2023

Associations Between Socioecological Factors and Breastfeeding Duration Among Obese Mothers in Mississippi

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Walden University
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Abstract

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MS, California University of Pennsylvania, 2009

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

There is a growing obesity pandemic in the United States. Low breastfeeding duration rates and socioecological factors lead to obesity in the most southern states. Overweight and obese breastfeeding mothers have not been primarily studied. There is mixed information regarding duration of breastfeeding, BMI, and heart health, as well as a lack of quantitative analyses involving reducing obesity rates in mother-child dyads. The purpose of this quantitative cross-sectional study was to investigate whether there were any associations between breastfeeding duration and BMI, heart health problems, breastfeeding support, and eating and exercise among Mississippi overweight and obese postpartum women based on the CDC's Pregnancy Risk Assessment Monitoring System survey. The socioecological model was used to explore how influence may be applied to support women with their breastfeeding goals while achieving optimal health for them and their nursing children. Each research question was addressed separately using crosstabulation and chi-square tests with SPSS version 28. The total sample size of respondents was 1,012. However, only 46.0% of women responded to the survey question regarding breastfeeding duration. Given that, there were no significant associations between breastfeeding duration and health indicators for BMI ($p = 0.984$) and participation in breastfeeding support groups ($p = 0.512$). Findings contribute to positive social change for mothers and offer additional insight for both practitioners and researchers on the need to identify and develop interventions that support breastfeeding mothers towards better health and nourishment for their child(ren).

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Dedication

To be of service to the women and children in the community we live. For my children, Maya, and Alex, to share the knowledge that raising and nourishing a baby takes everything of one's being and love.

Acknowledgments

I am deeply grateful that God has allowed me to continue achieving a higher education and a growing family. To my husband, Randy, for always being there for our family and home, and for his love, support and understanding, which gave me the continuous encouragement and faith in God to finish this endeavor. Thank you, Dr. Manoj Sharma, Dr. Sanggon Nam, Dr. Heather Root, and the faculty of Walden University, for your support and guidance through the long review and approval process. Special thanks to my parents, family, friends, and co-workers for always lending their ears to listen and encouraging me to reach this point of my academic career.

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Section 1: Foundation of the Study and Literature Review

Maternal overweight and obesity is a public health concern and social problem that affects the health of the mother-child dyad (United States Department of Health and Human Services [DHHS], 2023). According to Boseley (2019), 16.8% of children who were never breastfed were found to be obese, and children who were never breastfed were 22.0% more likely to be obese than children who were breastfed for 6 months or longer. The American Academy of Pediatrics (AAP) highlighted the importance of child nutrition from conception until the second birthday, which is called the first 1000-day window (Schwarzenberg et al., 2018).

The AAP provides guidelines to family physicians and child health providers to educate pregnant women and new mothers on the importance of breastfeeding or providing breastmilk for nourishing their baby (Schwarzenberg et al., 2018). Breastmilk contains protective factors against obesity and acts as a vaccine against other infectious and noncommunicable diseases (Boseley, 2019). Those who are not exclusively breastfed for the first 6 months are at greater risk of infections such as ear infections, in addition to asthma, and sudden infant death syndrome (SIDS). Mothers who do not breastfeed are at greater risk of female cancers, type 2 diabetes, and hypertension (DHHS, 2023; Fair et al., 2019).

A contributor to the problem of child nourishment is that rate and duration of breastfeeding is significantly lower in overweight and obese lactating women, which may lead to cardiovascular health risks in the future. Mothers who breastfeed and are overweight (body mass index [BMI] of 25.0 to 29.0 kg/m^2) or obese (BMI greater than

30.0 kg/m^2) tend not to breastfeed at all, or only breastfeed for shorter durations (Fair et al., 2019). Only 22% of mothers breastfeed exclusively for the first 6 months, and overweight and obese women are less likely to initiate breastfeeding and breastfeed for a shorter time than normal-weight women (BMI of 18.5-24.9 kg/m^2) (Fair et al., 2019; Schwarzenberg et al., 2018).

For context within this study, there are three classes of obesity. Class 1 is defined as having BMI of 30-34.9, class 2 (35-39.9) and class 3 (> or equal to 40). In population, as weight increases, so does BMI. At the individual level, health complications begin to occur with excess adiposity (body fat) and the location and distribution of it depends on many factors such as environmental, genetic, biological, and socioeconomic (Wharton et al., 2020). Obesity is a chronic disease that impairs health and wellbeing.

The purpose of this study was to identify a gap in literature involving key health issues related to overweight and obese women and duration of breastfeeding. Research is needed to confirm associations between breastfeeding and maternal cardiovascular health in overweight and obese mothers. More specifically, it is needed to explore associations between BMI, heart health, exercise and nutrition, and health support groups among overweight and obese postpartum women as well as low breastfeeding rates and duration among overweight and obese mothers in Mississippi.

Breastfeeding helps in many ways to support the first five goals of the Sustainable Development Goals (SDG). The Agenda for Sustainable Development (2022) emphasizes a global action plan to improve and strengthen the people and the planet such as ensuring a commitment to end hunger and poverty. In the first five goals, the agenda discusses

how it aims to end hunger and malnutrition in women and children, building resiliency, and reducing global maternal mortality and newborn deaths. The SDGs are worth mentioning here along with the Healthy People 2030 because breastfeeding duration is important to building sustainability, reducing hunger and malnutrition in children, reducing mortality rates and illnesses in the mother-child dyad.

Additionally, utilizing a framework such as the socioecological model (SEM) can support breastfeeding promotion at each level and helps one to understand how it can support the Sustainable Development Goals for 2030 (United Nations, 2022; Victora et al., 2016), and Healthy People 2030 objectives for the social determinants of health for overweight and obesity and pregnancy and childbirth through breastfeeding (DHHS, 2023). The SEM is a theoretical model first proposed by Bronfenbrenner in the 1970s. Organized by level of influence, SEM seeks to understand the complexity of the individual, interpersonal, organizational, community, and policy factors that significantly influence human behavior and health outcomes (Owen & Sallis, 2015). This model is commonly applied in public health to understand the various influences on health and wellbeing and inform the development of multilevel interventions to promote health, prevent disease, and reduce health disparities (Hreha, 2023). The SEM is considered one of the theoretical frameworks in behavioral change, for simplicity, it is considered a model. Table 1 lists the 17 SDGs for the United Nations 2030 Agenda for Sustainable Development (2022).

Table 1

Sustainable Development Goals for 2030

SDG	Indicator
1	End poverty in all its forms everywhere.
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
3	Ensure healthy lives and promote well-being for all at all ages.
4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5	Achieve gender equality and empower all women and girls.
6	Ensure availability and sustainable management of water and sanitation for all.
7	Ensure access to affordable, reliable, sustainable and modern energy for all.
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.
9	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10	Reduce inequality within and among countries.
11	Make cities and human settlements inclusive, safe, resilient, and sustainable.
12	Ensure sustainable consumption and production patterns.
13	Take urgent action to combat climate change and its impacts.
14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

Note. Adapted from the Transforming Our World: The 2030 Agenda for Sustainable Development, by United Nations, 2022, (21252030 Agenda for Sustainable Development web.pdf (un.org). In the public domain.

A potential application of the study to social change is implementation of socioecological programs to increase support of breastfeeding duration for overweight and obese postpartum mothers for 12 to 24 months. For example, implementing recommendations involving future state planning for breastfeeding support networks and practices through state health departments and coalitions to improve provider breastfeeding education and strengthen communities for breastfeeding mothers (Barrera et al., 2018). Also implementing continued counseling, support, and education involving nutrition and physical activity for overweight and obese pregnant and breastfeeding women (pre and postpartum) for up to at least 18 months. Counseling overweight and obese mothers during prenatal through postpartum periods about nutrition, parenting support groups, and well-child visits will ensure a more consistent health balance in U.S. society (Gross et al., 2019). Section 1 includes the background of the problem, problem statement, purpose of the study, research questions and hypotheses, theoretical framework, nature of the study, literature search strategy, review of literature, definitions of terms, assumptions, limitations, scope and delimitations, significance of the study, and a summary and conclusions.

Background of the Problem

There are challenges that overweight and obese women face while pregnant and after that affect their ability to breastfeed and properly nourish their babies. Breastfeeding duration and milk production are affected by diet, physical activity, and behavioral factors during pregnancy. Rajaei et al. (2019) identified some physiological and biological changes that occur during pregnancy to support the growth of the fetus, which

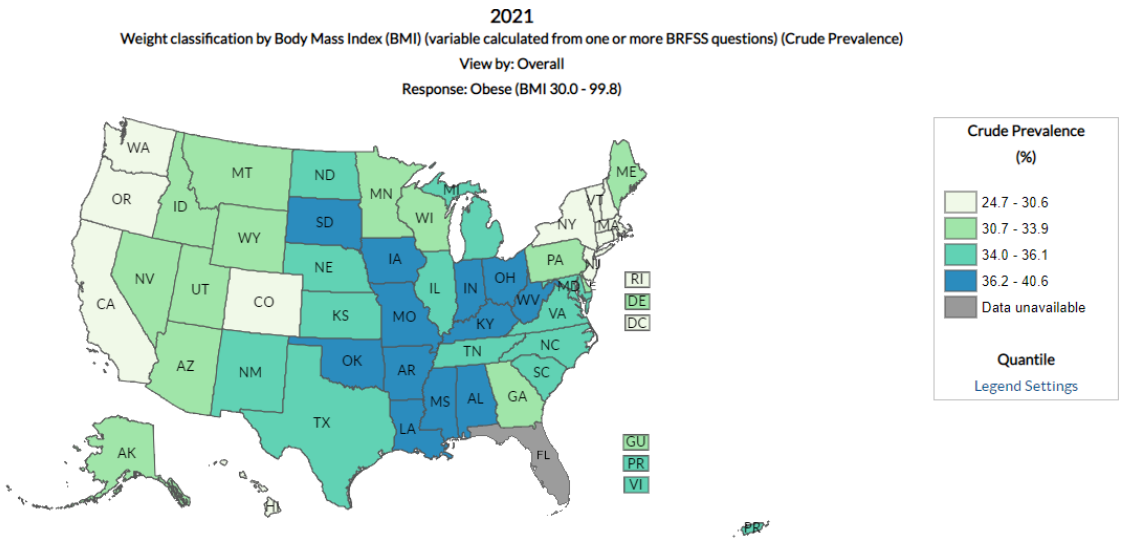
include elevated levels of cholesterol (low-density lipoprotein [LDL]) and triglycerides to transfer fatty acids to the fetus, increase in BMI, hyperlipidemia, insulin resistance, glucose intolerance, and gestational diabetes; these can lead to future cardiovascular disease (CVD) conditions if not adequately addressed. For this study, I examined social, educational, physical, and health support interventions to help overweight and obese mothers achieve optimal breastfeeding outcomes for longer periods (12-24 months).

Stokes et al. (2018) found 96.0% of adults with obesity in the U.S. are not accessing adequate care. A major barrier for not seeking professional medical care is due to what is and is not available for overweight and obese mothers. According to Stokes et al., (2018), "Affordable Care Act health plans do cover diagnostic screening and counseling for obesity, [but] does not guarantee access to effective treatment for obesity" (p. 817). Obesity is underdiagnosed in primary practice, and obese patients may not be receiving adequate counseling and treatment for weight management. These barriers and issues can affect obese pregnant and breastfeeding mothers who are not only trying to nourish their babies with their own breastmilk but also dealing with obesity and weight issues which need special medical support and attention. Overweight and obese women may not be receiving adequate obesity care. For example, in the southern regions of the U.S., according to the Pregnancy Risk Assessment Monitoring System (PRAMS), between 2016 and 2020 in the state of Mississippi, the prevalence of maternal indicators for pregnancy risk such as being overweight and obese was 26.1% and 27.7% respectively, while 88% had postpartum checkups, and 68% breastfed for the first 8 weeks (CDC, 2018b). Additionally, obesity is a contributing risk factor to CVD that is

prominent in the southern regions of the U.S. (CDC, 2015). According to year 2021, the CDC (2015) reported that twelve states have populations that exceed the highest levels of obesity prevalence and five of those states are in the southern regions of the U.S., including Mississippi (see Figure 1).

Figure 1

BMI Prevalence



Note. From Behavioral Risk Factor Surveillance System (BRFSS) by U.S. Center for Disease Control 2015 (https://www.cdc.gov/brfss/brfssprevalence/). In the public domain.

The prevalence of adult obesity in Mississippi is 40.8%; it is the most obese state in the U.S. (CDC, 2015). Overweight and obese women have increased maternal and neonatal complications. While breastfeeding can prevent obesity in children, many other factors can affect the children's health and wellbeing, such as physical activity, nutrition education, and parental influence. Also, mothers who breastfeed longer are more likely to have higher education degrees, private insurance, and higher income which may allow

parental leave in order to exclusively breastfeed (McCarthy, 2018). Breastfeeding can help reduce obesity prevalence in children, prevent diseases, and reduce malnutrition and undernutrition in infants, as well as reduce maternal obesity related to CVD and morbidity (Victora et al., 2016).

Problem Statement

There is a positive association between breastfeeding and decreased risks of childhood obesity and other factors, such as immunity and CVD protection (Gaffney et al., 2018). For example, the more and longer a baby is breastfed, the more protective antibodies will be passed on to the baby which in turn will protect the baby's immunity towards certain infectious diseases. Gaffney et al. (2018) proposed that further research is necessary to assess the impact of exclusive breastfeeding on child nutrition for longer periods (60 days or more) for this selected population of overweight and obese mothers and consider socioecological support for modifiable behavioral and physiological variables that can lead to healthy weight loss while breastfeeding to reduce cardiovascular risk factors. They also noted that a quantifiable research study is necessary to address associations between coronary artery disease (CAD) risk and breastfeeding duration, therefore it is important to consider heart related problems in mothers who breastfeed (Rajaei et al., 2019). Overweight and obesity should be closely managed in pregnant or expecting and postpartum mothers, along with continued breastfeeding support. Not addressing these issues is detrimental to the physical, emotional, and social wellbeing of babies and mothers.

Purpose of the Study

The purpose of this quantitative cross-sectional study is to explore breastfeeding duration along with exercise and nutrition, BMI, social support, and risk for heart disease while controlling for age, race/ethnicity, and education in overweight and obese women in Mississippi. Specifically in the study, I used the SEM framework to examine these relationships and suggest possible interventions for this population to bring about positive social change in the state. I used PRAMS data as the dataset to examine these factors.

Research Questions and Hypotheses

This quantitative cross-sectional study was implemented to examine associations between breastfeeding duration and BMI, heart health problems, breastfeeding support groups, and whether eating and exercise were discussed with practitioners of overweight and obese breastfeeding women residing in Mississippi.

RQ1: Is there an association between breastfeeding duration and BMI?

$H_0$1: There is no association between breastfeeding duration and BMI.

H_a1: There is an association between breastfeeding duration and BMI.

RQ2: Is there an association between breastfeeding duration and heart health problems?

$H_0$2: There is no association between breastfeeding duration and heart health problems.

H_a2: There is an association between breastfeeding duration and heart health problems.

RQ3: Is there an association between participation in breastfeeding support groups and breastfeeding duration?

$H_0$3: There is no association between participation in breastfeeding support groups and breastfeeding duration.

H_a3: There is an association between participation in breastfeeding support groups and breastfeeding duration.

RQ4: Is there an association between breastfeeding duration and eating and exercise?

$H_0$4: There is no association between breastfeeding duration and eating and exercise.

H_a4: There is an association between breastfeeding duration and eating and exercise.

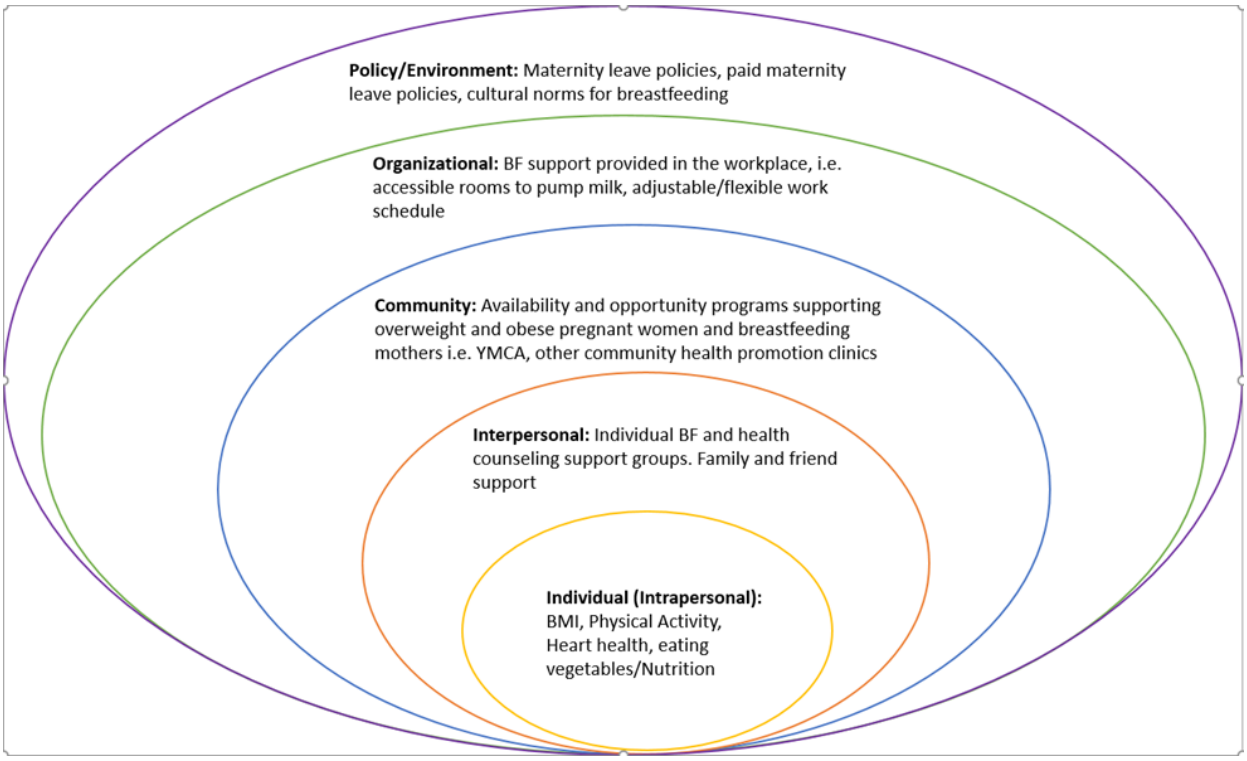
The independent variable (IV) is duration of breastfeeding (BF5LNGTU) for RQ1, RQ2, and RQ4. For RQ3 breastfeeding support group is the IV and breastfeeding duration is the dependent variable (DV). For RQs 1,2, and 4 the DVs are BMI, heart health, eating and exercise. The variables are measured as follows: The IV/ (DV for RQ3)-duration of breastfeeding in days (BF5LNGTU) is nominal; the DV BMI (MOM_BMIG) is ordinal; DV-heart health (HTH_HRT) is nominal; IV-breastfeeding support group (BFINF_GRP) is nominal; and DV-eating and exercise (VPP_EAT_RAW) are nominal.

Theoretical Framework

The SEM is considered one of the many theoretical frameworks that influence behavior change, although it is called a model (CDC, 2022d). The SEM is a framework that is commonly used to help explain the influence of societal interactions (Amoo et al, 2022; Hreha, 2023). Psychologist Urie Bronfenbrenner first developed the ecological systems theory in the 1970s to better understand human development in multiple interacting systems. Since then, the SEM was adapted and integrated to study health behaviors to better understand multiple levels of influence in health (Hreha, 2023). According to McLeroy et al. (1988), health is determined and impacted through influences at different levels in the socioecological system, in this case, the SEM. The SEM is also used to focus on an individual's behaviors and how they interact with their physical and sociocultural environments. The SEM is based on the multiple levels of influence in one's surrounding communities (Gallegos et al., 2020). There is relative importance of influence in the individual, social, and environmental nuclei of community and how one influences another to bring about social change in the U.S. populations (Owen & Sallis, 2015). For example, when the environment, policies, and communities align, the individual can be influenced to make better health choices. It was used to conduct analysis on how physiological and behavioral factors can affect mothers' behaviors and support when they engage in exclusive breastfeeding during the first 2 years of the newborn's life. The SEM is used to focus on behavior within each stage of the five environmental levels: Individual, interpersonal, organizational, community, and policy. Figure 2 presents the SEM framework for breastfeeding support.

Figure 2

SEM for Breastfeeding Support



Note. Source: Owen and Sallis, 2015, p.52

The SEM is also used to focus on individual behaviors and how they interact with physical and sociocultural environments. It explores what is happening around the individual's physical and sociocultural environments, to determine what barriers or challenges are present and can be mitigated to facilitate their breastfeeding efforts. I used the SEM to apply interventions at each level and examining what is happening with the mother's breastfeeding habits, the efficacy at each level, and the outcome she experiences.

To help improve breastfeeding initiation and duration rates, the SEM is ideal to consider policies, communities, and systems. Behavioral and structural mechanisms for breastfeeding require an integrated approach to address factors influencing mothers, families, and communities as they navigate through systems (Gallegos et al., 2020). For example, it is important to integrate breastfeeding counseling in addition to facilitating a way for the mother to breastfeed her baby in a proper structural environment such as in her community, with her intrapersonal relationships and communities as supporting systems.

Segura-Perez et al. (2021) suggested that policy and community interventions such as women and children community programs and health care facilities can help address and improve breastfeeding barriers among minority women. Additionally, more in-depth research is needed to learn how to scale up and sustain effective breastfeeding interventions. In doing so, it is important to identify breastfeeding interventions that are inclusive of all women, regardless of ethnic background or weight status, such as using the SEM (Segura-Perez et al., 2021). The different SEM levels encompass multiple areas that impact women and wellness, including weight status (BMI), cardiovascular risk factors, breastfeeding support, and lifestyle (nutrition and exercise). When these factors are considered within this framework, mothers may have the opportunity to care for and breastfeed babies for nourishment and achieve optimal health for both. While the SEM is applicable to multiple topics, each level of the SEM provides a clearer understanding of how and why mothers can be motivated to engage in breastfeeding their child(ren). The

following levels will explain how the SEM operates within each RQ, that is, how it explains the impact of the independent on the dependent variable.

Individual (Intrapersonal) Level

The individual level is the first level of the SEM. This level includes personal characteristics, habits, beliefs, and socioecological factors of the individual, such as age, education, socioeconomic status (SES), and health history (ATSDR, 2015). This level is selected to help the individual identify the actions that need to be taken, or interventions to help with breastfeeding duration, eating and exercise, BMI or weight monitoring, and support. At the individual (intrapersonal) level of the SEM, the person encounters factors that influence habits, beliefs, barriers, knowledge or literacy, embarrassment, negative perceptions, and experiences with the topic under study. Individual level factors influence a person's decision to act. At the individual level, beliefs and decisions mothers make about whether to breastfeed can lead to heart health improvements or setbacks, such as increased risk for heart disease. Breastfeeding choices can impact the mother's balance of energy and her calorie intake based on her activity levels and weight goals. One way of applying this level in an intervention is to provide education programs to help the mother make better healthier choices to improve her nutritional intake and physical activity to help monitor her weight through the pregnancy and post-partum stage while breastfeeding. For instance, if the mother decides to breastfeed longer, the mother may or may not decide to also exercise and eat according to recommended daily caloric allowance; in making that choice she also influences her own nourishment, the baby's nourishment, and her ability to manage any postpartum weight gained. In turn, her

decision to breastfeed longer, exercise, and consume a balanced diet can lead to heart health improvements, as well as decreased risk of diabetes and metabolic challenges. Additionally, beliefs, barriers, and knowledge affect her decision to have a breastfeeding support group which may impact her breastfeeding duration.

Interpersonal Level

The interpersonal level is the second level of the SEM. This level includes all relationships, the individual's closest social circle: spouse, family, and friends. The person's closest social circle can influence a person's behavior and they greatly contribute to the mother's experiences and decisions (ATSDR, 2015). Family support can also impact outcomes of breastfeeding duration. If the individual feels confident to breastfeed, her self-efficacy may not warrant the need to have a support group at all. Breastfeeding may also be influenced by relationships, as both direct contacts or social networks can affect self-efficacy and expectations (Tahir et al., 2019). However, associations between breastfeeding duration and postpartum weight loss are inconclusive due to the possibility of confounding variables that may arise in interpersonal relationships (Tahir et al., 2019). Support systems like families, friends, and healthcare providers are key factors that help remove the barriers to breastfeeding mothers (Amoo et al., 2022). To implement the SEM at the interpersonal level can be to create daily encouraging habits such as conducting daily walks with people from the close social circle and community groups, promote healthy eating, and obtain the support from the spouse or partner, and family. At this level, social environments and relationships

influence breastfeeding duration that can positively or negatively affect BMI, heart health, and exercise and eating outcomes.

Community Level

The third level of the SEM is the community. At this level the community setting sets the stage for people to have social relationships such as support groups, schools, workplaces, neighborhoods, in which all can provide insight or characteristics that may influence or affect a person's health (ATSDR, 2015). Some women may experience discomfort when breastfeeding in public places. Others may be unaware of community programs that could benefit them. Communities may have lactation consulting breastfeeding groups to join, and mothers should be encouraged to attend breastfeeding support groups. Within socioecological environments involving communities there may be programs that make it easier for women of all health classes to learn about and participate in breastfeeding counseling. For example, the Young Men's Christian Association (YMCA) and other community health promotion clinics may have programs for breastfeeding mothers. Some women have home visits in which they receive pre- and postnatal education and lactation support from community health workers (CHWs) (Tomori et al., 2022). Given the benefits of breastfeeding, the community level is important because it can help overcome barriers through peer support and education programs and breastfeeding clinics (CDC, 2022e). The community level of influence can provide so much support to families and breastfeeding mothers through connection with other women going through the same situation. The Surgeon General's Call to Action to Support Breastfeeding provides many ways that communities can support the women

(CDC, 2022e). When women are encouraged to join breastfeeding support groups, they are more likely to achieve longer breastfeeding duration and adhere to their health and wellness goals. Communities are an important resource for this encouragement, from women and children's organizations to breastfeeding support groups.

Organizational Level

The fourth level of the SEM is the organizational level. It is mainly known for workplace or school environments; it could include hospitals and clinical organizations, or any organization the person relates to in their everyday life. This level has a broader spectrum of the breastfeeding mother and her environment. The impact on breastfeeding duration can be affected if there is a lack of support in the organizational environment. For example, if a lactation room is inaccessible or unavailable for breastfeeding working mothers, then then the health benefits from breastfeeding (e.g., reduced BMI, lack of positive exercise and nutrition habits, and not addressing heart health) may be compromised. The healthcare environment (i.e., hospitals and clinics) is a system that falls into the SEM organizational level. If there is no support in the healthcare environment, breastfeeding duration may be negatively affected.

Policy Level

The fifth level of the SEM is the policy level. This level includes cultural and social norms, health, economic, educational, and social policies. The policy level helps to regulate policies and create, maintain, or reduce socioeconomic inequalities within groups of people (ATSDR, 2015). in this context involves paid maternity leave policies, flexible work schedules, cultural norms of breastfeeding, and ensuring availability and

access to community support groups. Paid maternity leave has a significant impact on breastfeeding duration, yet there are disparities in terms of access (Tomori et al., 2022). The disparities can be seen in the way state and company policies decide to support maternity leave. For instance, some employers fully pay maternity leave for up to three months and others vary. They also vary in terms of the pay amount; some employers pay maternity leave for a third or half of a regular paycheck, others offer the full paycheck. Some policies may allow for maternity leave; however, it may be unpaid. Therefore, the significant impact can vary depending on how long maternity leave is and whether it is paid leave or a percentage of pay. The impact is that the mother may not have the full support to sustain the quality of life for herself and now the newborn. If, maternity leave is unpaid or a percentage of pay, there will need to be an income to offset or supply for the shortage amount. This situation may cause added stress on the mother, and it would influence her decision on when to go back to work and leave the baby at a daycare center. According to Amoo et al. (2022), the disparate policies and pay can open opportunities for interventions such as baby-friendly and/or provider led initiatives that promote breastfeeding practice. Examples of the baby-friendly or provider led initiatives are employers having dedicated breastfeeding or pump areas, safe, secure, and clean, along with a refrigerator to store the milk until it is time to return home from work. Another initiative is to allow mothers the time to pump throughout her work hours depending on her schedule. The consequences for a lack of flexibility to breastfeed impact not only the mother but the baby. If there is a lack of flexible work schedules or spaces for mothers to breastfeed in organizational spaces, it means less breastfeeding will occur. Similarly, if

paid maternity leave is not granted, women may have to resort to using formula and leaving their babies in daycare, if they can afford it, which also reduces breastfeeding. Given these outcomes, however, there remains inadequate attention and knowledge about interventions that address policy and workplace settings (Tomori et al., 2022). Consequently, to this concern as it relates to SEM, regarding maternity leave, paid or unpaid, and flexibility of work schedules, these all depend on the policies of the state and the employer. These factors become barriers for the lower income earners than higher income earners, it affects women differently depending on their socioeconomic status, type or work and work setting. Therefore, these can be some inequity type of issues to address at the policy level to allow the same opportunities between high-, middle-, and lower-income earning mothers.

Nature of the Study

I used a cross-sectional quantitative design sourcing secondary data from the PRAMS dataset to measure and understand relationships and associations between breastfeeding support groups, BMI, heart health, and nutrition and exercise, all of which affect breastfeeding practices among overweight and obese women. The population under study were postpartum breastfeeding women in Mississippi. A cross-sectional study design helped address current trends and updates as well as relationships between health-related characteristics via data that were taken at a particular time. Using a cross-sectional quantitative analysis design was selected because it measures the data over the time that it is collected (Aschengrau & Seage, 2014; CDC, 2018a). According to Aschengrau & Seage, cross-sectional study design is an observational type of study that includes

analyzing the collection of data from a population at one specific period. The data collection process for this study was conducted via the CDC's PRAMS state-based surveillance system, which measures maternal behaviors, attitudes, and experiences before, during, and after pregnancy. The data included birth certificate records of women who delivered live-born infants from Mississippi with a sample size of 1012 women for the 2021 survey year. I used crosstabulation with chi-square analyses to test for associations.

Literature Search Strategy

To ensure a high-quality review of literature, I conducted a comprehensive search of peer-reviewed journals and articles. Key terms were: *breastfeeding or lactation*, *breastfeeding duration*, *obese or overweight women*, *cardiovascular disease, or heart or cardiac or coronary heart disease*, *eating and exercise*, *BMI*, *support*, *heart health*, and *socioecological model*. I used the following databases and resources: PubMed, EBSCOHost, BioMed Central, Google Scholar, Research Gate, Medscape, and Walden University Library. I used a total of 572 articles that were published between 2018 and 2023, including some articles that highlighted the SEM. I searched peer-reviewed articles that included a variety of methodologies, designs, and population as well as study settings and environments, including those in other countries. There was a very low number of studies conducted in the southern United States and few were of quantitative cross-sectional research methodology. Table 2 Literature Intervention Table highlights the most significant articles on this topic of study.

Table 2

Literature Intervention Table

Author and Year	Methodology and Design	Population/ Sample	Intervention Description	Outcome (Intervention vs. Control)	Key Findings - Recommendations/ implications for future research, practice "GAP"
RQ1 - Breastfeeding Duration and BMI					
Lyons et al. (2019)	Meta-synthesis, qualitative	65 women with BMI>30kgm2 before and during gestational period with intention to breastfeed.	Investigated perceptions and experiences in women with BMI>30kgm2 who reported bf behaviors. Also, studies focused on health professional's perceptions of the women's experiences.	Weight increases bf difficulties and women are likely to report suffering from complications and becoming separated from their infant which negatively impacts bf, increases self-doubt in their ability to bf, and encounter more barriers such as psychological reactions to medical intervention- >30kgm2 are labeled "high risk" and can experience longer labor, cesarian sections, separation from infant, reduced mobility, delayed skin-to skin contact with the baby and reduces confidence to bf in the hospital environment.	Need more qualitative longitudinal studies from women's pregnancies to measuring breastfeeding timeline aiming to reduce negative impact in breastfeeding behavior. Future studies can also be investigated quantitatively to measure instances and types of medical intervention that women may experience and their motivation and perceived control to breastfeed.
Tahir et al. (2019)	Ongoing prospective cohort	338 mother-infant dyads, BMI 18.5-40kg/m^2 with information on breastfeeding duration, maternal pre-pregnancy weight and 1-, 3-,	To evaluate factors affecting lower maternal postpartum weight retention compared to a shorter breastfeeding duration	Predominantly white, highly educated, older and multiparous mothers fully breastfed for 6 months or longer. They retained less weight and fed more frequently and gave birth to heavier infants. No significant differences in DOL, milk flow, milk supply, sore, cracked or	The mothers in this study were highly educated and lower pre-pregnancy BMI compared to women in the United States. The study did not have sufficient sample size to stratify analysis for maternal obesity. Need more studies to identify how to reduce obstacles to prolong breastfeeding

		or 6-months postpartum weight		bleeding nipples, breast engorgement or clogged ducts or infected breasts or milk leakage between mothers who fully breastfed from 1-3 months vs. those who breastfed longer. Researchers suggest that women strongly committed and supported to breastfeed longer than 3 months can potentially reduce PPWR (BMI).	duration to advance the health for women and children.
Cieśla et al. (2021)	Cross-sectional study design	7500 parous 55.5+/- 5.3 yr	Assess the relationship between breastfeeding duration and BMI, BF% and waist-to height ratio (WHtR)	The required number of calories for milk production, the metabolic activity to breastfeed and milk production help mothers reduce the accumulated fat stores acquired during pregnancy. The longer one breastfeeds >3 months, the less visceral fat will get stored. Study indicated no correlation between BF% and breastfeeding duration, other studies conducted supported through measurement using DEXA scan that women who breastfed less than 6 months had higher BF% compared to those who breastfed longer.	Breastfeeding is associated with lower risk of excessive weight and abdominal obesity after menopause compared to mothers who did not breastfeed. Requires long term studies. Study did not mention overweight and obese women population.
Moonesar et al. (2021)	Literature Review	*n*=12 research articles: France n= 1,432 mothers; South Carolina: Random sample of 2,840 black and 3,517 white women; Florida: n=1,161,949	A review of 12 research articles (1 qualitative, 11 quantitative) to explore the significance of impact of maternal obesity/overweig	Most of the studies indicated there was no impact from obesity on breastfeeding rates.	More empirical studies are needed that will use well-established theories to further effect the norms for overweight and obese women's intention and continuation to BF. Further studies are also needed to explore the effect of culture to consider social norms, roles, and values in their environment to

		between 2004-2009; Canada n=22,131; Scotland n=28;	ht on breastfeeding rate. To assess a qualitative and quantitative impact of BMI on initiation and duration of breastfeeding from breastfeeding mothers.		shape the intention for obese mothers to BF. Lastly, to inform physicians and healthcare providers as the forefront of the mother/infant dyad to educate the overweight and obese mothers on the benefits of BF and explore the perceptions and factors that may interfere with their intentions and willingness to BF.
Hashemi-Nazari et al. (2020)	Systematic review and dose response Meta-Analysis	n=32 studies with the effect of pre-pregnancy BMI on BF initiation, duration and intention BMI; n=33 studies with % or number of initiation or intention to BF and duration of BF	To find association between pre-pregnancy BMI and persistence and duration of breastfeeding in systematic review and dose-response meta-analyses.	Empirical data exists that women with underweight, overweight, and obese are all less likely to initiate and or continue to BF. Compared to normal weight women, overweight and obese women had lower ratios on initiating or ceased BF early. There was a linear association between the risk of BF and pre-pregnancy BMI in which for every 1% of increased BMI the BF cessation increased by 4%.	Findings from the systematic review and meta-analysis is that there is significant relative risk and greater hazard for overweight and obese women for not initiating BF or ceasing to BF. The excessive weight is multifaceted that includes psychological, physiological, emotional and mechanical barriers that all may be reasons that influence the decision to breastfeed prenatally and required additional attention during early pregnancy stages.
Kronborg & Foverskov (2020)	Community self-reported data	*n*=1265 with 49% response rate	Explore breastfeeding experiences in duration of breastfeeding at 3- and 9-months pp, overweight and obese women to understand what	Investigated the influence of psychosocial factors to emphasize the importance of practical facilitating guidance and positive verbal encouragement and education to achieve effective breastfeeding support. Significant factors influenced the duration of exclusive breastfeeding including skin-to-skin contact, intention to	Granted obese mothers have increased difficulty due to hormonal and physiological factors they also have low self-efficacy and require varying levels of influence and education preferably in the early stages of pregnancy to help them gain a positive experience in breastfeeding.

			influence their infant feeding decisions. Using a combination of influential factors to breastfeed cessation from a community-based trial to find which factors health professionals should focus on concerning maternal needs for breastfeeding support.	breastfeed, high levels of self-efficacy, and maternal sense of security for breastfeeding, all the opposing factors were time dependent on the exclusive breastfeeding duration. In regard to BMI, the mothers with higher maternal BMI tended to have shorter breastfeeding duration during the first months postpartum. With characteristics such as being obese they still managed to establish breastfeeding during the first months, then they were more likely to continue to breastfeed.	
Waits et al. (2020)	Cross-sectional review	*n*=52,367 postpartum women in Taiwan	Examined the relationship between postpartum weight retention (PWR) and duration of exclusive or partial breastfeeding in n=52,367 postpartum women from 2012-12016 Taiwan national breastfeeding surveys.	For women of BMI>27 the women who exclusively breastfed lost to postpartum weight retention (PWR) peaking at 90 days and significantly lowered at PWR 270 and 330 days respectively. Women with high obesity rates are a potential target group for supportive interventions based on breastfeeding promotion. The notion that “every feed matters” can motivate or encourage the mothers concerned of getting the extra weight to choose to breastfeed longer for better weight management.	Future investigation recommendations are to include the effect of breastfeeding on PWR in diverse populations, and to employ longitudinal follow-up and standardized definitions of breastfeeding variables along with controlling for dietary intake and physical activity.

Saeidi and Gholami (2019)	Cross-sectional	*n*=300 overweight and obese Iranian women	To test the hypothesis of a correlation between maternal obesity and exclusive breastfeeding in Iranian women.	A cross-sectional study of 300 overweight and obese Iranian women found that there is a significant association between pre-pregnancy BMI and breastfeeding status at discharge. The rate of failure to exclusively breastfeed was high among obese mothers. Also, educational level and planned feeding method are also significant associations to consider. Delivery method i.e. c-section had decreased rate of breastfeeding initiation. Cultural support was also mentioned in this study, regardless of education level, cultural support (regardless of country of origin) affects breastfeeding initiation and duration.	Further studies can be researched regarding education and intermediary support to include high-risk populations of overweight and obese women who plan to breastfeed for a shorter duration and have less breastfeeding intention than normal weight peers.
Aldana-Parra et al. (2020)	Two-arm simple RCT study. Variables: breastfeeding duration, BMI, food intake, milk production,	Overweight and obese women, post-partum, recruited at 32 weeks gestation.	In a baby friendly hospital in Bogota, Colombia to assess the impact or effectiveness of counseling intervention through the Centered-Client Theory to this group of women to influence and encourage exclusive breastfeeding	The women were recruited during their last month of pregnancy (32 weeks gestation) and monitored anthropometric measurements, food intake, and milk production in addition to latching on the breast and how often they nursed. A key point is that children born from overweight and obese mothers are at increased risk for obesity and infectious diseases; therefore, breastfeeding may lower the risk. Breastfeeding is challenging due to emotional, physiological, and psychosocial	Implications for research include counseling strategies to support overweight women to increase breastfeeding rates through design, development, and implementation of efficient strategies that promote breastfeeding in overweight and obese women.

			duration (up to at least 4 months but encouraged to 6 or longer) to allow adequate infant growth velocity and maternal weight loss after delivery.	issues that affect breastfeeding initiation and duration.	
RQ2 - Breastfeeding Duration and Heart Health					
Zachou et al. (2019)	Narrative review; cohort, cross-sectional etc. 36 articles	*n*=795 women, pregnancy, 6 mo. pp and 10 years later	to update association of bf w/maternal cardiovascular risk factors and CVD in later life	Hypertension- is inversely proportional to lactation. The longer women breastfeed the less chances for maternal hypertension, it is a linear dose response benefit against hypertension and high blood pressure development. CVD- mothers who breastfeed longer than 3 months are less likely to get aortic calcification or coronary artery calcification, this leads to CAD. The prevalence of carotid plaque was 10% in women who breastfeed for at least 3 months compared to 18% in women who never breastfeed.	There is little existing evidence regarding the effect of lactation on lipid levels and adiposity in postpartum women. More research is needed to support causality of the link between lactation and cardiometabolic risk profile which remains unclear.
Kirkegaard et al. (2018)	Danish national Birth Cohort (1996-2002); Interviews	*n*=63260 women with singleton infants, variables included: pre-pregnancy BMI, 7 years post waist circumference, full or partial bf,	Examined how any, fulltime, and partial bf durations were associated with maternal risk of hypertension and CVD, and how	bf for > 4 mo. Was associated with 20-30% lower risk of hypertension and CVD compared to <4 mo. bf in both normal weight and overweight/obese women. Partial bf>2 months had 10-25% lower risk for hypertension and CVD; longer duration of bf associated w/	Studies with information on maternal metabolic profile before pregnancy are needed to confirm the findings and further explain the association between breastfeeding and maternal cardiovascular health.

		with diagnosis of hypertension or CVD before index pregnancy and minimum of six months of maternity leave.	pre-pregnancy BMI and waist circ.7ypp influenced the associations.	lower maternal risk for hypertension, CVD irrespective of BMI and abdominal adiposity 7 years postpartum. Full and partial bf contributed to an improved CV health in mothers. Residual confounding is a concern because bf closely relates to social status, behavioral factors, and BMI.	
Velle-Forbord et al. (2019)	longitudinal population-based cohort study	Norway, n=1,403 women who participated in a health study were followed up after 12 years	aimed to disentangle effects of BF on long-term maternal metabolic health from effects of pre-pregnant metabolic health on BF duration and long-term metabolic health.	1,403 women were analyzed with a median follow-up of 12 years (interquartile range 11–22). Pre-pregnant WCF and HR correlated inversely with BF duration. Pre-pregnant BMI had a u-shaped correlation-pattern with BF duration. The researchers observed similar between-group differences in metabolic health parameters at baseline and at follow-up, which implies that mean change in metabolic health parameters was similar across BF groups. Those women who started out with the best health had the longest BF duration and ended up with the best health, and those women who started out with the poorest health had shortest BF duration and ended up with the poorest health.	Our results do not support a causal relationship between long BF duration and improved metabolic health. It is more likely that pre-pregnant metabolic health affects both BF duration and long-term metabolic health. Reverse causality can explain previously observed improved long-term metabolic health after BF.
Hauspurg et al. (2019)	Prospective cohort study	n= 656 predominantly overweight or obese; total n=315 early pregnant women included	To describe the rates of hypertension in overweight and obese women one year after	In this study it was demonstrated in the first year postpartum there were high rates of sustained hypertension and an adverse cardiometabolic profile associated with hypertensive disorders of	Recommend focusing studies on more structured postpartum follow up for overweight and obese women and begin identifying interventions to reduce the risk of

		in analysis who did attend the postpartum study with complete data.	delivery under the new ACC/AHA guidelines and to determine if pregnancy-associated hypertension is associated with an increased risk of abnormal biomarkers in the first year postpartum.	pregnancy among overweight and obese women.	hypertension and cardiometabolic risk factors.
Countouris et al. (2019)	Prospective cohort study	Of n=425 enrolled primarily overweight and obese women during early pregnancy 37 (9%) had preeclampsia and 48 (11%) had gestational hypertension during enrollment pregnancy.	At a postpartum study visit occurring 6–24 months after delivery; collected data on lactation duration and measured hsCRP and cystatin C. Associations were assessed between lactation duration and levels of hsCRP and cystatin C among normotensive women and women with preeclampsia or gestational	Researchers concluded that preeclampsia history was associated with elevated postpartum levels of cystatin C; however, duration of lactation was not associated with postpartum hsCRP or cystatin C, regardless of history of gestational hypertension or preeclampsia. The postpartum visit occurred at a mean of 8.6 ± 4.4 months after delivery. Women with a history of preeclampsia had significantly higher levels of cystatin C (mean 0.86 versus 0.78 mg/L; $p = 0.03$) compared with normotensive women, but nonsignificant elevation in hsCRP (mean 8.39 versus 6.04 mg/L; $p = 0.08$). Women with gestational hypertension had no differences in mean hsCRP or cystatin C compared with normotensive	Further research is needed on mechanisms through which lactation may affect maternal risk of cardiovascular disease.

			hypertension using analysis of variance and chi-squared tests. Linear regression models adjusted for age, race, education, pre-pregnancy body mass index, current smoking, and time since delivery.	women. Among the 237 women with any lactation, 78 (18%) lactated for at least 6 months. Lactation duration both in the overall sample and among women with gestational hypertension or preeclampsia was not associated with levels of hsCRP or cystatin C.	
RQ3 - Breastfeeding Duration and Support Group					
Fair et al. (2019)	RCTs and quasi RCTs	n=831 women;3 trials obese prior to pregnancy and 4 trials overweight and obese	Assess effectiveness of interventions to support the initiation or continuation of breastfeeding in women who are overweight or obese.	Sample: 831 women from ClinicalTrials.gov and reference lists. Methods: RCTs that compared interventions to support the initiation and continuation of bf in overweight or obese women. Resolved discrepancies of 7 trials and 1 cluster RCT. The available evidence indicates very low certainty, meaning the effectiveness of physical interventions or methods of support for bf continuation in o/o women remains unclear.	Further research is needed regarding social, educational, physical support, or any combination of health support for interventions to help overweight and obese mothers achieve optimal breastfeeding outcomes and for longer periods (12-24 months) (Fair et al., 2019).
Chang et al. (2019)	Systematic mixed methods (qualitative and quantitative) review	n=16 studies in full review from 2,591 identified records.	SEM: PICOS (Population/participants, Interventions/phenomena of interest, Comparison/cont	Conducted a systematic qualitative and quantitative review for breastfeeding barriers and support experienced from overweight and obese breastfeeding women. The support information gathered were perceptions from healthcare	Overweight and obese women need more support regarding decisions to infant feeding from health care prof. peer supporters and family, especially spousal support and must tailor to women's individual needs. There is lack of

			ext, Outcomes, and Study types framework from Joanna Briggs Institute (2014) used to develop the eligibility of criteria to address review questions.	professionals, peer, partner, and family members. It highlights the importance of breastfeeding support for overweight and obese women at every level and environment during and beyond pregnancy to overcome barriers and plan successful breastfeeding for maternal and infant health. Women of reproductive age with higher BMI should be urgently addressed in the healthcare institutions and provide prioritized support and care.	research to address partners' and family's views in supporting women with higher BMIs. Further robust research with large sample sizes should be prioritized among obese women of reproductive age worldwide.
Reis-Reilly et al. (2018)	Qualitative analysis	n=27 grantees reported inclusion of Policy, Systems, Environmental (PSE) change strategies	To implement PSE change strategies to increase breastfeeding knowledge and deconstruct structural barriers that contribute to inequitable breastfeeding rates through community breastfeeding support services (environmental, policy, systems).	The researchers here shared practice-oriented strategies for breastfeeding interventions through the public health policy, systems, and environmental (PSE) change approach. It is recommended that programs to change behavior should not only focus on the individual but also the underlying needs of the families within the community. Recommendation for partnerships to strengthen the collective capacity to address cultural barriers that contribute to the inequitable breastfeeding rates.	The need for partnership for PSE change implementation to strengthen collective capacity of the programs that local agencies cannot overcome on their own.
Barrera et al. (2018)	Qualitative - interviews, reports, and success stories	6 interviews with two individuals affiliated with ADPH and	Describes how AL used multiple funding opportunities to	In 2014 National Immunization Survey at 12 months the # of infants receiving breastmilk rose from 14.1% to 21%. There are	Future state planning for bf support networks and practices through state health departments and coalitions. Also increase

		Alabama Breastfeeding Committee (ABC). Reviewed 2 success stories by CDC's NPAO div. 8 final program reports from CDC funded grants and contracts.	create strong and diverse partnerships to strengthen bf support in AL to improve bf practices and increase bf rates.	only 8 baby friendly hospitals in Alabama. The programs are non-profit organizations that require funding from the CDC and volunteers for board of directors.	provider bf education and strengthening the community for bf mothers.
Chimoriya et al. (2020)	Cohort; secondary data	n=1035 mothers participated	What is the prevalence of full breastfeeding at 6, 12, and 24 months to determine predictors of breastfeeding duration among women in Sydney Australia?	Found that women who had a more advance maternal age were more likely to breastfeed for longer durations at 12 and 24 months than the younger women. Supported by other studies this may be because they would be in better circumstances, higher education, and more financially secure. Whereas women who are younger with lower education level and residing in socioeconomic disadvantage were more likely to stop breastfeeding early due to low family support, reduced assistance to breastfeeding issues, rigid work schedules and not wanting to breastfeed in public. This study took place in culturally diverse and socioeconomically disadvantaged regions of New South Wales Australia.	Study did not assess mother's BMI or other physiological factors that would be barriers to discontinued BF rates such as medical leader support and SEM factors. Study was in diverse Australia

RQ4- Breastfeeding duration and Eating and Exercise

Alves et al., (2020)	Prospective Cohort	n=641 mother-infant dyad	Evaluated for 6 and 12 months postpartum to determine whether BF duration influenced lower postpartum weight retention through the infant's first year of life	At mean maternal weight retention of 1.79kg to 1.69kg from 6 to 12 months meant that there is an association between breastfeeding duration and post-partum weight retention with adjusted confounders. This means that for each day of breastfeeding (about 180 days or 6 months pp) the reduced maternal weight retention on average was 5 grams per day.	There remain speculations for the hypothesis whether there are differences in the levels of metabolic hormones between breastfeeding and non-breastfeeding mothers in 6 months postpartum.
Meyers & Hong (2021)	Integrative Review	N=12 articles that met inclusion criteria	To evaluate the impact of exercise on weight loss, body composition, and bone mineral density in lactating females. The intervention included exercise only, diet and exercise, or exercise alone.	No significant effect on weight loss with exercise only or combined with diet. Significant effect with diet alone (-6 -8.4 lbs.) with negative energy balance of 595kcal/day from milk energy output for at least the first 3 months. Increased energy intake may cancel out energy expenditure yielding no weight loss.	There remains lack of research in lactation and physical changes in active, overweight, and obese women in reproductive years.
Oken et al. (2017)	The Obesity Center, Scientific Position Statement	Various	Provided a body of evidence accounting for associations of breastfeeding within	Compared to normal weight women, overweight and obese women are 46% less likely to initiate breastfeeding compared to 14% of normal weight women. There is confirmed correlation	Randomized controlled trials are ideal yet unethical. Intervention studies to address milk composition and breastfeeding initiation and duration.

			postpartum and child health.	between higher BMI and failure to initiate or sustain breastfeeding	
Most et al. (2020)	Prospective observational cohort study	N=37 pregnant women with obesity (BMI>30kg/m^2)	To examine how energy intake and expenditure affects the weight trajectory during and 12 months after pregnancy.	No change in metabolic biomarkers between women with postpartum weight retention (PPWR) and PPW loss (PPWL). An average of weight gain from pregnancy =8kg body weight, 6.4kg lost postpartum=1.8+/-1.1kg weight gain from early pregnancy to 12 months postpartum.	It is essential for overweight and obese women to eat to satisfy their energy needs and restore exercise habits to pre-pregnancy levels to avoid unnecessary weight gain and prevent associated comorbidities and risk factors.

Literature Review Related to Key Variables and/or Concepts

To briefly recap, the key variables in this study are Breastfeeding Duration, BMI, Heart Health, Breastfeeding Support Group, and Eating and Exercise. In this literature review, I addressed challenges that overweight and obese women face involving duration of breastfeeding. Each research question was addressed using peer-reviewed articles to illustrate the scholarly discourse related to the key variable, including any similarities or differences. Specifically, this literature review includes empirical studies and outcomes on the impact of breastfeeding duration on BMI, heart health, breastfeeding support groups, and eating and exercise. This review includes supporting and evidence-based research regarding the impact of breastfeeding duration on BMI, impact of breastfeeding duration on heart health, impact of breastfeeding support groups on breastfeeding duration, prenatal obesity complications, body image, pregnancy, and breastfeeding barriers, and lastly, impact of breastfeeding duration on eating and exercise.

Impact of Breastfeeding Duration on BMI

There has been a lot of research on the impact of breastfeeding duration on BMI (Aldana-Parra et al., 2020; Cieśla et al., 2021; Hashemi-Nazari et al., 2020; Kronborg & Foverskov, 2020; Lyons et al., 2019; Moonesar et al., 2021; Oken et al., 2017; Saeidi & Gholami, 2019; Tahir et al., 2019; Waits et al., 2020). Scholarly studies both internationally and in the U.S. have indicated that breastfeeding duration has positive health impacts on a mother's BMI. Some scholars focused on port partum weight loss and BMI, while others focused more on health benefits of breastfeeding duration.

Overweight and obese women are 46.0% less likely to initiate breastfeeding compared to 14% of normal-weight women (Oken et al., 2017). In this study, it was indicated that there is an association between full time breastfeeding and reduced maternal postpartum weight retention. It also indicated that prolonged breastfeeding promotes infant health and helps mothers prevent development of obesity and cardiometabolic disorders. Identifying obstacles to longer breastfeeding duration is critical to the mother child dyad (Tahir et al., 2019). Lyons et al. (2019) confirmed women with BMI over 30 kg/m^2 struggle to initiate and maintain breastfeeding for longer than 6 months. Obese mothers are less likely to breastfeed due to high levels of BMI. Breastfeeding can help to reduce obesity among mothers, as well as reducing risk of childhood obesity for infants and helping prevent future risks of metabolic disease (Lyons et al., 2017; Tahir et al., 2019). Therefore, breastfeeding duration helps in terms of reducing BMI in women and children, leading to a lesser likelihood of becoming overweight and obese.

Due to metabolic changes and activities during pregnancy, breastfeeding helps to reduce the amount of fat stores that are accumulated during pregnancy (Cieśla et al., 2021). There are observed differences with full breastfeeding mothers in terms of fat distribution during pregnancy between normal weight, overweight, and obese women, such as whether they breastfed for short or long durations (Tahir et al., 2019). In a study conducted in Poland, Cieśla et al. (2021) found in that the longer women breastfed, the lower the risk of excess weight and abdominal obesity after menopause compared to those who did not breastfeed. This Poland study also showed no significant associations

between reduction of fat storage and 1) risks for excessive weight and 2) obesity among premenopausal women. Food choices and exercise, along with increases in appetite may hinder or aid weight loss during postpartum while breastfeeding (Ciesla et al., 2021).

Moonesar et al. (2021) conducted a systematic review of empirical research to investigate whether maternal obesity impacts breastfeeding prevalence. The authors also focused on other factors such as race and nationality from different geographic locations, different types of studies or methodologies such as cohort, quantitative and qualitative synthesis through interviews and multiple secondary data analyses. As reported in the results, Moonesar et al. found that overweight and obesity had a negative impact on breastfeeding initiation rates. Perceived barriers to breastfeeding were lack of maternal knowledge, preferences of the mother towards breastfeeding, and maternal and infant health conditions.

Moonesar et al. (2021) noted other important factors that affected breastfeeding were support from providers, employer policies, and health facility infrastructure in terms of baby-friendly hospitals. The mothers in the study also expressed that the infants remained hungry after breastfeeding and claimed formula milk is just as effective as breastmilk. Overweight and obese mothers had less confidence in terms of practicing breastfeeding, even when they initially intended to do so.

With regards to race, Moonesar et al. (2021) further stated in the results of the systematic review that in Canada, obese mothers had a 26.0% increased risk of not initiating breastfeeding and were 21.0% less likely to plan to breastfeed compared to normal-weight women. The findings in the study also indicated that the women in South

Carolina and Florida, pre-pregnancy weight negatively affects breastfeeding among morbidly obese White women, and the obese Black women in the study did not initiate breastfeeding. Moonesar et al. (2021) said these women were not breastfeeding due to high BMI levels among other social, physical, and confidence barriers, as well as poor maternal knowledge. For example, the barriers can mean that breastfeeding is socially unacceptable, physical meaning they can't physically breastfeed because it's difficult to accommodate with the baby, and confidence is because they don't have the confidence to breastfeed in public locations. I also identified important factors such as health provider attitudes and health practices to support breastfeeding continuation while educating about and continuously measuring BMI. In Black women for example, even though they had high BMI levels, breastfeeding initiation and duration was not affected when BMI was measured consistently, this is possibly due to the conscious adherence and effort toward meeting a goal (Moonesar et al., 2021).

The implications of the Moonesar (2021) study were that more empirical studies are needed that will use well-established theories to positively affect norms for overweight and obese women in terms of shifting their intentions to more likely breastfeed. Studies are also needed to explore how social norms, roles, and environmental values shape intention of obese mothers to breastfeed, as well as educate physicians and healthcare providers who are the professionals most likely to be able to educate overweight and obese, new and expectant mothers regarding benefits of breastfeeding perceptions and factors that may interfere with their intentions and willingness to breastfeed.

Hashemi-Nazari et al. (2020) conducted a systematic review and dose-response meta-analysis to explore the effect of pre-pregnancy BMI on breastfeeding duration. The authors found that for every unit of BMI, there was a 4.0% increase in terms of breastfeeding cessation. Overweight and obese women were more likely not to initiate breastfeeding or cease exclusive breastfeeding. The influence of excessive weight on breastfeeding mothers is multifaceted due to psychological, physiological, and emotional barriers. Study implications recommend counseling and support for women from conception to maximize breastfeeding outcomes as well as health benefits that breastfeeding can provide. Also, investigating southern U.S. culture on breastfeeding and overweight among obese women is necessary.

For women in Denmark, duration of breastfeeding was between 3 and 9 months postpartum, and mothers with higher maternal BMI tended to have shorter breastfeeding durations during the first months postpartum (Kronborg & Foverskov, 2020). If obese mothers established breastfeeding during the first months, they were more likely to continue. Obese mothers have increased difficulty due to hormonal and physiological factors; they also have low self-efficacy and require influence and education, preferably during the early stages of pregnancy, to help them gain positive experiences during breastfeeding.

In terms of breastfeeding duration impacting postpartum weight loss or reducing BMI levels; Waits et al. (2020) found women in Taiwan who breastfed exclusively for more than 30 days had significantly lower postpartum weight retention (PWR) compared to women who did not breastfeed. After 90 days postpartum, obese women in Taiwan (>

27 BMI) had significantly lower PWR by an average of at least 2.98 kg compared to those who were not breastfeeding. However, Waits et al. also found confounding variables in their study that yielded inconsistent results such as eating habits and physical activity. These variables nullified this association of breastfeeding and PWR at one year postpartum in American overweight and obese women; this may be due to the increase in energy expenditure and prolactin secretion also increases appetite and dietary intake, therefore making the women eat more calories (Waits et al., 2020). As noted in earlier studies, the longer the duration of breastfeeding the higher the energy expenditure, however consuming more calories cancels out this energy expenditure causing the woman to retain or even gain more weight. Waits et al. (2020) showed obese class I (30 > BMI < 35) women had reduced their weight up to 2.64 kg at 6 months postpartum due to adjusting for physical activity and dietary intake, but results differed when it came to diversity of study populations and methodologies (Waits et al., 2020).

Due to many challenges that obese women already face, they are less likely to breastfeed, yet teaching them that longer-duration or partial breastfeeding for more than 240 days can lead to significant changes in terms of postpartum weight. According to Alvez et al. (2020), mean maternal weight retention from 1.79 to 1.69 kg between 6 and 12 months meant that there is an association between breastfeeding duration and postpartum weight retention with adjusted confounders, i.e., exercise, energy increase and reduced energy intake (eating less calories). This means that for each day of breastfeeding, reduced maternal weight retention on average was five grams per day.

Waits et al., (2020) also suggested that Future research should focus on women with excessive weight. Obese women were underrepresented in the study because there were very few compared to the other group of women, and associations between breastfeeding and PWR were overestimated in the obese group. Women with high obesity rates are a potential target group for supportive interventions based on breastfeeding promotion. The notion that every feed matters can motivate or encourage mothers concerned about gaining extra weight to choose to breastfeed longer for better weight management. Waits et al. suggested that future investigation recommendations should include addressing effects of breastfeeding on PWR among diverse populations and employing longitudinal follow-up and standardized definitions of breastfeeding variables, along with controlling for dietary intake and physical activity.

Maternal obesity is a risk factor and predictor of breastfeeding at hospital discharge (Saeidi & Gholami, 2019). In a cross-sectional study of 300 overweight and obese mothers receiving prenatal care in a Medical Sciences university in Iran; overweight and obese women who failed to breastfeed normally had an average BMI of 28.3, which is significantly higher than those with normal weight who exclusively breastfed. Those with the highest level of obesity (class III) were less likely to breastfeed compared to the other two obesity classes (Class III had 50.87%, class II had 39.62%, class I had 24.44%, and 18.0% for overweight). There was an association between pre-pregnancy BMI and breastfeeding status at discharge. The higher the BMI, the lower the percent of those who exclusively breastfed. The rate of failure to exclusively breastfeed was high among the mothers in the obese categories (Saeidi & Gholami, 2019). In the

U.S., overweight and obese mothers have a higher risk of failing to initiate breastfeeding (Saeidi & Gholami, 2019).

According to Aldana-Parra et al. (2020), children in Bogota, Colombia who were born in a baby-friendly hospital from overweight and obese mothers were at increased risk for obesity; breastfeeding may lower these risks. Breastfeeding is a challenge due to emotional, physiological, and psychosocial issues that impact breastfeeding initiation and duration. There remains a lack of research involving interventions to improve breastfeeding initiation, duration, counseling, and strategies to support overweight and obese women to achieve their goals (Aldana-Parra et al., 2020). Programs with interventions can be used to help breastfeed more successfully and provide the means to assess effects of interventions to better measure outcomes from breastfeeding on infant survival, growth, and maternal postpartum weight loss (Aldana-Parra et al., 2020).

Lyons et al. (2019) investigated perceptions and experiences of women with BMI > 30 kg/m^2 who reported breastfeeding behaviors and claimed weight increases breastfeeding difficulties, and women are likely to report suffering due to complications and becoming separated from their infants from the lack of being able to breastfeed, which negatively impacts breastfeeding. Women with higher-than-normal weight cope with increased self-doubt in terms of their ability to breastfeed and tend to encounter more barriers involving psychological reactions to medical interventions due to their weight. Women with BMI greater than 30kg/m^2 are labeled high risk and can experience longer labor, caesarian sections, reduced mobility, and separation from or delayed skin-to skin contact with babies, which in turn reduces confidence to breastfeed. More qualitative

longitudinal studies are needed involving women's pregnancies and measuring breastfeeding timelines to reduce negative impacts on breastfeeding behavior. Future studies can also be used to measure instances and types of medical interventions that women may experience, as well as motivations to breastfeed and perceived control.

It is well established in the research summary the impact of breastfeeding duration and BMI. Most of the studies in the literature are in concurrence that women with higher BMI have difficulty breastfeeding, sustaining longer breastfeeding duration and maintaining postpartum weight-loss to healthier weight. The following paragraphs will address RQ2 regarding the impact of breastfeeding duration on heart health.

Impact of Breastfeeding Duration on Heart Health

Implications that duration of breastfeeding benefits maternal cardiovascular health are well-documented (Chetwynd et al., 2017; Countouris et al., 2019; Hauspurg et al., 2019; Kirkegaard et al., 2018; Peters et al., 2017; Velle-Forbord et al., 2019; Zachou et al., 2019). Zachou et al. (2019) examined associations between breastfeeding and maternal CVD risk factors and discovered hypertension is inversely proportional with lactation. The longer women breastfeed, the less chances there are for maternal hypertension, which means that breastfeeding protects the mother from developing hypertension and high blood pressure. Mothers who breastfeed for longer than 3 months are less likely to suffer from aortic calcification or coronary artery calcification, which leads to CAD. The prevalence of carotid plaque was 10.0% in women who breastfeed for at least three months compared to 18.0% in women who never breastfeed (Zachou et al., 2019). Duration of lactation is associated with decreased risk of CAD and up to 23.0%

lower risk of coronary heart disease among those who breastfed for longer than two years. With each additional six months of lactation per child, coronary heart disease and stroke decreased by 4.0% compared to women who never breastfed (Peters et al., 2017).

Kirkegaard et al. (2018) found significant associations between breastfeeding for longer than four months and 20-30% lower risk of hypertension and CVD compared to breastfeeding less than four months among both normal and overweight/obese women. One determinant on breastfeeding duration is how long the mother can dedicate to breastfeed exclusively, for example, women in Denmark have least 6 months of maternity leave (Kirkegaard et al., 2018). Therefore, the implications in this study were that the mothers who had more time to breastfeed had a lower risk for heart disease. Within seven years postpartum, mothers who partially breastfed longer than two months had a 10-25% lower risk of hypertension and CVD. These associations were irrespective of BMI and abdominal adiposity (fat in the abdomen). Both full and partial breastfeeding durations contributed to improved heart health in mothers. Also, residual confounding was a concern due to how breastfeeding closely relates to social status, behavioral factors, and BMI. Therefore, depending on the mother's social status, behavioral factors and BMI, these factors can also impact duration of breastfeeding on improving heart health.

As a significant contributor to heart disease, hypertension is a risk factor that can be influenced by the metabolic changes that occur during pregnancy (Chetwynd et al., 2017). Black women in the United States are more likely to get metabolic disease and have higher prevalence in hypertension than other ethnic groups at 41.2%, while White 28%, and Hispanic 26% (Chetwynd et al., 2017). Black women are also less likely to

breastfeed. The case control study findings of n=12,513 women were that women aged 40-49 who breastfed longer had a reduced risk of hypertension compared to those who did not breastfeed (i.e., either tried but couldn't [=failed] to lactate or never tried) (Chetwynd et al., 2017). An interesting reason for the favorable change is that during lactation the reset hypothesis is the possible mechanism that lowers the risk of metabolic diseases later in life for women who breastfeed compared to those who do not. According to the authors of this study, future research is needed to assess the relationships between breastfeeding duration and intensity, lifestyle factors, and perinatal events.

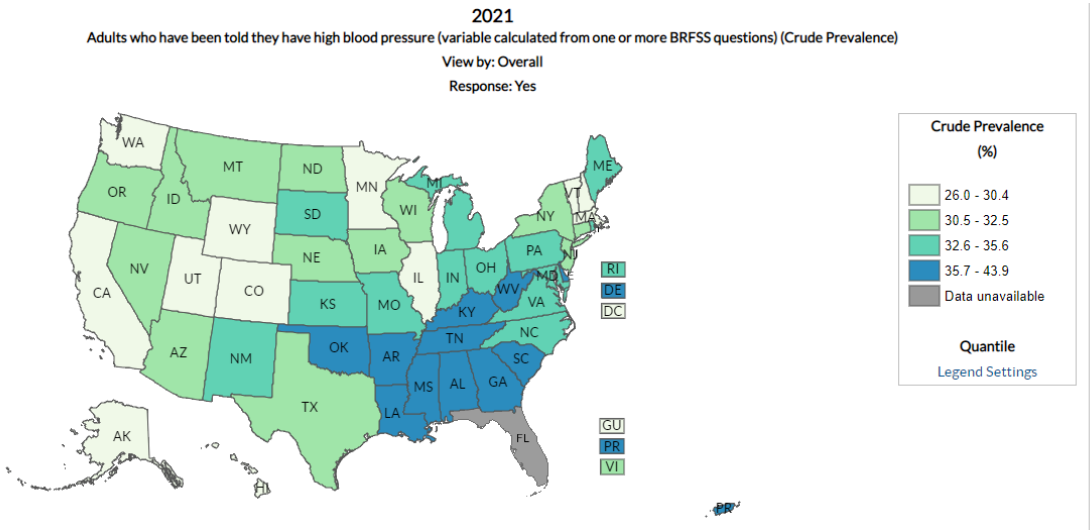
According to Kirkegaard et al. (2018) and Zachou et al. (2019) there is little existing evidence regarding the effect of lactation on lipid levels and adiposity in postpartum women. More research is needed to support causality of the link between lactation and cardio-metabolic risk profile; the maternal metabolic profile before pregnancy is essential to confirm findings and further explain associations between breastfeeding and maternal cardiovascular health. However, Velle-Forbord et al. (2019) found no causal relationship between breastfeeding duration and improved metabolic health in postpartum women, unless they already had good metabolic health before pregnancy. Velle-Forbord et al. (2019) aimed to clarify the effects of breastfeeding duration and long-term maternal metabolic health in a longitudinal population-based cohort study conducted in Norway, where n=1,403 women participants were followed up with after 12 years. In the study, the pre-pregnant waist circumference (WCF) and heart rate (HR) were correlated inversely with breastfeeding (BF) duration. Correlation was found in BMI and metabolic health parameters with BF duration, which means there was

an association. The conclusion implies that overweight and obese women have shorter BF duration and therefore have higher metabolic health affecting cardiac risk factors (Velle-Forbord et al., 2019).

Hypertension is a heart health problem related to CVD, which is the leading cause of death in women worldwide and increasing in women aged 35-54 (Hauspurg et al., 2019). Regarding the risk of hypertension in overweight and obese women, Hauspurg et al. (2019) conducted a prospective cohort study including n=315 women that demonstrated a positive rate of sustained hypertension and an adverse cardiometabolic profile associated with hypertensive disorders during their first year postpartum. This study was relevant because it reinforces the idea that focus on postpartum support and interventions are needed to reduce the risks. This finding also reinforces the question of whether hypertension and cardiometabolic profiles have an impact on duration of breastfeeding, particularly due to the higher risk of preeclampsia (Hauspurg et al., 2019). Figure 3 indicates hypertension prevalence is higher in the southern states of the United States The state of Mississippi represents one of 12 states with hypertension prevalence of 35.7-43.9%.

Figure 3

Hypertension Awareness



Note. Source: BRFSS (CDC, 2015).

Countouris et al. (2019) conducted a prospective cohort study in n=425 overweight and obese women during early pregnancy and 6-24 months postpartum. The study included lactation duration and cystatin and high-sensitivity C-reactive protein (hsCRP) in the women who had preeclampsia (n=37[9%]) or gestational hypertension (n=48[11%]). Of the n=237 women that breastfed for at least six months, Countouris et al. concluded there were no associations between duration of breastfeeding and hsCRP or cystatin C, regardless of the history of both conditions. Therefore, according to the conclusion of this study, there is no relationship between duration of breastfeeding and gestational hypertension, including postpartum hypertension. More research is needed on breastfeeding duration and maternal risk of CVD (Countouris et al., 2019).

Impact of Breastfeeding Support Groups on Breastfeeding Duration

The impact of breastfeeding support groups on breastfeeding duration is discussed in multiple studies (Aldana-Parra et al., 2020; Barrera et al., 2018; Chang et al., 2019; Chimoriya et al., 2020; Fair et al., 2019; Reis-Reilly et al., 2018; Saeidi & Gholami, 2019). Some would help to identify whether breastfeeding duration shortfalls are due in part of the lack of support. It is essential to have pregnancy and breastfeeding support for optimal mother and baby health outcomes. Support at the individual level, group level, and societal levels of the SEM are prominent in each environment, such as the home, work, and hospital or medical team caring for the mother and baby. Cultural support, regardless of education level and country of origin, also affects breastfeeding initiation and duration (Saeidi & Gholami, 2019).

According to Saeidi and Gholami (2019), educational level and planned feeding methods are also significant associations to consider, as it is more challenging for obese mothers to breastfeed, and the rate of failure to breastfeed is high in this group of women. Women who delivered by c-section (caesarian) also had decreased rate of breastfeeding initiation. Chimoriya et al. (2020) also described that in disadvantaged communities, such as South Western Sydney and New South Wales (for this study), of n=1035 mother-infant dyads in the Healthy Smiles Healthy Kids cohort study, only 25.5% of infants received breastmilk at 12 months and 2.9% at 24 months due to their mothers' lower education level, lower socioeconomic status, full-time employment, smoking during pregnancy, caesarean delivery, lower family support, younger age, rigid work schedule, and wish to avoid breastfeeding in public. By contrast with regard to family support and

age, in addition to older maternal age, the mother's partner's preference for breastfeeding was associated with continuation to breastfeed up to 24 months, due to the support the women received. It is important for the postpartum mother to feel included and accepted, especially when breastfeeding in public.

Breastfeeding support groups are effective within certain timelines and types of approach. In a study in Bogota, Colombia, the client-centered theory was the support theory used to encourage overweight and obese women to breastfeed and to help them not only achieve breastfeeding but also to breastfeed longer than six months and monitor their BMI, food intake, and milk production. These women also had support to achieve their maternal weight-loss without the expense of milk production (Aldana-Parra et al., 2020). However, other randomized controlled trials aimed to assess the effectiveness of intervention studies indicate an unclear gap in support for initiation and continuation of breastfeeding in overweight and obese women with low certainty of effectiveness in physical interventions and methods of support for longer breastfeeding periods (Chang et al., 2019; Fair et al., 2019).

Many of the women in the overweight and obese population cannot explain why they decide on early cessation of breastfeeding, yet it is important to look at other aspects of their environment. In a qualitative analysis of n=27 women, Reis-Reilly et al. (2018) reported that breastfeeding support interventions should include practice-oriented strategies such as the policy, systems, environmental (PSE) change strategy. The PSE strategy is based on the SEM, and it enhances programs and partnerships to focus on the underlying needs of the families within the community and to be able to strengthen the

collective capacity to address cultural barriers that can be contributors to the inequitable breastfeeding rates. For example, in the state of Alabama, to strengthen breastfeeding support, and through creation of diverse partnerships, the Alabama Breastfeeding Committee (ABC) created breastfeeding coalitions to make quality breastfeeding services an essential part of family healthcare and accessible to all families (Barrera et al. 2018). Breastfeeding support is needed at early stages of pregnancy for overweight and obese women to be able to address and assist them with two important barriers they encounter: prenatal obesity complications and body image, pregnancy, and breastfeeding barriers.

Prenatal Obesity Complications

Although socioecological differences that affect breastfeeding rates exist due to culture and beliefs (e.g., how women feel about initiating and continuing breastfeeding while overcoming social pressure and the need for encouragement and support in gaining the confidence to breastfeed), it is cumulatively significant that overweight and obesity further negatively impact breastfeeding initiation and duration (Fair et al., 2019). Other biological factors affect the decrease in milk production, such as the delayed onset of lactogenesis II (DOL), more prolonged labor, increased C-sections, and increased leptin levels. For obese women, the insulin concentration is lessened at the end of the pregnancy, and the reduced glucose availability affects milk synthesis, meaning less milk production. Other factors that impact the duration or choice to breastfeed are androgens such as polycystic ovarian syndrome (PCOS), elevated hypothyroidism or thyroid dysfunction, postpartum depression, and insufficient glandular tissue. These physiological and biological factors affect the milk supply of obese women;

approximately 60%, compared to 94%, of normal-weight women receive their milk supply (Fair et al., 2019).

The barriers to initiation and continuation of breastfeeding among overweight and obese mothers need to be addressed before they are discharged from the hospital, if possible, in prenatal education to help them cope with unforeseeable possibilities such as lack of breastmilk or infant jaundice due to lack of satiety from the breastmilk provided. All these factors affecting obese pregnant women warrant the need for medical treatment and support throughout the pregnancy and beyond. These new mothers do not only struggle with overweight and obesity complications, but the pregnancy is also complicated, and this affects their milk production and reduces the opportunity to breastfeed their baby. For these reasons, this group of women requires longer periods of support from their socioecological environment.

Body Image, Pregnancy, and Breastfeeding Barriers

Obese women are at greater risk of breastfeeding discomfort and have reduced confidence in reaching their goals for breastfeeding, which also negatively impacts their milk supply. The changes that pregnancy causes on women's bodies affects their comfort and confidence, since it takes a while to return to their previous shape and image (DHHS, 2021). Although these changes are part of the natural biology of women, it is difficult to keep a positive image while going through pregnancy and postpartum, especially when hormone and physical changes begin to happen along the way. The changes also affect the mood and quality of life. Therefore, it is important to have support, especially emotional support.

When it comes to body image and breastfeeding duration, a systematic review study by Morley-Hewitt and Owen (2020) found that out of 13,046 participants of non-randomized control design; the pregnant women who had a higher body image were more likely to breastfeed exclusively and longer than those with body image concerns. The women with body image concerns also had shorter breastfeeding duration. Support interventions are needed to improve breastfeeding rates among overweight and obese women by increasing self-efficacy through multi-faceted challenges that are tailored to their individual needs (Chang et al., 2019).

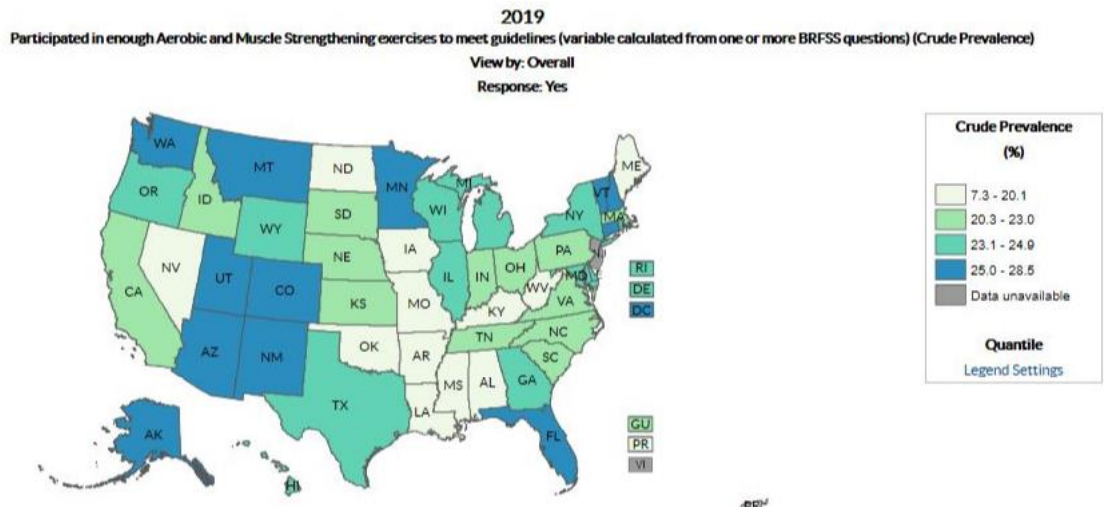
Impact of Breastfeeding Duration on Eating and Exercise

Research regarding the impact of breastfeeding duration on Eating and Exercise were informative to define how these factors affect a mother and child's health and wellbeing (Alves et al., 2020; Meyers and Hong, 2021; Most et al., 2020; Oken et al., 2017. It is also important to note some statistics of the population and environment in this study regarding physical activity and nutrition intake of fruits and vegetables. The CDC tracks historical data on physical activity and eating fruits and vegetables prevalence rates that affect the population in southern states in the U.S. Nutrition and physical activity are key indicators that affect the physiological adaptations in the mother's body to produce the milk it requires to nourish the baby; and to have a healthy pregnancy and promote postpartum weight loss (Alves et al., 2020). Figure 4 represents the physical activity prevalence rate of the percent population that conducts aerobic and muscle strength exercises on a regular basis. Note that Mississippi is one of 12 states that is in the

category of 7.3-20.0% of people that exercise regularly. This means that people are less likely to exercise in these states compared to the rest of the U.S.

Figure 4

Physical Activity Index

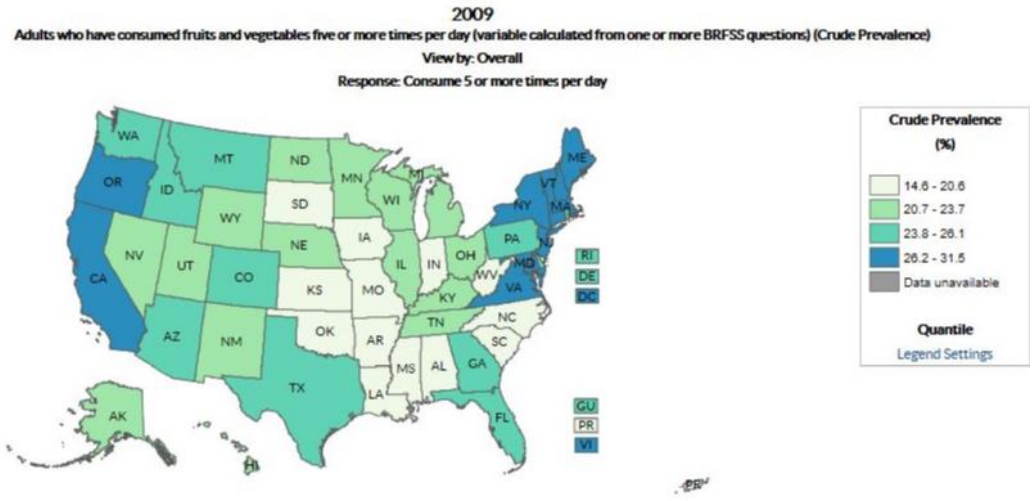


Note. Source: BRFSS (CDC, 2015).

Figure 5 indicates the prevalence rates of the state population that eat fruits and vegetables on a regular basis. Mississippi, again, falls in the 14.6-20.6% category, is one of 13 states of the total United States population that eat their fiber on a regular basis.

Figure 5

Prevalence of Adults who Consume Fruits and Vegetables 5 or More Times Per Day



Note. Source: BRFSS (CDC, 2015).

Meyers and Hong (2021) addressed effects of exercise and diet among lactating women and confirmed that most of the population were overweight and obese and/or previously sedentary postpartum lactating women. The reviewers of the study found no significant effect on short- and long-term weight loss with exercise only or diet and exercise, only the group with the diet alone intervention demonstrated weight loss (6 vs. -8.4 lbs.). Proposed reasons why exercise is not associated with additional weight loss in lactating women are: Due to the total energy expenditure decrease, i.e., the body tries to conserve its energy as much as possible; increase in energy to compensate for calories lost during exercise, this can come from behavioral cues or hunger cues, such as one thinking they should eat to replace calories or the increase in appetite. Lastly, the lack of weight loss is due the alteration regulating hormones. Prolactin is an appetite-enhancing hormone that creates a demand for energy to balance the high demands of milk energy output. Prior researchers estimated a 595 kcal/day in the first three months for fully

lactating mothers. Prolactin levels decline when the infant begins to consume other foods, therefore the 595kcal/day will continue to decrease. The increased energy intake can effectively cancel out the energy expenditure from exercise among the breastfeeding mothers, therefore causing them to retain the postpartum weight.

Researchers have indicated that some lactating women (mostly lean) will experience a decrease in milk energy output when a negative energy balance is achieved, which means they will risk losing their milk production due to calorie restriction and exercise. Meyers and Hong (2021) also found no association between exercise and weight loss in exercising lactating women, yet this doesn't mean that exercise should be ruled out from lactating women. Exercise, rather, should be recommended for all lactating populations because the benefits outweigh the risks. Exercise should the paired with caloric restriction post-partum with proper monitoring and direction. The postpartum period influences lifelong behaviors that will impact maternal and child health. More recent studies are needed regarding physical activity and nutrition in active as well as overweight and obese breastfeeding women (Meyers & Hong, 2020).

Given that more studies are needed regarding nutrition and physical activity, in n=37 overweight and obese breastfeeding mothers, Most et al. (2020) conducted a prospective observational study on this same topic. Most et al. aimed to examine the influence of energy intake and expenditure through exercise during pregnancy and postpartum up to 12 months. The key findings of this study are congruent with the previous study of Meyers & Hong (2021). There were 16 women (43%) who experienced postpartum weight loss, and 21 (57%) experienced postpartum weight retention. Exercise

and metabolic biomarkers did not show much of a difference as the caloric intake. Breastfeeding duration was self-reported and did not specify frequency or exclusivity. Those who lost weight had reduced their intake postpartum by 300kcal/day and those who retained the weight increased their energy intake by 250kcal/day without changing their breastfeeding or eating behavior. The recommendation is to tailor the intervention programs to the individual patient for energy requirements based on their anthropometry to promote postpartum weight management, and to restore physical activity to pre-pregnancy levels and improve postpartum weight to limit weight gain and prevent comorbidities and risk factors (Most et.al, 2020).

Regarding nutrition, maternal obesity affects the health and early life programming of the fetus, since the mother is the main source of nutrients from the creation of the fetus in the womb. Breastfeeding can still be safe and effective in promoting weight loss in the mother without reduced milk production, if monitored with energy balance. Since exclusive breastfeeding expends 300-500 kcal/day, weight loss and reduction of adiposity can also lower risk for hypertension, hyperlipidemia, diabetes, and CVD morbidity and mortality with varying BMI categories. A healthy weight reduction rate without compromising milk production can be 1lb per week if physical activity is included along with energy deficit (Oken et al., 2017). The first step is establishing consistent breastfeeding; the next step is providing support to the mother; and lastly, breastfeeding overweight and obese mothers can be further supported and monitored in reducing energy intake and exercising until the desired healthy weight is achieved (Oken et al., 2017).

Summary of all RQ Support Findings

Throughout the review of the literature, it has been well established that duration of breastfeeding impacts health outcomes in the mother-child dyad and health factors impact initiation and duration of breastfeeding. It is also well established that maternal overweight and obesity during pregnancy and postpartum increases complications and heart health problems that affect breastfeeding initiation and continuation. There were contradicting results as to whether breastfeeding duration influenced hypertension, or vice versa (Aldana-Parra et al., 2020; Countouris et al., 2019). Yet social support, healthy eating, and exercise can help lower the risk factors the longer the mother can breastfeed.

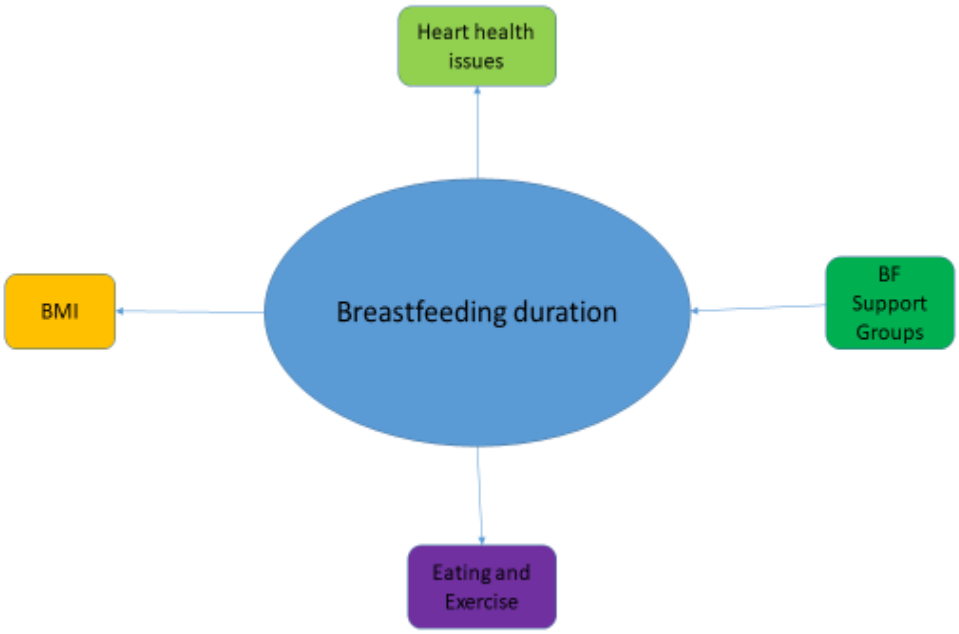
There were many studies that indicate association between BMI impacting breastfeeding initiation and duration. However, very few studies indicate the health benefits of breastfeeding duration on BMI and heart health in overweight and obese women. The first research question is about whether breastfeeding duration affects BMI outcomes in postpartum overweight and obese breastfeeding mothers. The second research question is to explore whether breastfeeding duration impacts heart health such as hypertension. The third research question is to explore whether belonging or having a support group impacts breastfeeding duration. Lastly, the fourth research question is to see whether breastfeeding duration impacts eating and exercise.

There are many factors that influence this question to include breastfeeding initiation and duration. Other factors are breastfeeding time, lifestyle choices like choosing healthy foods to help produce the milk, exercise to help reduce postpartum weight, or to balance milk production with weight loss to continue breastfeeding for

longer periods of time while simultaneously and carefully continue to exercise to achieve pre-pregnancy weight or healthy weight goal. Figure 6 diagram indicates how the research questions may or may not be associated with breastfeeding duration. The arrows between each bubble in the diagram are for reference to the research questions.

Figure 6

Research Questions Diagram



There was a total of 225 articles within the last 5 years that addressed key search words for RQ1. There were an additional 192 articles with key words that addressed RQ3. Many of these articles were duplicates and overlapped each other, and therefore I had to narrow down to the most prominent ones that targeted the RQ and variables.

The nutrition of early life predisposes to reduced obesity rates and has beneficial effects on the population's health later in life. The sample sizes for the studies vary and present a significant contribution to maternal and neonatal nutrition. Some of the studies indicate comparison between women who breastfeed and women who do not. Some of the studies were conducted in different countries, such as Sweden, Denmark, Australia, Iran, China, and Mexico, and so the study setting, and sample populations varied. Therefore, some of the limitations were that some studies did not include overweight and obese women because the overall population health and BMI rates for some of the countries mentioned is lower than that of the United States.

Another observation is that many of the articles that were reviewed did not include a theoretical framework or model. There are not enough studies to confirm use of the SEM to be effective in supporting breastfeeding duration and social and physical support. There were two studies conducted using the SEM and 572 articles that included the assessment of the variables BMI, heart health, exercise, and nutrition and support groups. All of the 572 articles containing all the key words had duplicate studies across various searches and platforms; also, some of the articles were not peer review approved therefore were not included in this study.

Operational Definitions

The following terms were used in this dissertation:

Age: Provided by the participant at the time of survey.

Body Mass Index (BMI): A method of measuring a person's weight category that can indicate health predictors. BMI is determined by dividing the weight in kilograms (or

pounds) by the height in meters (or feet) squared (CDC, 2022a). Class I is defined as having BMI of 30-34.9, class II (35-39.9) and class III (> or equal to 40) (Wharton et al., 2020).

Breastfeeding duration: Exclusive breastfeeding for 6 months followed by complimentary feeding (solids) with breastfeeding, bottle milk from breast pump, or pure breastmilk for the remainder of 24 months or older (CDC, 2022c).

Breastfeeding support group: Provides social support, education/health literacy, physical support, or a combination of these, to overweight and obese breastfeeding women. Forms of support can be breast pump provision, counseling support, family support, employer support, policy-level support, community support, health coach support (nutrition and exercise), and lactation counseling support (Fair et al, 2019).

Eating and exercise: Maintenance of healthy eating from nutrient-dense food; maintenance of a consistent exercise program with health coach guidance and support and monitored by a practitioner. Patient and Practitioner talk about eating and exercise (CDC, 2018a).

Education: Level of education provided at the time of survey. Based on the highest-grade level that was completed by the mother. Education level included Elementary, High School, HS graduate or GED, Some College, College Graduate/Professional Degree (CDC, 2018a).

Heart health: In this study, heart health includes hypertension, coronary heart disease, cardiovascular disease, coronary artery disease, myocardial infarction, angina,

congestive heart failure, peripheral arterial disease, revascularization, and stroke (Zachou et al., 2019).

Race/Ethnicity: Race/ethnicity provided at the time of survey (CDC, 2018a).

Socioecological model (SEM): A model framework that considers complex interplay between the individual, social relationships, community, and societal-policy factors to understand how the variables affect the maternal-child dyad and how each level has an influence on others (Owen & Sallis, 2015).

Assumptions

Assumptions for this study were: Valid anthropometric data were collected by the staff, as the participants were seen at regular physician appointments. These measurements are needed to obtain BMI and cardiovascular biomarkers. Self-reported data regarding breastfeeding duration and introduction to formula and solid foods were valid as reported by the mothers during regular appointment visits. This reporting is needed to calculate breastfeeding duration. All race/ethnicity, education, and socioeconomic status were self-reported. Data was gathered from surveys and birth certificate records for singleton live born infants during the surveillance year.

Scope and Delimitations

The scope of this study was as follows: The population total was as reported in the PRAMS surveillance system for the year of the data collected. The criteria of the study were pregnant and postpartum women who fell within the independent and dependent variables selected to include the covariate variables such as age, race/ethnicity, and education.

Delimitations of this study were as follows: The boundaries of the study were that the population included was from the PRAMS for the state of Mississippi, representing one of 12 states in the United States to have high obesity rates. The PRAMS was a voluntary self-reported survey with responses taken over the phone or by mail.

Limitations

Limitations for this study were: The PRAMS was a mixed-mode (mail and telephone) surveillance system. Although each state had incentives for volunteer participants, the response rate for Mississippi was 46.6%. The self-declaration of ethnicity in the surveys was defined by the participants. The self-declaration of socioeconomic status and education in the surveys was defined by the participants. Self-reported height and weight can lead to misclassification of BMI status. The participants included in the PRAMS survey were voluntary, which may cause the results to limit representation at the state level and not be generalized at the national level. For example, the total sample for Mississippi was 1012 and 466 responded to the variables in the study, therefore, I did not have enough power in the sample size to obtain representation of the sample. Confounder variables such as smoking, diabetes conditions, post-partum depression, various types of cancers, and other health issues not related to heart health, BMI, eating and exercise, and support groups are excluded from this study. The survey question related to RQ4 was whether the patient and practitioner discussed healthy eating and exercise habits, not whether the patient was practicing healthy eating and exercise. Finally, since the study is a cross-sectional design, the data collected at one time is not the most optimal way to obtain significance.

Significance/Contributions to Research

There are positive impacts that breastfeeding provides to a baby and mother dyad, such as preventing obesity and morbidity. Breastfeeding helps reduce infant mortality, obesity, and other chronic diseases that develop later in life (Schwarzenberg et al., 2018). The practice of breastfeeding affects positive social change by saving money, reducing formula use, and influencing the growth in acceptance of for women to breastfeed in public for as long as they need to. The results of this study can provide insights regarding the SEM framework to assess which interventions and program initiatives are appropriate to reduce cardiovascular health risk for overweight and obese postpartum women, as well as assess the impact of behavioral and physiological factors that can aid overweight/obese women at every level (see Figure 6). Chang et al. (2019) indicated that women of reproductive age with higher BMI should be urgently addressed in healthcare institutions and provided prioritized support and care and that more education is needed to provide support to this group of women with development and appropriate interventions. The key is to educate new and future mothers who can make a social impact that leads to a healthier and more educated nation and influence policymakers to allow women to breastfeed in the workplace and take the time they need to fully recover. A potential contribution to public health knowledge is to use the SEM theory to help overweight and obese postpartum women achieve their breastfeeding goals (see Figure 6). The SEM can be a framework tool for organizing support groups from the prenatal stages of the child through two years of age. Potential implications for positive social change are that every level of the SEM can be addressed and referenced for assistance in the intervention.

This study is unique in that it addresses the understanding of how the SEM framework can be applied to promote increased duration of child nourishment rates in the southern states, where obesity is most prominent, through the support of the breastfeeding initiative with simultaneous behavioral and physiological support to overweight and obese breastfeeding mothers in order to prevent or reverse cardiovascular disease risk factors. Additionally, the study attempts to find what other factors affect women in different ecological settings in the southernmost regions of the United States that could prevent them from continued breastfeeding and reducing obesity risk factors.

The social impact that breastfeeding mothers would bring is reducing morbidity by challenging the modifiable risk factors related to obesity, hypertension, and other factors that lead to cardiovascular disease.

Summary and Conclusions

BMI does have an impact on breastfeeding initiation and duration among women in terms of shortened durations and overweight and obese populations who are less likely to initiate breastfeeding. This means that many women are not breastfeeding their babies due to higher BMI levels and other risk factors. Breastfeeding duration also has a positive impact on protecting postpartum mothers from cancers and heart health conditions; it can also help to reduce risks, when combined with nutrition and exercise. However, initiation and duration of breastfeeding is affected by length of support within circles of influence and environments. Interventions should be implemented to extend knowledge and public health practices and address the problem.

The cross-sectional quantitative research methodology is explained in Section 2, along with the research design and data collection. I also address the population, data collection, instrumentation and operationalization of constructs, operationalization, data analysis plan, threats to validity, and ethical procedures.

Section 2: Research Design and Data Collection

The purpose of this quantitative cross-sectional study was to examine associations between rates of breastfeeding initiation and duration and health and behavior indicators (exercise, nutrition, BMI, risk for heart disease) while controlling for age, race/ethnicity, and socioeconomic status among overweight and obese women in Mississippi using secondary data. In this section, I describe the research methodology that was used for this study. This includes a description of the population and selection of participants based on the data survey, sampling procedures used by original creators of the data set, instrumentation and operationalization of constructs used to collect data, operationalization for each variable, and the data analysis plan used to describe statistical methods and procedures for each research question. This section also includes descriptions of the research design and rationale, sampling methods, and criteria for selection of participants. as well as methods for addressing threats to validity and ethical procedures. This section concludes with a summary and transition to Section 3.

Research Design and Rationale

A cross-sectional quantitative approach was essential for examining the most recent rates of breastfeeding duration status among overweight and obese mothers in Mississippi. PRAMS state data sets are useful for cross-sectional studies and for evaluating the most current public health programs and policies. PRAMS is an ongoing surveillance system that is used to record health indicator and behavior trends over time (Shulman et al., 2018). Secondary data were accessed from PRAMS P8 Questionnaire Analytic Codebook.

The dataset includes the following variables of interest: duration of breastfeeding in days (BF5LNGTU), eating and exercise (VPP_EAT_RAW), participation in breastfeeding support groups (BFINF_GRP), heart health problems (HTH_HRT), BMI (MOM_BMIG), and demographics including age, race, and education of participants. There are two independent variables in this study, depending on which RQ. IVs are the duration of breastfeeding and participation in breastfeeding support groups. DVs are BMI, heart health, and eating and exercise. Demographics determine the effects of the dependent variables. The demographics also help identify associations between the different types of variables and population. I used crosstabulation and chi-square to statistically test for associations. The quantitative design was the best approach for research and evaluation to evaluate relationships between variables and outcomes.

Methodology

Population

The target population size for Mississippi is N=1,012. The population consists of respondent mothers who recently gave birth to a liveborn infant during the surveillance year of 2021.

Sampling Procedures Used by Original Creators of the Data Set

I stratified data by state, maternal age, race/ethnicity, geographic location, and infant birth weight. Data collection procedures included phone calls and mail surveys, in addition to collecting birth certificate records for a sample representation of all women who delivered liveborn infants. PRAMS data were generated from mail and phone surveys in addition to the individual's medical file which included birth certificates,

medical care data, and written surveys. Further, all participants were women who had a live birth during 2020, experienced heart health issues, and were breastfeeding. For this study, I excluded all mothers who smoked, had diabetes, or had been physically abused.

The PRAMS dataset is accessible through the CDC PRAMS homepage. The dataset is public and available upon request to any state or jurisdiction; however, to collect data for a specific year or multiple jurisdictions or states, submitting a proposal to the CDC is required. There is a PRAMS application form that needs to be submitted which includes a project abstract of 350 words or less as well as a data-sharing agreement that includes signatures of all authors involved in the study. The proposal submission deadline is the 1st of every month, and any proposal submitted after this deadline is reviewed the following month. Every submission needs to be included in a single PDF document and sent by email to the CDC.

PRAMS data is heavily used by academic researchers, nonprofit organizations, state health departments, and federal agencies. These institutions use PRAMS data to help guide development of new programs and policies and develop educational material for healthcare providers and the public; they also use it to contribute to general health knowledge. Since the implementation of PRAMS in 1987, the number of participating states has increased from six to 50 (plus the District of Columbia) and includes data for 83.0% of all births in the U.S. (Shulman et al., 2018).

As an ongoing state-level population-based surveillance system, the PRAMS was the best source for my study for the purpose of developing programs and policies to help decrease maternal and infant morbidity and mortality. Collection, analysis, and

dissemination of population-based data needs to be used to develop these policies and educational programs. Furthermore, data also helps with monitoring health behaviors, access to care, and receipt of services and support for pregnant and postpartum women as well as identifying maternal and infant health indicators that are not available from any other public accessible database.

I used G*Power as the power analysis tool for calculating sample and effect size of variables. RQ1 required crosstabulation and chi-square tests for analysis; the dataset indicates BMI is categorical. The number of predictors variables is eight (IVs, DVs, and demographics). Crosstabulation and chi-square tests are needed to test for associations between variables. According to the CDC (2021), since annual sample sizes for the PRAMS data surveys range from 1,000 to 3,400, there is a large enough sample at the 95% confidence level (alpha level 0.05) to generalize to the population. Each category contains at least 25 respondents, and the magnitude of any adjustments based on nonresponses vary by category; therefore, a power of 80% or .80 (conventionally set) is used to weight responses, accordingly.

The effect size for a t-test correlation set at 0.1 would yield a meaningful sample size of $N = 614$ and power at 0.80 or 80% to support the null hypothesis. The alpha level was set to an 0.05 error probability, which is the normal standard. This is the smallest effect size that would have practical significance for addressing any differences between groups. A power value of 0.80 is acceptable to support a null hypothesis (Cohen, 1988). I determined whether difference between two groups were due to chance by addressing p values and alpha levels. Therefore, the effect size used during this planning stage was

sufficient for this study. The sample size, alpha level, and power level for RQ2, RQ3 and RQ4 also used crosstabulation and the Chi-square goodness of fit test to compute effect sizes. The input parameters included the alpha level error probability of .05 and power 0.8 or 80% among eight predictor variables.

Instrumentation and Operationalization of Constructs

The developers of the questionnaires consist of the personnel located in the PRAMS states and the CDC. Both questionnaires were combined and were disseminated to all states. The aimed dataset for this study is the 2020 data set. The PRAMS dataset is appropriate to this study due to its criteria of recorded variables such as maternal behaviors, attitudes, and experiences before, during, and after pregnancy suited for a cross-sectional study. It is recorded as secondary quantitative data conducted by the CDC's Division of Reproductive Health, in collaboration with state health departments.

PRAMS data from 2004 to 2006 in 11 states had response rates equal to or above 70% and 95% CI, or alpha level of 0.05 (Ahluwalia et al., 2012). Also, in terms of validity and reliability, according to the PRAMS data in this study, the overall children who did not breastfeed was 21% (95% CI: 21.5-22.6), and 27.7% breastfed for less than 10 weeks. Another study where PRAMS data was used analyzed associations between maternity care practices and 2-month breastfeeding duration and how they can vary by race, ethnicity, and acculturation (Sebastian et al., 2019). The PRAMS dataset was from 2012-2014 New Mexico. The questionnaire was sent by mail to over 2,000 new mothers each year, with about 65% response rate. For the study, the researcher used the 2012, 2013, and 2014 data that included the desired variables. Validity and reliability were

established in the study by using the same instrument (PRAMS survey) for the state in which the study took place (a different location than the previous study). For the data analysis, Sebastian et al. (2019) conducted bivariate analyses, chi-square analyses, and logistic regression and used SPSS 23.0. PRAMS was also used in a systematic review of breastfeeding intervention for breastfeeding rates and practices in racial and ethnic disparities.

The two studies mentioned used the PRAMS survey data from two different regions; the methodology was similar, the questionnaires remained similar, and both had similar variables. The results were similar in terms of breastfeeding initiation and duration compared to the two groups, thereby making it stable. Both study samples established the validity of the results. For validity to hold true, the content should correlate with other results, and items should be measured as intended. Reliability is the consistency and repeatability of the instrument in which the two studies mention the use of the PRAMS data sets (Creswell & Creswell, 2018).

Operationalization for Each Variable

The operationalization for each variable is defined as how each concept is measured; it would give what the scores represent from the codebook of the PRAMS dataset. There are eight variables in this study, including the three demographics (race, education, and age). For RQ1, there are two variables, breastfeeding duration (BF5LNGTU) and BMI (MOM_BMIG). For RQ1, the outcome variable or dependent variable is BMI (MOM_BMIG), the operational definition is determined by dividing the weight in kilograms (or pounds) by the height in meters (or feet) squared (CDC, 2022a).

For the predictor variable breastfeeding duration (BF5LNGTU) (IV) more specifically, for this survey, the number of days was only given by whether the mother breastfed for a length of time such as: less than one week, weeks, and months. RQ1: BMI (DV) will use cross-sectional and Chi-square tests of association since both the DV and IV are nominal. The dependent variables for RQ2 and RQ4 are operationalized as dichotomous or binary with two groups (yes/no), while the IV continues to be breastfeeding duration (BF5LNGTU). In RQ3 the IV is breastfeeding support group (nominal) and DV is breastfeeding duration which is also nominal. Table 3 represents the RQ variables, measurement, and codes.

Table 3

RQ Variables, Name, Measurement, and Codes

Variable	Name and Measurement	Codes
BMI (MOM_BMIG)	Categorical	BMI=19.8-40+kg/mm2 or 1= UnderWT (<19.8), 2= Normal (19.8 -26), 3= OVERWT (.26-29), 4= Obese (>29).
Heart health (HTH_HRT)	Nominal scale	1= No, 2= Yes.
Breastfeeding support group (BFINF_GRP)	Nominal scale	1= No, 2= Yes.
Eating and exercise (VPP_EAT_RAW)	Nominal scale	1= No, 2= Yes.

The BMI variable association informs whether breastfeeding duration affects BMI levels. The heart health variable association indicates whether the mother has any heart issues and if breastfeeding duration can improve the mother's heart health. Breastfeeding support group association answers the question of whether breastfeeding duration is related to having a breastfeeding support group. The eating and exercise variable

association addresses whether the practitioner and patient discuss eating and exercise habits. Knowing if there is significance helps determine if breastfeeding duration affects eating and exercise. If there is a relationship between the BF duration and eating and exercise, then it is another factor that impacts the mother's health. Other variables included in this study are the demographic variables depicted in Table 4.

Table 4

Demographic Variables, Name, Measurement, and Codes

Variable	Name and Measurement	Codes
Maternal age grouped (MAT_AGE_NAPHSIS)	The mother's age at time of the survey. Categorical	1= 17, 2=18-19, 3=20-24, 4=25-29, 5=30-34, 5=35-39, 7=40+
Maternal Race (MAT_RACE)	The race of the mother. Nominal scale	U= Unknown, 1= Oth-Asian, 2= White, 3= Black, 4= AM Indian, 5= Chinese, 6= Japanese, 7= Filipino, 8= Hawaiian, 9= Oth-Nonwht, 10= AK Native, 11= Mixed Race.
Education (MAT_ED)	The number of years of the mother's education. Categorical	1= 0-8 Yrs, 2= 9-11 Yrs, 3= 12 Yrs, 4= 13-15 Yrs, 5= 16 Yrs.

Data Analysis Plan

Statistical analysis was performed using SPSS version 28. A basic analysis was conducted using SPSS to produce descriptive statistics involving frequency and percentages.

RQ1: Is there an association between breastfeeding duration and BMI?

$H_0$1: There is no association between breastfeeding duration and BMI.

H_a1: There is an association between breastfeeding duration and BMI.

RQ2: Is there an association between breastfeeding duration and heart health problems?

$H_0$2: There is no association between breastfeeding duration and heart health problems.

H_a2: There is an association between breastfeeding duration and heart health problems.

RQ3: Is there an association between activity in breastfeeding support groups and breastfeeding duration?

$H_0$3: There is no association between activity in breastfeeding support groups and breastfeeding duration.

H_a3: There is an association between activity in breastfeeding support groups and breastfeeding duration.

RQ4: Is there an association between breastfeeding duration and eating and exercise?

$H_0$4: There is no association between breastfeeding duration and eating and exercise.

H_a4: There is an association between breastfeeding duration and eating and exercise.

The IV for RQ1, RQ2, and RQ4 is duration of breastfeeding (BF5LNGTU). The DV are BMI, heart health, eating and exercise. For RQ3 the IV is breastfeeding support group, DV is breastfeeding duration. The variables are measured as follows: The IV duration of breastfeeding in days (BF5LNGTU) is categorical; the DV BMI

(MOM_BMIG) will be categorical in the dataset; DV heart health (HTH_HRT) is nominal and DV eating and exercise (VPP_EAT_RAW) nominal. IV breastfeeding support group (BFINF_GRP) nominal, and DV duration of breastfeeding in days (BF5LNGTU) categorical. Table 5 depicts the statistical tests used to analyze each RQ.

Table 5

Statistical Tests Used to Analyze Quantitative Research Questions

Research Question (RQ)	Instrument	Variable	Analysis/Test
Descriptive statistics for demographics to understand the difference in education level, age, and race.	PRAMS survey data	Demographics in education level, age, race, and research variables	Percentages and frequencies
RQ1-Quantitative: Is there an association between breastfeeding duration (BF5LNGTU) and BMI (MOM_BMIG)?	PRAMS survey data	Breastfeeding duration (BF5LNGTU) and BMI (MOM_BMIG)	Crosstabulation and Chi-Square. Rationale: DV is categorical; IV is categorical
RQ2-Quantitative: Is there an association between breastfeeding duration (BF5LNGTU) and heart health problem (HTH_HRT)?	PRAMS survey data	Breastfeeding duration (BF5LNGTU) and heart health problem (HTH_HRT)	Crosstabulation and Chi-Square. Rationale: DV is binary with two groups (yes/no). IV is categorical
RQ3-Quantitative: Is there an association between breastfeeding support group (BFINF_GRP) and breastfeeding duration (BF5LNGTU)?	PRAMS survey data	Breastfeeding support group (BFINF_GRP) and breastfeeding duration (BF5LNGTU)	Crosstabulation and Chi-Square. Rationale: binary DV and categorical IV
RQ4-Quantitative: Is there an association between breastfeeding duration (BF5LNGTU) and eating and exercise (VPP_EAT_RAW)?	PRAMS survey data	Breastfeeding duration (BF5LNGTU) and eating and exercise (VPP_EAT_RAW)	Crosstabulation and Chi-Square. Rationale: DV is binary with two groups (yes/no) and categorical IV

For all RQs, a descriptive analysis crosstab test was used to examine the demographics in education level, age, and race of the population. The crosstab test was used to analyze results for frequencies and percentages for the categorical variables.

Then, for RQ1, crosstabulation and Chi-square were used to analyze the association between BF duration (IV) and BMI (DV). For RQ1 the DV was categorical BMI variable in the dataset, while the IV was also categorical. For RQ2 and RQ4, also required crosstabulation and Chi-square to test for association of the variables (DVs: heart health and eating and exercise). Rationale: DV is nominal with two groups (yes/no). For RQ3 since the IV is nominal and DV is also nominal, the statistical analysis will also be crosstabulation and Chi-square. The missing responses were not included in the total count for each RQ sample. For example, the PRAMS weighting process mentioned in CDC (2021), all the sampled individuals or birth certificates will be accountable to derive nonresponses, if the missing responses would have provided similar answers to the surveys. According to the source, the initial sampling weight will be the reciprocal of the sampling fraction which is then applied to the stratum, such as transforming the missing values and replacing them. To prepare the data for analysis the data was screened and cleaned. There were no duplicate or irrelevant observations in the dataset. It is also important to note to remove or correct structural errors such as typos, replacing the missing values, and out of range values and outliers.

Threats to Validity

Validity involves identifying potential threats to outcomes of the study and the meaningfulness of research components such as methods and techniques, data analysis, and instruments and materials for the data, and the type of population or sample being studied (Creswell & Creswell, 2018; Drost, 2011). The PRAMS survey questionnaire has been used throughout all participating states and published by various academic

researchers and nonprofit health organizations and health departments, as well as federal agencies, since its implementation in 1987 by the CDC (Shulman et al., 2018). The PRAMS survey was implemented with the aim of tracking and developing policies and programs to decrease maternal and infant morbidity and mortality. PRAMS represents 83% of all United States live births (Shulman et al., 2018).

Threats to External Validity

Ecologically, the women in the selected population from the survey are all inclusive of SES. The study can be replicated using different settings, or the same subjects that have responded to surveys with added demographics or variables, such as SES and other risk factors, such as diabetes. The study can also be replicated to include more locations to obtain a greater sample.

Threats to Internal Validity

SES was not measured as part of the demographics to compare the overweight and obese breastfeeding mother population. Demographics that were included are education level, age, and race. Though SES is not part of this research effort, this study can be replicated using different or the same subjects with added demographics or variables, and with other risk factors (e.g., diabetes). Given the small effective size, this study has enough responses to be representative of the breastfeeding mother population in the state of Mississippi. When sampling, however, if the number of responses does not meet the number required for the minimum sample size, then the effective size may need to be raised to maintain internal validity.

Threats to Construct or Statistical Conclusion Validity

Threats to construct validity can include the concept, idea, or behavior that is translated from the operationalization of the variables (Drost, 2011). The two categories of construct validity are: Translation validity and face validity. In translation validity, there is an assessment to what degree the construct or variable is accurately translated into the operationalization. Face validity is subjective on the operationalization of the variable—for example, a subjective judgement of the translation of the variable representations after the data analysis has been conducted (Drost, 2011). The rectification of this threat would be to ensure that the statistical constructs on conclusion validity are in fact objective in operationalization and translation of the variables in the study.

Ethical Procedures

The CDC PRAMS questionnaire survey is completely voluntary when the mother receives the letter and questionnaire packet, by filling out the packet or verbally agreeing and responding to a phone survey initiates informed consent to the survey participation. The questionnaire addresses barriers to and content of prenatal care, obstetric history, maternal use of alcohol and cigarettes, physical abuse, contraception, economic status, maternal stress, and early infant development and health status. There are no identifier questions about the person and no personal identification indicators in the dataset. Since PRAMS includes questions related to physical abuse, the survey is confidential; it is unethical to disclose abuse (Shulman et al., 2018). The data needs to be requested to the state or jurisdiction that is needed, however, for multiple jurisdictions, the request needs to be submitted to the CDC. For this study, only one jurisdiction was used. Data will be

stored in my personal computer at home. No other person will have access to the data. Data are used solely for data analysis specifically for this study, and it will be deleted 5 years after completion of the study based on Walden University guidelines. There is no known conflict of interest involving use of the data. Due to participation of human subjects, Walden University IRB approval was necessary to continue this study and obtain access to the data set (#12-13-22-0432418).

Summary

This section included an explanation of the quantitative research methodology and setting and population sampling methods, data collection, instrumentation and operationalization of constructs, data analysis plan, and criteria for selecting participants. I also addressed threats to validity and ethical procedures. Section 3 includes a presentation of results and findings from the study.

Section 3: Presentation of the Results and Findings

In this study, I used nonparametric analyses to determine associations between research questions. The two tests I ran were crosstabs and chi-square. Quantitative analyses were used to answer the following research questions:

RQ1: Is there an association between breastfeeding duration and BMI?

$H_0$1: There is no association between breastfeeding duration and BMI.

H_a1: There is an association between breastfeeding duration and BMI.

RQ2: Is there an association between breastfeeding duration and heart health problems?

$H_0$2: There is no association between breastfeeding duration and heart health problems.

H_a2: There is an association between breastfeeding duration and heart health problems.

RQ3: Is there an association between activity in breastfeeding support groups and breastfeeding duration?

$H_0$3: There is no association between activity in breastfeeding support groups and breastfeeding duration.

H_a3: There is an association between activity in breastfeeding support groups and breastfeeding duration.

RQ4: Is there an association between breastfeeding duration and eating and exercise?

$H_0$4: There is no association between breastfeeding duration and eating and exercise.

H_a4: There is an association between breastfeeding duration and eating and exercise.

This quantitative cross-sectional study was used to investigate whether there were any associations between breastfeeding duration and BMI, heart health problems such as hypertension, breastfeeding support, and eating and exercise among Mississippi overweight and obese postpartum women based on the most recent PRAMS data. Section 3 includes data analysis of the sample population and discrepancies during statistical analyses that may have varied from the initial plan. I conclude by providing results of secondary analysis of data and describe findings and analysis to answer the research questions.

This study was based on 2021 secondary data from the PRAMS dataset with a total sample of 1,012 respondents from Mississippi. There were many discrepancies in the data set that caused a change of plans in terms of analysis presented in Section 2. During the study review and preliminary data analysis, the variables were mostly nominal. This was a limitation in terms of the proposed statistical analysis, given that the plan to conduct logistic regression was not possible. Specifically, the sourced variable categories did not meet all the assumptions required to run that test.

For RQ1 the test planned was an ordinal logistic regression, however, since the IV was not continuous, the test did not meet all the assumptions to run the statistical analysis. However, a cross tabulation with chi square analysis is a better test for

association. The cross tabulations are used to explore relationships within the data through closer observation of the population variables. For both RQ2 and RQ4, binary logistic regression requires that the IV, which is breastfeeding duration, be either continuous or nominal. This variable is ordinal; therefore, statistical analysis test of binary logistic regression did not meet all assumptions to conduct the test. Furthermore, logistical regression is not a test of associations but rather a prediction test. For RQ3, the variables did not meet the necessary statistical requirements to conduct a multiple regression analysis. Specifically, the DV must be continuous and the IV must be continuous or nominal; neither were present. Therefore, this prediction test was not possible to respond to the research question. Lastly, there were missing values in categorical variables of DVs: Heart health problem had eight missing entries, the BMI group had 36 missing entries, eating and exercise had 158 missing entries, and breastfeeding duration had 546 missing responses. From the PRAMS 2021 data, all breastfeeding women were included in the study, which also included the BMI underweight group (<19.8 kg/m^2) and normal BMI group (19.8-26 kg/m^2).

Descriptive and Demographic Characteristics of the Sample

The descriptive and demographic characteristics of the sample provide the frequencies for each key variable in the study. Out of 1,012 total participants, 466 (46.0%) of them reported having ever breastfed. The demographic variables age, race, and education did not have missing cases; however, they had to be eliminated as control variables for data analysis tests. Table 6 includes the total number of participants that responded to each variable alone.

Table 6

Baseline Data Collection Information from Mississippi PRAMS 2021

	Maternal years of education	Health prob -- Heart	MOM BMI	Maternal Race	PP talk -- eating and exercise	BF support group	BF duration – wks/mnths	Maternal age
N	1012	1004	976	1012	854	933	466	1012
Missing	0	8	36	0	158	79	546	0

All 1,012 participants in the survey responded to demographic questions; however, as previously noted, not all of them responded to every survey question that comprised this study's variables. For maternal age, most participants (*n* = 308) were between 25 and 29 (30.4%), while 34 participants (3.4%) were younger than 17. Of the 1,012 participants, the highest education level completed was some college (*n* = 357, 35.3%). Race demographics indicated that most participants are either White (*n* = 441, 43.6%) or Black (*n* = 521, 51.5%). Other race categories made up the remainder of the survey respondents. Table 7 includes demographics data for the sample survey respondents, including age, education level, and race.

Table 7

Demographics

Characteristic	N	%
Maternal Age		
<=17	34	3.4
18 to 19	63	6.2
20 to 24	301	29.7
25 to 29	308	30.4
30 to 34	199	19.7
Education Level		
Elementary, 0-8	13	1.3
High school, 9-11	113	11.2
HS Diploma / GED,12	327	32.3
Some College, 13-15	357	35.3
College grad, >=16	202	20.0

Maternal Race		
Oth-Asian	5	0.5
White	441	43.6
Black	521	51.5
AM Indian	7	0.7
Chinese	1	0.1
Hawaiian	1	0.1
Oth-Nonwht	26	2.6
Mixed Race	10	1.0

The demographics and characteristics for the sample variables are: Breastfeeding Duration, BMI, Heart Health, Breastfeeding Support Group, and Eating and Exercise. The characteristics for Breastfeeding duration are: Less than 1 week, weeks, and months. For BMI, the characteristics are underweight, normal, overweight, and obese. The characteristics for Heart Health, Breastfeeding Support Group and Eating and Exercise are Yes or No.

When coupled with the dependent variables in each research question, less of the breastfeeding participants responded than were in the entire data set. For breastfeeding duration, most of the participants only breastfeed for weeks. The survey did not state the exact number of weeks; however, the total population (n=209, 44.8%) only breastfed for weeks. The other half of the respondents (n=205, 44.0%) breastfed in a few months, although, again, the specific number of months is not known.

For BMI all the women's BMI were included in the analysis of the study due to the small number of respondents for RQ1. The BMI with the most cases was the obese

group (>29) at n=205, 45.1% and the least number of BMI was the underweight group (<19.8) at n=48, 10.5%. The normal BMI group (19.8-26) had more cases n=146, (32.1%) than the overweight group (>26-29) at n=56, 12.3%.

The heart health variable had the most respondents our of all the other variable groups (n=1,004). However, out of the total population, only 3% (n=30) of the 1,012 respondents reported positively about heart health. Any statistics attempted on this small percentage would generally not be valid.

For breastfeeding support group most of the respondents, n=684, 73.3% stated they did not have a breastfeeding support group and n=249, 26.7% stated they did have a support group. For eating and exercise n=507, 59.4% stated they did talk about eating and exercise with the provider and n=347, 40.6% stated they did not have that talk with the provider. Table 8 indicates the number of cases and percentages of the research question variables.

Table 8

Demographics for Sample Variables

Characteristic	N	%
Breastfeeding duration		
Less than 1 Week	52	11.2
Weeks	209	44.8
Months	205	44.0
BMI		
UNDERWT (<19.8)	48	10.50
NORMAL (19.8-26)	146	32.10
OVERWT (>26-29)	56	12.30
OBESE (>29)	205	45.10
Heart Health		
Yes	30	3.0
No	974	97.0
Breastfeeding Support Group		

Yes	249	26.7
No	684	73.3
Eating and Exercise		
Yes	507	59.4
No	347	40.6

The data in this sample is representative of the population. According to the CDC (2022b) 83.0% of American women breastfed in 2019 with Mississippi at 68.0%, with declining scores every 3 to 6 months.

The sample included 1,012 respondents from the Mississippi state PRAMS survey; of these, 44% of the sample population ever breastfed, which is approximately half of the national average.

Results

Descriptive Statistics

The proposed data analysis tests do not meet the criteria to perform the expected inferential statistics with regard to identifying differences among survey respondents. More specifically, the survey data was collected using ordinal data, which is not conducive to multiple regression and binary logistic regression analyses. To resolve the limitation, I conducted crosstabulations using the inferential Chi square statistic to determine if there were significant associations among the sample data set. This alternative data analysis enabled some ability to respond to the research questions.

The PRAMS survey from Mississippi included 1,012 respondents. Among those respondents, less than half met the criteria for this study with regard to experiences or reporting breastfeeding duration, BMI, heart health, support groups, or eating and

exercise. Table 9 presents the crosstabulation combinations and the sample of respondents that were eligible and included as part of this research study.

Table 9

Respondent Sample for Study

Variables	n	Percent of N
Breastfeeding Duration * BMI	455	45.0%
Breastfeeding Duration * Heart Health	462	45.7%
Breastfeeding Support Group *Breastfeeding Duration	443	43.8%
Breastfeeding Duration * Eating and Exercise	406	40.1%

Inferential Statistics

Using the adjusted sample sizes as noted in Table 9, each research question and hypothesis is presented with relevant crosstabulations and Chi Square (X^2) tests. All tests were conducted at the 95% confidence level ($p < .05$). Across all the research questions, none of the results were found to be statistically significant; therefore, the results from the crosstabulations are specific to the study's sample and cannot be generalized to the population.

There was a total of 455 participants that responded to breastfeeding duration and BMI. To examine this combination, a crosstabulation with the Chi Square test was run for these two variables. The crosstabulation matrix indicated that women who were classified as obese breastfed longer than those who were underweight and normal weight. Specifically, nearly half (45.5%) of the women who breastfed for months were obese, a third (33%) were of normal weight, and the remaining 21.5% were either underweight or overweight in their BMI. Similar percentages occurred among the women respondents who breastfed for weeks and less than one week (see Table 10).

Table 10

Results of Crosstab for Breastfeeding Duration by BMI

			BMI				Total
			UNDERWT (<19.8)	NORMAL (19.8-26)	OVERWT (>26-29)	OBESE (>29)	
Breastfeeding Duration	LESS THAN 1 WEEK	N	6(12.20%)	14(28.60%)	6(12.20%)	23(46.90%)	49(100.00%)
		(% within Breastfeeding Duration)					
	WEEKS	N	21(10.20%)	66(32.00%)	28(13.60%)	91(44.20%)	206(100.00%)
		(% within Breastfeeding Duration)					
	MONTHS	N	21(10.50%)	66(33.00%)	22(11.00%)	91(45.50%)	200(100.00%)
		(% within Breastfeeding Duration)					
Total		N	48(10.50%)	146(32.10%)	56(12.30%)	205(45.10%)	455(100.00%)
		(% within Breastfeeding Duration)					

A Chi-square analysis was conducted to determine association between breastfeeding duration and BMI. There is no association between breastfeeding duration and BMI, p=0.984, therefore the null hypothesis was accepted (see Table 11).

Table 11

Results of Chi-Square Test for Breastfeeding Duration by BMI (n=455)

Variables	X^2	df	Significance (.05)
Breastfeeding * BMI	1.036	6	0.984

When tested at the .05 level (X2(6) < =1.036, p < .05), there is not a statistically significant association between breastfeeding duration and BMI for this sample.

The majority of the respondents with heart health problems (n=8) breastfed longer than the other group with heart health problems, five (5) breastfed for weeks, and those who breastfed less than one week did not have heart health issues. Yet, most women

(N=203) without heart health problems only breastfed for weeks. Even though a small number of women who had heart health problems, those who chose to breastfeed longer were still able to breastfeed. The limitation of this study is that a very low number of participants responded to the question. A crosstabulation and Chi-square test was run to determine the association. There were 462 participants of 1012 who responded to heart health. The crosstabulation matrix indicates mostly all who breastfed, N=449, responded not having heart health issues and 13 who did (see Table 12).

Table 12

Results of Crosstab for Breastfeeding Duration by Heart Health (n=462)

			Heart Health		Total
			NO	YES	
Breastfeeding Duration	LESS THAN 1 WEEK	N (% within Breastfeeding Duration)	51(100%)	0(0.00%)	51(100.0%)
	WEEKS	N (% within Breastfeeding Duration)	203(97.60%)	5(2.40%)	208(100.00%)
	MONTHS	N (% within Breastfeeding Duration)	195(96.10%)	8(3.90%)	203(100.00%)
Total		N (% within Breastfeeding Duration)	449(97.20%)	13(2.80%)	462(100.00%)

A Chi-square analysis was conducted to determine associations between breastfeeding duration and heart health. The null hypothesis indicated that there is no association between breastfeeding duration and heart health was accepted (p=0.28) (see Table 13).

Table 13

Result of Chi-Square Test: Breastfeeding Duration by Heart Health (n=462)

Variables	X^2	df	Significance (.05)
Breastfeeding Duration * Heart Health	2.55	2	0.28

When tested at the .05 level ($X^2(2) <= 2.55$, $p < .05$), there is not a statistically significant association between breastfeeding duration and heart health for this sample.

Less women in the support group (N=127,28.7%) breastfed than the women who were not in a breastfeeding support group (N=316, 71.3%). Of the women not in support groups there were more who breastfed for weeks (N=142,71.4%) and less than one week (N=138, 69.7%) and only N=36 women who were not in support group breastfed for months. Of the women who were in support groups, sixty women breastfed for less than one week, then 57 breastfed for weeks, and only 10 breastfed for months. This suggests that the breastfeeding support groups were not effective in helping women to breastfeed longer or have self-efficacy in breastfeeding (see Table 14).

Table 14

Results of Crosstab for Breastfeeding Support Group by Breastfeeding Duration (n=443)

		Breastfeeding Duration -- wks/mnths						Total	
		Less Than 1 Week		Weeks		Months			
		N	%	N	%	N	%	N	%
Breastfeeding Support Group	No	138	69.70%	142	71.40%	36	78.30%	316	71.30%
	Yes	60	30.30%	57	28.60%	10	21.70%	127	28.70%
Total		198	100.00%	199	100.00%	46	100.00%	443	100.00%

A Chi-square analysis was conducted to determine association between breastfeeding support group and breastfeeding duration. This resulted in no association between the two variables, therefore, the null hypothesis was accepted with p=0.512 (see Table 15).

Table 15

Result of Chi-Square Test for Breastfeeding Support Group by Breastfeeding Duration (n=443)

Variables	X^2	df	Significance (.05)
Breastfeeding Support Group * Breastfeeding Duration	1.339	2	0.512

When tested at the .05 level ($X^2(2) <= 1.339$, $p < .05$), there is not a statistically significant association between breastfeeding support group and breastfeeding duration for this sample.

Breastfeeding duration rates were higher in the women who responded to having discussed eating and exercise with their provider (yes to the question), than those who did not discuss eating and exercise with their provider (answered no to the question). Out of a total of n=406 breastfeeding women there were N=201 (59.4%) who answered yes and N=165 (40.6%) who answered no. The higher numbers in breastfeeding duration for months, weeks, and less than one week are in those who answered yes to having discussed eating and exercise with their provider. However, the results were inconclusive because most of them (n=185) only breastfed for weeks. Even though the highest number of women who did have the health and exercise discussion with their provided breastfed for months, the numbers were not that far off from one another. This suggests that discussing eating and exercise with the provider may have an impact on self-efficacy in

breastfeeding mothers and may help further improvements in their health and the child, yet more data and further research is required.

A crosstabulation test was conducted to determine the frequency and percentage of the sample population compared to the total sample and find indicators that highlight the majority and minority of the sample results and examine relationships (see Table 16).

Table 16

Results of Crosstab: Breastfeeding Duration by Eating and Exercise (n=406)

			Eating and Exercise		Total
			NO	YES	
Breastfeeding Duration	LESS THAN 1 WEEK	N (% within Breastfeeding Duration)	21(47.70%)	23(52.30%)	44(100.00%)
	WEEKS	N (% within Breastfeeding Duration)	77(41.60%)	108(58.40%)	185(100.00%)
	MONTHS	N (% within Breastfeeding Duration)	67(37.90%)	110(62.10%)	177(100.00%)
Total		N (% within Breastfeeding Duration)	165(40.60%)	241(59.40%)	406(100.00%)

A chi-square analysis was conducted to determine whether there was or no association between breastfeeding duration (IV) and eating and exercise (DV) (see Table 17).

Table 17

Results of Chi-Square Test for Breastfeeding Duration by Eating and Exercise (n=406)

Variables	X^2	df	Significance (.05)
Breastfeeding Duration * Eating and Exercise	1.56	2	0.46

For breastfeeding duration and eating and exercise, the null hypothesis is accepted at p=0.46. When tested at the .05 level ($X^2(2) <= 1.56$, $p < .05$), there is not a statistically significant association between breastfeeding duration and eating and exercise for this sample.

Summary

This chapter included results of this cross-sectional quantitative study. Study results indicated no significant associations between breastfeeding duration and sociological and cardiometabolic variables among breastfeeding mothers in Mississippi based on the 2021 PRAMS survey. There was no association between breastfeeding duration and BMI, heart health, breastfeeding support group and eating and exercise (see Table 18).

Table 18

Research Questions and Hypothesis Response

RQ	Hypothesis Response
RQ1: Is there an association between breastfeeding duration and BMI?	Fail to reject the null hypothesis. There was no association between breastfeeding duration and BMI. p=0.984
RQ2: Is there an association between breastfeeding duration and heart health?	Fail to reject the null hypothesis. There was no association between breastfeeding duration and heart health. p=0.28
RQ3: Is there an association between breastfeeding support group and breastfeeding duration?	Fail to reject the null hypothesis. There was no association between breastfeeding support group and breastfeeding duration. p=0.512
RQ4: Is there an association between breastfeeding duration and eating and exercise?	Fail to reject the null hypothesis. There was no association between breastfeeding duration and eating and exercise. p=0.46

In section 4, I will discuss the following: Interpretation of findings, limitations of the study, recommendations for future studies, implications for professional practice and social change, and conclusion of the study.

Section 4: Application to Professional Practice and Implications for Social Change

Breastfeeding rates begin to decline in women after the first day of delivery and continue to decline over time. Only 24.0% of children are breastfed exclusively to reach six months, and 35.0% are breastfed after 12 months (CDC, 2022b). One of the breastfeeding objectives for Healthy People 2030 is to increase the proportion of infants who are breastfed at different rates, from six months (42.0%), up to at least one year to reach a target of 54.1% (CDC, 2022c). Healthy People 2030 also aims to increase the proportion of women who have healthy weight postpartum in order to reduce hypertension and other comorbidities that arise during pregnancy and thereafter (DHHS, 2023). Some of the challenges postpartum mothers have been physiological such as BMI or weight, cardiometabolic, heart health, low milk supply, lack of breastfeeding support, and societal factors such as the environment they are in, communities, work conditions and support, and policies that support breastfeeding in public or educational support.

The nature and purpose of this quantitative cross-sectional study using secondary data analysis was to investigate whether there were any associations between breastfeeding duration and BMI, heart health problems, breastfeeding support, and eating and exercise among Mississippi lactating postpartum women based on the 2021 CDC PRAMS survey. The SEM was used to explore how individual, interpersonal, community, organizational, and policy levels of influence may be applied to support breastfeeding mothers. I explored whether associations existed between socioecological, physiological, and behavioral factors that affect breastfeeding practices in women.

This research included the following variables: mothers' BMI, heart health, whether they were in a breastfeeding support group, and eating and exercise. Included socio demographics were education level, age, and race; however, they were not the main factor within the research questions. I examined whether these variables had significant associations with breastfeeding duration – namely, the respondent's BMI, breastfeeding with social support groups, eating and exercise, and heart health. There were inconsistencies in terms of whether breastfeeding duration affects women's physiological and social wellbeing. Based on the inferential tests, there were no statistically significant associations between breastfeeding duration and any of the socioecological, physiological, and behavioral factors affecting postpartum nursing mothers.

Interpretation of the Findings

The purpose of this quantitative study was to examine the associations of breastfeeding duration and BMI, heart health, support group, and eating and exercise among Mississippi breastfeeding women using a cross-sectional study design. The data was collected from the 2021 PRAMS survey from Mississippi that contained a sample of 1,012 mothers. A cross-sectional analysis and Chi-square test was used to analyze each research question variables to test for association at 95% confidence interval (CI). In the analysis of breastfeeding duration and BMI, heart health, support group, and eating and exercise, there was no association between any of the variables. The demographics, age, race, and education were tested using crosstabs and Chi-square with independent variable Breastfeeding duration. As noted in the Frequency document (see Table 4), only 46.0% of the participants qualified for this study.

Among the total respondents, 43.0% of respondents were White and 51.0% were Black. In terms of education level, 32.0% had a college degree and 35.0% had a high school diploma. But these results changed when running the crosstabs and chi-square for this group, 32.4% of mothers had a HS diploma or GED, and 38.6% had some college (up to 15 years of education). The same number of women breastfed for weeks and for months, however more women were of the higher education. According to the chi-square test for breastfeeding duration and education was not significant of the population. Most participants were between ages 20 (32.2%) and 29 (30.7%) breastfed for months. However, according to the chi-square test results age was not representative of the population.

According to the demographics of my study, of the 46.0% who qualified (responded to breastfeeding duration, independent variable), between breastfeeding duration by race there were 0.6% other-Asian, 42.1% White, 53.2% Black, 0.9% American Indian, 0.2% Hawaiian, 2.4% Other race, and 0.6% Mixed race. Of the race respondents within breastfeeding duration, 43.1% White and 61.0% Black breastfed for months. However, the percent women within race were similar in those what breastfed for weeks 44.8% and slightly lower total were those that breastfed for months at 44.0%. The Chi-square test showed interesting results for the race category that the race population is statistically significant ($p<.05$) meaning that the race composition for this dataset on breastfeeding participants is generalizable to the population.

According to the CDC (2022c), demographics play a role in terms of existing breastfeeding disparities. Mississippi is one of three states where 40.0% or less women

breastfeed for up to 6 months (CDC, 2022c). Mothers living in the southeast region of the U.S. tend to breastfeed less than the rest of the U.S. There are fewer non-Hispanic Black (74.1%) people who are breastfed compared to Asian (90.0%), non-Hispanic White (85.3%) and Hispanic infants (83%; CDC, 2022c). As for age, 79.9% mothers between 20 and 29 are less likely to ever breastfeed (CDC, 2022c).

My findings align with those of other researchers. According to Laksono et al. (2021), higher education rates resulted in sustained breastfeeding rates. According to Chimoriya et al. (2020), women who are older, more educated, and financially more stable, tended to breastfeed longer than women who are less educated. Fair et al., (2019) also concluded that further research is needed to address social, educational, physical, and health support interventions to help overweight and obese breastfeeding women.

RQ1

The results did not support RQ 1 in terms of an association between breastfeeding duration and BMI. Breastfeeding mothers retain less weight and have less excessive abdominal obesity compared to those who do not breastfeed (Ciesla et al., 2021; Tahir et al. 2019). Studies in the literature review also varied in terms of larger sample size, and geographical locations, i.e., countries in Europe, Australia, South America, and Asia. There is a lack of research regarding whether physiological changes, such as weight and BMI, in active overweight breastfeeding women are sustainable (Fair et al., 2019). Findings in this study were not statistically significant, and therefore the null hypothesis is accepted for RQ1.

RQ2

Results of RQ2 were not significant in terms of associations between breastfeeding duration and heart health. The null hypothesis was there no associations between breastfeeding duration and heart health. The results for this RQ align with multiple studies indicating there may be a possible link or association between breastfeeding and cardiovascular health. However, the implications remain to be confirmed with further research because they did not conclude whether a link between breastfeeding and cardiometabolic risk is related (Contouris et al., 2019; Hauspurg et al. 2019; Kirkegaard et al., 2018; Zachou et al., 2019). However, other studies did find results that women who breastfed for up to at least up to five months had a 30% decreased risk of CAD compared to those who never breastfed (Rajaei et al., 2019).

Since breastfeeding helps bring back cardiometabolic health back to normal such as lower hyperlipidemia, LDL, BMI, and total cholesterol, and reducing the risk of hypertension. Other studies support the association that breastfeeding duration longer than 12 months lowers the risk for CVD in later live by 10% and for every additional 6 months of breastfeeding per child lowered the risk for CAD (Peters et al., 2017). The low response rate (n = 462) could have possibly affected the results to this study. Two percent of the participants had heart health problems; this number is too small to test for significance to determine whether breastfeeding duration affects heart health. Findings in this study were not statistically significant, and therefore the null hypothesis is accepted for RQ2.

RQ3

When examining the association of breastfeeding support group and breastfeeding duration, the rationale for this question is that breastfeeding duration rates would be affected by the breastfeeding support group, that breastfeeding support group can influence the breastfeeding duration and rate. Breastfeeding duration and support groups allow for different experiences and outcomes involving pregnancy and breastfeeding. Since a crosstabs and chi-square test was used to test for association, and the breastfeeding duration was not a continuous variable, for alignment purposes the variables in this question may be interchangeable.

Due to no significance for association, the null hypothesis was accepted. The total number of participants that responded to this set of variables was equal to the total sample population (n=443, 44.0%). Those who affirmed having a support group tended to breastfeed less (n= 127, 28.7%) than those who were not in a support group (n=316, 71.3%). In Fair et al. (2019), it was hypothesized that belonging to a support group would increase the effectiveness of intervention to support overweight and obese breastfeeding mothers. However, for this study, I investigated whether there is an association between breastfeeding support group and breastfeeding duration. Although Change et al. (2019) confirmed that overweight and obese women needed more support from health care professionals, family members and peer support, more specifically spousal support to tend to the individual needs and to encourage breastfeeding initiation and duration. It was also confirmed that further research is needed to include larger sample size and women with higher BMI who are in the reproductive age. Breastfeeding support group and

outreach resources such as lactation consultants, La leche League, and other community groups and partners would be able to provide mothers support and leverage to deal with barriers and difficulties they face when going through the pregnancy, breastfeeding, and postpartum milestones. Having the support system, they need to help facilitate and ensure that they sustain confidence and self-efficacy to breastfeeding longer. RQ3 also had a low number of responses from the total sample as well as the result being that most respondents who were not in breastfeeding support groups breastfed longer than those who were. This also suggests that those who did not have support groups may have been either more focused on having self-efficacy to breastfeed and or not report the support group in their interpersonal and community and organizational levels and culture. Findings in this study were not statistically significant, and therefore the null hypothesis is accepted for RQ3.

RQ4

There was no statistical significance for the research question regarding association between the independent variable breastfeeding duration and dependent variable eating and exercise. Although I aimed to find out through the research question terminology of eating and exercise was whether the breastfeeding mother was eating healthy and exercising regularly, the standardized PRAMS survey question referred to whether the provider (pp talk) talked to the patient about eating and exercise. Therefore, the answer yes or no refers to whether they discussed the question or not. This response satisfied the research question in terms that eating, and exercise was still part of the questionnaire, it was a dichotomous question (yes/no) and it is the initial step in

addressing healthy eating and exercise habits in a pregnant and postpartum woman to influence a healthy lifestyle. The research question had n=406 responses which was less than half of the total sample. Out of the 406 responses 59.4% responded yes and 40.6% responded to no.

Even though there was no statistical significance to the research question, the study adds knowledge to the public health field that not a lot of women are involved in responding to surveys and those that do, may not feel comfortable about addressing any issues. Although both responses were close in the numbers; those who responded yes to provider and patient discussed eating and exercise were more inclined to breastfeed and continue breastfeeding compared to those who responded to no. Also, it is the provider who should be initiating conversation regarding healthy eating and exercise more so than the patient, therefore the respondents who answered no, may have not had the opportunity from the provider to discuss the topic and therefore may not had the same type of breastfeeding support and had less efficacy to initiate and continue breastfeeding. It is important to note that eating and exercise are impactful health habits for the breastfeeding mother. Not only does the mother have to nourish herself but she must nourish her baby during and after pregnancy, and it is a very challenging standard or habit maintain because she needs to avoid unnecessary weight gain and prevent associated comorbidities and risk factors, yet also to lose the extra weight gained postpartum and breastfeed and nourish the baby all at the same time (Alves et al., 2020; Most et al., 2020). Findings in this study were not statistically significant, and therefore the null hypothesis is accepted for RQ4.

Limitations of the Study

This study was based on exploring associations of breastfeeding duration and cardiometabolic and social support in breastfeeding mothers in the state of Mississippi. Limitations to the study are based on the survey questions stated in the PRAMS. 1) The number of participants compared to the dataset was half of the total respondents in the survey. Due to the low number of respondents the survey results also caused me to include all women in the study to include those respondents that had low and normal BMI (underweight and normal). 2) The way the data set was received was in a format that was not conducive to the initially proposed analysis plan, therefore I had to change the analysis plan from statistical regression analysis to crosstabulation and Chi-square analysis. 3) The way the variables were given in the data set were mostly nominal; this was a limitation to the proposed statistical analysis plan which needed continuous and interval variables. 4) Breastfeeding duration, BMI, and age were not continuous variables, they were reported as ordinal (grouped). 5) When trying to control for age, race, and education, due to the participants being less than 500, this impacted my ability to have statistical significance. For example, only 3.0% of the 1012 respondents reported positively about heart health. Any statistics attempted on this small percentage would generally not be valid. Therefore, controlling for age, race, and education the numbers would be significantly low that it cannot be generalized and had to take this second portion out of my original research questions. 6) The literature review had some limitations due to the amount of research published is not as recent within the last five

years. There were many quality studies regarding breastfeeding mothers, yet they were dated over 10-20 years ago.

Recommendations

This study was based on data from one state representing the population with the highest overweight and obesity rates in the US. However, future studies should incorporate breastfeeding duration and socioecological factor comparisons with those of healthier states or generally include all the 14 states classified as most overweight and obese to test for significance. Even though the Chi-square inferential statistics results were not statistically significant, however, the results are still applicable to the population. Future research studies may focus on a larger and broader populations in the U.S. For RQ2 more specific cardiometabolic focus questions should be included in a quantitative and longitudinal research to include hypertension, cardiovascular disease or coronary arterial disease or other heart related comorbidities. Another recommendation is for RQ4 eating and exercise patient provider talk could be elaborated to whether the patient confirms whether they were conducting healthy eating habits and regular physical activity. Furthermore, a recommendation for mixed methods research to address any underrepresentation and gaps which may be presented in the quantitative data. There were not many mixed-methods studies regarding this important public health topic for this population. With increasing overweight and obesity rates compared to 20-30 years ago, new studies should focus on this population health to improve mother-child wellbeing.

Implications for Professional Practice and Social Change

Professional Practice

A continuous need for further studies is essential to expand knowledge and explore the multifaceted factors that influence breastfeeding initiation and duration and how it affects women and children's wellbeing and how to improve health in this growing population of overweight and obesity and heart disease. It is important to explore how can resources and advocacy can help promote health in the mother-child dyad, and to dedicate sustainable support for them. This study offered extended knowledge regarding breastfeeding duration and socioecological, lifestyle, and physiological variables that encompass everything that a woman goes through in the process of pregnancy and postpartum to nourish the baby. Breastfeeding is an important aspect of life that impacts the community and society. With further studies, networking, and partnerships health care professionals would have all the information at their fingertips to use frameworks such as the socioecological model to adopt new ways to discuss breastfeeding issues with pregnant and postpartum women. They need professional's holistic and open-minded approach to understand complications and barriers they face at each level of influence and provide avenues to approach a decision that's conducive and sustain their breastfeeding goals.

Recommendations for Professional Practice

Recommendations for empirical implications are that mixed methods cross-sectional and retrospective cohort research would be more appropriate for this type of study, to be able to capture and encompass a larger population sample, and to fill in any

gaps in knowledge that standardized questionnaires do not cover. In this study I encountered that many variables did not meet the statistical analysis assumptions and that did not allow for analysis techniques as planned. The analysis for this research was based on secondary data and it was difficult to obtain the dataset from some states. Some data sets are not available online and if they are, the codebook also needs to be accompanying it, which was not the case for this research study. Theoretical concepts should also vary, while there are very few studies that include the socioecological model in breastfeeding mothers, they were either dated or did not include the variables that this study covered. I recommend finding more secondary data surveys that would cover variables related to breastfeeding initiation, duration, heart health and behavioral. Also, partnerships or coalitions for lactation support would also be valuable to find respondents that would be willing to contribute to the study and help the public health practice to focus emphasis on the communities that need the support.

Positive Social Change

One of the main impacts for positive social change in this study is that it goes back to focus on the Sustainable Development Goals (SDG) 2030 and Healthy People 2030 social determinants of health. The number 3 goal of the SDG is "to ensure healthy lives and promote well-being for all at all ages." It is important for the mother to ensure a healthy pregnancy and healthy self. The goal for Healthy People 2030 is also in line with improving the woman's health postpartum with the desired increase from 39.1% to 47.1% (DHHS, 2023). The potential for social change at the individual level is to gain self-efficacy to improve health, eating and exercise habits to sustain a healthy lifestyle,

BMI, heart health, social support. The impact of interpersonal social change is that the partner and family nucleus support the mother in her breastfeeding journey for as long as she needs it. The community impact is that the mother needs support from her provider and coalition groups to maintain health and provide her with the appropriate breastfeeding resources she needs. The provider should be able to understand and be involved with any situation she finds herself to ensure that she and the baby have a healthy journey of growth. The organizational impact is needed for support because more women are in the workforce now (46.8%) and increasing, than they were 50 years ago (42.5%) (U.S. Bureau of Labor Statistics, Current Population Survey, 1948-2022 annual averages, (2023). Tomori et al. (2022) noted that a more holistic approach and attention is needed for intervention in the workplace setting due to inadequate breastfeeding accommodations and time opportunities for women at work. The policy level of impact would be the backbone of support in organizations, communities, and interpersonal or families. Policy makers have much influence on public health organizations to help develop programs and coalitions to extend the knowledge to the communities. Understanding the SEM will be helpful for organizations and communities and practitioners to make an effort to share the responsibility with the families and communities and network to help bring knowledge and awareness through maternal, pre- and post-natal, education and about the importance of breastfeeding mothers being accepted and integrated in communities. Having the support of a policy would hold society, every organization, accountable to sustain the way of life of a breastfeeding mother, her health, and the health of the nursing infant.

Conclusion

This study was based on a cross-sectional quantitative methodology with secondary data from PRAMS survey 2021. In this study I examined whether there were any associations between breastfeeding duration and BMI, heart health, support group, and eating and exercise among breastfeeding women in Mississippi. The breastfeeding rate in women is lower in the southeastern regions of the US and it is also where the rates of overweight and obesity are paramount at 39.1% and getting worse (DHHS, 2023). Although there have been studies regarding breastfeeding duration and its effects on the mother's health, the complexity of breastfeeding and its benefits to the health of the mother and child needed to be addressed to contribute to the literature.

The results of my research indicated there were no associations between breastfeeding duration and the health factors previously listed. It would add to the knowledge in public health that there remains focus to be made in this population and to be more inclusive of all regions to ensure equality is being met where there is the need. It should encourage and empower mothers to become educated and aware and of their health and the babies and learn about the benefits of breastmilk and know that breastfeeding duration matters for their health and their infant. It takes a village, for the success and sustainability of a community, a culture, and a country to improve women's health, reduce obesity, and prevent heart disease.

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