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Assessing Best Practices, Perceptions, and Barriers to Breastfeeding in the Appalachian Region

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A dissertation

presented to

the faculty of the Department of Biostatistics and Epidemiology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Public Health, Epidemiology

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by

Melissa White

May 2022

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Dr. Michael Smith

Dr. Randy Wykoff

Keywords: breastfeeding, best practices, maternity care practices, baby-friendly, Appalachia, disparities

ABSTRACT

Assessing Best Practices, Perceptions, and Barriers to Breastfeeding in the Appalachian Region

by

Melissa White

Background: Breastfeeding protects against a variety of adverse health outcomes for mothers and babies. Global best practices, known as the Baby-Friendly Hospital Initiative (BFHI), have been developed to support the initiation and exclusivity of breastfeeding during the post-delivery hospital stay. The aims of this study were to explore the literature related to the impact of the BFHI on breastfeeding disparities in the U.S.; compare the impact of exposure to these best practices on exclusive breastfeeding rates in Appalachian and non-Appalachian hospitals; and to understand knowledge, perceptions, and barriers to breastfeeding of postpartum mothers receiving care in a Northeast Tennessee OB/GYN clinic and regional International Board Certified Lactation Consultants' (IBCLCs®) knowledge, perceptions, and barriers to implementation of the BFHI.

Methods: A scoping review was completed to explore literature related to exposure to the BFHI and breastfeeding disparities using the Levac, Colquhoun, and O'Brien methodology. A linear regression analysis of Maternity Practices in Infant Nutrition and Care (mPINC) breastfeeding best practice scores and breastfeeding rates at discharge was conducted comparing this relationship in Appalachian and non-Appalachian hospitals. Finally, a qualitative study was conducted using semi-structured interviews and thematic analysis to gather information from postpartum mothers and regional IBCLCs®.

Results: The BFHI has been found to reduce both geographic and racial/ethnic disparities in the U.S., but there are limited studies examining this topic. While there was a significant negative

relationship between Appalachian hospitals and exclusive breastfeeding rates at discharge ($p=0.0003$), there was no significant difference in the relationship between total mPINC scores and exclusive breastfeeding rates at hospital discharge between the two designations (0.4539). Furthermore, both postpartum patients and regional IBCLCs® reported that support, education, and self-efficacy were all necessary to assist mothers on their infant feeding journey.

Implications: These findings highlight the need for studies examining the impact of the BFHI on breastfeeding disparities. Research also needs to be conducted to better understand breastfeeding rates and maternity care practices in economically distressed, rural areas of the country. Ultimately, risk-stratified interventions supporting the specific needs of a population should be identified or developed to support and empower postpartum mothers to achieve their infant feeding goals.

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Chapter 1. Introduction/Statement of the Problem

Rationale for Improving Optimal Breastfeeding Rates

Breastfeeding has been shown to protect against a variety of adverse health outcomes in both mothers and infants, making the improvement of breastfeeding rates in the United States (U.S.) a consistent goal for the past three decades (Cadwell, 1999; Ip et al., 2007; U.S. Department of Health and Human Services, n.d.-c). However, research has shown these protective effects to vary depending on the duration and exclusivity of breastfeeding, geographic characteristics of the population being studied, comparison groups, and outcomes being examined (Kramer & Kakuma, 2012). Therefore, research supporting the existence of these protective effects is seemingly inconsistent across settings and populations (Kramer & Kakuma, 2012). Moreover, breastfeeding disparities exist by geography and demographic factors (socioeconomic status, educational achievement, race/ethnicity, etc.), preventing these protective effects from being seen across all populations (Anstey et al., 2017; Bartick, Jegier, et al., 2017).

Due to the suggested protective effects of breastfeeding, global best practices to support breastfeeding behavior have been established, but are mostly targeted at improving the hospital environment to support breastfeeding initiation and exclusivity during the hospital stay after delivery (Centers for Disease Control and Prevention, 2013). Research examining the impact of the implementation of these best practices in the U.S. is relatively limited, but has shown reductions in racial/ethnic and geographic disparities (Merewood et al., 2019; Munn et al., 2016). Moreover, variation in hospital resources (e.g. financial and personnel), may contribute to inconsistent implementation of these best practices among hospitals across the nation (Semenic et al., 2012). Therefore, a primary goal of this research was to assess the impact of these best practices on breastfeeding disparities in the U.S. A secondary goal was to compare the

implementation of hospital-level best practices and hospital breastfeeding behavior in a disparate population to the rest of the U.S.

Determinants of breastfeeding behavior extend beyond the hospital setting and include all socioecological levels such as maternal and infant characteristics, social and community support, and workplace policies, indicating a need to identify and cater solutions to specific populations (Rollins et al., 2016). Learning about the existing knowledge, perceptions, and barriers to breastfeeding within a certain population can help inform interventions to better support the populations they are intended to impact. Therefore, the final goal of this research was to examine knowledge, perceptions, and barriers to breastfeeding among a rural, underserved subpopulation as well as a clinician population located in Northeast Tennessee.

History of U.S. Breastfeeding Goals and Objectives

Improving breastfeeding rates across the U.S. has been a national goal since the first iteration of Healthy People (HP) was developed by the Surgeon General in 1978, which established objectives to have at least 45% of mothers breastfeeding upon hospital discharge and 21% breastfeeding at six months postpartum (U.S. Department of Health and Human Services et al., 1984). These objectives were further supported by the office of the Surgeon General in 1984, via the Workshop on Breastfeeding and Human Lactation which was held in an attempt to determine and diminish breastfeeding barriers, especially for at-risk populations identified as low-income, low-education, and minority groups (U.S. Department of Health and Human Services et al., 1984). Subsequently, HP breastfeeding objectives were revised in 1990 (75% breastfeeding at hospital discharge and 35% breastfeeding at six months) and again in 2000 (75% and 50%, respectively) (Cadwell, 1999). HP 2010 objectives maintained the previous targets but reworded them to be 75% of women across all racial and ethnic groups breastfeeding in early

postpartum and 50% at 6 months (U.S. Surgeon General, 2001). Further, for HP 2010, an additional breastfeeding goal to have at least 25% of women across all racial and ethnic groups breastfeeding at 12 months was added (U.S. Surgeon General, 2001). In the quest to achieve these goals, the office of the Surgeon General developed a framework entitled the Blueprint for Action on Breastfeeding in 2001, which outlined a plan to create and foster partnerships between governmental agencies, community organizations, health professionals and their associated organizations, as well as family units and even individuals interested in supporting breastfeeding mothers (U.S. Surgeon General, 2001). In the 2020 iteration of HP, released in 2010, the rates of the previous three targets were increased again (81.9% of all infants ever breastfed, 60.6% breastfeeding at 6 months, and 34.1% breastfeeding at one year) and two more objectives were added (46.2% exclusively breastfeeding at 3 months and 25.5% exclusively breastfeeding at 6 months) (U.S. Department of Health and Human Services, n.d.-c). In 2011, the Surgeon General again supported these goals through the creation of a call to action report to support breastfeeding mothers, requesting a society-spanning effort to support breastfeeding across the U.S. and help the nation achieve these objectives (Department of Health et al., 2011). Data from the 2018 National Immunization Survey (NIS) indicates the HP 2020 objectives of infants ever breastfeeding (83.9%), infants breastfed at 12 months (35.0%), infants exclusively breastfed at 3 months (46.3%), and infants exclusively breastfed at 6 months (25.8%) were all met prior to 2020 (Centers for Disease Control and Prevention, n.d.-a). The meeting of these goals may have contributed to the scaled back HP 2030 goals that now only include the objectives to have 42.4% of all infants exclusively breastfed at 6 months of age and to have a total of 54.1% of infants breastfeeding at one year (U.S. Department of Health and Human Services, n.d.-a, n.d.-b). The U.S. Breastfeeding Committee played a role in maintaining the goal for infants breastfeeding at

12 months by suggesting there was a disconnect between evidence and practice and highlighting the need for more than a goal for exclusive breastfeeding at six months (United States Breastfeeding Comittee, 2019). A timeline of these HP objectives and Surgeon General initiatives is provided in Appendix A.

Evidence to Support National Goals and Objectives

These initiatives and goals have historically been and continue to be based on and supported by evidence surrounding the protective effects of breastfeeding for both mothers and infants. Research has shown that breastfeeding protects against a variety of adverse health outcomes for both mothers (reduced risk for the development of obesity, type II diabetes, hypertension, and short interval pregnancies) and babies (reduced risk for asthma, type I diabetes, and sudden infant death syndrome) (Centers for Disease Control and Prevention, n.d.-b; Victora et al., 2016). However, these benefits vary depending on geographic setting, demographic characteristics, the exclusivity and duration of breastfeeding, as well as the level of breastfeeding in which the outcomes are being compared against (e.g. no breastfeeding, exclusive breastfeeding for the first four months, etc.) (Victora et al., 2016).

A seminal report developed in 2007 by Tufts-New England Medical Center Evidence-based Practice Center in Boston, Massachusetts, for the Agency for Healthcare Research and Quality (AHRQ) found that, in developed countries, past exposure to breastfeeding was associated with reduced risk for infant development of ear infection, gastrointestinal illness, lower respiratory tract infections, eczema, asthma, obesity, diabetes mellitus (types I &II), leukemia, sudden infant death syndrome (SIDS), and short bowel syndrome (SBS) (U.S. Surgeon General, 2001). Further, results demonstrated that breastfeeding was associated with reduced maternal risk for the development of type II diabetes, along with reduced risk for both ovarian

and breast cancers; and early weaning or lack of breastfeeding was associated with greater risk for postpartum depression (U.S. Surgeon General, 2001). Despite these promising findings, there were key limitations associated with the research utilized for this report, such as a range in breastfeeding durations being assessed, lack of consistent definition of breastfeeding exclusivity, lack of consistent comparison group (e.g. never breastfed, supplemented breastfeeding, etc.), and various levels of quality of the studies included (U.S. Surgeon General, 2001).

Similarly, results of a systematic review conducted by Kramer & Kakuma (2012) found that exclusive breastfeeding for the first six months was associated with reduced infant risk of gastrointestinal illness compared to infants breastfed for only the first three to four months. Moreover, these results indicated no growth discrepancies between the two groups, suggesting that exclusive breastfeeding for the first six months is not associated with stifled development (Kramer & Kakuma, 2012). Results of the systematic review also indicated mothers breastfeeding exclusively for the first six months had prolonged return of their menstrual cycle and lost weight more quickly compared to mothers exclusively breastfeeding for three to four months (Kramer & Kakuma, 2012). The researchers noted differences in exclusive breastfeeding definitions between studies included in their review, limiting their comparability as well as the evidence in support of or against the researchers' findings, corroborating the need for more consistent definitions of exclusivity within breastfeeding research (Kramer & Kakuma, 2012). While these studies provide promising evidence to support a plethora of benefits related to breastfeeding for both mothers and babies, there needs to be clarity and consistency related to the circumstances in which those benefits have been seen.

The evidence to support the association between breastfeeding and reduced risk for various infant adverse health outcomes is underpinned by the Developmental Origins of Health

and Disease (DOHaD) framework, which suggests that early-life exposures to various environmental factors during fetal and infant development have long-term health implications (Stiemsma & Michels, 2018). This is proposed to occur via early programming, in which an environmental factor may stimulate nutritional, hormonal, or metabolic factors during a critical period of development that can affect the physiology of the body and result in long-term health implications (Eriksson, 2016). Researchers suggest the gut microbiome to be a potential pathway in which breastfeeding can impact long-term health outcomes (Pannaraj et al., 2017). Results of a longitudinal study assessing the relationship between bacterial diversity of the infant microbiome and percent of daily milk intake attributed to breastfeeding showed that infant microbiome diversity was significantly associated with the amount of breastmilk infants were receiving (Pannaraj et al., 2017). Researchers also suggest that breastfeeding impacts the gut microbiome via the exposure to bacteria on the maternal areolas, bacteria within breastmilk itself, and through the sugars in breastmilk that support bacterial growth in the infant microbiome (Pannaraj et al., 2017).

The American Academy of Pediatrics and the U.S. Dietary Guidelines for Americans suggest that exclusive breastfeeding for the first six months of life followed by supplemented (breastfeeding with some supplementation of formula or other substances) breastfeeding for the first 12 months of life is considered optimal breastfeeding behavior that results in reduced adverse health outcome risks for both mothers and children (CDC - DNPAO & CDC - NCCPHP, 2021; Hayes et al., 2014; Healthy Children.org & American Academy of Pediatrics (AAP), 2021; USDA, 2020). However, data measuring such behavior in full is limited. Therefore, for the purpose of this research, optimal breastfeeding (OB) is defined as breastfeeding without any supplementation from formula or any other liquid (exclusive breastfeeding) for the first six

months of life, and suboptimal breastfeeding (SB) is defined as not meeting the exclusivity or duration criteria associated with OB (Hayes et al., 2014).

Disparities and Epidemiologic Trends in Breastfeeding Behavior

Despite the known benefits of breastfeeding, HP breastfeeding objectives, and Surgeon General initiatives to improve exclusivity and duration of breastfeeding for the last three decades, disparities in breastfeeding duration and exclusivity persist in the U.S. by race/ethnicity, socioeconomic status, maternal educational attainment, geographic location, and maternal age (Anstey et al., 2017; Grummer-Strawn et al., 2006; Li & Grummer-Strawn, 2002). For example, Li & Grummer-Strawn (2002) examined National Health and Nutrition Examination Survey (NHANES) data from 1988-1994 and found that around 25% of non-Hispanic Black infants were ever breastfed compared to 54% of Mexican American infants, and 60% of non-Hispanic White infants during that time (Li & Grummer-Strawn, 2002). Similarly, the researchers found that only 8.5% of non-Hispanic Black infants were exclusively breastfed at 4 months compared to 26.8% of non-Hispanic White infants and 20.4% of Mexican American infants from 1991-1994 (Li & Grummer-Strawn, 2002). Geography was also found to contribute to disparities in breastfeeding behavior, with infants across all racial and ethnic groups residing in the southern U.S. having the lowest prevalence of ever being breastfed (1988-1994) compared to those residing in the Northeast, Midwest, and Western U.S. (Li & Grummer-Strawn, 2002). Moreover, infants residing in a rural area had lower rates of ever breastfeeding and breastfeeding at six months across all racial/ethnic groups compared to their metropolitan counterparts (Li & Grummer-Strawn, 2002).

This research was furthered in 2006 using National Immunization Survey (NIS) data, in which Grummer-Strawn et al. (2006) estimated that almost three quarters of non-Hispanic White

infants compared to only around half of non-Hispanic Black infants had been ever breastfed in the U.S. Of those ever breastfed, over half non-Hispanic White infants and only around 40% of Black non-Hispanic infants did so through 6 months of age (Grummer-Strawn et al., 2006). Further, breastfeeding disparities among racial and ethnic group by region persisted, with non-Hispanic White infants being breastfed at six months having the lowest rates in the Southern U.S. and non-Hispanic Black infants being breastfed at six months having the lowest rates in the Western U.S. (Grummer-Strawn et al., 2006). Despite differences in the lowest rate of breastfeeding by geographic region, researchers found that both non-Hispanic White and non-Hispanic Black infants residing in the Northeastern U.S. compared to the Midwest, South, and Western parts of the U.S. had the highest rate of being breastfed at six months (Grummer-Strawn et al., 2006). Moreover, residents in non-metropolitan service areas (MSA) had the lowest rates of ever breastfeeding and breastfeeding at six months in both non-Hispanic Black and non-Hispanic White infants compared to non-central and central cities (Grummer-Strawn et al., 2006).

More recently, using NIS data, Anstey et al. (2017) estimated that from 2011-2015, 79.2% of all infants in the U.S. had ever breastfed, 20.0% were exclusively breastfed at six months of age, and 27.8% were breastfed with supplementation from other foods and/or liquids at 12 months. The researchers found disparities in rates by race/ethnicity, with around 81.5% of non-Hispanic White infants being ever breastfed compared to 64.3% of non-Hispanic Black and 81.9% of Hispanic mothers, and around 22.5% of non-Hispanic, White infants exclusively breastfed through six months compared to 14.0% of non-Hispanic Black and 18.2% of Hispanic infants (Anstey et al., 2017).

Relevance to Population of Interest

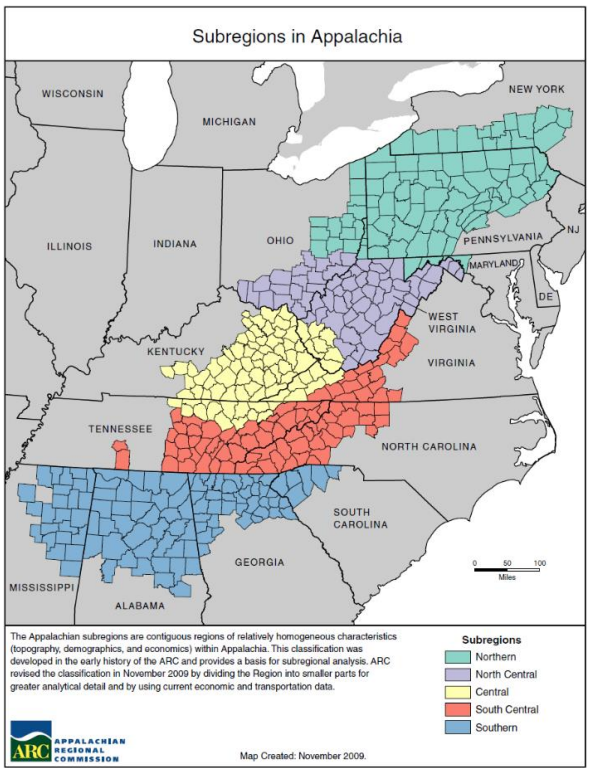
As mentioned above, OB is suggested to help reduce risk for the development of some chronic illnesses such as diabetes and obesity in infants and mothers as well as hypertension in mothers (Centers for Disease Control and Prevention, n.d.-b; Ip et al., 2007; Victora et al., 2016). Appalachia, a region spanning from New York to Mississippi, disproportionately faces many adverse health outcomes including the aforementioned chronic illnesses in which breastfeeding is suggested to protect against (Marshall et al., 2017). According to a report developed by the Appalachian Regional Commission (ARC), the Appalachian region had higher rates of heart disease (204 per 100,000 population), stroke (43.8 per 100,000), and diabetes (23.8 per 100,000) associated mortality compared to the rest of the U.S. (173, 38.0, and 21.3, respectively, per 100,000) from 2008-2014 (Marshall et al., 2017). Similarly, the diabetes (11.9%) and adult obesity (31.0%) rates within Appalachia were higher than the rest of the U.S. for the same years (9.6% and 27.1%, respectively) (Marshall et al., 2017).

There is also great variation in these health outcomes within Appalachia, which is separated into five subregions: Southern Appalachia, South Central Appalachia, Central Appalachia, North Central Appalachia, and Northern Appalachia (Figure 1.1). For heart disease (249 per 100,000) and diabetes (30.4 per 100,000) deaths, as well as for diabetes (13.5%) and adult obesity (34.7%) prevalence, Central Appalachia had the highest rates of the subregions from 2008-2014 (Marshall et al., 2017). Additionally, Central Appalachia has a high concentration of rural counties as well as economically distressed counties, where research has shown both characteristics to be associated with lower rates of ever breastfeeding and

breastfeeding for six months (Figures 1.2 & 1.3) (Grummer-Strawn et al., 2006; Marshall et al., 2017).

Figure 1.1

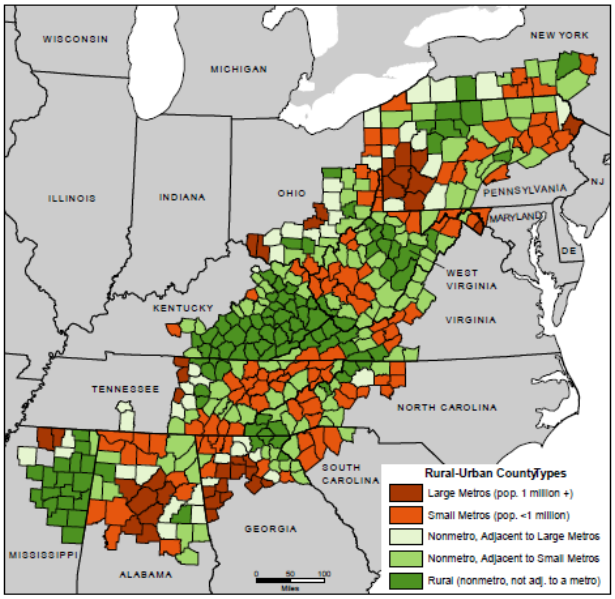
Subregions in Appalachia



Marshall, J. L., Thomas, L., Lane, N. M., Holmes, G. M., Arcury, T. A., Randolph, R., Silberman, P., Holding, W., Villamil, L., Thomas, S., Lane, M., Latus, J., Rodgers, J., & Ivev, K. (2017). *Creating a culture of health in Appalachia: Health disparities in Appalachia* (Issue August). https://www.arc.gov/assets/research_reports/Health_Disparities_in_Appalachia_August_2017.pdf

Figure 1.2

Rurality in Appalachia

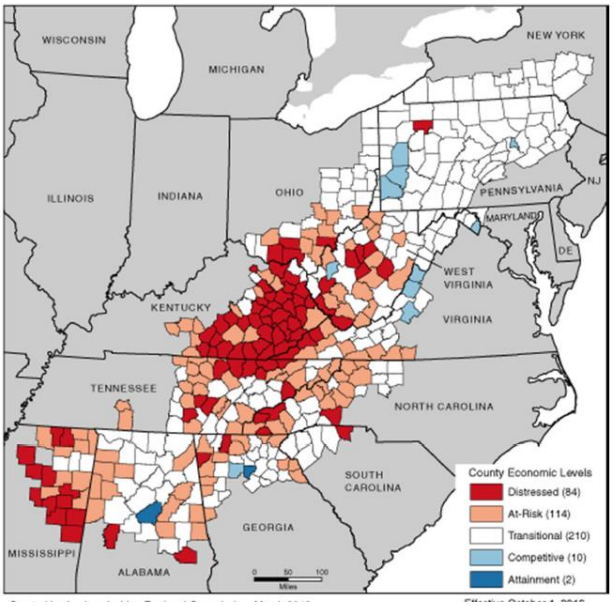


Source: USDA, Economic Research Service, 2013 Urban Influence Codes. Condensed by ARC. Figure created by ARC, October 2016.

Marshall, J. L., Thomas, L., Lane, N. M., Holmes, G. M., Arcury, T. A., Randolph, R., Silberman, P., Holding, W., Villamil, L., Thomas, S., Lane, M., Latus, J., Rodgers, J., & Ivev, K. (2017). *Creating a culture of health in Appalachia: Health disparities in Appalachia* (Issue August). https://www.arc.gov/assets/research_reports/Health_Disparities_in_Appalachia_August_2017.pdf

Figure 1.3

Economic Stability in Appalachia



Marshall, J. L., Thomas, L., Lane, N. M., Holmes, G. M., Arcury, T. A., Randolph, R., Silberman, P., Holding, W., Villamil, L., Thomas, S., Lane, M., Latus, J., Rodgers, J., & Ivev, K. (2017). *Creating a culture of health in Appalachia: Health disparities in Appalachia* (Issue August). https://www.arc.gov/assets/research_reports/Health_Disparities_in_Appalachia_August_2017.pdf

Geographic characteristics may be a contributing factor to the persistent adverse health outcome disparities experienced by and within the Appalachian region. Wykoff (2020) suggests that there are four pillars of the intergenerational cycle of rural health as poverty, lower educational achievement, negative health behaviors, and limited access to healthcare that perpetuate these disparities over generations (Wykoff, 2020). Therefore, due to the region's increased rates of diabetes and obesity in concert with OB's suggested protective effects against the development of these diseases, working to better understand and improve OB rates in Appalachia by identifying and working to reduce breastfeeding barriers could help to interrupt the intergenerational cycle of health in Appalachia.

Potential Return on Investment

Across the U.S., the estimated number of deaths associated with SB totals an estimated 3,340 every year (Bartick, Schwarz, et al., 2017). Of those 3,340, around 2,600 are maternal deaths related to heart attack, breast cancer, and diabetes mellitus, and more than 700 infant deaths primarily associated with SIDS or gastrointestinal death (Bartick, Schwarz, et al., 2017). The total financial burden of SB is estimated to be over $17 million in medical and premature mortality costs (Bartick, Schwarz, et al., 2017). Moreover, researchers estimate that 600 mothers optimally breastfeeding saves one life (Bartick, Schwarz, et al., 2017). While this is a national estimate of the financial and mortality burden of SB, the known disparities in heart disease, stroke, and diabetes mortality experienced by the Appalachian region make it an ideal geography to focus OB improvement efforts. Ultimately, supporting OB behavior in the Appalachian region could help save both lives and money that is spent on medical care and death-related costs associated with SB.

Determinants and Amenable Risk Factors

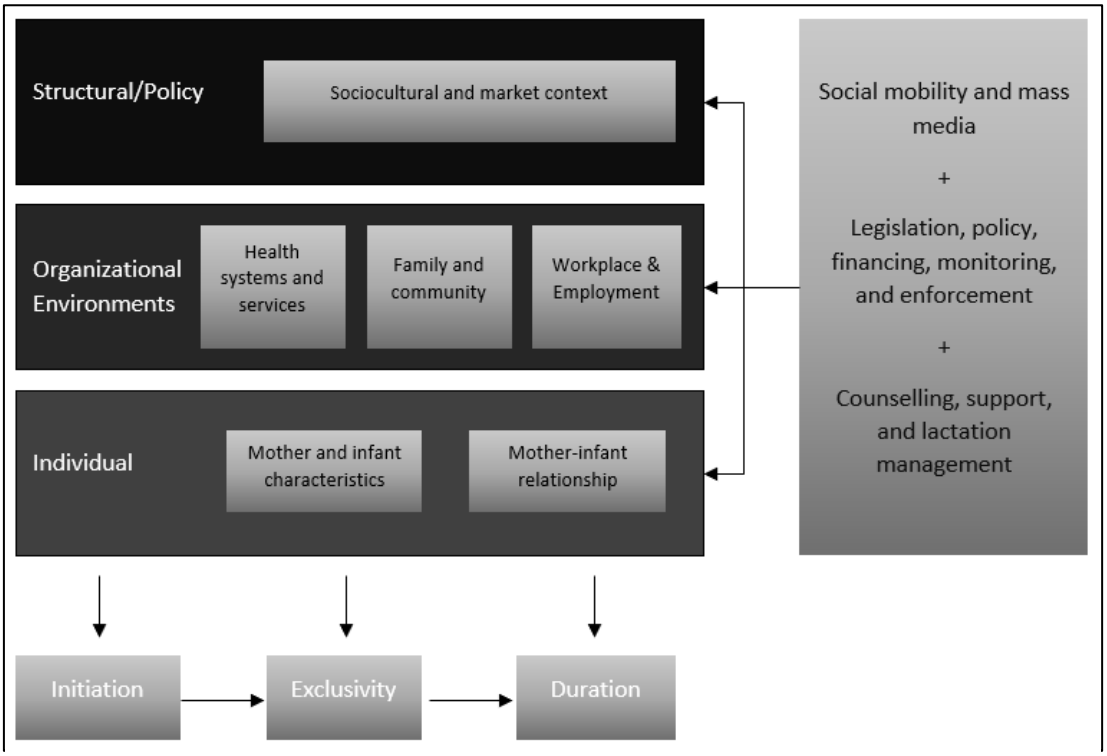
Determinants of breastfeeding behavior can be derived from the socio-ecological model (Rollins et al., 2016). Breastfeeding intention is a primary individual-level determinant of breastfeeding behavior, with perceived risks, benefits, and social norms influencing intention (Rollins et al., 2016). Infant characteristics such as fussiness, ability to latch, and birthweight are also influencers of breastfeeding behavior (Rollins et al., 2016). Maternal behaviors, such as smoking, as well as maternal morbidity, such as obesity and mental illness, are also individual characteristics affecting maternal breastfeeding behavior (Rollins et al., 2016). Further, maternal access and exposure to prenatal care, especially breastfeeding education, can be predictive of ever breastfeeding, longevity, and exclusivity (Costanian et al., 2016). Similarly, an eligible

mother's decision to participate in the Special Supplemental Nutrition Program for Women Infants and Children (WIC) has been found to relate to breastfeeding behavior, where research has found participation in WIC to be associated with lower rates of breastfeeding compared to non-participation (Houghtaling et al., n.d.). Interpersonal factors, especially partner and female relatives' attitudes and perceptions of breastfeeding, also influence such behavior (Rollins et al., 2016). Social norms determining acceptability of breastfeeding in public settings are community-level determinants of breastfeeding behavior (Rollins et al., 2016). Hospital policies relate to organizational determinants of behavior and tend to determine provider knowledge of breastfeeding (Rollins et al., 2016). Therefore, such policies may affect breastfeeding initiation immediately after birth, which affects long-term breastfeeding behavior (Rollins et al., 2016). Workplace policies and infrastructure such as breaks, designated lactation rooms, and maternity/paternity leave are also aspects of the environment that influence breastfeeding behavior (Rollins et al., 2016). Finally, at the environmental level, formula marketing practices and policies have also been identified as breastfeeding behavior determinants (Rollins et al., 2016). WIC eligibility and policies have also been found to affect breastfeeding behavior (Houghtaling et al., n.d.). Epidemiologic research has identified maternal educational achievement, breastfeeding education, maternal-infant separation after birth, parity, mode of delivery, and smoking status to be consistent determinants of breastfeeding behavior (Cohen et al., 2018). However, breastfeeding intention, maternal behaviors, maternal access and exposure to prenatal care, social support and family/peer attitudes, social norms, hospital and workplace policies, and formula marketing policies are determinants amenable to change.

Rollins et al. (2016) suggests interventions to address these varying levels of amenable determinants include social mobilization, legislation and policy, and counseling and support (Figure 1.4). Therefore, this research is focused on better understanding these amenable determinants and known breastfeeding interventions as they relate to breastfeeding in the Appalachian region. The overall project aims and competencies that were addressed are provided below.

Figure 1.4

Determinants and Interventions of Breastfeeding



Developed from: Rollins, N. C., Bhandari, N., Hajeebhoy, N., Horton, S., Lutter, C. K., Martines, J. C., Piwoz, E. G., Richter, L. M., & Victora, C. G. (2016). Why invest, and what it will take to improve breastfeeding practices? *The Lancet*, *387*(10017), 491–504. https://doi.org/10.1016/S0140-6736(15)01044-

Project Aims

The following aims were explored:

1. Aim 1: To synthesize the evidence surrounding impact of the Baby-Friendly Hospital Initiative's maternity care best practices impact on breastfeeding disparities

    a. Product: scoping literature review and associated evidence matrix

2. Aim 2: To compare breastfeeding best practice implementation and breastfeeding behavioral outcomes in Appalachian vs non-Appalachian hospitals (NY, PA OH, MD, WV, VA, NC, SC, GA, AL, MS, TN, KY).
    a. Product: Empirical manuscript
    b. Connected hospital-level Maternity Practices in Infant Nutrition and Care (mPINC) data to SAS dataset and ARC dataset
3. Aim 3: To assess breastfeeding perceptions and barriers among women receiving health care at ETSU's OB/GYN clinic and assess regional International Board-Certified Lactation Consultants' (IBCLC®) views on relevance and implementation of breastfeeding best practices as well as perceived barriers to breastfeeding for their patients.
    a. Product: Empirical manuscript with a focus on policy and practice implications
    b. Qualitative interviews were conducted with patients and IBCLCs®

Integrative Learning Experience Competencies

Table 1.1

Integrative Learning Experience Competencies

Subject	Description	ILE Integration
Data Analysis	Design a qualitative, quantitative, mixed methods, policy analysis or evaluation project to address a public health issue	Aim 2: quantitative study using mPINC Aim 3: primary qualitative data collection and analysis of lactation consultants and patients
Data Analysis	Explain the use and limitations of surveillance systems and national surveys assessing, monitoring, and evaluating policies and programs and to address a populations health	Chapter 1: Background/intro – gaps in existing data/surveillance Aim 1: Scoping literature review – gaps in interventions
Policies & Programs	Integrate knowledge of cultural values and practices in the design of public health policies and programs	Aim 3: qualitative study to help better understand perceptions of and barriers to breastfeeding
Policies & Programs	Propose interprofessional team approaches to improving public health	Aim 3: qualitative study assessing IBCLCs'® perceptions and barriers to implementing BF best practices in clinical settings
Education & Workforce Development	Assess an audience's knowledge and learning needs	Aim 3: qualitative assessment of IBCLCs'® perceptions and barriers to implementing BF best practices in clinical settings
Leadership, Management, & Governance	Integrate knowledge, approaches, methods, values, & potential contributions from multiple professions and systems in addressing public health problems	Aim 1 – assesses contribution to address breastfeeding Aim 3

Leadership, Management, & Governance	Propose strategies for health improvement and elimination of health inequities by organizing stakeholders, including researchers, practitioners, community leaders, & other partners	Aim 3 Dissertation defense
Epidemiology	Critically review and interpret public health and other scientific literature to synthesize evidence in a public health area, identify gaps in evidence, and propose further epidemiologic investigation	Aim 1: Scoping literature review & evidence matrix
Epidemiology	Apply the ethical and legal principles, including the concepts of human subject's protection and confidentiality, related to collection, management, use and dissemination of epidemiologic data for the conduct of research and public health practice	Aim 2: IRB Form 129 – mPINC Aim 3: Formal IRB proposal to conduct qualitative research
Epidemiology	Apply appropriate methods and correctly interpret complex and multifaceted data analysis in determining risk factors and causes of health and disease in populations	Aims 1, 2, & 3
Epidemiology	Demonstrate proficiency in the use of computer software for data entry, database management, data analysis, and displaying and reporting results	Aims 2 & 3

Stakeholder Engagement Plan

Stakeholders at the organizational, community, and regional levels may be interested in this research. Stakeholders at the organizational level may include ETSU academic researchers and clinicians from the College of Public Health and OB/GYN clinics, respectively. Academic researchers from ETSU having a focus on maternal and child health include individuals such as Dr. Michael Smith, Dr. Kate Beatty, Dr. Katie Baker, and Dr. Amal Khoury. Clinicians specializing in maternal and child health, such as lactation consultants, OB/GYNs and pediatricians, may also be interested in this work. These professionals include individuals such as lactation consultant, Gloria Dudney, RN, IBCLC®, RLC, and pediatrician Dr. Karen Schetzina, MD, MPH, CLC, FAAP.

The Child and Family Health Institute (CFHI) is a community organization that will be included as a primary stakeholder. The CFHI is a collaborative institute that has four focus areas (supporting communities, eliminating disparities, empowering families, and understanding COVID-19's impact on children) to help improve child and family health in our region (Houghtaling et al., n.d.). Co-investigator (CI), Gloria Dudney, and principal investigator (PI), Melissa White, have already given a talk in the CFHI's Collaborative series on reconciling breastfeeding best practices with environmental realities and hope to continue this effort after the current research has been conducted. The CFHI includes both academic and non-academic community members.

This research will be primarily disseminated through the dissertation defense of this work to the stakeholders. Invitations to potential stakeholders will be provided to this event through the COPH, the Child and Family Health Institute (CFHI), and ETSU OB/GYN clinic. A secondary dissemination goal includes the publication of chapters 2-4, which address aims 1-3,

in peer-reviewed, academic journals, such as the Journal of Human Lactation, the Journal of Maternal and Child Health, or Breastfeeding Medicine. Moreover, this research will be submitted for presentations at conferences such as CityMatCH. CityMatCH is a national maternal and child health organization for programs within city and county health departments (CityMatCH, 2018). Their annual conference brings together maternal and child health professionals from a variety of disciplines working to improve maternal and child health policy, research, and data (Houghtaling et al., n.d.). In addition to the dissertation defense, publications, and conferences, this research may support the updates of existing literature that inform breastfeeding policy changes, be disseminated through the CFHI collaborative series for both ETSU and community members.

Chapter 2. Examining the Impact of the Baby-Friendly Hospital Initiative on Breastfeeding Disparities in the U.S. - A Scoping Review

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Running Title: Impact of BFHI on Breastfeeding Disparities

Abstract

Background Breastfeeding protects against a variety of short and long-term adverse health outcomes in mothers and babies. Breastfeeding best practices such as the Baby-Friendly Hospital Initiative (BFHI) have been established to support improvements in breastfeeding behavior and rates. Despite development of these best practices and improvements in breastfeeding rates in the U.S., breastfeeding disparities persist among various demographic racial/ethnic and geographic groups. Therefore, the purpose of this scoping review was to explore the existing literature examining the impact of the BFHI best practices on breastfeeding behavior disparities.

Methods The Levac, Colquhoun, and O'Brien expansion of the Arksey and O'Malley scoping review framework was used to assess the current state of the literature. Studies included in the final sample were conducted in or compiled research from the U.S., were written in English, and addressed the question, "how does the BFHI impact breastfeeding behavior disparities?"

Results A total of 20 studies were included in this scoping review examining the impact of the BFHI on the relationship between education, employment, geography, other maternal/infant characteristics, race/ethnicity, and socioeconomic status and breastfeeding outcomes. The BFHI was found to impact the relationship between educational attainment, maternal body mass index (BMI), race/ethnicity, and socioeconomic status and breastfeeding behavior outcomes.

Key Findings Exposure to the BFHI reduced breastfeeding disparities experienced by mothers with lower educational attainment, mothers with higher BMIs, non-Hispanic Black mothers, and mothers experiencing poverty. However, more research needs to be conducted examining the impact of the BFHI on breastfeeding disparities in the U.S.

Introduction

Research has shown that ever breastfeeding is associated with a variety of reduced maternal and child morbidity risks.[1] In a formative report developed for the Agency for Healthcare Research and Quality (AHRQ), Ip et al. determined that ever breastfeeding was associated with reduced risk for ear infections, eczema, asthma, obesity, types 1 and 2 diabetes, childhood leukemia, sudden infant death syndrome, and necrotizing enterocolitis.[1] The researchers also indicated that ever breastfeeding was associated with reduced maternal risk for the development of type 2 diabetes and breast and ovarian cancers.[1] More recently, in 2012, Kramer & Kakuma examined the effects of exclusive breastfeeding for the first six months of life compared to exclusive breastfeeding for the first three to four months on child growth, development, and morbidity as well as maternal morbidity.[2] The researchers found that infants being breastfed exclusively for the first six months of life were at reduced risk for gastrointestinal infections.[2] In 2016, Binns, Lee, & Low found evidence suggesting that breastfeeding was associated with increased cognitive ability (as measured by IQ), as well as reduced risk for the development of maternal and child obesity, type II diabetes, and high blood pressure.[3]

The evidence of the protective effects of breastfeeding contributed to governmental support for the improvement of breastfeeding rates. This support has been exemplified by the Surgeon General's Workshop on Breastfeeding and Lactation conducted in 1984, the Blueprint for Action on Breastfeeding in 2001, and the Call to Action to support breastfeeding in 2011.[4–6] Furthermore, improving breastfeeding behavior rates has also been a national goal for the last three decades, as demonstrated by Healthy People (HP) objectives from 1990-2030.[7–9] These objectives were scaled back from five objectives in 2020 to only two in 2030 (Table 2.1),

which may have been due to the achievement of four of the 2020 objectives based on results from the 2018 National Immunization Survey (NIS) data.[10]

Table 2.1

Healthy People Breastfeeding Objectives: 2020 & 2030

Year	Goal	Target Percentage	2018 Percentage	Achieved
2020	Increase percentage of infants ever breastfed	81.9%	83.9%	Yes
	Increase percentage of infants breastfed at six months	60.6%	56.7%	No
	Increase percentage of infants breastfed at one year	34.1%	35.0%	Yes
	Increase percentage of exclusively breastfed infants at three months	46.2%	46.3%	Yes
	Increase percentage of exclusively breastfed infants at six months	25.5%	25.8%	Yes
2030	Increase percentage of infants exclusively breastfed at six months	42.2%	-	-
	Increase percentage of infants breastfed at one year	54.1%	-	-

*Achievement based on 2018 (latest release) National Immunization Survey Data: https://nccd.cdc.gov/dnpao_dtm/rdPage.aspx?rdReport=DNPAO_DTM.ExploreByTopic&islClass=BF&islTopic=BF1&go=GO

Despite these improvements in breastfeeding rates, disparities in breastfeeding initiation and duration have persisted over time especially by race/ethnicity and geography.[11–13] Results from the National Health and Nutrition Examination Survey (NHANES) data from 1988-1994 estimated that only 25% of non-Hispanic Black infants were ever breastfed and only 8.5% were exclusive breastfed for four months compared to 60% and 26.8% of their non-Hispanic White counterparts, respectively.[12] Results also indicated the lowest rates of being ever breastfed across all racial/ethnic groups were seen in the southern U.S. compared to other areas of the country, and that those living in a rural area had lower rates of ever breastfeeding and exclusively breastfeeding at six months compared to infants living in metropolitan areas.[12]

Similar patterns were seen in 2004, with results from the NIS indicating that nearly 75% of non-Hispanic White infants were ever breastfed compared to only around 50% of non-Hispanic Black infants.[13] Non-Hispanic Black infants living in the Western region of the U.S. and non-Hispanic White infants living in the Southern U.S. had the lowest rates of breastfeeding at six months within their racial/ethnic groups.[13] However, both non-Hispanic Black and non-Hispanic White infants living in rural areas had lower rates of ever breastfeeding and breastfeeding at six months compared to infants of the same group living in non-central and central cities.[13]

In 2017, Anstey et al. used NIS data to estimate that 64.3% of non-Hispanic Black infants were ever breastfed and 14.0% were exclusively breastfed through six months of age compared to 81.5% and 22.5% of non-Hispanic White infants, respectively.[11] Furthermore, a recent study found that racial disparities between Black and White populations in breastfeeding duration were lessened when comparing only infants who had initiated breastfeeding.[14] Therefore, interventions focused on supporting the initiation of breastfeeding mothers across racial groups could potentially reduce these disparities.

One such example is the Baby-Friendly Hospital Initiative (BFHI) which was developed by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) in 1991 and updated in 2018 (Table 2.2).[15,16] The BFHI is a global effort to improve breastfeeding rates around the world that includes ten steps to support breastfeeding mothers in the hospital setting.[15] The U.S. adopted this initiative, entitled Baby Friendly USA, and accredited its first Baby-friendly hospital in 1996.[17] Globally, the BFHI has been found to improve short and long-term health outcomes across demographic groups.[18,19] There are a few recent compilation studies (reviews, meta-analyses, or systematic reviews) examining the impact of the initiative

specifically on infant and maternal health outcomes or breastfeeding behavior outcomes in the U.S., but few investigating the impact on various subgroups within the population.[18–20] The current literature suggests that the BFHI supports improvements in breastfeeding behavior.[21–24] However, recent observational studies in the U.S. have indicated that the BFHI helps to reduce racial and geographic breastfeeding disparities.[25–27] Given the persistent gaps in breastfeeding behavior by racial/ethnic groups and geographic regions, despite overall increasing breastfeeding behavior rates in the U.S. and the implementation and effectiveness of the BFHI, more research is needed to understand the impact of the BFHI on breastfeeding behavior disparities among various population groups within the U.S.

Table 2.2

Baby-Friendly Hospital Initiative - Ten Steps to Successful Breastfeeding
1. A) Comply fully with the International Code of Marketing of Breastmilk Substitutes and relevant World Health Assembly resolutions B) Have a written breastfeeding policy that is routinely communicated to all health care staff C) Establish ongoing monitoring and data-management systems
2. Ensure that all staff has sufficient knowledge, competence, and skills to support breastfeeding
3. Discuss the importance and management of breastfeeding with pregnant women and their families
4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties
6. Do not provide breastfed newborns any food or fluids other than breastmilk, unless medically indicated
7. Enable mothers and their infants to remain together and to practice rooming-in 24 hours a day
8. Support mothers to recognize and respond to their infants' cues for feeding
9. Counsel mothers on the use and risks of feeding bottles, artificial nipples (teats) and pacifiers.
10. Coordinate discharge so that parents and their infants have timely access to ongoing support and care.

Reference: Baby-Friendly USA ~ 10 Steps & International Code. https://www.babyfriendlyusa.org/for-facilities/practice-guidelines/10-steps-and-international-code/

Rationale

The limited number of compilation studies examining the impact of the BFHI on breastfeeding disparities in the U.S. illuminates an important gap in the literature that needs to be filled. Therefore, a scoping review is the ideal process by which to help fill these gaps through the systematic mapping of existing literature in order to establish the current state of the research.[28]

Objectives

The primary objective of this scoping literature review was to synthesize evidence regarding the relationship of the BFHI and breastfeeding disparities in the U.S., and to answer the question: how does the BFHI impact breastfeeding disparities, specifically in the U.S.?

Methods

The Levac, Colquhoun, and O'Brien expansion of the Arksey and O'Malley scoping review framework was used to develop the methods for the current project. Arksey and O'Malley outline six steps to conducting such reviews, which includes identifying the research question, identifying relevant studies, selection of studies, charting of the data, summarizing and reporting the results, and potentially consulting with stakeholders on the relevance of the results.[29] Levac, Colquhoun, and O'Brien expanded upon this work by breaking down these steps and further explaining how to achieve them.[30] Lastly, the PRIMSA-ScR guidelines were used to develop the report of this scoping review.[31]

PubMed, CINHAHL, and Cochrane Database of Systematic Reviews were used to search for articles related to the BFHI and breastfeeding disparities in the U.S. To be included in the review, articles had to be published in English, have been conducted in the U.S., and have used BFHI (or related term) or breastfeeding as a key predictor or outcome variable, respectively.

Studies were excluded when breastfeeding or BFHI (or an alternative term) was used only as a potential confounder in the study or if it was the only study setting (e.g., no comparison time or group). The search for eligible studies was conducted from 2/23/22-3/4/22. Example search terms for all databases included Baby-friendly, baby friendly, hospital, breastfeeding, breastfeeding disparities, and disparities. Quantitative meta-analyses, systematic reviews, clinical trials, and observational studies were all eligible to be included in the review along with any qualitative studies and any commentaries, editorials, or other gray literature that may shed light on research relating to the BFHI and breastfeeding disparities in the U.S. Variables were extracted by the principal investigator and two secondary extractors. Variables included author(s), title, year of publication, journal, publication type, location, aim/purpose, population of interest, sample size, study design, intervention, predictor variable(s), outcome variable(s), results, relevant findings to the current review.[32]

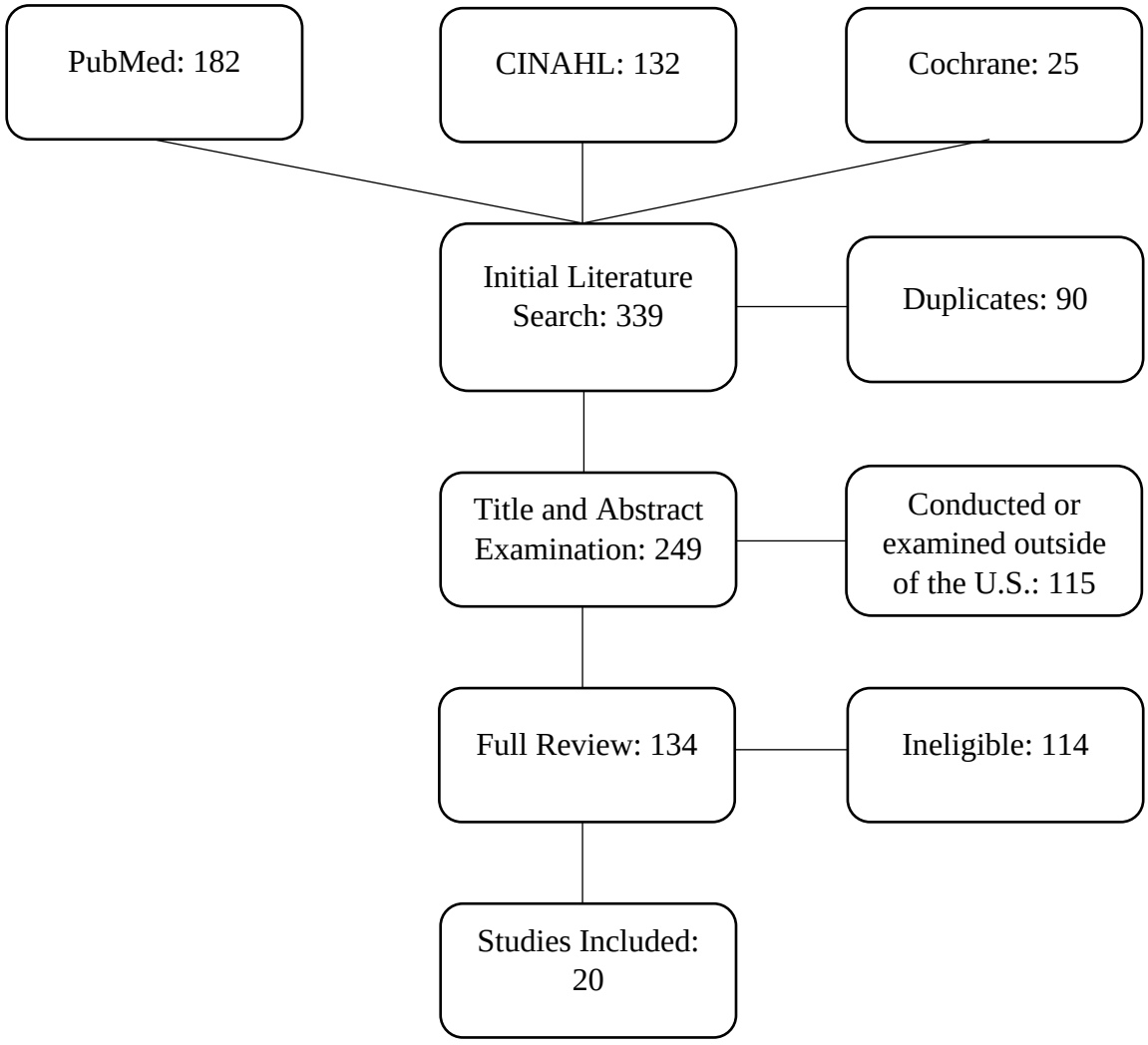
Results

A total of 339 potential studies were found from the initial literature search (Figure 2.1). Of those, 182 were from PubMed, 132 were from CINAHL, and 25 were identified in Cochrane Database of Systematic Reviews. There were 90 duplicates between PubMed and CINAHL and zero duplicates between Cochrane and the other two databases, reducing that total to 249. The titles and abstracts were then examined for the location of the study, where 115 studies not conducted in the U.S. or reviews including studies from other countries were excluded. The remaining 134 were assessed, with another 114 being excluded because they were not focused on the U.S., did not address the research question of interest, and/or did not include the BFHI as a primary predictor variable, leaving the research team with a total of 20 studies from which to abstract data. Breastfeeding disparities were grouped by the following categories: education,

employment, geographic, other characteristics, racial, and socioeconomic (Table 2.2). Studies ranged in publication date (2003 to 2022), with all being published in a peer-reviewed journal (Table 2.3, page 57).

Figure 2.1

Literature Search and Studies Included



BFHI and Education

There were two studies that specifically assessed the impact of the BFHI best practices on breastfeeding rates in groups with varying educational levels, both of which were conducted by

Hawkins et al. in 2013 and 2014.[33,34] In 2013, the authors examined the impact of the BFHI on breastfeeding initiation and duration rates in mothers with lower (less than a high school) vs higher (at least some college) education giving birth in Baby-friendly accredited hospitals compared to propensity-matched non-Baby-friendly accredited facilities.[34] The researchers found that Baby-friendly accreditation was significantly associated with breastfeeding initiation, where women having lower educational attainment giving birth in a Baby-friendly hospital initiated breastfeeding by nearly nine percentage points more than their matched counterparts giving birth in non-Baby-friendly hospitals (β=0.09; 95% CI: 0.01-0.16).[34] Additionally, the researchers saw a dose-response relationship between exposure to the number of Baby-friendly practices and breastfeeding initiation, with each step being associated with a 16.2% increase in breastfeeding initiation rates among mothers with lower educational attainment (β=0.162; 95% CI=0.15-0.18).[34]

In 2014, the authors examined the same predictor and outcome variables, but in hospitals located in Alaska, Maine, Nebraska, Ohio, or Washington.[33] The researchers found increases in rates of breastfeeding initiation and duration for at least four weeks between mothers with less than a high school education giving birth in Baby-friendly hospitals compared to mothers giving birth in non-Baby-friendly hospitals, but these increases were not significant (95% CI=0.00-0.08).[33]

BFHI and Employment

Attanasio et al. published a study in 2013 comparing the impact of giving birth at a hospital having Baby-friendly-aligned policies on breastfeeding intention and other breastfeeding behavior at one week postpartum, in mothers who were employed prenatally and those who were not.[35] The researchers found that there was not a statistically significant difference in ever

breastfeeding intention or exclusive breastfeeding intention in mothers who were unemployed vs. employed full-time, prenatally (95% CI: 0.54-1.39 & 0.30-1.21, respectively).[35] However, the researchers did find that mothers who were employed full-time during pregnancy were at 52% lower odds (aOR=0.48; 95% CI=0.25-0.92) of exclusively breastfeeding at one week postpartum compared to mothers who did not work during pregnancy (95% CI; 0.25-0.92).[35] This relationship was not statistically different in mothers who were exposed to Baby-friendly practices and those who were not.[35]

BFHI and Geography/Access

Of the 20 studies that assessed the impact of the BFHI on breastfeeding disparities by various characteristics, two examined the relationship between geographic relation or access to Baby-friendly accreditation and breastfeeding behavior.[25,27] In 2020, Bass, Gartley, and Kleinman assessed the relationship between state-level breastfeeding initiation rates with rates of any breastfeeding at 6, and 12 months and rates of exclusive breastfeeding at 3 and 6 months while controlling for the percentage of hospitals that were Baby-friendly.[25] The researchers found that there was a significant relationship between breastfeeding initiation and breastfeeding duration outcomes, but that state-level Baby-friendly designation was not significantly associated with exclusive breastfeeding at 3 or 6 months (p=0.20 & 0.26, respectively).[25]

Liberty et al. examined the impact of giving birth at a Baby-friendly designated hospital on breastfeeding initiation rates, assessed the relationship between maternal residence in a county containing a Baby-friendly hospital and breastfeeding initiation rates, and compared the relationships between these variables by rural/urban maternal county residence in North Carolina.[27] Ultimately, the researchers found mothers giving birth at Baby-friendly facilities had significantly higher odds of breastfeeding initiation (aOR=1.82; 95% CI=1.65-2.01).(Liberty et

al., 2019) Interestingly, results indicated that living in a county with a Baby-friendly hospital was associated with decreased odds of breastfeeding initiation (aOR=0.81; 95% CI=0.72-0.92).[27] Furthermore, the researchers found increased rates of breastfeeding initiation in mothers living in urban counties compared to rural counties (aOR=1.80; 95% CI=1.73-1.86).(Liberty et al., 2019) However, the researchers indicated the rural mothers giving birth at a Baby-friendly hospital had similar likelihoods of breastfeeding initiation as mothers living in metropolitan areas having a Baby-friendly hospital within their community, although no statistics were provided for this result.[27]

BFHI and Other Characteristics

There was a total of six studies related to breastfeeding disparities associated with physiological characteristics of mothers and/or infants and exposure to BFHI best practices.[36–41] Crook and Brandon (2017) conducted a prospective cohort study that assessed the impact of exposure to the BFHI best practices and breastmilk provision (e.g., all breastmilk, all formula, more than half breastmilk, and more than half formula) in the hospital and at discharge to infants diagnosed with Neonatal Abstinence Syndrome (NAS), a diagnosis associated with fetal drug exposure.[36] The researchers did not find a significant association between Baby-friendly designation and the level of breastmilk provided to infants diagnosed with NAS during the hospital stay or at discharge (p=0.286 & 0.517, respectively).[36]

Kair et al (2019) and Marshall et al. (2020) examined the impact of the BFHI on breastfeeding disparities by maternal BMI.[37,38] Kair and colleagues assessed the impact and utilization of BFHI practices on exclusive breastfeeding at one week and three months postpartum in mothers with varying body mass index (BMI) ranges from normal weight (BMI= 18.5-24.9) to obese (BMI>=30).[37] The researchers found that overweight mothers were at higher

odds of exclusive breastfeeding at three months when staff supported their breastfeeding initiation and facilitated skin-to-skin contact compared to normal-weight individuals (aOR=1.86; 95% CI=1.12-3.09), and that overweight mothers were at higher odds of exclusive breastfeeding at one week if water nor formula or formula packets were given to the mother compared to normal-weight mothers (aOR=3.03; 95% CI=1.75-5.27).[37] Similarly, obese mothers had higher odds of exclusive breastfeeding at one week than normal-weight mothers when hospital staff supported breastfeeding initiation and skin-to-skin contact (aOR=3.18; 95% CI=1.73-5.85).[37] Obese mothers also had higher odds of exclusive breastfeeding at three months if their infants were not provided with formula or water and they were not given formula packets to take home compared to normal-weight mothers (aOR=1.97; 95% CI=1.08-3.60).[37]

Marshall and colleagues examined the relationship between exclusive breastfeeding rates and BFHI adherence in overweight/obese compared to normal-weight women.[38] The researchers found that BFHI practices were associated with higher exclusive breastfeeding rates six weeks postpartum ($p<0.0001$) regardless of weight status.[38] However, there was not a significant association between BMI and BFHI practice adherence or a significant difference in the relationship when comparing mothers who were exclusively breastfeeding at six weeks and those who were not.[38]

Merewood et al. 2003 and Naylor et al. 2020 both assessed the impact of the BFHI on breastfeeding in babies admitted to the neonatal intensive care unit (NICU).[39,40] Merewood and colleagues examined the relationship between BFHI designation and breastfeeding initiation and exclusivity rates.[39] The researchers found that BFHI accreditation was associated with significantly increased rates of breastfeeding initiation and exclusivity in two week old infants in the NICU ($p<0.001$ and $p=0.002$, respectively).[39]

Naylor et al 2020 also explored the BFHI impact on breastfeeding rates for babies in the NICU but stratified this relationship by maternal intention to breastfeed.[40] The authors found BFHI designation did not have a significant impact on breastfeeding rates by breastfeeding intention for babies in the NICU.[40] The evidence for this particular study is limited, as no multivariate analysis was conducted, therefore there was no controlling for potential confounding factors.[40] Similar to Naylor et al. 2020, Perrine and colleagues (2012) also examined the impact of the exposure to six BFHI-aligned best practices on achieving maternal breastfeeding intentions. [41] Using the Infant Feeding Practices II study, a longitudinal panel study, the researchers found that the majority of mothers intended to breastfeed exclusively for the first three (85%) and five months (57.8%), whereas less than half breastfeed exclusively for the first three months (45.3%) and five months (24.9%).[41] About one third of mothers included in the study met their breastfeeding intention goals.[41] After controlling for maternal characteristics, the authors found breastfeeding initiation within one hour of life, no supplementation with other substances, and no pacifiers increased maternal odds of achieving breastfeeding intentions (aOR=1.4, 95% CI=1.1-1.9; aOR=2.5, 95% CI=1.9-3.2; aOR=2.3, 95% CI=1.8-3.1, respectively).[41]

BFHI and Race/Ethnicity

There were a total of six studies examining the impact of the BFHI on breastfeeding disparities by race. Burnham et al. 2022 assessed the impact of the implementation of the Communities and Hospitals Advancing Maternity Practices (CHAMPS) to support Baby-friendly accreditation of hospitals in Mississippi on breastfeeding initiation and exclusivity rates and disparities in such rates between Black and White infants.[42] The results indicated that breastfeeding initiation rates significantly increased ($p<0.05$) and the disparity in breastfeeding

initiation rate between Black and White infants decreased by 17 percentage points each month but was not significant.[42] Similarly, there was not a significant change in exclusive breastfeeding rates between White and Black infants with the implementation of CHAMPS.[42] Merewood et al. also assessed the impact of the CHAMPS program in four southern U.S. states on racial/ethnic breastfeeding disparities.[26] The researchers found the program to reduce breastfeeding initiation disparities (95% CI=1.6-19.5) and to significantly increase the percentage of African American infants being exclusively breastfed ($p<0.05$).[26] The authors did not discuss whether disparities in breastfeeding exclusivity rates between White and Black infants were reduced.[26]

Deubel et al. explored perceptions of breastfeeding in low socioeconomic status African American women in Tampa, Florida.[43] This qualitative study also included primary quantitative data indicating that after Baby-friendly accreditation, the rate of African American women exclusively breastfeeding at hospital discharge increased.[43] However, there was no analysis conducted to determine whether this increase was statistically significant, or any analysis conducted to account for any confounding variables.[43] Similarly, Miller et al. conducted a qualitative study exploring African American women's experiences with the BFHI, and found that interviewees appreciated long-term relationships with clinicians, needed support beyond hospital discharge, and desired support in their own infant feeding preferences.[45]

Hemingway et al. assessed the impact of the BFHI on racial disparities in breastfeeding initiation and at hospital discharge rate in a South Carolina hospital.[45] The rate of breastfeeding initiation in Black mothers increased by 27% compared to only 10% in non- Black mothers after Baby-friendly accreditation.[45] However, Black mothers who had initiated breastfeeding were still almost two and half times less likely to still be breastfeeding at discharge.[45]

Louis-Jacques et al. conducted a review investigating contributing factors to racial/ethnicity breastfeeding disparities, specifically in the U.S.[44] The authors noted racial/ethnic disparities related to access to Baby-friendly accredited agencies.[44] Therefore, the researchers suggest the need to improve access to such hospitals in order to support reductions in breastfeeding disparities by race/ethnicity.[44]

BFHI and Socioeconomic Status

Three studies explored the relationship between BFHI and socioeconomic characteristics. Jung et al. conducted a repeated cross-sectional study to assess the likelihood of mothers utilizing Baby-friendly accredited hospitals as well as Baby-friendly practice changes and their relation to ever and exclusive breastfeeding rates in low-income mothers participating in the Special Supplemental Women, Infants, and Children program (WIC) in Los Angeles County, California.[47] The researchers found that the number of infants receiving WIC that were born in Baby-friendly hospitals significantly increased ($p<0.001$), ever breastfeeding rates at one month of age increased ($p<0.001$), and exclusive breastfeeding rates at 1 month also increased ($p<0.001$) from 2014 to 2017.[47]

Kivlighan and colleagues conducted a quasi-experimental retrospective cohort study comparing breastfeeding duration in an underserved population in New Mexico before and after the implementation of the BFHI. Results indicated significant increases in likelihood to ever and exclusively breastfeed when exposed to six steps of the BFHI.[48] More specifically, odds of ever breastfeeding increased by 81% (OR=1.81; 95% CI=1.32-2.50) and odds of breastfeeding between 2-6 weeks postpartum was increased by 70% for each BFHI step exposure.[48]

Patterson et al. investigated the locations of Baby-friendly and non-Baby-friendly hospitals in the U.S. according to Area Deprivation Index (ADI), a metric related to the

socioeconomic status of a geographic area, and exclusive breastfeeding rates.[49] The researchers suggest Baby-friendly hospitals were evenly distributed across ADI categories (low, medium, high).[49] However, exclusive breast feeding rates were higher in less deprived areas ($p<0.01$).[49]

Discussion

Results of this scoping review highlighted some of the breastfeeding disparities that have been examined in relation to the BFHI. Many of the articles identified in the initial literature search support the findings of Patterson, Keuler, & Olson as well as Munn et al. which suggest BFHI can help to improve breastfeeding behavior across demographic, economic, and racial/ethnic groups, but few studies directly assessed the impact of the BFHI on the reducing gaps in breastfeeding behavior between groups of differing demographic, maternal, or infant characteristics in the U.S.[19,50] After eligibility criteria were applied, 20 studies were identified that investigated the impact of the BFHI on the relationship between educational attainment, employment, geography, maternal/infant characteristics, race/ethnicity, and socioeconomic status with breastfeeding outcomes. The two Hawkins et al. papers indicated that the BFHI increases breastfeeding initiation in women with lower educational attainment, although the statistical significance of this increase varied between the two studies.[33,34] Attansio et al. found that the BFHI did not impact the relationship between working during pregnancy and reduced odds of exclusive breastfeeding at one week postpartum.[35]

Mixed results have also been found when assessing proximity to BFHI and breastfeeding outcomes, where Bass, Gartley, & Kleinman found state-level BFHI prevalence did not significantly impact the relationship between breastfeeding initiation and breastfeeding duration outcomes.[25] However, Liberty and colleagues found Baby-friendly hospitals to have higher odds of breastfeeding initiation, urban counties to have increased rates of breastfeeding initiation, and

living in a county containing a Baby-friendly hospital to be associated with lower odds of breastfeeding initiation.[27] Furthermore, the researchers indicated that women residing in a rural area giving birth at a Baby-friendly institution had almost the same probability of breastfeeding initiation as women living in an urban area not giving birth at a Baby-friendly institution but did not provide an estimate for this probability.

BFHI was not associated with the level of breastmilk provided to NAS babies.[36] Exposure to certain steps of the BFHI was associated with improvements in breastfeeding initiation and exclusive breastfeeding for one week in overweight and obese mothers compared to normal-weight mothers.[37,38] Furthermore, Merewood et al. indicated that BFHI was associated with increased initiation and exclusivity of infants in the NICU.[26] Lastly, specific BFHI practices are associated with increased odds of reaching breastfeeding intention goals.[41]

When assessing the impact of the BFHI on breastfeeding by race/ethnicity through the implementation of the CHAMPS program, the results seem to suggest that the initiative is associated with reductions in breastfeeding initiation disparities between Black and White mothers, but the BFHI's impact on breastfeeding duration and exclusivity disparities by race/ethnicity still need to be explored.[26,42,46] When examining socioeconomic disparities in breastfeeding behavior, the research included in this project suggests that the BFHI can support ever, exclusive, and longer-duration breastfeeding behavior across low socioeconomic populations.[47,48]

Of the studies included in this scoping review, ten indicated that the BFHI significantly impacted breastfeeding behavior.[26,27,33,34,39,41,42,46–48] Within those ten, nine indicated that the BFHI reduced breastfeeding initiation or ever breastfeeding disparities and three suggested the BFHI reduced breastfeeding duration gaps between various groups.[26,27,33,34,39,41,42,46–48] The

maximum number of studies exploring the impact of the BFHI on any one disparity was six, assessing its effects among various racial/ethnic groups.[26,42–46] However, only three of those were observational studies, one was a review, and two were qualitative studies, illuminating the need for more empirical research assessing the impact of the BFHI on breastfeeding disparities.

Limitations in the Current Body of Literature

There are limitations with the current body of literature related to the BFHI and breastfeeding disparities in the U.S. Firstly, there is lack of consistent definition and inclusion of variables across studies. Breastfeeding behavior outcomes were highly variable (e.g., ever breastfeeding, exclusive breastfeeding at hospital discharge, and breastfeeding duration). Similarly, the definition of exclusivity varied from never having any substance other than breastmilk to exclusivity aside from supplementation for procedures during the hospital stay. Confounding variables assessed in the literature included were not always the same. Lastly, BFHI predictors varied between studies, with some considering the impact of the initiative as a whole and some only including certain steps, and some examining both individual steps and the program as a whole. Ultimately, there were only a few studies specifically examining the interaction between exposure to BFHI and disparate characteristics of the population of interest to show their combined impact on breastfeeding behavior disparities. It seems that most of the current literature tends to control for demographic characteristics or study the impact of the BFHI on a specific population of interest, as opposed to assessing the impact of the BFHI on the relationship between demographic, maternal, or infant characteristics and breastfeeding outcomes. Limitations of the current study included the eligibility criteria, which only allowed for manuscripts written in English and conducted in the U.S., as well as the database search that only included three databases.

Implications and Conclusion

The purpose of this scoping review was to systematically map the state of the current literature investigating the relationship between exposure to the BFHI and breastfeeding behavior disparities. One prominent breastfeeding outcome examined was breastfeeding initiation, where the institution of programs such as CHAMPS could help to reduce breastfeeding initiation disparities. The implementation of such programs could amplify the impact of the BFHI on breastfeeding initiation disparities by providing multiple hospitals with support to achieve accreditation, as opposed to a single hospital or hospital system working towards accreditation in a silo. This may reduce barriers to accreditation for resource-limited settings while also providing more equitable access to Baby-friendly accredited hospital and could result in reductions in breastfeeding initiation disparities.

Furthermore, the current project highlighted important gaps in the literature such as lack of studies empirically examining the impact of the BFHI on breastfeeding disparities among different populations. Future research needs to examine these relationships, as opposed to simply including demographic characteristics as potential confounders, to determine if the BFHI may be impacting breastfeeding disparities among different groups in different ways or at different rates. Given the 2030 Healthy People objectives, future research also needs to examine the impact of breastfeeding interventions, such as the BFHI, on exclusive breastfeeding at six months or breastfeeding with supplementation at twelve months. Of the limited studies available, some research included in this scoping review suggests the BFHI does not impact breastfeeding duration disparities, indicating the need for more research to be conducted examining this topic. Additionally, this may highlight the need for the development of alternative interventions to

improve care coordination for the maternal/infant dyad and better support mothers post-discharge in their infant feeding journey.

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Table 2.3

Evidence Matrix

Authors/Title/ Year	Locale	Aim	Population of Interest	Sample Size	Study Design	Predictor Variable	Outcome Variable	Results	Relevant Findings
Education									
Hawkins S, Stern A, et al. *Evaluating the impact of the Baby-Friendly Hospital Initiative on breast-feeding rates: A multi-state analysis* 2014	U.S. – AK, ME, NE, WA	Assess the impact of the BFHI on breastfeeding initiation, duration, and exclusivity by maternal educational attainment	Mothers giving birth at BFHI accredited hospitals and mothers matched non-BFHI facilities PRAMS 19992009	25,327	Quasi-experimental study; case-control	Giving birth in a BFHI-accredited hospital	breastfeeding initiation and duration (any and exclusive breast-feeding for >4 weeks	No difference in initiation in BFHI vs. non-BFHI (coefficient: 0.024; -0.00-0.51), Initiation non-significantly increased in mothers with lower education in BFHI facilities (adjusted coefficient=0.038;-0.00-0.08) Initiation did not increase in mothers with higher education (adjusted coefficient (0.002; -0.04-0.05). Exclusive breast-feeding rate at >4 weeks significantly increased (adjusted 0.045; 0.01-0.08) in mothers with lower education in Baby-friendly hospitals	"By increasing breast-feeding initiation and duration among mothers with lower education, the BFHI may reduce socio-economic disparities in breast-feeding."
Hawkins S, Stern A, et al. *Compliance with the Baby-Friendly Hospital Initiative and impact on breastfeeding rates* 2013	U.S. - ME	"To evaluate the BFHI and its components on breastfeeding initiation and duration overall and according to maternal education level."	Mothers who gave birth in four hospitals that were BFHI accredited or became accredited and mothers from six matched non-BFHI facilities - PRAMS 2004-2006 data	2014	Quasi-experimental study; case-control - propensity matching	Giving birth in a BFHI-accredited hospital	Self-report of breastfeeding initiation, any breast feeding for ≥4 weeks, exclusive breast feeding for ≥4 weeks	Initiation significantly increased in mothers with low educational attainment (adjusted coefficient, 0.086 [95% CI, 0.01 to 0.16]) Each step, "was associated with an average increase in breastfeeding initiation of 16.2 percentage points (adjusted coefficient, 0.162 [95% CI, 0.15 to 0.18])." No significant effect of BFHI on breastfeeding in mothers with higher education.	BFHI significantly increased BF initiation in mothers with lower education, but not in higher education groups

Employment									
Attanasio, Kozhimannil, McGovern, Gjerdingen, & Johnson *The impact of prenatal employment on breastfeeding intentions and breastfeeding status at 1 week postpartum* 2013	U.S.	"To measure the relationship between prenatal employment and breastfeeding intent and status 1 week postpartum"	Nationally representative survey of women	1498	Cross-sectional	prenatal employment status hospital support consistent with BFHI practices	breastfeeding intention breastfeeding status at one week postpartum	No statistically significant differences in breastfeeding intention based on employment status or exclusive breastfeeding intention Employed women who intended to exclusively breastfeed had significantly lower odds of exclusively breastfeeding at 1 week pp compared to those who were not employed (OR=0.48; 0.25-0.92) No significant difference in breastfeeding intention or behavior at 1 week when comparing no, part, and full-time employment Higher scores on BFHI scale were associated with significantly higher odds of breastfeed Interactions between BFHI scale and employment status were not statistically different, indicating the association between hospital practices and breastfeeding behaviors did not differ by employment status	The association between hospital practices and breastfeeding behaviors did not differ by employment status - BFHI practices do not change the relationship seen between employment status and breastfeeding behavior Impact of BFHI not statistically significant
Geography/Access									

Bass, Gartley, & Kleinman *Outcomes from the Centers for Disease Control and Prevention 2018 Breastfeeding Report Card: Public Policy Implications* 2020	U.S.	To compare the impact of Baby-Friendly designation with breastfeeding initiation and to clarify those public policy initiatives most likely to result in better breastfeeding outcomes after discharge.	National Immunization Survey - 50 U.S. states and 3 territories	53	Cross-sectional	Breastfeeding initiation Baby-friendly penetrance (highest baby-friendly births vs highest breastfeeding initiation rates)	Any breastfeeding at 6 and 12 months Exclusive breastfeeding at 3 and 6 months	Breastfeeding initiation was significantly associated with all outcomes (P < .0001), including any breastfeeding at 6 and 12 months and exclusive breastfeeding at 3 and 6 months "Baby-Friendly designation did not demonstrate a significant association with any post discharge breastfeeding outcome. There was no association between Baby-Friendly designation and breastfeeding initiation rates…"	"States with substantially fewer births at Baby-Friendly facilities, and who have high breastfeeding initiation rates, have had greater success in promoting breastfeeding after discharge, a more important outcome than exclusivity during the birth hospitalization." Impact of BFHI not statistically significant
Liberty, Wouk, Chetwynd, & Ringel-Kulka *A Geospatial Analysis of the Impact of the Baby-Friendly Hospital Initiative on Breastfeeding Initiation in North Carolina* 2018	U.S. - NC	"To evaluate the impact of the Baby-Friendly Hospital Initiative on breastfeeding initiation in North Carolina, with special attention to rural areas."	"Singleton term births to primiparous mothers with North Carolina residence who gave birth at a hospital in North Carolina."	137738	Retrospective secondary analysis	Giving birth in a BFHI-accredited hospital Residence in a rural/urban county	Breastfeeding initiation	BFHI was significantly associated with breastfeeding initiation (aOR = 1.7, 95% CI=1.65, 1.89). BFHI in county of residence was not associated with improvements in breastfeeding initiation. Rural mothers giving birth at BFHI hospitals had similar probabilities of initiation as urban mothers not giving birth in a BFHI	Birth at Baby-friendly hospital is significantly associated with BF initiation; in mothers living in a rural residence, BF was associated with breastfeeding initiation probability similar to mothers living in an urban residence in North Carolina
Other Characteristics									
Crook K, Brandon D *Prenatal Breastfeeding*	U.S.	"To increase breastfeeding rates among all infants with NAS by	infants with NAS (enrolled in a methadone clinic, active	200	pre/post design	1. Baby-friendly status (BFS) 2. Baby-friendly	Feedings during hospitalization and at discharge Length of stay	"No significant differences between cohorts on the amount of human milk provided during the hospital	"Although not statistically significant, there were increases in exclusive

Education: Impact on Infants with Neonatal Abstinence Syndrome 2017		10% from the baseline cohort to a BFS cohort to a BFS plus breastfeeding education cohort. Secondary aims included decreased hospital length of stay by 10% for infants with NAS between cohorts and retention of 50% enrolled women across the 3-class curriculum."	illicit substance users, or were prescribed medication that placed their infant at risk for NAS) born to mothers 18 and over in a hospital that traditionally serves underserved women from 2/14-7/15			status + breastfeeding education (BFS + BFed)		stay or at discharge (P > .05)" "The baseline cohort had a significantly longer LOS (mean = 18.80, standard deviation [SD] = 14.71) than the BFS cohort (mean = 13.14, SD = 9.17), P = .006, and the BFS plus breastfeeding education cohort (mean = 10.41, SD = 10.54), P < .001. There was no significant difference in LOS between BFS cohort and the BFS plus breastfeeding education cohort"	breastfeeding rates for NAS infants both during hospitalization and at discharge across the 3 cohorts. During hospitalization exclusive breastfeeding increased from 9.1% in the baseline cohort to 14.5% in the BFS cohort to 24.6% in the BFS plus breastfeeding education cohort. At discharge the rates were 20.0%, 25.0%, and 31.9%, respectively." Impact of BFHI not statistically significant
Kair L, Nickel N, et al. *Hospital breastfeeding support and exclusive breastfeeding by maternal pre-pregnancy body mass index* 2019	U.S.	"To determine whether pre-pregnancy BMI is associated with the implementation and effectiveness of the Ten Steps"	mothers of term infants intending to breastfeed	1506	Cross-sectional	BFHI Status	Exclusive breastfeeding	"Results suggest that two practices (i.e., holding babies skin-to-skin for the first time and being encouraged to breastfeed on demand) were more strongly associated with exclusive breastfeeding among mothers with obesity than other mothers. Additionally, mothers with obesity reported holding babies skin-to-skin significantly less often than other mothers".	"Interventions aimed at helping mothers with obesity to hold their babies skin-to-skin in the first hour and teaching them to breastfeed on demand have the potential to decrease the breastfeeding disparities in this population."

									Impact of BFHI statistically significant
Marshall N, Lallande L, et al. *Exclusive Breastfeeding Rates at 6 Weeks Postpartum as a Function of Preconception Body Mass Index Are Not Impacted by Postpartum Obstetrical Practices or Routines* 2020	U.S. - Oregon Health Sciences University	"To determine whether differences in BFHI adherence, obstetric practices, or social support explain weight related EBF disparities."	"Healthy mother–baby pairs stratified by maternal pre-pregnancy BMI"	190	Cross-sectional	BMI	BFHI Adherence EBF rates	"BFHI components and composite BFHI score did not differ by maternal BMI.Furthermore, regardless of BMI, women with greater adherence to BFHI practices were more likely to be EBF at 6 weeks postpartum (p-value<0.001). Nonetheless, at 6 weeks postpartum, women with obesity were expressing milk more frequently and less likely to have met their own breastfeeding goals "compared with women with overweight and normal weight"	"Differences in EBF rates by BMI were not explained by BFHI adherence or obstetric practices. These data suggest physiological differences, rather than intrapartum practices and support services, may explain differences in EBF rates by maternal overweight/obesity." Impact of BFHI not statistically significant
Merewood A, Philipp B, et al. *The baby-friendly hospital initiative increases breastfeeding rates in a US neonatal intensive care unit* 2003	U.S. - Boston, MA	To evaluate, "the impact of Baby-Friendly designation on breastfeeding rates in a US neonatal intensive care unit (NICU)"	"All surviving infants directly admitted to the Boston Medical Center's level III, 15-bed NICU in 1995 (before Baby-Friendly policies were implemented) and 1999 (when Baby-Friendly	217	Pre/Post intervention	BFHI Designation	Breastfeeding rates	"NICU breastfeeding initiation rate increased from 34.6%(1995) to 74.4% (1999) (P< .001). Among 2-week-old infants, the proportion receiving any breast milk rose from 27.9% (1995) to 65.9% (1999) (P< .001), and the proportion receiving breast milk exclusively rose from 9.3% (1995) to 39% (1999) (P= .002)"	"The implementation of Baby-Friendly policies leading to a Baby-Friendly designation was associated with increased breastfeeding initiation and duration rates." Statistically significant increase in BF initiation and

			status was granted)"						EBF at two weeks
Naylor L, Clarke-Sather A *Factors Impacting Breastfeeding and Milk Expression in the Neonatal Intensive Care Unit* 2020	U.S.	To analyze "the impact of intention to breastfeed and BFHI designation on breastfeeding and milk expression duration when infants require NICU care"	"Birth mothers whose infants had received NICU care"	approx. 142	Cross-sectional	Intention to breastfeed and BFHI designation	Breastfeeding initiation and duration	"Mothers with intention to breastfeed (n=113) averaged 15.8 months breastfeeding. BFHI designation had no significant difference on breastfeeding or milk expression duration."	"Mothers' intention to breastfeed significantly impacted breastfeeding and milk expression duration. BFHI designation did not impact breastfeeding or milk expression duration, possibly since NICUs are not explicitly considered in BFHI guidelines." Impact of BFHI not statistically significant
Perrine C, Scanlon K, et al. *Baby-Friendly hospital practices and meeting exclusive breastfeeding intention* 2012	U.S.	"To describe mothers' exclusive breastfeeding intentions and whether Baby-Friendly hospital practices are associated with achieving	Mothers, "at least 18 years old, mother and infant be without medical conditions that would affect feeding, and the infant be born after at least 35 weeks	3006	Longitudinal survey study	BFHI Implementation	Meeting breastfeeding intention goals	"Among women who prenatally intended to exclusively breastfeed (n=1457), more than 85% intended to do so for 3 months or more. However, only 32.4% of mothers achieved their intended exclusive breastfeeding duration. Beginning breastfeeding within one hour of birth and not being given supplemental feedings or pacifiers were	"The majority of mothers who intend to exclusively breastfeed are not meeting their intended duration. Increased Baby-Friendly hospital practices, particularly giving only breast milk in the

		these intentions"	gestation and weigh at least 5 lbs."					associated with achieving exclusive breastfeeding intention. After adjustment for all other hospital practices only not receiving supplemental feedings remained significant (aOR=2.3, 95% CI=1.8, 3.1)".	hospital, may help more mothers achieve their exclusive breastfeeding intentions." Specific constructs of the BFHI were significantly associated with meeting breastfeeding intention goals
Race/Ethnicity									
Burnham L, Knapp R, et al. *Mississippi CHAMPS: Decreasing Racial Inequities in Breastfeeding* 2022	U.S. - MS	"The aims of Mississippi CHAMPS were to (1) increase breastfeeding initiation and exclusivity and (2) decrease racial disparities in breastfeeding by increasing the number of Baby-Friendly hospitals in the state from 2014 to 2020."	Mississippi hospitals enrolled in CHAMPS	39 Mississippi birthing hospitals	Prospective cohort quality improvement initiative	"The Communities and Hospitals Advancing Maternity Practices (CHAMPS) program works with hospitals and communities to implement the Baby-Friendly Hospital Initiative, increase breastfeeding rates, and decrease racial disparities in breastfeeding." Baby-Friendly	Breastfeeding initiation and exclusivity rates during the hospital stay Black and White breastfeeding disparities	"By August 2020, 20 Mississippi CHAMPS hospitals (22 hospitals in the state as a whole) had gained Baby-Friendly designation, and 11 others were in the final designation phase of BFUSA's 4-D Pathway." "Significant racial inequities existed in breastfeeding initiation and exclusivity at baseline but not in skin-to-skin care post-birth or rooming-in." "Over the course of the study, breastfeeding initiation rose by 10 percentage points, from 56% to 66% (P < .05) (Fig 5A), an average of 0.4% each month." "For Black and White dyads, breastfeeding initiation increased by 21 and 4 percentage points, respectively (P< .05), and the disparity between Black and	Breastfeeding initiation and exclusivity significantly increased in Mississippi CHAMPS hospitals for all infants, and racial inequities declined. Among Black dyads, the average monthly increases in breastfeeding initiation and exclusivity were significant and greater than the increases among White dyads. Significant increases in BF initiation among Black dyads; non-significant reduction in breastfeeding

						Accreditation		White dyads decreased by 17 percentage points, an average of 0.176 percentage points each month." "Exclusive breastfeeding rates increased by 11 percentage points, from26% to 37% (P< .05). The average monthly increase for Black dyads was 0.9% (RR: 1.009, 95%CI: 1.004 to 1.015) and 0.3% (RR: 1.003, 95%CI: 1.000 to 1.007) for White dyads. The disparity in breastfeeding exclusivity between Black and White dyads did not change significantly." "There were no initial disparities by race for skin-to-skin and rooming-in, and none emerged over the course of the program."	initiation disparities
Deubel T, Miller E, et al. *Perceptions and Practices of Infant Feeding among African American Women* 2019	U.S. - Tampa, FL	"To investigate perceptions and practices of infant feeding among low-income African American women seeking prenatal care at Oasis and delivering in a BFHI hospital and women's attitudes towards prenatal breastfeeding	"low-income, self-identified African American women who received prenatal care at Oasis and delivered babies at the associated urban hospital all women giving birth at Hospital and Oasis clinic.	20 1001	Qualitative: semi-structured interviews Pre/post intervention design	BF accreditation	% Breastfeeding initiation % Exclusive breastfeeding at hospital discharge	"African American women had the lowest rate of breastfeeding initiation at 68.8% and a rate of 7.3% for EBF at discharge in August 2014; however, data from February 2016 show that EBF rates at discharge for African American women had risen to 19%. This increase suggests that BFHI status has led to improvements in breastfeeding initiation rates overall."	There was an increase in EBF rates in African American women from 2014-2016, but breastfeeding initiation went down

		education and postpartum support available or received and key factors motivating women's feeding decisions." Authors included primary data assessing the impact of BFHI on breastfeeding rates among racial/ethnic groups							
Hemingway S, Forson-Dare Z, et al. *Racial Disparities in Sustaining Breastfeeding in a Baby-Friendly Designated Southeastern United States Hospital: An Opportunity to Investigate Systemic Racism* 2021	U.S. - SC	"To determine racial differences in breastfeeding initiation and breastfeeding sustained through birth hospitalization rates after BFHI hospital designation in a Southeast U.S. hospital." "To evaluate the demographics and medical comorbidities associated with sustained	"Women who delivered an infant or infants who were admitted directly to the well-newborn service and remained on this service through hospitalization (infant must be greater than 35 weeks and 0 days postmenstrual age and able to eat without gavage or IV fluid requirements.)"	6685	Retrospective cohort	BFHI Accreditation	Breastfeeding initiation (defined as any breastfeeding during infant born at hospitalization) Sustained breastfeeding (any breastfeeding and breastfeeding in the 24 hours before maternal hospital discharge)	"Post BFHI mothers were significantly more likely to initiate breastfeeding when compared to mothers who delivered at the institution pre-BFHI. A significant increase in breastfeeding initiation post-BFHI was seen for both the non- Black and Black mothers." "The relative improvement in this population is 1.1 times the pre-BFHI rate. For the Black mothers, the relative improvement in this population is 1.27 times the pre-BFHI rate, which is higher than the relative improvement in the non-Black population." "When stratified by race, 84.6% of non- Black	Significant increase in breastfeeding initiation in both Black and non-Black mothers Greater increase in Black mothers compared to non-Black mothers

		breastfeeding. ”						breastfeeding-initiating mothers sustained breastfeeding, while only 69.5% of Black breastfeeding-initiating mothers sustained breastfeeding. Black mothers were 2.4 times less likely to sustain breastfeeding than non- Black mothers. Other demographic factors were significantly associated with failure to sustain breastfeeding, but when controlling for these factors, the racial disparity persisted.”	
Louis-Jacques A, Deubel T, et al. *Racial and ethnic disparities in U.S. breastfeeding and implications for maternal and child health outcomes* 2017	U.S.	“To discuss maternal and child health outcomes associated with breastfeeding, and we review potential causes of racial and ethnic disparities in breastfeeding outcomes in the United States.”	non-Hispanic Black, American Indian/Alaska Native, and Hispanic/Latina population	N/A	Review	N/A	N/A	N/A	Authors propose that access to BFHI contributes to breastfeeding disparities
Merewood A, Bugg K, et al. *Addressing racial inequities in breastfeeding in the southern United States* 2019	U.S.	“To determine if a hospital and community-based initiative in the Southern United States could increase compliance	Mothers and infants at 31 hospitals across the four southern states included in the study	39272 births	Pre/Post intervention	CHAMPS Intervention	Breastfeeding rates	“Disparity in breastfeeding initiation between African American and White infants decreased by 9.6 percentage points (95% confidence interval 1.6–19.5) over the course of 31 months. Breastfeeding initiation increased from 66% to 75% for all races combined, and	“Increased compliance with the Ten Steps was associated with a decrease in racial disparities in breastfeeding.” Statistically significant

		with the Ten Steps, leading to Baby-Friendly designation, and decrease racial disparities in breastfeeding. "						exclusivity increased from 34% to 39%. Initiation and exclusive breastfeeding among African American infants increased from 46% to 63% (P,.05) and from 19% to31% (P,.05), respectively."	decrease in breastfeeding initiation disparity between Black and White infants
Miller E, Louis-Jacques A, et al. *One step for a hospital, ten steps for women: African American women's experiences in a newly accredited baby-friendly hospital* 2018	U.S.	"To explore African American women's experiences of the Ten Steps to Successful Breastfeeding at a women's center associated with a university-affiliated hospital that recently achieved Baby-Friendly status."	African American Women	20	Cross-sectional Qualitative interview	BFHI Designation	African American Women's experiences with the Ten Steps	"Three key themes emerged from the women's interviews: (a) An appreciation of long-term relationships with medical professionals is evident at the women's center; (b) considerable lactation problems exist postpartum, including lack of help from Baby-Friendly Hospital Initiative sources; and (c) mothers' beliefs about infant autonomy may be at odds with the Ten Steps to Successful Breastfeeding."	"Hospitals with Baby-Friendly status should consider models of breastfeeding support that favor long-term healthcare relationships across the perinatal period and develop culturally sensitive approaches that support breastfeeding beliefs and behaviors found in the African American community."
Socioeconomic									
Jung S, Notary T, et al. *Breastfeeding Outcomes among WIC-Participating Infants and Their Relationships to Baby-Friendly*	United States - California	"To examine changes in Baby-Friendly hospital practices, breastfeeding outcomes, and their relationships with Baby-	WIC recipients living in Los Angeles County - data source 2008, 2011, 2014, & 2017 LAC WIC Survey; infants no	1544	Repeated cross-sectional	# Of hospital practices successfully met by mothers (max of 3?)	Any breastfeeding Any breastfeeding duration at 1,3,&6 months	"The percentage of WIC infants born in Baby-Friendly hospitals (designated or in-process) significantly increased from 63.6% in 2014 to 75.4% in 2017." Between 2014 and 2017, "the percentage of infants who received any breastfeeding at 1 month significantly	"The increased number of Baby-Friendly hospitals' uptake of Baby-Friendly hospital practices coincides with significant increases in any and exclusive breastfeeding

Hospital Practices 2019		Friendly hospital status among WIC-enrolled children in LAC."	older than 2 years					increased from 84% to 93.8%. The percentage of infants exclusively breastfed at 1 month also significantly increased from 30.9% in 2014 to 41.5% in 2017. Though it is recommended that infants be exclusively breastfed for the first 6 months of life, only 8.2% and 9.3% of children in the sample met this recommendation in 2014 and 2017, respectively."	outcomes among WIC infants in LAC." Significant increase in percent of infants receiving any breastmilk and exclusively breastfed at one month in WIC participants
Kivlighan K, Murray-Krezan C, et al. *Improved breastfeeding duration with Baby Friendly Hospital Initiative implementation in a diverse and underserved population* 2020	United States - New Mexico	"To evaluate the impact of BFHI implementation on underserved populations in New Mexico."	"Inclusion criteria for the two cohorts included delivery by a UMA-certified nurse-midwife, singleton gestation, gestational age older than 37 weeks, spontaneous vaginal birth (instrumental or surgical deliveries were excluded) and visit attendance with a midwife between 2 and 8 weeks postpartum."	Approx. 1000	quasi-experimental, retrospective cohort design	BFHI Implementation	Breastfeeding initiation, duration, and exclusivity	"Implementation of the BFHI and cumulative exposure to the Ten Steps increased short-term duration of any breastfeeding and exclusive breastfeeding at 2-6 weeks postpartum." "Exposure to all six of the inpatient Ten Steps increased the odds of any breastfeeding by 34 times and exclusive breastfeeding by 24 times. Exposure to Step 9 ("Give no pacifiers or artificial nipples") uniquely increased the likelihood of any breastfeeding at 2-6 weeks postpartum by 5.7 times, whereas Step 6 ("Give infants no food or drink other than breastmilk") increased the rate of exclusive breastfeeding by 4.4 times at 2-6 weeks postpartum."	"Baby Friendly Hospital Initiative can have a positive impact on breastfeeding among underserved populations." Significant increase in any BF at 2-6 weeks postpartum. Significant increase in exclusive BF at 2-6 weeks postpartum "Hispanic women, uninsured women, and persons of color were less likely to be breastfeeding at 2-6 weeks postpartum."

Patterson J, Keuler N, et al. *Differences in Exclusive Breastfeeding Rates in US Hospitals According to Baby-Friendly Hospital Initiative Designation and Area Deprivation Index Category* 2021	U.S. Hospitals	"To evaluate the geographical distribution of BFHI and non-BFHI hospitals across Area Deprivation Index (ADI) categories and explore the differences in EBF rates in BFHI and non-BFHI hospitals across ADI categories."	Joint Commission certified hospitals	414 BFHI hospitals; 1532 non-BFHI hospitals	Cross-sectional	BFHI Status	Ever breastfed rates	"EBF rates were 4.9% lower in highly deprived areas compared to areas with lower deprivation ($p<0.01$). BFHI was associated with significantly higher EBF rates across all ADI categories (6.9%–11.2%,$p<0.01$)."	"BFHI hospitals were distributed about equally in areas identified as low, medium, and highly deprived." "EBF rates were lower in hospitals serving highly deprived populations compared to areas with lower deprivation, BFHI benefited mothers' EBF rates across ADI categories" Impact of BFHI not statistically significant

Chapter 3. Assessing the Relationship Between Maternity Care Practices and Exclusive Breastfeeding at Discharge in Appalachian and Non-Appalachian Hospitals

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Baby-friendly, maternity care practices, breastfeeding, Appalachia, cross-sectional

Key Messages

1. There is limited research examining breastfeeding behavior and best practices in Appalachia.
2. There was a statistically significant negative association between hospital Appalachian designation and rate of exclusive breastfeeding at hospital discharge.
3. The relationship between Maternity Practices in Infant Nutrition and Care total score and exclusive breastfeeding at hospital discharge rates was not significantly different in Appalachian and non-Appalachian hospitals.
4. Maternity care practices aligned with the Baby-friendly Hospital Initiative could help to improve in-hospital in breastfeeding behavior in Appalachian hospitals.

Abstract

Background Breastfeeding protects against a variety of short and long-term adverse health outcomes in both mothers and infants, making improvements in breastfeeding behavior rates is a high priority in the U.S. Maternity care practices have been established to support these goals. Appalachia is disproportionately affected by many of the adverse health outcomes that breastfeeding protects against, but most national surveillance systems measure breastfeeding and maternity care practices or breastfeeding best practices at the state level.

Research aim/question To determine if there are differences in in-hospital breastfeeding rates, maternity care practices, and the relationship between maternity care practices and in-hospital breastfeeding rates in Appalachian and non-Appalachian hospitals.

Methods Maternity Practices in Infant Nutrition and Care (mPINC) survey data from 2018 was merged with an Appalachian Regional Commission (ARC) dataset analyzed using descriptive, bivariate, and simple and multiple linear regression.

Results mPINC scores and exclusive breastfeeding at hospital discharge rates were significantly lower in Appalachia. However, Appalachian designation did not change the positive relationship seen between total mPINC score and rates of exclusive breastfeeding at hospital discharge.

Conclusions Improving hospital maternity care practices could be a way to support improvements in in-hospital breastfeeding in the Appalachian region.

Background

Ever breastfeeding and exclusive breastfeeding for the first six months of life have been associated with reduced infant and maternal risk for a variety of adverse health outcomes such as maternal and child obesity, infant gastrointestinal infections, and maternal cancers (Binns et al., 2016; Ip et al., 2007; Kramer & Kakuma, 2012; Yan et al., 2014). For example, Babic et al. (2020) compiled data from 13 Ovarian Cancer Association Consortium Studies conducted within and outside of the U.S. and found that ever breastfeeding was associated with a 26% decrease in odds for ovarian cancer compared to never breastfeeding. Due to these documented relationships, organizations have developed best practices to support the improvement of breastfeeding rates across the globe and within the United States (U.S.) (Baby-Friendly USA, 2022; Centers for Disease Control and Prevention, 2013; United Nations Children's Fund (UNICEF), n.d.). The most well-known set of best practices is the Baby-Friendly Hospital Initiative (BFHI), which outlines ten key steps to successful breastfeeding for maternity care practices at the hospital level (Baby-Friendly USA, 2022; United Nations Children's Fund (UNICEF), n.d.). These ten steps relate to and address the following maternity care topics: hospital policies; staff competency; antenatal care; care immediately after birth; supporting mothers trying to breastfeed; supplementing for mothers who cannot breastfeed; rooming-in; supporting responsive feeding; educating on bottles, teats, and pacifiers; and supporting mothers after discharge (Table 3.1) (WHO, 2020).

Table 3.1

Baby-Friendly Hospital Initiative - Ten Steps to Successful Breastfeeding

1.	A) Comply fully with the International Code of Marketing of Breastmilk Substitutes and relevant World Health Assembly resolutions B) Have a written breastfeeding policy that is routinely communicated to all health care staff C) Establish ongoing monitoring and data-management systems

2. Ensure that all staff has sufficient knowledge, competence, and skills to support breastfeeding
3. Discuss the importance and management of breastfeeding with pregnant women and their families
4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties
6. Do not provide breastfed newborns any food or fluids other than breastmilk, unless medically indicated
7. Enable mothers and their infants to remain together and to practice rooming-in 24 hours a day
8. Support mothers to recognize and respond to their infants' cues for feeding
9. Counsel mothers on the use and risks of feeding bottles, artificial nipples (teats) and pacifiers.
10. Coordinate discharge so that parents and their infants have timely access to ongoing support and care.

Reference: Baby-Friendly USA ~ 10 Steps & International Code. https://www.babyfriendlyusa.org/for-facilities/practice-guidelines/10-steps-and-international-code/

Many of the steps in the BFHI are self-explanatory, such as the establishment of ongoing monitoring and data-management systems, but others such as steps 1. B, 6, 7, and 10, may not be common knowledge, so a brief explanation for each of those is provided below. Step 1 B., refers to hospital policies and includes hospitals having regulations related to not promoting formula, bottles, or teats; making breastfeeding care standard practice; and tracking breastfeeding support (WHO, 2020). For step six, donor breastmilk or formula can be provided when a mother prefers not to breastfeed in addition to medical reasons (WHO, 2020). In step seven, rooming-in is considered keeping mothers and newborns together during their entire hospital stay unless for a medical reason (WHO, 2020). Step ten relates to supporting mothers at discharge by connecting them to community resources and collaborating with various organizations to help mothers continue breastfeeding after they leave the hospital (WHO, 2020).

Studies examining the effects of this global initiative have found the program to improve short, medium, and long-term health outcomes across geographic groups, with a dose-response relationship between the number of steps the mother is exposed to and improved breastfeeding behavior (initiation, exclusivity, and duration), internationally (Pérez-Escamilla et al., 2016). However, evidence examining its impact in the U.S., especially on child health outcomes, is relatively limited due to the majority of studies being observational in nature (Pérez-Escamilla et al., 2016). Research studies in the U.S. have indicated that exposure to the BFHI supports breastfeeding initiation and exclusivity, although there is little evidence establishing its relationship with breastfeeding duration (Munn et al., 2016). Recent observational studies have found exposure to the BFHI in the U.S. supports reductions in rural-urban and racial/ethnic breastfeeding behavior disparities (Merewood et al., 2019; Munn et al., 2016). Research also indicates that there is reduced access to maternity care practices in rural counties compared to urban counties in the U.S., indicating a need to examine the impact of the BFHI breastfeeding best practices in the southeastern U.S., more specifically in rural areas (Allen et al., 2015; Munn et al., 2016).

The Appalachian region is one geographical area, encompassing a portion of the southeastern U.S., in which the improvement of breastfeeding rates may help to reduce disparities in adverse health outcomes. The Appalachian region spans from Mississippi to New York and is characterized by high rates of rurality and economic distress, as well as increased rates of adverse health outcomes and reduced access to clinical health services, compared to the rest of the U.S. (Marshall et al., 2017). The region has higher rates of chronic disease that breastfeeding has been found to reduce risk for, including obesity, type II diabetes, heart disease, and some maternal cancers, such as ovarian cancer (Binns et al., 2016; Marshall et al., 2017).

There is limited research examining breastfeeding in Appalachia, making it a region of interest to better understand breastfeeding behavior and exposure to breastfeeding best practices (Wiener & Wiener, 2011).

Determination of breastfeeding rates, however, across the Appalachian region, is difficult because most national surveillance systems (e.g., the Pregnancy Risk Assessment Monitoring System and National Immunization Survey) measure breastfeeding rates at the state level, while the Appalachian region is made up of counties from segments of various states. Unlike other breastfeeding-related data collection systems, the Maternity Practices in Infant Care and Nutrition (mPINC) survey is sent to individual hospitals across the U.S., and gathers institution-level, self-reported data related to breastfeeding best practices, as well as some aggregate breastfeeding behaviors (CDC - DNPAO & CDC - NCCPHP, 2022). While the survey does not assess long-term breastfeeding rates, it can shed some light on the current state of the implementation of maternity care practices associated with the BFHI and in-hospital breastfeeding initiation, at a regional, sub-state level. Many mPINC measures align with the BFHI accreditation requirements (Table 3.2). The mPINC scoring algorithm can be found elsewhere (CDC - DNPAO & CDC - NCCPHP, 2021). While mPINC is not a direct measure of the implementation of the BFHI, results of the survey can help hospitals better understand their current implementation of maternity care practices and potentially help them to identify areas that need improvement (CDC - DNPAO, n.d.).

Table 3.2

Alignment of BFHI Best Practices with mPINC Maternity Care Measures

	BFHI Maternity Care Best Practices	Best Practice Summary	mPINC Measures
1.	A) Comply fully with the International Code of Marketing of Breastmilk	Hospital policies	Institutional management

Substitutes and relevant World Health Assembly resolutions B) Have a written breastfeeding policy that is routinely communicated to all health care staff C) Establish ongoing monitoring and data-management systems		Discharge support
2. Ensure that all staff has sufficient knowledge, competence, and skills to support breastfeeding	Staff competency	Institutional management
3. Discuss the importance and management of breastfeeding with pregnant women and their families	Prenatal care	Standalone variable
4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth	Care right after birth	Immediate postpartum Care
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties	Support mothers with breastfeeding	Feeding education
6. Do not provide breastfed newborns any food or fluids other than breastmilk, unless medically indicated	Supplementing	Feeding practices Feeding education
7. Enable mothers and their infants to remain together and to practice rooming-in 24 hours a day	Rooming-in	Immediate postpartum care Rooming-in
8. Support mothers to recognize and respond to their infants' cues for feeding	Responsive feeding	Feeding education
9. Counsel mothers on the use and risks of feeding bottles, artificial nipples (teats) and pacifiers.	Bottles, nipples, and pacifier	Feeding education
10. Coordinate discharge so that parents and their infants have timely access to ongoing support and care.	Discharge	Discharge Support

Reference: CDC, & DNPAO. (n.d.). *mPINC Ten Steps Assessment Tool*.

Research Aim

The primary aims of this research were: 1) to better understand if there are differences in the implementation of maternity care practices in Appalachian compared to non-Appalachian hospitals and 2) to examine the relationship between exposure to maternity care practices, as measured by mPINC, and exclusive breastfeeding upon hospital discharge (while controlling for hospital characteristics) in Appalachian compared to non-Appalachian hospitals; 3) to estimate

the impact of exclusive breastfeeding at discharge through increased mPINC scores, which indicate better implementation and utilization of best practices, on maternal ovarian cancer rates. Breastfeeding is suggested to be associated with reduced risk for the development of various types of ovarian cancers, so this estimation may speak to the role in which maternity care practices (as measured by mPINC scores) may play in the development of long-term adverse health outcomes (Babic et al., 2020).

The main hypotheses were: 1) Appalachian hospitals would have lower rates of exclusively breastfed infants at hospital discharge and lower total mPINC scores compared to non-Appalachian hospitals; 2) the relationship between average total mPINC score, and average percent of infants exclusively breastfed at discharge would be different in Appalachian vs. non-Appalachia hospitals.

Methods

Research Design

The mPINC survey is cross-sectional and is administered to hospitals every two years. It assesses the implementation of maternity care practices at the hospital level across the U.S. (CDC - DNPAO & CDC - NCCPHP, 2022). The Centers for Disease Control and Prevention (CDC) contacts the hospital mother-baby nurse manager or the manager for the labor and delivery unit, determines the best person to fill out the survey, and then sends the survey to that individual's email address (CDC - DNPAO & CDC - NCCPHP, 2022). Since the survey is administered every other year and COVID has impacted the capacity of many hospitals, 2018 mPINC survey data (as opposed to 2020) was requested from the CDC, and the hospitals' state and zip code were used to identify the hospital county. Hospital county was then matched with its respective, combined five-digit county and state Federal Information Processing System

(FIPS) codes. Once hospital FIPS codes were determined, Appalachian or non-Appalachian status was assigned using a dataset that was developed by the Appalachian Regional Commission (ARC) (Appalachian Regional Commission, n.d.). Therefore, Appalachian designation indicates any county that is served by ARC and includes counties from Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia (Appalachian Regional Commission, n.d.). Hospital identifiers such as hospital ID, city, and zip code were removed once data was merged to ensure institution anonymity and confidentiality. To further preserve anonymity, no analyses were conducted on hospital groups smaller than five.

Sample

In 2018, surveys were sent to a total of 2,913 hospitals across the nation that offer maternity services (Centers for Disease Control and Prevention, n.d.-a). Of the eligible hospitals, 2,045 (70.20%) participated in the survey (Centers for Disease Control and Prevention, n.d.-a). Inclusion criteria for this study included hospitals in one of the 50 states or the District of Columbia (D.C.), excluding hospitals located within U.S. territories such as Puerto Rico, the Virgin Islands, or Guam. The final study sample totaled 2,025 hospitals across the U.S.

Measurement

The primary predictor variable was total mPINC score, which is the calculated mean of the six maternity care practice sub-scores, including immediate postpartum care, rooming-in, feeding practices, feeding and education support, discharge support, and institutional management that make up the mPINC survey. While the mPINC survey cannot serve as a direct assessment of the BFHI measures, many of its sections align with best practices outlined in the BFHI 10 steps, and can therefore measure the implementation of such practices, regardless of

Baby-friendly designation (Centers for Disease Control and Prevention, n.d.-b; Grossniklaus et al., 2017; Patterson et al., 2019). A description of the practices, as measured by mPINC, can be found elsewhere (Centers for Disease Control and Prevention, n.d.-a; WHO, 2020). A secondary predictor of interest was Appalachian-designation, as determined by the ARC.

Hospital characteristics such as hospital type and teaching hospital status were included as potential covariates (Barrera et al., 2019). For-profit, private, military, and governmental hospital types had to be collapsed due to low prevalence in Appalachia. Baby-friendly hospital designation was included in the descriptive analysis and bivariate analyses to determine whether there was a significant association between Appalachian designation and Baby-friendly accreditation. However, Baby-friendly was not included in the multiple linear regression model for reasons that will be discussed in the next section. Total number of live births by cesarean section was also included as a covariate, as research has found that planned and emergency c-sections are associated with lower rates of breastfeeding initiation (Hobbs et al., 2016). The total annual live births was used as a weighting variable to estimate and account for hospital size in both the descriptive and analytic models.

The primary outcome of interest was the rate of exclusively breastfed infants at hospital discharge. This rate is determined by the representative of the hospital taking the survey and can be reported as an actual percentage or as an estimation (Centers for Disease Control and Prevention, 2021).

Data Analysis

Descriptive statistics were determined by establishing frequencies and percentages for categorical variables and means and standard deviations for continuous variables. Chi-square tests were used to test the significance of any association between categorical variables and

Appalachian designation. T-tests were used to determine if there were any significant differences between continuous variables by Appalachian designation.

Prior to regression analysis, the distribution of the outcome variable, percentage of infants exclusively breastfed at discharge, was plotted and indicative of normality, making linear regression an appropriate statistical method to analyze the relationship between the primary predictor (mPINC score) and outcome of interest. Simple linear regression was used to examine the relationship between exclusive breastfeeding at discharge and all predictors and covariates**.** Multiple linear regression was then used to assess the relationship between mPINC total score, and the percentage of infants exclusively breastfed at discharge while holding all other variables constant.

Unweighted descriptive and linear regression analyses were conducted in addition to analyses weighted by hospital size, as measured by the annual number of live births for each hospital**.** Baby-friendly designation was not included in the multiple linear regression model since mPINC score is indicative of the extent to which hospitals are following maternity care best practices and as mentioned previously, the mPINC measures align with all but one of the requirements for BFHI accreditation (Table 3.2). Therefore, the two variables would be assessing similar metrics, likely resulting in multi-collinearity within a model including both variables. An interaction variable was created to assess the impact of Appalachian-designation in concert with mPINC total score while controlling for potential confounders.

To estimate the potential impact of mPINC scores (via breastfeeding rates) on a health outcome of interest, the potential impact fraction (PIF) can be calculated. For this study, the potential impact fraction was used to estimate the impact of mPINC total score on risk for ovarian cancer using an adjusted odds ratio from a recent meta-analysis (Babic et al., 2020).

Ovarian cancer was selected as the outcome of interest because breastfeeding is known to reduce risk for ovarian cancer (Babic et al., 2020). Compiled information from various sources to get a pooled adjusted odds ratio, and the researchers included all of the necessary information for the PIF equation. The researchers estimated that mothers having ever breastfed were at 26% reduced odds (OR=0.74; 95% CI=0.70-0.79) of developing invasive ovarian cancer, than those that had never breastfed (Yan et al., 2014). The pooled, adjusted odds ratio was substituted for the risk ratio in the PIF calculation. The full methodology for calculating the potential impact fraction can be found elsewhere (Barendregt & Veerman, 2010). All analyses were conducted using SAS 9.4 (Inc., 2013)**.**

Results

Unweighted and weighted descriptive characteristics of the sample along with bivariate tests of significance by Appalachian-designation can be found in Table 3.3. When weighting for hospital size, the majority of both Appalachian and non-Appalachian hospitals were designated as non-profit (83.51% and 79.72%, respectively), teaching hospitals (79.96% and 77.87%, respectively), and were not accredited as Baby-friendly (78.76% and 65.78%, respectively). However, Baby-friendly hospital status was significantly associated with Appalachian designation ($p<0.0001$). Appalachian hospitals had a significantly lower average (mean=1104.33; $p=0.0286$) of total annual (fiscal or calendar year) births compared to non-Appalachian hospitals (mean=1323.25). When weighting for hospital size, there was a statistical difference in number of live births by cesarean section in Appalachian (809.50; $p=0.0436$) compared to non-Appalachian hospitals (926.90). Among the mPINC sub-section scores, Appalachian hospitals had a significantly lower average score for immediate post-partum care (76.18 vs. 83.43; $p<0.0001$), rooming-in (68.41 vs. 76.12; $p=0.0004$), feeding practices (78.39

vs. 82.28 p=0.0053), and institutional management (70.00 vs. 76.78; p=0.0002) compared to non-Appalachian hospitals. Similarly, average total mPINC score was significantly lower in Appalachian (76.65; p<0.0001) compared to non-Appalachian hospitals (81.71). The average rate of exclusive breastfeeding at discharge was also significantly lower in Appalachia (46.90%; p<0.0001) compared to non-Appalachia (53.79).

Table 3.3

Descriptive and Bivariate Analysis of Hospital Characteristics, mPINC scores, and Rate of Exclusive Breastfeeding at Discharge by Appalachian Region

Variable	**Unweighted**			**Weighted**		
	Appalachia N (%) or Mean ± SD	**Non-Appalachia N (%) or Mean ± SD**	**P**	**Appalachia N (%) or Mean ± SD**	**Non-Appalachia N (%) or Mean ± SD**	**P**
Hospital Characteristics						
Hospital Type **(N=2025)**			0.2022			<0.0001
Non-profit, private	139 (81.29)	1428 (77.02)		157694 (83.51)	1955844 (79.72)	
Other	32 (18.71)	426 (22.98)		31147 (16.49)	497462 (20.28)	
Teaching hospital **(N=2025)**			0.1528			<0.0001
Yes	126 (73.68)	1268 (68.39)		150997 (79.96)	1910367 (77.87)	
No	45 (26.32)	586 (31.61)		37844 (20.04)	542939 (22.13)	
Baby-Friendly Designation **(N=2025)**			<0.0001			<0.0001
Yes	19 (11.11)	478 (25.78)		40109 (21.24)	839505 (34.22)	
No	152 (88.89)	1376 (74.22)		148732 (78.76)	1613801 (65.78)	
Total Live Births **(N=2025)**	1104.33 ± 1223.28	1323.25 ± 1438.00	0.0286	-	-	-

***Total Live Births by Cesarean Section* (N=2016)**	359.01 ± 434.08	416.13 ± 485.33	0.1048	809.5 ± 23690.3	926.9 ± 30170.3	0.0436
mPINC Scores						
***Immediate Postpartum Care* (N=2024)**	73.33 ± 24.33	81.76 ± 19.94	<0.0001	76.18 ± 796.9	83.43 ± 686.4	<0.0001
***Rooming-In* (N=2022)**	62.17 ± 26.71	71.53 ± 24.71	<0.0001	68.41 ± 886.7	76.12 ± 911.6	0.0004
***Feeding Practices* (N=2025)**	78.26 ± 18.92	82.21 ± 17.62	0.0092	78.39 ± 544.2	82.28 ± 586.8	0.0053
***Feeding Education & Support* (N=2025)**	90.87 ± 14.78	91.67 ± 13.55	0.4999	91.08 ± 491.8	92.49 ± 463.7	0.2068
***Discharge Support* (N=2025)**	72.37 ± 23.02	78.52 ± 22.61	0.0010	76.17 ± 737.6	79.70 ± 819.0	0.0690
***Institutional Management* (N=2025)**	65.43 ± 23.66	70.51 ± 25.15	0.0081	70.00 ± 740.1	76.78 ± 821.9	0.0002
***Total* (N=2022)**	73.67 ± 15.87	79.28 ± 14.34	<0.0001	76.65 ± 518.6	81.71 ± 494.9	<0.0001
Infant Feeding Behavior						
***Exclusively Breastfed Infants at Discharge* (N=2022)**	43.19 ± 19.09	56.32 ± 20.74	<0.0001	46.90 ± 559.2	53.79 ± 657.2	<0.0001

Unweighted and weighted unadjusted results from the simple linear regression and adjusted results from the multiple linear regression analyses can be found in Tables 3.4 and 3.5, respectively. When controlling for all covariates and weighting by hospital size, non-profit hospitals had an exclusive breastfeeding at discharge average rate that was 6.26 percentage points greater than other hospitals (e.g., private, government, or military) ($p<0.0001$). Non-academic hospitals' exclusive breastfeeding at discharge average rate was 2.67 percentage points

significantly higher than teaching hospitals (p=0.0023). Appalachian hospitals had an exclusive breastfeeding at discharge rate that was significantly lower (p=0.0003) than non-Appalachian hospitals by 4.99 percentage points on average. Total live births occurring via c-section was significantly associated with exclusive breastfeeding at discharge rate, where, for every live birth delivered by c-section, the percentage of babies exclusively breastfed decreased on average by 0.004 points (p<0.0001). Additionally, for every one percentage point increase in total mPINC score, exclusive breastfeeding rate at discharged increased an average of 0.50 percentage points (p<0.0001). This average increase of 0.50 was used to calculate the PIF to assess the impact total mPINC score on risk for ovarian cancer in mothers that ever breastfeed compared to those who never breastfeed. Results of this calculation indicated that for every one percentage increase in mPINC score, due to its associated increase in average breastfeeding rates, the risk for the development of ovarian cancer in a mother could potentially be reduced by 10.6%, highlighting the potential protective effects of maternity care practice implementation (Supplemental Equations and Supplemental Table 3.1). An interaction term was used to compare the relationship between total mPINC scores and rates of exclusive breastfeeding at hospital discharge in Appalachian and non-Appalachian hospitals. This interaction was insignificant in the bivariate unweighted and weighted analyses (p=0.6646 and p=0.7042, respectively). Therefore, the term was not included in the adjusted models (Tables 3.4 & 3.5).

Table 3.4

Unweighted Multivariable Analysis of Percent of Infants Exclusively Breastfed at Discharge and Total mPINC Score

Variable	**Unadjusted**			**Adjusted***		
	β	**SE**	**P**	**β**	**SE**	**P**
Hospital Characteristics						
Hospital Type						
Non-profit	7.253	1.100	<0.0001	5.595	0.980	<0.0001

Other	Ref	Ref	Ref	Ref	Ref	Ref
Teaching hospital						
Yes	Ref	Ref	Ref	Ref	Ref	Ref
No	2.533	1.004	0.0117	1.544	0.891	0.0832
Baby-Friendly Designation						
Yes	Ref	Ref	Ref	-	-	-
No	-8.024	1.067	<0.0001	-	-	-
Appalachia						
Yes	-13.134	1.647	<0.0001	-10.330	1.470	<0.0001
No	Ref	Ref	Ref	Ref	Ref	Ref
Total Live Births by Cesarean Section	-0.005	0.0009	<0.0001	-0.008	0.0009	<0.0001
Total mPINC Score	0.606	0.029	<0.0001	0.601	0.029	<0.0001
Interaction: Total mPINC *Appalachian Designation						
Appalachia	0.549	0.091	0.6646	-	-	-
Non-Appalachia	0.590	0.030	Ref	-	-	-

Table 3.5

Multivariate of Analysis of Percent of Infants Exclusively Breastfed at Discharge and Total mPINC Score Weighted by Hospital Size

Variable	**Unadjusted**			**Adjusted***		
	β	**SE**	**P**	**β**	**SE**	**P**
Hospital Characteristics						
Hospital Type						
Non-profit	7.560	0.990	<0.0001	6.257	0.906	<0.0001
Other	Ref	Ref	Ref	Ref	Ref	Ref
Teaching hospital						
Yes	Ref	Ref	Ref	Ref	Ref	Ref
No	2.785	0.970	<0.0001	2.668	0.874	0.0023
Baby-Friendly Designation						
Yes	Ref	Ref	Ref	-	-	-
No	-7.400	0.836	<0.0001	-	-	-
Appalachia						
Yes	-6.889	1.551	<0.0001	-4.988	1.392	0.0003
No	Ref	Ref	Ref	Ref	Ref	Ref
Total Live Births by Cesarean Section	-0.003	0.0004	<0.0001	-0.004	0.0004	<0.0001

Total mPINC Score Overall	0.528	0.027	<0.0001	0.502	0.026	<0.0001
Interaction: Total mPINC*Appalachian Designation						
Appalachia	0.552	0.088	0.7042	-	-	-
Non-Appalachia	0.517	0.028	Ref	-	-	-

Discussion

There is limited research examining the comparison of hospital-level breastfeeding best practices and the impact of maternity care practices on breastfeeding behavior in Appalachia (Wiener & Wiener, 2011). In this study, Appalachian hospitals had a significantly lower average rate of Baby-friendly designated hospitals compared to non-Appalachia. This lower average coincided with Appalachian hospitals having a significantly lower average mPINC scores compared to hospitals in non-Appalachia, including immediate post-partum care, rooming-in, feeding practices, institutional management, and overall total score, when weighted by hospital size. The only two mPINC sub scores that were not statistically different between Appalachia and non-Appalachia were feeding education and support and discharge support. The breakdown of the sub scores may provide Appalachian hospitals with more specific maternity care practices to target and implement to better support exclusive breastfeeding during the hospital stay. Furthermore, while controlling for potential confounders, there was a significant negative association between Appalachian designation and the percentage of babies that are exclusively breastfed at discharge.

There was a significant positive association between total mPINC score and the percentage of babies exclusively breastfed at discharge, indicating that implementation of maternity care practices in the hospital setting may support such behavior. This result corroborates similar findings in nationwide studies, examining the impact of maternity care

practices on rates of exclusive breastfeeding at hospital discharge (Barrera et al., 2019). There was not a statistically significant relationship between the interaction term assessing the impact of Appalachian designation on the relationship between total mPINC score and exclusive breastfeeding rate at hospital discharge (Tables 3.4 & 3.5). This finding suggests that Appalachian designation does not significantly influence the relationship between mPINC score and exclusive breastfeeding at hospital discharge rates, indicating that other factors aside from maternity care practices, as measured by mPINC, may need to be explored to better understand the relationship between Appalachian-designation and exclusive breastfeeding rates at hospital discharge. While this lack of difference was not what the researchers anticipated, it suggests that regardless of Appalachian region, mPINC scores remain associated with rates of exclusive breastfeeding at discharge. This finding highlights the importance of in-hospital maternity care practices and may suggest that improvements in mPINC scores in the Appalachian region could support improvements in in-hospital breastfeeding behaviors.

The exploration of the PIF relating mPINC scores to risk for the development of ovarian cancer in mothers highlights the importance of breastfeeding to maternal health. Results indicated that for every increase in mPINC score by one percentage point, was associated with about a potential to reduce maternal risk for ovarian cancer by about ten percent. This calculation should be interpreted with caution, as a pooled, adjusted odds ratio was substituted for an adjusted risk ratio. An odds ratio is usually inflated away from zero compared to a risk ratio, potentially exaggerating the association between one variable and another (Zhang & Yu, 1998). Despite this limitation, these findings help to connect the exposure to breastfeeding best practices and long-term health implications.

Limitations

There are key limitations within this study. Firstly, it is cross-sectional, so there is no way to establish whether mPINC total or sub scores are causally related to the percentage of infants being exclusively breastfed at discharge. There may also be some response bias, as there is not one consistent person across hospitals who provides responses to the survey. However, CDC tries to mitigate this to some extent by determining the most qualified person at each hospital to take the survey. Another element of response bias may be the ability of some hospitals to have the time and resources to fill out the survey, where resource-limited settings may be less likely to fill out the survey due to time or personnel constraints. Additionally, some responses to questions are answered as actual numbers or estimates of number (Supplemental Table 3.2). However, there is not a way to know how close the estimated percentages are to true percentages of exclusively breastfed infants. Furthermore, the mPINC study does not collect demographic characteristics of hospital population, but there are known disparities in breastfeeding behavior (rural/urban locale, race, and socioeconomic status) that could be explained by some of these factors. There could also be other hospital characteristics related to the availability of resources that could impact the relationships seen in this research. Additionally, the way in which hospital type was collapsed was due to prevalence limitations within groups of interest but not necessarily grouped to combine like categories together. More research needs to be conducted in order to determine alternative characteristics that could be contributing to these differences and relationships.

Conclusion

Both Appalachian designation and total mPINC score had significant independent relationships with the rate of exclusively breastfed infants at discharge. However, the interaction

between Appalachian designation and mPINC score and its influence on exclusive breastfeeding rate at hospital discharge was not significant. These findings suggest that Appalachian-designation does not alter the relationship seen between mPINC total scores and exclusive breastfeeding rates at discharge. Importantly, this lack of difference in relationship indicates that mPINC scores are just as effective in Appalachia compared to non-Appalachia. Due to the known protective effects against long-term adverse health outcomes, such as ovarian cancer, results of this study indicate that improvements in maternity care practices in Appalachia could potentially reduce other adverse health outcome disparities experienced by the region. More research needs to be conducted examining these relationships while including other potential confounding variables such as hospital population demographic characteristics.

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Supplemental Material

Supplemental Table 3.1

Two by Two Table of Ever and Never Breastfeeding in Invasive Ovarian Cancer Cases and Controls from Babic et al. 2020

Exposure	Cases: Invasive Ovarian Cancer	Controls: No Ovarian Cancer	Total
Ever Breastfeeding	5,981	9,417	15,398
Never Breastfeeding	3,992	4,426	8,418
Total	9,973	13,843	23,816

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Supplemental Table 3.2

Two by Two Table of Actual vs. Estimated Rate of Exclusively Breastfed Newborns at Hospital Discharge in Appalachia vs. Non-Appalachia

Region	Actual	Estimate	Total
Appalachia	89	82	171
Non-Appalachia	911	940	1851
Total	1000	1022	2022

Chi-square prob: 0.4788

Supplemental Equations: adjPAF & PIF

$$adjPAF = \frac{a}{m1} X \frac{adjRR - 1}{adjRR}$$

$$= \frac{\#\ exposed\ cases}{total\ cases}\ X \frac{adjusted\ Relative\ Risk - 1}{adjusted\ Relative\ Risk}$$

$$adjPAF = \left(\frac{5{,}981}{9{,}973}\right) * \frac{0.74 - 1}{0.74} = -0.211$$

$$PIF = adjPAF\ x\ Success\ Rate$$

Chapter 4. Exploring Patient and Lactation Consultant Knowledge, Perceptions, and Barriers to Breastfeeding and Best Practices in Northeast Tennessee – A Qualitative Study

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Abstract

Keywords Breastfeeding, Appalachia, Tennessee, Lactation Support, Lactation Consultant

Objectives To explore postpartum patients' and International Board Certified Lactation Consultants'® (IBCLC®) knowledge, perceptions, and barriers to breastfeeding and breastfeeding best practices, respectively in the Northeast Tennessee (NE TN) Region.

Methods Semi-structured interviews were conducted with seven IBCLCs® and seven postpartum patients. Interviews were recorded and transcribed. Thematic analysis was conducted to determine emergent themes related to knowledge, perceptions, and barriers to breastfeeding and implementation of breastfeeding best practices for IBCLCs® and postpartum patients, respectively.

Results Perceived barriers to breastfeeding, barriers to implementation, and perceptions of best practices were themes identified from the IBCLC® interviews. Perceived barriers to breastfeeding, breastfeeding experiences, and perceived facilitators to breastfeeding were themes identified through the analysis of postpartum patient interviews. Within those themes, each contained a variety of emergent subthemes. Both postpartum patients and IBCLCs® mentioned the importance of maternal self-efficacy and the need for breastfeeding education.

Conclusion for Practice This study highlighted the importance and need for breastfeeding education, post-discharge support, and the need for increased value placed on lactation consultants such as IBCLCs® and lactation knowledge for other disciplines in the NE TN region.

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Introduction

Research has found optimal breastfeeding (OB), considered breastfeeding exclusively for the first six months of life, to reduce maternal risk for the development of hypertension, type II diabetes, short interval pregnancies, and breast cancer, and reduce infant risk for infection, asthma, type I diabetes, and sudden infant death syndrome (SIDS) (Bartick et al., 2017; Centers for Disease Control and Prevention, n.d.; Kelishadi & Farajian, 2014; Victora et al., 2016). Suboptimal breastfeeding, defined as not meeting the exclusivity and duration parameters of optimal breastfeeding, is estimated to be associated with almost 3,500 excess deaths each year, and nearly $18.5 billion in financial costs (Bartick et al., 2017). Further, breastfeeding disparities exist in the United States (U.S.) by geography. For example, in 2017 the Southeastern states had some of the lowest rates of OB (18-23%) in the U.S. (Centers for Disease Control and Prevention (CDC), n.d.). In the same year, non-Hispanic Black infants (15%) optimally breastfed at a rate that was just over half that of non-Hispanic White infants (27%) (Louis-Jacques et al., 2017).

The Baby-Friendly Hospital Initiative (BFHI), developed by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), is a global program that accredits hospitals to support breastfeeding based on ten best practices (Table 4.1) (Baby-Friendly USA, 2022a).

Table 4.1: BFHI

Ten Steps to Successful Breastfeeding	
1.	A) Comply fully with the International Code of Marketing of Breastmilk Substitutes and relevant World Health Assembly resolutions B) Have a written breastfeeding policy that is routinely communicated to all health care staff C) Establish ongoing monitoring and data-management systems
2. Ensure that all staff has sufficient knowledge, competence, and skills to support breastfeeding	
3. Discuss the importance and management of breastfeeding with pregnant women and their families	

4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties
6. Do not provide breastfed newborns any food or fluids other than breastmilk, unless medically indicated
7. Enable mothers and their infants to remain together and to practice rooming-in 24 hours a day
8. Support mothers to recognize and respond to their infants' cues for feeding
9. Counsel mothers on the use and risks of feeding bottles, artificial nipples (teats) and pacifiers.
10. Coordinate discharge so that parents and their infants have timely access to ongoing support and care.

Reference: Baby-Friendly USA ~ 10 Steps & International Code. https://www.babyfriendlyusa.org/for-facilities/practice-guidelines/10-steps-and-international-code/

Baby-friendly (BF) designated hospitals are required to meet certain standards to ensure that best practices are in place and have recurring assessments to ensure they maintain those standards (Baby-Friendly USA, 2022a). BF accreditation helps hospitals develop the infrastructure to support breastfeeding mothers via maternity care practices by providing them with information and skills to build their self-efficacy to breastfeed (Baby-Friendly USA, 2022b).

Research on the impact of the BFHI on optimal breastfeeding rates has found the program has varying effects (Gomez-Pomar & Blubaugh, 2018; Pérez-Escamilla et al., 2016). Results of compilation studies have indicated improvements in short and long-term health outcomes associated with exposure to BFHI's best practices, although these depend upon maternal characteristics such as socioeconomic status, race/ethnicity, education, and mental health (Gomez-Pomar & Blubaugh, 2018; Pérez-Escamilla et al., 2016). Studies have also highlighted a dose-response relationship between exposure to the number of BFHI best practices and rates of adverse health outcomes (Munn et al., 2016; Pérez-Escamilla et al., 2016). More recently, researchers in North Carolina found that exposure to BFHI best practices is associated with reduced disparities in breastfeeding initiation between rural and urban populations (Liberty

et al., 2019). Merewood et al. (2019) suggested the BFHI to reduce disparities by race/ethnicity in the Southern U.S (Merewood et al., 2019). While these two studies suggest associations between the BFHI and reduced socio-demographic disparities, research related to the impact of the BFHI is limited, especially in southern, rural areas of the U.S. (Munn et al., 2016; Pérez-Escamilla et al., 2016).

Although research has shown BF designation to be associated with improved short and long-term health outcomes, research has identified key barriers for hospitals working toward BF designation, including the marketing of infant formula, lack of governmental support, social norms surrounding breastfeeding, lack of personnel and financial resources to implement the ten steps, hospital infrastructure, and provider knowledge and attitudes related to breastfeeding (Semenic et al., 2012). Some hospitals have also indicated internal barriers to include staff resistance to change, the length of time it takes to become accredited, and staff commitment and efficacy to accreditation (Hughes, 2015). Therefore, utilizing the BFHI best practices may provide only a framework for hospitals, especially those with limited resources, to begin making changes to improve breastfeeding behaviors in the population they serve, as opposed to pursuing full accreditation (Gomez-Pomar & Blubaugh, 2018). Some states have enacted programs that recognize hospitals for implementation of individual or a portion of these steps, to support breastfeeding in their states (Texas Ten Step Program, 2022; Virginia Department of Health, 2022).

The implementation of the BFHI requires interdisciplinary collaboration within the hospital setting (St. Fleur & Mckeever, 2014). One important clinician known to support breastfeeding behavior is the International Board Certified Lactation Consultant® (IBCLC®). According to the International Board of Lactation Consultant Examiners (IBCLE®), IBCLCs®

support mothers in their breastfeeding journey by helping them troubleshoot breastfeeding difficulties, connecting them to resources, and reducing risks associated with breastfeeding (International Board of Lactation Consultant Examiners, 2022). In a scoping literature review, Haase et al. (2019) indicate that access to and utilization of IBCLCs® has been associated with improved breastfeeding behavior in mothers (Haase et al., 2019). Chiurco et al. (2015) assessed characteristics of lactation support and breastfeeding rates in a maternity care ward before and after an IBCLC® was hired. The researchers found that after the IBCLC® was introduced, significantly more women received breastfeeding support, accurate breastfeeding information, and breastfed their newborn within two hours post-delivery (Chiurco et al., 2015). Therefore, access to an IBCLC® could be beneficial to populations in which breastfeeding rates need to be improved.

There are an estimated eleven IBCLCs® that are members of the United States Lactation Consultant Association (USLCA) practicing within 60 miles of the Johnson City, TN area, although this may be an underrepresentation of the total number, as USLCA requires IBCLCs® to pay for membership (United States Lactation Consultant Association, 2021). There are limited resources that allow an individual to search for an IBCLC® near them. Johnson City is in Northeast Tennessee (NE TN), which is within the South Central and Central Appalachian subregions of Appalachia. As a region, Appalachia faces socioeconomic, health, and healthcare disparities, and within the region, Central Appalachia is even further afflicted by these disparities (Marshall et al., 2017). According to Bailey & Cole (2009) infants born to mothers living in rural, economically distressed areas, such as that of Central and South Central Appalachia, have increased risk for poor birth outcomes. Due to the disparities in breastfeeding behavior seen in the Southeastern U.S. in concert with higher risk of adverse birth outcomes in rural,

economically distressed areas, breastfeeding interventions such as the best practices outlined by the BFHI are needed to potentially help reduce these disparities. Despite these needs, limited resources may prevent hospitals from pursuing or achieving BF accreditation. Little research has been conducted to assess breastfeeding knowledge, perceptions, and barriers for postpartum mothers in the Appalachian region. Furthermore, few studies have examined knowledge, perceptions, and barriers to implementation of maternity care practices in the Appalachian region. Wiener & Wiener (2011) estimated the prevalence of breastfeeding in Appalachia compared to the rest of the U.S. using 2007 National Survey of Children's Health (NSCH) data, finding that Appalachia had significantly lower breastfeeding rates than the rest of the U.S. In a recent abstract, Seiger et al. (2021)suggest that limited lactation support, being undervalued, and lack of family support were all barriers to providing infant feeding support in Appalachia. However, this finding is not specific to NE TN, but all of Appalachia. Therefore, breastfeeding knowledge and perceptions specific to NE TN need to be explored to better understand the infant feeding needs of the population of interest.

To identify relevant breastfeeding interventions to NE TN, it is important to understand knowledge, perceptions, and barriers to breastfeeding from both maternal and clinician experience. Therefore, the purpose of this qualitative study is to explore patient knowledge, perceptions, and barriers related to breastfeeding in a Northeast Tennessee (NE TN) OB/GYN clinic, in concert with regional IBCLCs' knowledge, perceptions, and barriers to implementing breastfeeding best practices in this area.

Methods

Sample

Convenience sampling was used to recruit postpartum patients from a NE TN OB/GYN clinic. The co-investigator (CI), a regional IBCLC® practicing at ETSU's OB/GYN clinic, informed patients of the on-going study, if interested in participating, the principal investigator (PI) reached out to the patient via text message, phone call, or e-mail to offer more information about the study. Snowball sampling was used to recruit regional IBCLCs® (Guest et al., 2006). The CI e-mailed fellow IBCLCs® with information about the study. If interested, the PI reached out to IBCLCs® via e-mail and scheduled a time to conduct an interview. If interested, the PI sent them an informed consent document via REDcap.

Interviews

Interview questions were created by the PI, were revised by the CI, and other members of the research team. Questions were submitted to the East Tennessee State University Institutional Review Board (IRB), approved, and modified as needed. Semi-structured interviews were conducted with both participant groups using open-ended questions and associated probes, along with short-answer demographic questions. Patient participants were interviewed virtually or in-person, and were asked to share their breastfeeding knowledge, experience, and barriers. Patient interviews lasted from 12 minutes to 35 minutes. All patient participants were incentivized to participate with a $10 electronic gift card. IBCLC® participants were interviewed via Zoom only and were asked to share their knowledge and perceptions of the BFHI, barriers to implementation, and barriers to breastfeeding among their patient population. IBCLC® interviews lasted 25-50 minutes. All interviews were recorded on Zoom with live transcript enabled, whether they were conducted virtually or in-person.

Qualitative Analysis

Recordings from seven IBCLC® and seven patient interviews were transcribed, and live transcripts were double-checked for accuracy by the PI. Thematic analysis was used to determine emergent themes from each sample populations' interviews, separately. Methods developed by Braun & Clarke (2006) and expanded upon by Nowell et al. (2017) were implemented, and include familiarization with the data, initial code generation, searching for themes, honing of themes, and development of the results and report**.**

The PI coded the first patient and IBCLC® interviews and developed the coding frame for subsequent interviews. Two additional coders were recruited and utilized to conduct thematic analysis. The coding team worked together to determine emergent codes from analysis as well as redundant codes that needed to be collapsed. Inter-rater reliability was determined between coders.

The percent agreement of the initial coding of all seven IBCLC® interviews was calculated at 20.98% with a minimum segment overlap percentage set at 67%, meaning that the coders agreed on 20.98% of the coded segments in which each of those coded segments overlapped by at least 67%. The researchers then utilized consensus coding, by reviewing all seven coded interviews together, to address discrepancies. The coders found that the level of context included in each segment varied by coder and agreed upon an appropriate amount of context for coding segments. Once disagreements in coding and contextualization were resolved, the percent agreement increased to 74.92% with an associated Kappa statistic of 0.74, indicating a moderate level of agreement between coders (McHugh, 2012).

The same process was conducted for patient interviews. When initial coding was complete for all seven interviews, the percent agreement was at 43.26% with a minimum

segment overlap of 67%. After discussing and resolving coding disagreements and contextualization issues using consensus coding, the percent agreement rose to 76.05% with the minimum segment overlap of 67%, and a moderate kappa statistic of 0.75. Data saturation was assessed by examining the redundancy of codes across interviews. For IBCLCs® no new codes were generated after the sixth interview. For postpartum patients one new code was developed in the sixth interview and one in the seventh interview. Data were coded and analyzed using MAXQDA 2022 (VERBI Software) (VERBI Software, n.d.).

Results

Study Population

Of the seven IBCLCs® who participated, all were practitioners in Tennessee and were non-Hispanic, White. Over 70% of IBCLC® participants had been practicing for at least ten years, and over 50% of them provided care to patients from three or more states. Of the postpartum patient participants, all were non-Hispanic White. They ranged in age from 21 to 44 years old with an average age of 31 years. Their infants ranged in age from 2 to 7 weeks with an average age of 3.85 weeks and a median age of four weeks. Four of the seven mentioned this being their first baby, but this may be an underestimation because this was not a specific question in the transcript.

Themes

Themes for IBCLCs® and postpartum patients can be found in tables 4.2-4.7. Each table represents an overarching theme, indicated by the title of the table, and includes a range of emergent subthemes. The tables include the total number of interviews in which the theme and subtheme were found, along with example quotations associated with each sub-theme. IBCLC® and postpartum patient interviews were analyzed separately.

IBCLCs®

A total of six emergent themes relating to perceived barriers to breastfeeding were determined and can be found in Table 4.2. These themes included self-efficacy, physiological, cultural, lack of support, socioeconomic status, and lack of education. Barriers related to self-efficacy included any segment of the interview indicating that an IBCLC® believed that lack of self-confidence, self-efficacy, or self-trust was a barrier to breastfeeding for mothers. Physiological barriers were related to physical maternal or infant characteristics that may have hindered breastfeeding, such as infant latch, having a cesarean section, or maternal breast anatomy. Cultural barriers encompassed hindrances related to the societal or organizational (e.g., hospital) importance of breastfeeding that may in turn impact a mother's decision to push through the difficulties of breastfeeding. Lack of support encompassed lack of family or peer support, but also lack of lactation support pre- and post-discharge. Socioeconomic status consisted of barriers related to economic status, such as lack of paid family leave or employer support in lower-paying jobs, lack of reliable transportation, and limited access to resources such as hospital-grade breast pumps. Lack of education relates to the need for prenatal or general breastfeeding education to help mothers better understand how to breastfeed and what to expect when breastfeeding. The three most prominent perceived barriers included need for education, mental health/self-efficacy, and lack of support. Both lack of support and mental health/self-efficacy were noted by six IBCLCs® and need for education was identified by all seven IBCLCs®.

Table 4.2

IBCLC® Perceived Barriers to Breastfeeding

Theme	*N=7*	*Representative Quotations*
Self-efficacy	N=6	"…they think that there is nothing in the world that they can do, and so they feel like, I think they feel like failures if they don't meet the expectation." "There's something about trusting your body and trusting the process that I feel like it's personality related-too, but right now, it's generationally related. Which is why it's so important that we have those weighted feeds and the constant weighing, so that the moms can learn to trust themselves."
Physiological	N=4	"I only see really complicated cases, so yes, oral restrictions, PCOS, insufficient glandular tissue." "We're just seeing more and more gestational diabetes, type two diabetes, along with obesity."
Cultural	N=5	"This is very weird in our rural Appalachian population, but culturally breastfeeding has not historically been accepted within the last probably 30-40 years, and so I'll have some moms that just don't feel comfortable with putting a baby to the breast…" "…there seems to be a culture of, 'if it doesn't work out for me, then you know, I'm just going to give it a try.' And with that comes zero preparation, zero taking any kind of education to know what it's going to take to be prepared to breastfeed…so they come in already kind of giving up before they even get started."
Lack of support	N=6	"The first couple of days I can get things started off as much as possible, but if we're not at the point where we are latching, I feel like I'm kind of like, 'hey, good luck! I hope that you're able to find somebody and the time and the patience and the, you know, whatever to get that to work for you.'" "And so, we don't have, we're not taking care of that transition of maternity to postpartum. Knowing the mom because it is a dyad."

		"I feel like in our area and in Appalachia, the lack of collaborative care is the biggest issue, that final step of community support. I think that's the most difficult one."
Socioeconomic status	N=3	"I've known moms, as an IBCLC®, who the mom had to go back to work at two weeks postpartum and that's just how it was, and so it's not this mom's fault that, you know, she's asking for formula in the hospital or whatever. She's just trying to survive and make sure her baby gets some nutrition." "I work with families sometimes that go back to work at two weeks. And that's not healthy, not even, you know, even taking breastfeeding out of the picture."
Lack of education	N=7	"I think I'm seeing a lot of, so a lot of moms – society, social media, their best friends, and their church friends, their neighbors, and everybody, told them that it was going to go this way. It was going to do this, and it was fun, and it was great. And, you know, nobody talks about how hard it is, and how difficult the first couple of weeks are, and different problems that different people had." "Mom's get this perception from several outside sources that they should breastfeed, and it's like the end all be all, and your baby should get breast milk, and then they never get prepared or are never prepared for when things are difficult. And so, then that leads to barriers, once baby gets here and things are hard. Why do it? When everybody told you [it] was easy…"

All seven IBCLC® participants discussed perceived barriers to the implementation of best practices, which included the impact of COVID-19, feasibility of best practices, lack of administrative support, conflict between clinicians or healthcare entities, limited clinician knowledge, respect for IBCLC® knowledge, and lack of financial resources, as shown in Table 4.3. Four of the seven IBCLCs® mentioned the impact of the COVID-19 pandemic on barriers to implementation of maternity care practices associated with the BFHI, such as no in-person

breastfeeding classes or limited time in the hospital. Six IBCLCs® discussed the feasibility of the best practices, which included segments discussing the success or noncompliance associated with implementing the BFHI maternity care practices. Lack of administrative support included any mention of the need support from healthcare clinics or hospital administration to implement the BFHI practices and was identified by four of the seven IBCLCs®. Territorial clinics were only mentioned by two participants, but pertained to clinicians not wanting to share resources, such as lactation support, for fear of losing patients to other clinics. Limited clinician knowledge was mentioned as a barrier by all seven participants and relates to the idea that most autonomous clinicians did not receive lactation education that is as granular as IBCLCs® do, making it difficult for IBCLCs® to consistently do what is best for their patients, lactation-wise. Similarly, respect for IBCLC® knowledge was a barrier, with five participants indicating that if the clinic or healthcare system that they work for does not value that expertise or their role in patient care, they are less effective in supporting BFHI maternity care practices. Additionally, three IBCLCs® mentioned the cost associated with the BFHI or the idea that it is not lucrative for hospitals as barriers to implementation.

Table 4.3

IBCLC® Perceived Barriers to Implementation of Best Practices

Theme	*N=7*	*Representative Quotations*
Impact of COVID	N=4	"Because of COVID we no longer have breastfeeding classes." "I know, particularly now, in light of COVID, we're getting moms in and out as quickly as possible and sometimes the IBCLC® doesn't even have the opportunity, so time, I think is also a barrier to these steps."
Feasibility of best practices	N=6	"Our policy, I think, is driven a little bit more by the 'in a perfect world without issues, this is how we do things.' And I don't think our personal

		policy is set up in a way to where we have that kind of gray area that would be best for baby." "…but Baby-friendly, all of the Baby-friendly concepts, precepts, philosophy absolutely are needed. But I recognize that it's not always feasible and we have to bring people along a little more slowly than that."
Lack of administrative support	N=4	"I don't think that there is usually strong administrative support for it. And if there is not strong administrative support for it, it just simply isn't going to work." "…I think the biggest difficulty is having hospital administration understand that aspect, just that we can't create a new lactation consultant."
Conflict between clinicians/healthcare entities	N=2	"…so, I may give a kid formula because they're at 12% weight loss and another lactation consultant would say that I'm unethical because I've provided infant formula for that baby." "…people just, they're territorial and this is not a place to be territorial."
Limited clinician knowledge	N=7	"Breastfeeding is one of those areas that's heavily influenced by personal experiences, and most healthcare fields have very limited knowledge, training, and you know nursing schools, medical schools, residency programs have very limited training in lactation…" "…the physician comes in and provides misinformation or the midwife comes in and provides misinformation because they all have different training, and that's probably the biggest struggle there, and probably the biggest reason parents aren't successful, is that misinformation piece from different healthcare providers."
Respect for IBCLC® knowledge	N=5	"Do you know if I spent 85 hours learning about tongue tie, and my doctors don't believe in it, I completely wasted my time learning about something that is very relevant in my field?" "…there are things we can do as an IBCLC® to try to support that like skin-to-skin and letting the baby be at the breast and trying to actively participate in that, but sometimes medical folks have other

		interventions that they like to do and that oftentimes will trump your IBCLC®."
Lack of financial resources	N=3	"If you're not making money with something in the hospital or you're not saving money with something in the hospital, you're generally not going to get a large amount of support." "…we as public health recognize that Baby Friendly is cost prohibitive. It's a hard pill to swallow, cost-wise, for many facilities and some it is absolutely a barrier, so most states have implemented a baby-friendly light…"

Themes related to IBCLC® perceptions can be found in Table 4.4. Every participant mentioned that they perceive the BFHI to be beneficial or important to the health of their patient population. However, there were five participants that suggested the program is too rigid in that its ten steps may not be beneficial to every mother or infant in every situation. Furthermore, there were a total of four IBCLCs® who indicated that the best practices may be detrimental to mothers by making them feel like failures if they choose not to breastfeed or are not successful at breastfeeding and placing too much emphasis on hospital rates of breastfeeding instead of quality of care provided. Finally, there were two IBCLCs® that considered the best practices to be misunderstood, meaning that the best practices were perceived as too rigid, when there actually is fluidity in their application.

Table 4.4

IBCLC® Perceptions of Best Practices

Theme	*N=7*	*Representative Quotations*
Benefits/importance to health	N=7	"…it is very beneficial to do that rooming in, so that you can do things like noticing those feeding cues, learning how to position yourself, making sure that you have kind of latch and things figured it."

		"There are many, many advantages to having the baby and the mom remain together, biologically. I can see the difficulties and the stress it can cause infants when they are not with their mothers and the difficulties of breastfeeding."
Detrimental to mothers	N=4	"But if a mom's completely losing it and she needs to send her baby to the nursery, then rooming in 24 hours a day didn't work for her, and we make her feel like a failure because she is struggling in that moment." "Moms are hearing, 'breastfeed, breastfeed, breastfeed. It doesn't matter.' I have traumatized mothers who are crying, and their nipples are literally like cracks and crevices and bleeding. All they got told was, 'just keep your baby to the breast.'"
Rigid/disconnected from reality	N=5	"I think the most difficult part of that is that you can't really fall under huge widespread protocols. You need to focus on every mom and baby specifically, for where they are in their journey with things." "I think a lot of families feel helpless. I think they think that there is nothing else in the world that they can do, and so they feel like, I think they feel like failures if they don't meet the expectation. I think that, like I've even had mom's say, 'oh, can I – oh, I just want to use a pacifier so bad, but I don't want to. I'm scared to,' or whatever. It's like, it shouldn't be that way. And it's like this is the new 10 commandments, and that is definitely not the case."
Misunderstood	N=2	"I think that's probably one of the biggest misconceived steps of baby friendly, is that baby friendly doesn't allow formula, and it does. It just gives guidelines and stipulations of how to appropriately give formula and how to protect breastfeeding…" "…there are difficulties with breastfeeding after using artificial nipples in the early hospital setting. I mean, we're talking about hospital setting, not three months down the road, and so they need to be counseled, not prohibited from using, but counseled to understand this is how it can affect your baby,

	and this is what we need to do to protect you and your baby."

Postpartum Patients

Four subthemes were identified as postpartum patients perceived facilitators to breastfeeding: benefits, self-efficacy, support, and alternative resources (Table 4.5). All seven participants identified perceived benefits, with many noting the positive impact of breastfeeding on the maternal/infant relationship through bonding as well as the health benefits for infants. Self-efficacy, related to postpartum patients' empowerment and building of confidence that resulted from identifying the right infant feeding method for them and their baby, was mentioned by four participants. Support from family, friends, and lactation consultants was mentioned by seven participants, with lactation support being noted as especially important. Additionally, five postpartum patients indicated that alternative resources (aside from support from relevant individuals), such as articles, events, and the Tennessee Breastfeeding Hotline, were facilitators to their breastfeeding behavior.

Table 4.5

Postpartum Patients Perceived Facilitators to Breastfeeding

Theme	*N=7*	*Representative Quotation*
Perceived benefits	N=7	"I know that it creates a better bonding experience growing up, and that it's a lot healthier than formula." "For baby, it has all kinds of good nutrients, lots of immunoglobulins and health benefits that way, immunity benefits, as well as decreasing some, well some evidence that it decreases some disease processes later in life."
Self-efficacy	N=4	"Sometimes people still have to supplement. We might even have to do that some, but I just feel like it's rewarding for both the baby and the mother."

		"…my confidence has come along quite a bit like since my supply has been established….and I'm able to tell when he's crying because he wants to eat, as opposed to crying for other reasons."
Support (partner, family, friends, lactation support)	N=7	"[IBCLC®] was definitely a lifeline because I had no idea that older women, it can take longer for their milk to come in." "One of my good friends…she's like training to get her IBCLC®, and she has breastfed her children, and so…she's been a huge source of comfort…"
Alternative resources (as opposed to clinicians, friends, family, or partner)	N=5	"…I read articles and read journals and read reviews and read, you know, just peoples' experiences with it, and I feel like that was probably the biggest thing." "…when you call the breastfeeding hotline, they're nice and they're sweet and they're encouraging, and you need that because it's very difficult."

Themes related to the postpartum patients' breastfeeding experiences can be found in table 4.6. Only two postpartum patients indicated mothers feeling pressure to breastfeed, which related to feeling pressure to breastfeed or not to breastfeed or feeling judgement or shame for not breastfeeding. Six participants also discussed any reason for supplementation, with most postpartum patients providing physiological reasons for supplementing with formula or donor breastmilk. Participants also expressed their attitude toward/intention to breastfeed across six transcripts, meaning that mentioned their intrinsic desire to breastfeed. Additionally, every postpartum patient mentioned pumping or expression of breastmilk, which was associated with uncomfortable feelings toward breastfeeding or physiological characteristics that prevented direct breastfeeding.

Table 4.6

Postpartum Patients' Breastfeeding Experiences

Theme	*N=7*	*Representative Quotation*
Pressure to breastfeed	N=2	"…the pressure that people make you feel and like I think social media is a large component of that or like people, you know, wanting to act like everything is going well with breastfeeding is something that I've seen a lot." "My mother is so obsessed with breastfeeding, and still asks me about it all the time, even though I don't want to…talk about it, you know? There's definitely like this bias and this pressure, if you do anything else."
Reason for supplementation	N=6	"And then he's had one bottle of formula since he's gotten home, and that's just because they said the Enfamil formula has extra calories and stuff for preemies that they need because they're premature and underdeveloped…" "When I got home, I was just doing the pumping every three hours, and then I was giving it to the baby, but pretty quickly he wanted to get more milk than I could produce…"
Maternal breastfeeding attitude/intention	N=6	"I had not done any kind of research into it, but with COVID being a thing for my entire pregnancy and you know experience in the hospital, I definitely was, you know, wanting to give my son like any additional immunity I could against COVID." "I knew I wanted to try breastfeeding, and I wasn't sure if I'd be able to…cause sometimes it just doesn't happen."
Pumping and expressing	N=7	"I'd say that I'm still probably most comfortable with pumping and then feeding him from the bottle." "I just felt like it would be uncomfortable to breastfeed. It would be scary. It would feel weird, and I wouldn't want to do it. So that's why I did the breast pumping…"

Four subthemes related to postpartum mothers' perceived barriers to breastfeeding can be found in Table 4.7. Lack of hospital resources, which related to limited in-hospital lactation support, was identified by three participants. Six postpartum patients mentioned that their expectations of the breastfeeding experience did not match what their actual experience turned out to be, which made it difficult to continue trying to breastfeed when all they had heard prior to trying was that breastfeeding was easy. Similarly, four postpartum mothers mentioned the need for accessible, transparent breastfeeding education, which could help to reduce the disconnect between expectations and the reality of breastfeeding. Complications were also a prominent barrier identified, with six postpartum mothers mentioning maternal or infant physiological complications that made it difficult for them to feed their infant in the way they desired.

Table 4.7

Postpartum Patients' Perceived Barriers to Breastfeeding

Theme	*N=7*	*Representative Quotation*
Hospital resources	P=3	"I think if there's any way that you or your research could help get a lactation consultant back at the hospital, I think that'd be very beneficial for new moms. I think that's a great loss for people." "The lactation consultant at the hospital was fantastic, though. The problem was she was so worn out cause they had her going 100 miles an hour. She was the only one there…"
Expectations	N=6	"It's time consuming, it's very time consuming, so that is a hindrance sometimes…." "I thought, 'well, I should be able to stick her right on…' and if I hadn't have survived it before, I don't know if I'd have even tried.
Complications	N=6	"But when my son was born with him being low blood sugar, I was producing some colostrum more the first day, than in subsequent days, but I had had a C section. I hemorrhaged. I had to have a blood transfusion, like I had no energy myself."

		"…My age would likely be a factor. I take Zoloft, which is an antidepressant, an SSRI, and then that can also have some factors at play in terms of, you know, him having some formula and maybe even some withdrawal, if he doesn't get enough breastmilk from me."
Need for education	N=4	"I needed to understand the technique and I needed to understand like what the baby brings to it as well, and those seem like such basic things. And why do we not have some basic information really readily available …?" "I felt like I just kind of was expected to just know what to do. But pumping at the hospital, that was my first experience with feeding the baby…"

Discussion

IBCLCs ®

Results from the semi-structured interviews of IBCLCs® indicate that there are a variety of perceived barriers to breastfeeding for postpartum mothers as well as perceived barriers to implementation of breastfeeding best practices in the hospital setting. The purpose of this research was to identify areas of need. Therefore, this discussion is primarily focused on emergent themes related to perceived barriers that are amenable to change and could serve as interventional targets for future programs and research.

Perceived Barriers. Emergent themes amenable to change from IBCLC® semi-structured interviews included self-efficacy, lack of support, and lack of breastfeeding education. These perceived barriers directly align with the proposed role of an IBCLC® as defined by the IBCLE®, which suggests that these clinicians support mothers in their breastfeeding journey by helping them troubleshoot breastfeeding difficulties, connecting them to resources, and reducing risks associated with breastfeeding (International Board of Lactation Consultant Examiners, 2022). From these interviews, it was clear that every IBCLC® had the same shared goal: to

support the postpartum mothers that they serve. Therefore, a potential solution to reduce these barriers could be to increase the number of IBCLCs® in our area, as this could improve access to a clinician whose role is to reduce the exact barriers that were identified in this qualitative study. Furthermore, from these interviews, there is a great need for breastfeeding education and access to reliable breastfeeding resources, as well as a need for support in the form of coordination of care from the hospital to the home. Therefore, investing in the existing IBCLCs® and supporting the development of future IBCLCs® could be an important first step to supporting postpartum mothers in the NE TN region.

Barriers to implementation of the BFHI best practices also provided some opportunities amenable to change, such as lack of administrative support, conflict between clinicians/healthcare entities, and limited clinician lactation knowledge. Lack of administrative support primarily related to the lack of appreciation for the IBCLC® certification and not following the existing best practices, specific examples included administration not complying fully with the International Code of Marketing of Breastmilk Substitutes by having formula advertisements and formula representatives in hospitals. Furthermore, conflict between clinicians/healthcare entities was associated with codes mentioning territorial healthcare clinics that did not want to share resources, such as an IBCLC®, for fear that they would lose patients to fellow clinics. This highlights the healthcare system-level issue of fee-for-service care as opposed to value-based care, where clinics are rewarded for the volume of patients and services they provide as opposed to being rewarded for the quality of care and maintaining the health of their patient population. While this barrier is amenable to change, it may be more difficult to address because it would be a change that likely needs to be made at the organizational or policy level and is most likely not specific to this geographic region. Another barrier amenable to

change related to the implementation of these best practices was clinician breastfeeding knowledge. In many cases IBCLCs® mentioned that their autonomy was limited or trumped by other clinicians in some cases, leading to the plan of care for mothers not being conducive to breastfeeding or maternal infant feeding preferences. Similarly, some participants indicated a lack of clinician knowledge of the maternal patient history as well. From these three themes, it is clear that education related to lactation and the importance of lactation consultants needs to be shared with other clinician fields. The value of a lactation consultant has been established in previous literature (Chiurco et al., 2015; Haase et al., 2019). Therefore, a potential solution would be to integrate more lactation knowledge into other clinicians' curriculum and to conduct and disseminate more research related to the value of the IBCLC® certification and role in long-term health of both mothers and babies.

Perceptions of the Best Practices. Every IBCLC® that was interviewed mentioned the benefits or importance of the BFHI maternity care best practices. However, four interviewees mentioned detrimental aspects and perceived rigidity of the best practices, while at least two indicated that the best practices were usually misinterpreted. These subthemes indicate that there may be some division in perceptions amongst IBCLCs® in this region about the BFHI best practices and highlights a key disconnect in the perceptions of these best practices. In a recent commentary, Trish MacEnroe, the executive director of Baby-Friendly USA, attempted to demystify these disconnects through the discussion about the perceived rigidity of each step and how those perceptions are misinterpretations of the BFHI best practices (MacEnroe, 2018). MacEnroe (2018) concluded that the goal of BFHI is to support mothers to make an educated decision related to infant feeding, as opposed to being forced to breastfeed against their will. MacEnroe's (2018) analysis of the BFHI best practices needs to be disseminated to help

reinforce collaborative lactation care and to clinicians participating in that care to be on the same page. Furthermore, in the interviews conducted; it was noted that it is not the sole responsibility of an IBCLC® to uphold these best practices. Therefore, there may be a need for clinicians (pediatricians, OB/GYNs), IBCLCs®, and hospital administration staff to review the best practices and reach a mutual interpretation or understanding of what is required to uphold the best practices to best support the maternal infant dyad pre- and postpartum.

Postpartum Patients

Perceived Facilitators and Barriers to Breastfeeding. When assessing the knowledge of postpartum patients, a key theme related to perceived facilitators of breastfeeding was the knowledge of benefits (both specific and general) for babies. Few mothers mentioned the benefits of breastfeeding for them, while research has shown that breastfeeding helps to reduce maternal risk for a variety of adverse health outcomes such as various types of cancer and obesity (Ip et al., 2007). Therefore, including information related to the benefits of breastfeeding for mothers within breastfeeding education could be of importance moving forward. Furthermore, a resounding theme related to facilitators of breastfeeding was the impact of lactation consultants, as supported by the representative quotes in Table 6. This theme reinforces the need for lactation support and IBCLCs® in the NE TN region. Barriers to breastfeeding also highlighted the need for lactation support in the region, where postpartum patients mentioned the lack of lactation support the hospital setting, lack of knowledge related to what to expect when breastfeeding, and the need for education for how to breastfeed. All these themes overlap with perceived barriers to breastfeeding that IBCLC® interviewees mentioned.

There were other themes that seemed to overlap between IBCLCs® and postpartum patient transcripts. Maternal self-efficacy was an emergent theme within the IBCLC® transcripts

for perceived barriers to breastfeeding, while maternal self-efficacy was identified as a theme within the facilitators to breastfeeding for postpartum patients. Similarly, IBCLCs® identified lack of support as a key barrier to breastfeeding as well, where postpartum patients suggested support from family, friends, and lactation consultants was a facilitator to their breastfeeding success. This could indicate that IBCLCs® are helping to reduce the barriers to breastfeeding that they see in their population by improving their self-efficacy and supporting their infant feeding journey.

Postpartum Patient Experiences. A few postpartum patients mentioned feeling pressure or judgement relating to their infant feeding choices. This pressure could potentially align with the perceived rigidity associated with breastfeeding best practices. In addition to pressure, mothers also discussed reasons in which they supplemented with formula, infant feeding intention, as well as alternative breastmilk feeding methods. The majority of mothers having to supplement with formula in some capacity was not out of lack of wanting to breastfeed, but instead seemed to be related to physiological challenges that prevented them from breastfeeding. Moreover, individuals mentioning alternatives to breastfeeding explicitly mentioned discomfort as a potential reason for pumping or hand expressing breast milk. Through the identification of themes within these experiences, this research may provide clinicians within this region with a better understanding of postpartum patients' infant feeding preferences and needs.

Limitations

There are some important limitations to note within the study. Firstly, the sampling method for both IBCLCs® (snowball) and postpartum patients (convenience) are prone to selection bias, limiting the generalizability of these results. Additionally, a key limitation of the study sample was that there was not diversity in either population, despite known breastfeeding

disparities by race/ethnicity and other sociodemographic characteristics and needs for a diverse clinician workforce to better support minority and underserved populations. The small sample size indicates lower rates of qualitative saturation, so the number of participants included in each study population is also an important limitation.

Conclusion

All IBCLCs® emphasized the importance and benefits of the maternity care practices outlined in the BFHI. However, this study illuminated important disconnects in the perception of these best practices and the need for the interdisciplinary lactation support team to be on the same page regarding the practices. Additionally, need for breastfeeding education was an emergent subtheme in both the IBCLCs® and postpartum patients perceived barriers to breastfeeding, highlighting the dire need for mothers to feel better prepared for the infant feeding experience. Results of this study also indicated that there needs to be a greater emphasis on lactation education for clinicians, such as pediatricians and OB/GYNs, caring for postpartum mothers to improve coordination of care between these entities and IBCLCs®. This education could also help illuminate the importance and value of IBCLCs® to the health of mothers and babies in the NE TN region. Improvements in breastfeeding education for mothers, lactation education for other clinicians, and increased value placed on the IBCLC® could help reduce barriers for postpartum mothers in their infant feeding journey. This study highlights the need for improvements in lactation collaboration, the sharing of lactation resources, and coordination of care for the mother/infant dyad as they move from hospital to home.

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Chapter 5. Summary and Discussion

Summary

Research has shown that breastfeeding reduces maternal and child risks for morbidity and mortality, leading to the development of the Baby Friendly Hospital Initiative (BFHI), a program designed to improve breastfeeding behavior in populations across the globe (Baby-Friendly USA, 2022; Ip et al., 2007; WHO, n.d.). The current state of literature suggests that the BFHI supports improvements in breastfeeding behavior (Munn et al., 2016; Pérez-Escamilla et al., 2016). However, breastfeeding behavior disparities persist in the U.S., especially by racial/ethnic groups and geographic location (Anstey et al., 2017; Grummer-Strawn et al., 2006; Li & Grummer-Strawn, 2002). Moreover, research suggests a prominent gap in the literature is the exploration of the impact of the BFHI in southern, rural areas of the U.S., such as Appalachia, a region that disproportionately experiences adverse health outcomes compared to the rest of the U.S. and is characterized by increased rates of rurality and economic distress (Pérez-Escamilla et al., 2016). An additional complication is that national surveillance systems that collect breastfeeding data do not collect information below the state-level, potentially masking breastfeeding disparities occurring in regions that cross state lines, such as Appalachia.

Therefore, the purpose of this research was three-fold: 1) to synthesize the evidence assessing the impact of the BFHI on breastfeeding disparities in this U.S. 2) to determine if there are differences in breastfeeding best practices in Appalachian compared to non-Appalachian hospitals and examine the relationship between best practices and breastfeeding at hospital discharge in Appalachian and non-Appalachian hospitals and 3) to explore knowledge, perceptions, experiences, and barriers to breastfeeding for postpartum mothers in a Northeast Tennessee (NE TN) Ob/Gyn clinic and to assess knowledge, perceptions, and barriers to

implementation of breastfeeding best practices and perceived barriers to breastfeeding of regional International Board Certified Lactation Consultants® (IBCLCs®).

Aim 1

Results of the scoping review corroborated previous research in finding that the BFHI is successful in improving breastfeeding behavior across demographic populations. However, there were only certain circumstances in which literature measured whether the BFHI reduced gaps in breastfeeding behavior among various populations. When comparing populations having less than a high school education to those with some college, the relationship between BFHI exposure and breastfeeding behavior was inconsistent across studies (Hawkins et al., 2013, 2014). Regardless of intention, the BFHI did not reduce gaps in breastfeeding outcomes in women who were employed compared to those that were unemployed (Attanasio et al., 2013). Similarly, when examining the relationship between breastfeeding behavior and the BFHI in different geographic groups, there was limited evidence supporting reductions in breastfeeding disparities (Bass et al., 2020; Liberty et al., 2019). Research also examined the relationship between BFHI exposure and various maternal and infant characteristics. Research suggests that exposure to the BFHI does not reduce breastfeeding behavior disparities in infants diagnosed with Neonatal Abstinence Syndrome (NAS), although it did support improvements in breastfeeding behavior among mothers of infants admitted to the neonatal intensive care unit (NICU) (Crook & Brandon, 2017; Merewood et al., 2003; Naylor & Clarke-Sather, 2020). In overweight and obese mothers, certain steps have been shown to reduce disparities by supporting improvements in breastfeeding initiation and exclusivity rates at higher rates compared to normal-weight mothers, but this finding is inconsistent across studies (Kair et al., 2019; Marshall et al., 2020). Among racial/ethnic groups, the implementation of the Communities and Hospitals

Advancing Maternity Care Practices (CHAMPS), a program developed to increase the number of Baby-friendly hospitals, supported reductions in breastfeeding initiation disparities between Black and White infants (Burnham et al., 2022; Hemingway et al., 2021; Louis-Jacques et al., 2017; Merewood et al., 2019). However, this relationship was not seen for disparities in breastfeeding exclusive breastfeeding rates (Burnham et al., 2022; Merewood et al., 2019). Lastly, the BFHI supports improvements in breastfeeding behavior regardless of socioeconomic characteristics, but may not reduce gaps in breastfeeding behavior rates between people experiencing higher versus lower incomes(Jung et al., 2019; Kivlighan et al., 2020; Patterson et al., 2021).

Examination of the BFHI as a predictor of breastfeeding behavior also needs to be more consistent, as some studies explored the impact of individual steps of the BFHI, some explored the impact of all steps on breastfeeding behavior, and some explored the impact of programs supporting BFHI implementation on breastfeeding behavior. Given the known disparities in breastfeeding by race/ethnicity and geographic location, the most promising evidence to potentially reduce disparities in breastfeeding initiation among these groups is the CHAMPS program that supports states to implement the BFHI. Additionally, based on this review, the development of interventions to support mothers post-discharge needs to be a priority to help reduce disparities in breastfeeding duration, as most of the evidence suggests that BFHI can contribute to reductions in breastfeeding initiation disparities among population groups.

Aim 2

Results of the quantitative analysis indicated that maternity care practice implementation scores and Appalachian designation had significant independent associations with exclusively breastfeeding rates at discharge. However, the relationship between maternity care practice

implementation scores and exclusive breastfeeding at discharge was not impacted by hospital locale in Appalachia vs non-Appalachia. This indicates that regardless of Appalachian designation, the maternity care practices associated with the BFHI remain significantly positively associated with exclusive rate of breastfeeding at hospital discharge. Therefore, improving these maternity care practices in regions such as Appalachia, could potentially help to improve breastfeeding and longer-term adverse health outcome disparities experienced by the region.

The results of this scoping review highlighted the need for consistency when examining the impact of the BFHI, as the breastfeeding outcomes examined in the current body of literature included breastfeeding initiation, breastfeeding exclusivity, and breastfeeding duration. Future research should examine the impact of the BFHI on longer duration of breastfeeding. Healthy People 2030 includes two breastfeeding objectives: 1) to increase the number of exclusively breastfed infants at six months to 42.2% and 2) to increase the number of infants breastfed at one year to 54.1% (U.S. Department of Health and Human Services, n.d.). These metrics relate directly to the definition of optimal breastfeeding: to exclusively breastfeed for the first six months with supplemented breastfeeding through the first year of life (Bartick et al., 2017). Suboptimal breastfeeding is estimated to be associated with increased economic and health burden compared to suboptimal breastfeeding (Bartick et al., 2017). Therefore, moving forward, research in the U.S. should focus primarily on these two metrics in order to better assess whether implementation of the BFHI can help to achieve these national goals.

Key limitations of the dataset could play a role in these findings, as there were only three hospital-level characteristics included in the multivariate models such as hospital type (non-profit, private, etc.), teaching hospital designation, and the annual number of live births by cesarean section. In future analyses, hospital data could be linked to alternative hospital-level

surveys, such as the National Hospital Care Survey (NHCS) to incorporate hospital population demographic characteristics, such as race/ethnicity makeup, which are associated with known breastfeeding behavior disparities. Furthermore, this research highlights the need for more comprehensive breastfeeding data collection tools to assess the relationship between breastfeeding behavior and best practice exposure among various populations.

Aim 3

Results of the qualitative data collection and analysis related to knowledge, perceptions, and barriers to breastfeeding and implementation of breastfeeding best practices of postpartum mothers and IBCLCs®, respectively. The research highlighted breastfeeding support needs in the NE TN area. IBCLCs® indicated that they all share the same common goal, but that there is sometimes a disconnect amongst these practitioners related to the interpretation of the best practices to support breastfeeding. Furthermore, IBCLCs® expressed that lack of other clinician knowledge and conflict between healthcare entities as barriers to implementation of such maternity care practices in their work. Additionally, IBCLCs® suggested there is a great need for breastfeeding education and postpartum support to prepare mothers for the infant feeding experience and to empower them by supporting their self-efficacy, respectively.

Postpartum mothers identified facilitators to their breastfeeding or infant feeding success as breastfeeding benefits and support (from family, friends, and lactation consultants). Barriers to breastfeeding included lack of hospital support, breastfeeding education, breastfeeding expectations, where participants suggested that some hospitals did not have sufficient lactation services and were unable to attain the breastfeeding education they desired, which contributed to unrealistic expectations about infant feeding. Postpartum mothers' breastfeeding experiences were characterized by themes of pressure, formula supplementation, breastfeeding intention, and

alternative breastmilk feeding methods. The need for breastfeeding education dominated both postpartum mothers' and IBCLC® interviews, highlighting the need for such a resource for the NE TN area. Furthermore, the need for lactation support in the hospital and the impact that lactation support can have on a mothers' infant feeding experience also illuminates an important need for mothers of childbearing age in the region.

There were some important limitations with sampling for this study. Sampling methodology for both populations (convenience and snowball) are highly subject to bias. The overall sample size was also small in both participant groups but allowed for an estimated 80% saturation of themes. Additionally, the sample lacked diversity as all participants were non-Hispanic White and geographic residence was not captured. These characteristics need to be addressed in future studies to better understand the infant feeding needs of the NE TN population and regional IBCLC® perspectives.

Conclusion and Implications

The results of this research highlighted the importance of the maternity care practices associated with the BFHI, as exemplified by the initiative's impact on breastfeeding initiation disparities identified in chapter two, the positive association between maternity care practices and exclusive breastfeeding at discharge rates exhibited in chapter three, and the BFHI's importance and benefits consistently identified by regional IBCLCs® in chapter four. These findings corroborate existing evidence suggesting the BFHI helps to improve breastfeeding behavior (Munn et al., 2016; Pérez-Escamilla et al., 2016). Two important findings were the establishment of the relationship between BFHI-associated maternity care practices and in-hospital breastfeeding behavior that remained significant regardless of Appalachian designation and the significant negative association between Appalachia and in-hospital breastfeeding rates.

Taken together, these findings may illustrate the need for programs to improve BFHI-associated maternity care practices to improve breastfeeding rates in Appalachia. This could be especially important in Central Appalachia because the subregion is disproportionately affected by many of the adverse health outcomes that breastfeeding protects against and is characterized by increased economic distress and rurality, two characteristics associated with increased adverse birth outcomes. Therefore, future studies need to examine the prevalence of BFHI-accredited hospitals in the Appalachian region, especially in Central Appalachia and examine the relationship between Appalachia and mPINC scores, while controlling for population characteristics and other potential confounders, to see if maternity care practices could provide an opportunity to improve breastfeeding rates in Appalachia and its subregions.

Additionally, this research illustrates the need to examine breastfeeding rates below the state level, as exemplified by the differences in breastfeeding rates between Appalachian and non-Appalachian hospitals. This could potentially be added to PRAMS or NIS by gathering maternal county of residence and birthing hospital county. By learning about both, there would be an opportunity to understand whether mothers are giving birth in their own county of residence or if they are traveling to an external county. Additionally, gathering the county of residence instead of the zip code or city of residence might reduce risk for confidentiality breaches. This could also be conducted by creating a uniform breastfeeding data collection methodology that would be implemented and utilized across all maternity care and birthing hospitals in the U.S., which would allow for comparison across such entities.

Results of this study also demonstrated the need to develop or implement interventions to support breastfeeding across populations to reduce breastfeeding disparities and improve breastfeeding and health equity. Programs such as CHAMPS, could be viable intervention to

support improvements in breastfeeding and reduce breastfeeding initiation disparities in the Appalachia region through increasing access to Baby-friendly hospitals, especially in underserved areas such as Central Appalachia. An additional intervention could be programs such as the Virginia Maternity Center Breastfeeding-friendly Designation Program (VA MCBFD), which encourages birthing and maternity care centers to implement the BFHI maternity care practices and awards for every two steps they achieve (Virginia Department of Health, 2022). One IBCLC® mentioned that these programs exist across the U.S., but that they have inconsistent names (e.g., the VA MCBFD and the Texas 10 Step Program). Therefore, future research could also develop a list of those programs, determine where they exist, how they compare, and what breastfeeding rates look like in their respective states or areas. These Baby-friendly light programs, as the IBCLC® referred to them, could be used in resource-limited areas, such Central Appalachia and other areas in the U.S. that have increased rates of economic distress and rurality, or known breastfeeding behavior disparities. In addition to these existing interventions, programs to support mothers beyond the hospital stay need to be developed, as exemplified by the results of chapter two and chapter four. Aspects of such a program could include home visits within the first two weeks, improving equitable access to breastfeeding education for every mother, and providing culturally relevant breastfeeding education for various populations. An important characteristic of these interventions is the need for interprofessional collaboration between providers for mothers and babies in concert with increased lactation support, as illustrated by the results in chapter two. Additionally, increased lactation knowledge for pediatricians and OB/GYNs could support the collaboration and increase respect for the value placed on IBCLCs®.

Attainment of ILE Competencies

This dissertation assessed breastfeeding best practices, perceptions, and barriers within and outside of the Appalachian region. The primary products included a scoping review and associated evidence matrix, a quantitative analysis of national hospital-level data, and the collection and data analysis of qualitative data. Achievement of ILE competencies associated with each study aim can be found in Table 5.1.

Table 5.1

ILE Competencies

Subject	Description	ILE Integration	Design	Results	Implication(s)
Data Analysis	Design a qualitative, quantitative, mixed methods, policy analysis or evaluation project to address a public health issue	Aim 2: quantitative study using mPINC Aim 3: primary qualitative data collection and analysis of lactation consultants and patients	Aim 2: Created an analytic dataset and associated methodology plan Aim 3: Developed IRB proposal (Informed consent documents, HIPAA authorization forms, E-mail and interview scripts)	Aim 2: Coordinated with research team to execute proposed methods Aim3: Completed and analyzed 14 interviews (7 IBCLC® and & 7 postpartum patient)	Aim 2: improved knowledge related to merging datasets, and interpreting results with continuous outcomes and categorical predictors Aim 3: Determined emergent themes related to breastfeeding best practices and breastfeeding needs of

					postpartum mothers
Data Analysis	Explain the use and limitations of surveillance systems and national surveys assessing, monitoring, and evaluating policies and programs and to address populations health	Chapter 1: Background/intro – gaps in existing data/surveillance Aim 1: Scoping literature review – gaps in interventions	Chapter 1: Gathered data and literature highlighting gaps in breastfeeding surveillance Aim 1: Gathered data and literature that identified gaps in the way in which breastfeeding data is assessed	Chapter 1: Built the argument for the need for dissertation work Aim 1: Evaluated the impact of the BFHI on breastfeeding disparities in the U.S. using Levac, Colquhoun, and O'Brien expansion of Arksey & O'Malley	Chapter 1: Provided the framework and part of the introduction for each dissertation manuscript Aim 1: Systematically mapped existing literature, establishing the current state of the research
Policies & Programs	Integrate knowledge of cultural values and practices in the design of public health policies and programs	Aim 3: qualitative study to help better understand perceptions of and barriers to breastfeeding	Aim 3: developed semi-structured interview scripts to collect qualitative data from two different groups	Aim 3: Identified emergent themes related to barriers, facilitators, and perceptions of participants	Aim 3: Highlighted current facilitators of needs to support infant feeding practices of postpartum patient population in NE TN

Policies & Programs	Propose interprofessional team approaches to improving public health	Aim 3: qualitative study assessing IBCLCs'® perceptions and barriers to implementing BF best practices in clinical settings	Aim 3: Included IBCLC® as a co-investigator, gathered qualitative data to include postpartum mothers' and lactation consultants' voices in this research	Aim 3: Identified needs of populations of interest,	Aim 3: Results provide intervention and programmatic targets for public health professionals to support both entities in relation to infant feeding practices in NE TN
Education & Workforce Development	Assess an audience's knowledge and learning needs	Aim 3: qualitative assessment of IBCLCs'® perceptions and barriers to implementing BF best practices in clinical settings	Aim 3: asked questions related to IBCLC® and postpartum mothers' knowledge of breastfeeding best practices and infant feeding	Aim 3: Shared BFHI ten steps with them during interviews	Aim 3: Learned about their perceptions of the best practices
Leadership, Management, & Governance	Integrate knowledge, approaches, methods, values, & potential contributions from multiple professions and systems in addressing public health problems	Aim 1 – assesses contribution to address breastfeeding Aim 3	Aim 1: Gathered literature from various disciplines Aim 3: Collected data from both postpartum mothers and IBCLCs®	Aim 1: Synthesized literature from various disciplines Aim 3: Identified themes from both population groups	Aim 1: Identified gaps in research and relevant interventions to support reductions in breastfeeding disparities Aim3: Discussed overlap between the two population groups

					to highlight the most important needs of postpartum in NE TN
Leadership, Management, & Governance	Propose strategies for health improvement and elimination of health inequities by organizing stakeholders, including researchers, practitioners, community leaders, & other partners	Aim 3: Dissertation defense	Aim 3: let IBCLC® participants know that my dissertation would be disseminated and that they were welcome to come to my dissertation defense	Aim 3: has not occurred yet	Aim 3: has not occurred yet
Epidemiology	Critically review and interpret public health and other scientific literature to synthesize evidence in a public health area, identify gaps in evidence, and propose further epidemiologic investigation	Aim 1: Scoping literature review & evidence matrix	Aim 1: Gathered data and literature that identified gaps in the way in which breastfeeding data is assessed	Aim 1: Evaluated the impact of the BFHI on breastfeeding disparities in the U.S. using Levac, Colquhoun, and O'Brien expansion of Arksey & O'Malley; used two other abstractors to reduce bias	Aim 1: Systematically mapped existing literature, establishing the current state of the research

Epidemiology	Apply the ethical and legal principles, including the concepts of human subject's protection and confidentiality, related to collection, management, use and dissemination of epidemiologic data for the conduct of research and public health practice	Aim 2: IRB Form 129 – mPINC Aim 3: Formal IRB proposal to conduct qualitative research	Aim 2: study approved as non-human subjects research; removed hospital identifiers to ensure anonymity Aim 3: Submitted proposal and received approval from ETSU medical IRB	Aim 2: N/A Aim 3: Ensured participants signed informed consent and voluntarily participated, de-identified all data after interviews were transcribed. All identifiable data backed up on ETSU's password protected One Drive	Aim 2: N/A Limited risk involved for patient and IBCLC® participants; ensured co-investigator and PI were upholding ethical standards.
Epidemiology	Apply appropriate methods and correctly interpret complex and multifaceted data analysis in determining risk factors and causes of health and disease in populations	Aims 1,2, & 3	Aim 1: Levac, Colquhoun, and O'Brien Aim 2: Linear regression Aim 3: Thematic analysis (Braun and Clarke)	Aim 1: systematic mapping of the current literature Aim 2: determined relationships between variables of interest while controlling for potential confounders	Aim 1: identification of future research endeavors Aim 2: determined relationships between variables of interest and future research opportunities

				Aim 3: developed emergent themes from both IBCLCs® and postpartum patients/mothers	Aim 3: identified infant feeding needs and barriers
Epidemiology	Demonstrate proficiency in the use of computer software for data entry, database management, data analysis, and displaying and reporting results	Aims 2 & 3	Aim 2: utilized SAS Aim 3: utilized MAXQDA	Aim 2: increased SAS proficiency Aim 3: increased MAXQDA proficiency	Aim 2: ability to perform and interpret linear regression with a continuous outcome and categorical predictor Aim 3: ability to utilize MAXQDA for future qualitative analysis using teams

Dissemination Plan

The dissemination plan or stakeholder engagement plan can be found in Chapter 1 (pages 29-30).

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APPENDICES

Appendix A: Chapter 1

Figure A.1

U.S. Timeline of Breastfeeding Goals

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Appendix B: Chapter 3

Table B.1

mPINC Immediate Postpartum Care Scoring Algorithm

IMMEDIATE POSTPARTUM CARE			
Measure	**Explanation**	**Survey item**	**Scoring**
Immediate skin-to-skin contact	After vaginal delivery, percent of newborns who remain in uninterrupted skin-to-skin contact with their mothers immediately after birth . . . . . .if breastfeeding, until the first breastfeeding is completed. . . .if not breastfeeding, for at least one hour.	C1_a1 C1_a2	100 = Most 70 = Many 30 = Some 0 = Few Items scored then averaged.
	After Cesarean-delivery, percent of newborns who remain in uninterrupted skin-to-skin contact with their mothers as soon as the mother is responsive and alert . . . . . .if breastfeeding, until the first breastfeeding is completed. . . .if not breastfeeding, for at least one hour.	C2_a1 C2_a2	100 = Most 70 = Many 30 = Some 0 = Few Items scored then averaged.
Transition	Percent of vaginally-delivered newborns separated from their mothers before starting rooming-in.	C3	100 = Few 70 = Some 30 = Many 0 = Most OR Not an Option
Monitoring following birth	Percent of newborns who receive continuous observed monitoring throughout the first two hours immediately following birth.	C5	100 = Most 70 = Many 30 = Some 0 = Few
	Immediate Postpartum Care Subscore		Mean of the 4 item scores[†]

[†]The subscore for hospitals with a valid skip for immediate skin-to-skin after Cesarean delivery was the mean of 3 items scored.

Reference: CDC - DNPAO, & CDC - NCCPHP. (2021). *mPINC Scoring Algorithm Overall Maternity Practices Score (Total Score)*. https://www.cdc.gov/breastfeeding/pdf/mpinc/states/mPINC-Scoring-Algorithm-h.pdf

Table B.2

mPINC Rooming-In and Feeding Practices Scoring Algorithm

ROOMING-IN			
Measure	**Explanation**	**Survey item**	**Scoring**
Rooming-In	Percent of newborns who stay in the room with their mothers for 24 hours/day (not including separation for medical reasons).	C4_a1	100: 80%+ 70: 50-79% 30: 20-49% 0: <20%
Mother-infant separation	Indicates usual location of newborns during. . . . . .pediatric exams/rounds. . . .hearing screening. . . . pulse oximetry screening. . . .routine labs/blood draws/injections. . . .newborn bath.	C6_a1 C6_a2 C6_a4 C6_a5 C6_a6	100 = in mother's room for all 5 situations 70 = removed from mother's room for 1-2 situations 30 = removed from mother's room for 3-4 situations 0 = removed from mother's room for all 5 situations
Rooming-in safety	Indicates whether your hospital has a protocol requiring frequent observations of high-risk mother-infant dyads by nurses to ensure safety of the infant while they are together.	C7	100 = Yes 0 = No
	Rooming-In Subscore		Mean of the 3 item scores

FEEDING PRACTICES			
Measure	**Explanation**	**Survey item**	**Scoring**
Formula-feeding of breastfed infants	Percent of healthy, term breastfed newborns who are fed infant formula.	D3_A1	100=<20% 70=20-49% 30=50-79% 0=80% +
Glucose monitoring	Indicates whether your hospital performs routine blood glucose monitoring of full-term healthy newborns NOT at risk for hypoglycemia.	D5	100 = No 0 = Yes
Formula counseling for breastfeeding mothers	Frequency that staff counsel breastfeeding mothers who request infant formula about possible health consequences for their infant and the success of breastfeeding.	E3	100 = Almost always 70 = Often 30 = Sometimes 0 = Rarely
	Feeding Practices Subscore		Mean of the 3 item scores

Reference: CDC - DNPAO, & CDC - NCCPHP. (2021). *mPINC Scoring Algorithm Overall Maternity Practices Score (Total Score)*. https://www.cdc.gov/breastfeeding/pdf/mpinc/states/mPINC-Scoring-Algorithm-h.pdf

Table B.3

mPINC Feeding Education Scoring Algorithm

FEEDING EDUCATION & SUPPORT			
Measure	**Explanation**	**Survey item**	**Scoring**
Formula preparation & feeding techniques	Among mothers whose newborns are fed any formula, percent of mothers taught. . . . . .appropriate formula feeding techniques. . . .how to safely prepare and feed formula.	E4_A1 E4_A2	100 = Most 70 = Many 30 = Some 0 = Few Items scored then averaged.
Feeding cues & Pacifiers	Percent of breastfeeding mothers who are taught or shown how to . . . . . .recognize and respond to their newborn's feeding cues. . . .breastfeed as often and as long as their newborn wants. . . .understand the use and risks of artificial nipples and pacifiers.	E2_A1 E2_A5 E2_A7	100 = Most 70 = Many 30 = Some 0 = Few Items scored then averaged.
Identify/solve breastfeeding problems	Percent of breastfeeding mothers who are taught or shown how to. . . . . .position and latch their newborn for breastfeeding. . . .assess effective breastfeeding by observing their newborn's latch and the presence of audible swallowing. . . .assess effective breastfeeding by observing their newborn's elimination patterns. . . .hand express breast milk.	E2_A2 E2_A3 E2_A4 E2_A6	100 = Most 70 = Many 30 = Some 0 = Few Items scored then averaged.
	Feeding Education & Support Subscore		Mean of the 3 item scores

Reference: CDC - DNPAO, & CDC - NCCPHP. (2021). *mPINC Scoring Algorithm Overall Maternity Practices Score (Total Score)*. https://www.cdc.gov/breastfeeding/pdf/mpinc/states/mPINC-Scoring-Algorithm-h.pdf

Table B.4

mPINC Discharge Support Scoring Algorithm

DISCHARGE SUPPORT			
Measure	**Explanation**	**Survey item**	**Scoring**
Pre-discharge criteria	Indicates whether your hospital's discharge criteria for breastfeeding newborns requires . . . . . . direct observation of at least one effective feeding within the 8 hours prior to discharge.	E5_a2	100 = Yes 0 = No
Post-discharge follow-up visit	. . . scheduling of the first follow-up visit with a health care provider.	E5_a3	100 = Yes 0 = No
Post-discharge breastfeeding support	Indicates whether your hospital's routine discharge support to breastfeeding mothers includes: a) in-person follow-up visits/appointments for lactation support, b) personalized phone calls to mothers to ask about breastfeeding, or c) formalized, coordinated referrals to lactation providers in the community when additional support is needed.	E6_a1 E6_a2 E6_a3	100 = Yes to any 0 = No to all 3
Distribution of infant formula or formula-related supplies/ coupons as gifts	Indicates whether your hospital gives mothers any of these items free of charge (not including items prescribed as part of medical care): a) infant formula, b) feeding bottles/nipples, nipple shields, or pacifiers, or c) coupons, discounts, or educational materials from companies that make or sell infant formula or feeding products.	G5_A1 G5_A2 G5_A3	100 = No to all 3 0 = Yes to any item
	Discharge Subscore		Mean of the 4 item scores

Reference: CDC - DNPAO, & CDC - NCCPHP. (2021). *mPINC Scoring Algorithm Overall Maternity Practices Score (Total Score)*. https://www.cdc.gov/breastfeeding/pdf/mpinc/states/mPINC-Scoring-Algorithm-h.pdf

Table B.5

mPINC Institutional Management Scoring Algorithm

INSTITUTIONAL MANAGEMENT			
Measure	**Explanation**	**Survey item**	**Scoring**
Nurse skill competency	Indicates which competency skills are required of nurses: Placement and monitoring of the newborn skin-to-skin with the mother immediately following birth.	F4_a1 F4_a2 F4_a3 F4_a4 F4_a5 F4_a6	100 = 6 skills 80 = 5 skills 65 = 4 skills 50 = 3 skills 35 = 2 skills 20 = 1 skill 0 = 0 skills
	Assisting with effective newborn positioning and latch for breastfeeding.		
	Assessment of milk transfer during breastfeeding.		
	Assessment of maternal pain related to breastfeeding.		
	Teaching hand expression of breast milk.		
	Teaching safe formula preparation and feeding.		
Nurse competency assessment	Assesses whether formal assessment of clinical competency in breastfeeding support and lactation management is required of nurses.	F3	100 = Required at least once per year OR Less than once per year 0 = Not required
Documentation of exclusive breastfeeding	Indicated whether your hospital records/tracks exclusive breastfeeding throughout the entire hospitalization.	G1	100 = Yes 0 = No
Acquisition of infant formula	Indicates how your hospital acquires infant formula.	G4_a1	100 = Pays fair market price 0 = Receives free OR Unknown/Unsure
Written policies	Indicates whether your hospital has a policy requiring. . . . . .documentation of medical justification or informed consent for giving non-breast milk feedings to breastfed newborns. . . .formal assessment of staff's clinical competency in breastfeeding support. . . .documentation of prenatal breastfeeding education. . . .staff to teach mothers breastfeeding techniques AND staff to show mothers how to express milk. . . .purchase of infant formula and related breast milk substitutes by the hospital at fair market value AND a policy prohibiting distribution of free infant formula, infant feeding products, and infant formula coupons. . . .staff to provide mothers with resources for support after discharge. . . .placement of all newborns skin-to-skin with their mother at birth or soon thereafter. . . .the option for mothers to room-in with their newborns.	G2_a1 G2_a2 G2_a4 G2_a5 / G2_a6 G2_a8 / G2_a12 G2_a9 G2_a7 G2_a11	100 = Yes 0 = No Final score is an average of the 8 scores.‡
	Institutional Management Subscore		Mean of the 5 item scores

‡ G2_a5 and G2_a6 as well as G2_a8 and G2_a12 are combined. Responses of Yes/Yes received a score of 100, other responses received a score of 0.
Note: Subscores are not provided if half or more of the items in the section do not have a score. Total score is not provided if any subscore is missing.

Reference: CDC - DNPAO, & CDC - NCCPHP. (2021). *mPINC Scoring Algorithm Overall Maternity Practices Score (Total Score)*. https://www.cdc.gov/breastfeeding/pdf/mpinc/states/mPINC-Scoring-Algorithm-h.pdf

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