeeding or combination of breastmilk and formula).

Methods: Food insecurity surveys were administered to 31 mothers in the Neonatal Intensive Care Unit in Joe DiMaggio Children's Hospital for 32 days.

Results: The total sample population is food insecure, with 54.8% of respondents reporting food insecurity. There are 32.26% of mothers who are food insecure and do a combination of

breastmilk and formula, compared to the 22.58% of mothers who are food insecure and exclusively breastfeed (p=0.149).

Conclusions: While results did find that most of the sample was food insecure, there was no association between their food insecurity and its influence on their choice of feeding.

Table of Contents

Introduction

Evidently, there exists a paradox of women who are food insecure being the least likely to breastfeed, and if they do it is for a shorter duration compared to mothers who are not food insecure. Food insecurity means having limited or uncertain access to adequate food.[1] Characteristics of food insecurity are feelings of anxiety about the shortage or sufficiency of food in the household, low quality, or variety in the diet, disrupted feeding patterns, and reduced food intake.[1] Infancy is a stage with rapid growth and development, and adequate nutrition is crucial. Inadequate nutrition in infants can increase the risk of stunted growth, cognitive deficits, and chronic disease.[2] Proper nutrition and infant growth and development can be threatened by food insecurity.[2]

The primary objective of this study is to find a relationship between food insecurity and methods of infant feeding (breastfeeding and combination of breastfeeding and formula). The hypothesis is a larger amount of food insecure mothers use a combination compared to food insecure mothers who exclusively breastfeed.

Literature Review

Food insecurity can cause breastfeeding and access to formula to become more difficult. Mothers who are food insecure face the problem of feeding their infants, whether they breastfeed, use formula, or do a combination of both. Mothers may feel they are not adequately nourished to provide their infants quality breastmilk, or they may feel the stress they face due to food insecurity diminishes the quality of their breastmilk and choose not to breastfeed. Some mothers are unable to breastfeed and must use formula, however, formula may be unaffordable and inaccessible to them.

Breastfeeding is believed to contribute to food security since it is a simple food system that is environmentally sustainable and affordable.[3] However, breastfeeding may be negatively impacted by experiencing food insecurity.[3] This paradox has mostly been studied in the United States and Canada[4,5,6,7,8,9], studies examining breastfeeding and food insecurity in developing countries are scarce.[10] Even with the research from the U.S. and Canada, results are mixed due to a large number of variables: initiation, duration, exclusive breastfeeding, early cessation, and levels of food insecurity.[3]

A Canadian cross-sectional study aimed to determine a relationship between breastfeeding duration and food insecurity. The study administered the "Canadian Community Health Survey" and the "Nutrition Screening for Every Preschooler (NutriSTEP)" questionnaire. As a result, they found no association between breastfeeding and food insecurity.[4] Another study from Canada studied mothers who completed the "Maternal Experiences – Breastfeeding Module" and the "Household Food Security Survey Module of the Canadian Community Health Survey (2005-2014)". This study found an association between breastfeeding and food

insecurity: food insecure mothers attempted to follow infant breastfeeding recommendations but were less able to compared to mothers who were food secure.[5] Two Canadian articles recognize the link between breastfeeding and food insecurity and advocate for public policy to promote breastfeeding at the local, provincial, and federal levels.[6,7]

An American study interviewed Hispanic mothers in New York City about their experience with pregnancy, post-pregnancy, and food insecurity.[8] A common theme throughout the interviews was that mothers worried about breastmilk quality being affected by their limited diets, which is a result of food insecurity. Many mothers were also concerned the stress related to food insecurity affected the quality of their breastmilk. Mothers also stated the need to switch to formula, thinking it would be better than their perceived low-quality breastmilk.

Another study pooled data from the Pregnancy Risk Assessment Monitoring System to find trends between food insecurity and breastfeeding initiation and duration.[9] The study found that 91.4% of food secure mothers initiated breastfeeding, compared to the 87.6% of food insecure mothers who initiated breastfeeding. The study also found that food secure mothers were more likely to breastfeed for 10+ weeks, while food insecure mothers mostly breastfed for 4-6 weeks.

Although evidence pointing towards the link between food insecurity and breastfeeding in developing countries is scarce, some studies further strengthen this relationship. For example, a study in western Kenya administered a breastfeeding questionnaire to post-partum mothers and assessed food insecurity using the "Household Food Insecurity Assess Scale."[10] The study found that decreased breastmilk intake was associated with household food insecurity. At six weeks postpartum, infants from very food insecure households consumed significantly less milk than infants from low food insecurity households.[10] The study concludes that implementing risk

screening and intervention programs can lead to an increase in the quantity of breastmilk ingested.

One study taking place in Haiti interviewed postpartum women about their experiences with breastfeeding, food insecurity, and employment.[11] The study found that many women experienced unstable and low-paying employment, and a lack of social and economic support, which leads to difficulty in accessing enough food for themselves and their children.[11] This food insecurity influenced their breastfeeding practices. Some women who could not afford enough food decided to quit breastfeeding due to fatigue, weakness, and perceived breast milk quality.[11] Undernutrition in mothers has definite negative effects on their children. However, a mother would have to be severely undernourished for their breastmilk to be insufficient. But perceived milk insufficiency seems to be widespread even among those who are not undernourished.[11]

Research on food insecurity and infant formula is also scarce, but one Canadian study states that poverty and food insecurity lead to difficulty is accessing formula due to its high price and unaffordability. Mothers often struggle to maintain an adequate supply of formula and tend turn to food banks and community organizations.[12] However, oftentimes mothers still cannot find what they need. Sometimes mothers settle for formulas that are not tolerable for the baby. As a last resort, some mothers also resort to stealing formula.[12]

Food banks and organizations throughout Canada were interviewed to find how they support and promote using formula – many do not. Of course, breastfeeding is the best choice nutritionally for infants, but not all mothers are able to breastfeed and must turn to formula. A lot of food banks and organizations do not take this into account. One interviewee stated that they only promote breastfeeding, and while they often receive donations of formula, they sent it to a food bank.[12] However, the study found when asking staff about the availability of formula, the

staff did not know.[12] The study argues that current public policy has created the issue of formula inaccessibility for food insecure mothers and must be reworked to make accessing formula easier.

Methods

Research Design

Participants were recruited in the Neonatal Intensive Care Unit at Joe DiMaggio Children's Hospital. Eligibility criteria included mothers who are 18 years old and over with an infant admitted to the NICU of Joe DiMaggio Children's Hospital who breastfeed, use formula, or do both. Mothers who do not meet the age criteria, do not have an infant in JDCH's NICU, have introduced solid food to the infant's diet, or are non-English speaking were excluded from the study. Mothers were given flyers which provide a QR code and a URL, both linking them to the Food Insecurity Survey. The Food Insecurity Survey was based off the United States Department of Agriculture's Six-Item Short Form of the Food Security Survey Module. The survey utilized branching logic to receive consent and confirm age prior to the beginning of the survey. Convenience sampling was used as this population is easy to reach. The sample size contained 31 participants.

The survey asked the participants to specify if they exclusively breastfeed, exclusively use formula, or do a combination of both. Based on their answers, they were to be split in to three groups: 1) breastfeeding, 2) formula, 3) combination. After data collection, no respondents chose that they use formula exclusively, so this group was excluded from data analysis. Participants were also asked to fill out demographic questions regarding their age, ethnicity, zip code of residence, and marital status. Survey data was collected by the survey website, Google Forms. Surveys were provided for 32 days.

Statistical Analysis

Statistical analysis included the chi-squared test to compare levels of food insecurity in each group. Microsoft Excel was used to conduct the chi-square test. Data was analyzed to find an association between each group and food insecurity and compare each group's association. Methods of feeding were measured as nominal variables: Breastfeeding and Combination. Demographic data was analyzed using the chi-squared test as well. The amount of affirmative responses (ie. "Often true" or "sometimes true", "yes", and "almost every month" or "some months but not every month") were counted for each survey. The sum of affirmatives determined level of food insecurity:

0-1: High food security

2-4: Low food security

5-6: Very low food security

These raw scores were categorized into two groups: Food secure (scores 0-1), and food insecure (scores 2-6). The categories were measured as ordinal variables: Food security = 0, Food insecurity = 1.

A p-value <0.5 will reject the null hypothesis of no relationship being present between method of infant feeding and food insecurity, while a p-value >0.5 will accept the null hypothesis.

Results

Table 1: Frequency of Food Insecurity in Total Sample

	Frequency	Percentage
Food Secure	14	45.2%
Food Insecure	17	54.8%
Total	31	100%

[a] N = 31.

[b] 54.8% of the total population is food insecure.

Table 2: Frequency of Feeding Methods in Total Sample

	Frequency	Percentage
Breastfeeding	17	54.8%
Combination	14	45.2%
Total	31	100%

[a] N = 31.

Table 3: Food Insecurity in Breastfeeding and Combination Groups

	Food Secure	Food Insecure	Total
Breastfeeding	10	7	17
Combination	4	10	14
Total	14	17	31

[a] $X^2 = 2.837$.

[b] P-value = 0.149 (>0.5).

Table 4a: Frequency of Age Groups

	Frequency	Percentage
24-29	12	38.7%
30-35	15	48.4%
36-42	4	12.9%
Total	31	100%

Table 4b: Food Insecurity in Age Groups

	Food Secure	Food Insecure	Total
24-29	4	8	12
30-35	8	7	15
36-42	2	2	4
Total	14	17	31

[a] P-value = 0.571.

Table 5a: Frequency of Ethnicity Groups

	Frequency	Percentage
Hispanic/Latino	13	41.9%
Caucasian	6	19.4%
African American	9	29.0%
Asian	1	3.2%
Pacific Islander/Hawaiian	1	3.2%
Prefer not to say	1	3.2%
Total	31	100%

Table 5b: Food Insecurity in Ethnicity Groups

	Food Secure	Food Insecure	Total
Hispanic	6	7	13
Caucasian	3	3	6
African American	3	6	9
Asian	1	0	1
Pacific Islander/Hawaiian	1	0	1
Prefer not to say	0	1	1
Total	14	17	31

[a] P-value = 0.575.

Table 6a: Frequency of Marital Status Groups

	Frequency	Percentage
Single	15	48.4%
Married	12	38.7%
Divorced	3	9.7%
Prefer not to say	1	3.2%
Total	31	100%

Table 6b: Food Insecurity in Marital Status Groups

	Food Secure	Food Insecure	Total
Single	8	7	15
Married	6	6	12
Divorced	0	3	3
Prefer not to say	0	1	1
Total	14	17	31

[a] P-value = 0.282.

Table 7a: Frequency of Zip Codes

	Frequency	Percentage
22193	1	3.2%
33020	1	3.2%
33021	2	6.5%
33022	3	9.7%
33023	1	3.2%
33024	4	12.9%
33025	7	22.6%
33026	5	16.1%
33027	2	6.5%
33133	2	6.5%
33181	1	3.2%
33321	2	6.5%
Total	31	100%

Table 7b: Food Insecurity in Most Common Zip Codes

	Food Secure	Food Insecure	Total
33025	2	5	7
33026	2	3	5
Total	4	8	12

[a] P-value = 0.679.

Discussion

The "Formula" group was being excluded from data analyses due to none of the survey respondents indicating they exclusively use formula for their infants. This may be due to surveys only being administered in Joe DiMaggio Children's Hospital's NICU, which provides donated breastmilk to mothers who are unable to breastfeed on their own. It is assumed that the nature of this population allows them to have more access to breastmilk compared to mothers with infants admitted to other units of the hospital. Statistical analysis was originally designed to include three groups (ANOVA); however, the analysis method was changed to accommodate two groups, thus the use of the Chi Squared test.

The total sample population is food insecure, according to Table 1, with 54.8% of respondents reporting food insecurity. There are 32.26% of mothers who are food insecure and do a combination of breastmilk and formula, compared to the 22.58% of mothers who are food insecure and exclusively breastfeed. However, there is no correlation to method of feeding and food insecurity. This is due to the X^2 test providing a p-value of 0.149, meaning the correlation is not statistically significant. A p-value <0.5 is required to accept the hypothesis that mothers who

breastfeed have higher food security than mothers who do a combination breastfeeding and using formula, so this hypothesis must be rejected. However, if the sample size was larger and the study had more power then it may be possible to have a p-value <0.5 and the hypothesis can be accepted.

While demographic data is not statistically significant, it does show some trends within the population. Results show that that the older the population the less food insecure they are (p=0.571). Hispanic/Latinos and African Americans seem to report the highest amount in food insecurity (p=0.575). Women who are single or married tend to be more food insecure compared to women who are divorced (p=0.282). The two most frequently reported zip codes were analyzed and found that respondents who reside in 33025 are more food insecure than those who reside in 33026 (p=0.679).

Conclusion

The study has found no association between food insecurity and method of infant feeding. While results did find that most of the sample was food insecure (54.8%), there was no significance between their food insecurity and its influence on their choice of feeding. Limitations of this study include the small sample size (n=31). With a larger sample size there is a possibility that the results will be significant. Further research is needed to find and solidify the relationship between food insecurity and choice of infant feeding.

References:

1. *Definitions of Food Security*. ers.usda.gov. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx. Published September 9, 2020. Accessed June 22, 2021.
2. Dredden CR, Coleman SM, Ettinger de Cuba S, Frank DA, Chilton M, Cook JT, Cutts DB, Heeren T, Casey PH, Black MM. Food Insecurity, Health, and Development in Children Under Age Four Years. *Pediatrics.* 2019;144(4). DOI: https://doi.org/10.1542/peds.2019-0824. Published October 1, 2019. Accessed June 22, 2021.
3. Sim SM, Rothfus M, Aston M, Kirk SFL, Frank L, Jefferies K, Macdonald M. Breastfeeding Experiences Among Mothers Living with Food Insecurity in High Resource, Western Countries: A Qualitative Systematic Review Protocol. *JBI Evidence Synthesis*. 2021;19(3):675-681. doi: 10.11124/JBIES-20-00052. Published March 2021. Accessed June 16, 2021.
4. Wong PD, Parkin PC, Moodie RG, Dai DWH, Maguire JL, Birken CS, Borkhoff CM, Total Breastfeeding Duration and Household Food Insecurity in Healthy Urban Children. *Academic Pediatrics*. 2019;19(8):884-890. https://doi.org/10.1016/j.acap.2019.02.009. Published March 1, 2019. Accessed June 16, 2021.
5. Orr SK, Dachner N, Frank L, Tarasuk V. Relation Between Household Food Insecurity and Breastfeeding in Canada. *Canadian Medical Association Journal*. 2018;190(11):312-319. doi: 10.1503/cmaj.170880. Published March 19, 2018. Accessed June 16, 2021.
6. Venu I, van den Huevel M, Wong JP, Borkhoff CM, Moodie RG, Ford-Jones EL, Wong PD. The Breastfeeding Paradox: Relevance for Household Food Insecurity. *Pediatrics &*

Child Health. 2017;22(4):180-183. https://doi.org/10.1093/pch/pxx067. Published May 24, 2017. Accessed June 16, 2021.

7. Frank L. The Breastfeeding Paradox. *Food, Culture & Society.* 2015;18(1):107-129. http://dx.doi.org/10.2752/175174415X14101814953927. Published April 29, 2015. Accessed June 16, 2021.
8. Gross RS, Mendelsohn AL, Arana MM, Messito MJ. Food Insecurity During Pregnancy and Breastfeeding by Low-Income Hispanic Mothers. *Pediatrics*. 2019;143(6). DOI: https://doi.org/10.1542/peds.2018-4113. Published June 1, 2019. Accessed June 16, 2021.
9. Dinour LM, Rivera Rodas EI, Amutah-Onukagha NN, Doamekpor LA. The Role of Prenatal Food Insecurity on Breastfeeding Behaviors: Findings from the United States Pregnancy Risk Assessment Monitoring System. *International Breastfeeding Journal*. 2020;15(30). https://doi.org/10.1186/s13006-020-00276-x. Published April 19, 2020. Accessed June 16, 2021.
10. Miller JD, Young SL, Boateng GO, Oiye S, Owino V. Greater Household Food Insecurity is Associated with Lower Breast Milk Intake Among Infants in Western Kenya. *Maternal & Child Nutrition*. 2019;15(4). https://doi.org/10.1111/mcn.12862. Published June 21, 2019. Accessed June 16, 2021.
11. Lesorogol C, Bond C, Dulience SJL, Iannotti L. Economic Determinants of Breastfeeding in Haiti: The Effects of Poverty, Food Insecurity, and Employment on Exclusive Breastfeeding in an Urban Population. *Maternal & Child Nutrition*. 2017;14(2). https://doi.org/10.1111/mcn.12524. Published October 4, 2017. Accessed June 16, 2021.

12. Frank L. Finding Formula: Community-Based Organizational Responses to Infant Formula Needs Due to Household Food Insecurity. *Canadian Food Studies*. 2018;5(1):90-112. DOI: 10.15353/cfs-rcea.v5i1.230. Published February 2018. Accessed June 16, 2021.