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A COST EFFECTIVENESS ANALYSIS OF BREASTFEEDING PROMOTION
WITHIN GEORGIA'S WIC PROGRAM

By

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B.A., SPELMAN COLLEGE

A Thesis Submitted to the Graduate Faculty
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Of the
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30303

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WITHIN GEORGIA'S WIC PROGRAM

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ABSTRACT

Erica Nicole Wherry

A Cost Effectiveness Analysis of Breastfeeding Promotion within Georgia's WIC Program

INTRODUCTION: It is well established that breastfeeding is optimal for infants for the first six months of life. Breastfeeding is a public health concern as current prevalence and initiation rates within the state of Georgia do not reflect public health target rates.

AIM: To examine the cost and health savings of infants who are exclusively breastfed versus the expenditures and health detriment for exclusively formula fed infants in Georgia.

METHODS: A cost effectiveness analysis was conducted on breastfeeding rates for infants in the Georgia's WIC using data from the USDA.

RESULTS: Breastfeeding programming in GA is costlier than formula use for WIC infants, but more cost effective as a whole given short-term outcomes.

DISCUSSION: Improving breastfeeding rates in Georgia by providing infants the healthiest start in life is an adequate prevention strategy to reduce health disparities gaps within the United States.

INDEX WORDS: Breastfeeding, cost effectiveness, infants, WIC

Author's Statement Page

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Erica Wherry
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Chapter I: Introduction

Optimizing infant nutrition through exclusive breast feeding during the first 6 months of life has both short-term and long-term health implications for the infant. The American Academy of Pediatrics and the World Health Organization along with other leading public health organizations, recommend exclusive breastfeeding for at least the first six months as best practice for infant nutrition and wellbeing (WHO, 2016). Breast feeding increases protections from certain common childhood illnesses such as respiratory infections, asthma, allergies (among others) which are evidenced throughout childhood and into adulthood. For nutritionally at-risk communities, those with limited access to fresh fruits and vegetables and typically comprised of lower income and minority populations, providing the healthiest start possible for these higher risk infants.

Breastfeeding is beneficial on many levels for both infants and mothers. Benefits from breast milk for infants include a reduced risk of hospitalizations for common childhood ailments like asthma due to its protections against upper and lower respiratory tract infections. Improved maternal health outcomes as a direct result of breastfeeding include, increased rate of baby weight loss, a delay of the return of fertility, and reduced risk of certain cancers (ovarian and breast). Breastfeeding can also enhance the bonding experience between the mother and infant provided by the physical act of latching on and nursing (Reeves et al, 2014), despite the various costs associated with breastfeeding. Cost implications to feed an infant for the first year of life vary between breastfeeding exclusivity and formula usage.

Healthy People 2020, the public health priorities set forth by the US Department of Health and Human Services, targets an 81.9% initiation rate for babies ever breastfed

in the United States, for which the US is on track for with a national initiation rate of 81.1% (CDC, 2016). However, the Healthy People 2020 goal of 25.5% of infants exclusively breastfed until at least 6 months of age is less on track with only 22.3% of infants exclusively breastfed nationally (HP2020,2016).

In relation to other states which constitute the Region IV district of southeastern states, Georgia ranks amongst the lowest performers (5th out of 8) for breastfeeding initiation and continuation (USDA, 2016). Currently the state of Georgia has an initiation rate of 69.2% of women choosing to ever breastfeed within the first 6 months of life with just 25.4% continuing to exclusively breastfeed at the 6th month benchmark (CDC, 2016). The limited prevalence of breastfeeding in Georgia has wide implications on society not only from health perspectives, but also economically as well.

Among communities of color in Georgia and by those of a lower socioeconomic status, rates of breastfeeding are more desperate than the overall state population due in part to the fact that women from nutritionally at-risk communities have varying levels of knowledge concerning breastfeeding benefits and varying cultural beliefs concerning infant feeding practices. Knowledge, cultural ideas or beliefs, health literacy and self-efficacy, and ease all influence a mother's decision whether or not to breastfeed. Women who have limited examples of nursing mothers within family and friend circles, and who themselves were not breastfed, are less likely themselves to initiate and continue breastfeeding for the suggested duration (Reeves et al, 2014). For African American women, in particular, disparities in breastfeeding rates are not improved as income, age and education levels increased, as traditionally seen in other socioeconomic and ethnic groups (Reeves et al, 2014). The breastfeeding rates for women living in Georgia are

lowest relative to state averages amongst the African American population with only 61.1% choosing to initiate breastfeeding and 17.2% continuing through the recommended 6-month timeframe (Anstey et al, 2017).

The Women, Infants and Children (WIC) program could be an effective tool to raise the initiation and continuation breastfeeding rates in Georgia particularly amongst low income and nutritionally at risk populations and especially African Americans, as nearly 20% of WIC clients in Georgia are African American. Additionally, breastfeeding rates amongst low income women in Georgia who participate in the Special Supplemental Nutrition program for WIC are lower than both national and state averages.

Within the WIC population in Georgia, only 29.6% total women participating ever breastfeed and on average a large majority (70%) of all WIC infants are formula fed (WIC, 2017). The number drops even more significantly when considering that only 9.2% of WIC participants in Georgia breastfed for the recommended 6 months' timeframe (USDA, 2017). Given the resources to promote breastfeeding, these statistics indicate significant room for improvement. Despite the increased cost associated with breastfeeding promotion for WIC, the return on that investment is seen through improved health outcomes and a reduced cost to the healthcare system overall. In fact, according to recent studies, children who are breastfed on average spend fewer sick days admitted into the hospital (Agetunmobi et al, 2015). This project proposed that if infants are exclusively breastfed for the recommended first 6-month timeframe, significant WIC fiscal and health improvements will be achieved versus expenditures and health detriment for exclusively formula fed infants. These anticipated results have implications for promoting WIC's strategies that encourage breastfeeding over formula feeding.

Chapter II: Literature Review

Breastmilk as the optimal source of infant nutrition leading to improved short-term and long-term health outcomes has been well documented. Increasing breastfeeding initiation and continuation as well as exclusivity rates amongst Georgia's low income and minority populations, specifically for African Americans, are important because currently these populations fall below benchmarks outlined by the US Department of Health and Human Services in Healthy People 2020 (U.S. Health and Human Services, 2017). The Women, Infants and Children (WIC) programs offers assistance and educational opportunities as strategies to improve rates amongst their population, which in Georgia is heavily comprised of minority clientele (Thorn et al, 2014). Participation in the WIC program is income based and as such, those with earnings higher than 185% of the federal poverty level are not eligible to participate (Hurley et al, 2008). As a publically funded program, leveraging the short-term and long-term fiscal and health cost differentials between breastfeeding and formula feeding may facilitate the use of additional strategies to improve breastfeeding rates among this population. The primary focus of this project was to determine whether WIC's promotion of breastfeeding is more cost effective overall in comparison to formula use, both in the program delivery and short-term health implications for infants.

Optimizing infant nutrition during the first 6 months of life has both short-term and long- term health implications not only for the infant, but also mother as well (Bartick et al, 2017). Providing breastmilk to infants is critically important as it contains various antibodies and other defense mechanisms which work to promote and support

improved immune development (Cleminson et al, 2016). Protectants found in breastmilk are evidenced by reduced rates and greater protections against common childhood infections related to the respiratory tract leading to reduced incidence rates of maladies such as allergies and asthma as well as maladies to the gastrointestinal system leading to reduced incidence and prevalence rates of ailments such as Celiac disease and Inflammatory Bowel disease, for example (Vereen et al, 2014). Breast milk also provides the most nutritionally balanced meals for the infants created with nutrients unique to the needs of the nursing infant. This works to reduce the rates of more long-term adverse health outcomes such as childhood overweight and obesity leading to reduced rates of diabetes (Cleminson et al, 2016). Infants who are breastfed also see a significant reduced risk of Sudden Infant Death Syndrome (SIDS) (Stuebe, 2017).

Of particular importance for health policy makers is that ailments such as respiratory tract infections and gastroenteritis are leading causes of morbidity and hospitalization for infants less than one year of age in the United States (Tromp, 2017). Respiratory tract infections and gastroenteritis are also leading causes of infant hospitalizations in Georgia (Rodriguez, 2013). Both conditions are costly to treat within the current healthcare system. On average, however, breastfed infants spend fewer sick days and are older when admitted into the hospital for treatment of these conditions (Ajetunmobi et al, 2015)). A reduction in these mostly preventable hospitalizations may contribute to a substantial savings for the healthcare system if breastfeeding rates increased even marginally (Ajetunmobi et al, 2015). The benefits of breastfeeding are seen not only during the immediate breastfeeding period, but beyond as well.

While most studies focus on immediate benefits to breastfeeding within the first year of life, the investment will continue to provide benefits throughout childhood and adulthood as seen with protections from diseases such as Celiac and diabetes which develop later in life (Pugh et al, 2002). As such, breastfeeding can serve as a prevention method and the foundation to help bridge health disparities gaps to promote health equity which grow wider as children grow from infancy into adulthood. Improved immune support with greater protections against common illnesses can also be cited for why breastfeeding is also linked with improved infant mortality rates (Rodriquez, 2016). In addition to improving morbidity and mortality rates for infants, breastfeeding also leads to improved IQ scores, and school grades for children leading to improved earning potential as an adult as well (Hansen, 2016).

For the United States, infant mortality rates are high in comparison to equally develop and some lesser developed countries (Barfield et al, 2013). However, infants born with low birth weight (<5000 grams) and very low birth weight (<2500 grams) show improved growth and developmental outcomes when breastfeeding with the infant's own mother's milk is initiated early, while colostrum levels are higher, and continued for at least three to six months (Cleminson et al, 2016). Colostrum, the first type of breastmilk immediately after birth, is a crucial source of providing antibodies and other immunities within the first 24 to 48 hours of life. Georgia has an infant mortality rate of 7.8 deaths per 1000 live births, but for African Americans, however, this number rises to 13.1 (GA Department of Public Health, 2015). While this disparity has multiple factors which influence the increased infant mortality rate for African American infants in comparison to the state overall, African American women are also least likely to

breastfeed their infants in comparison with state averages, despite the noted benefits to baby and mother (Mickens et al, 2009).

Maternal benefits as a direct result of breastfeeding infants include increased rate of baby weight loss, a delay of the return of fertility and a reduced risk of certain cancers (ovarian and breast) among several other noted health outcome benefits (Reeves et al, 2014). Breastfeeding helps mothers burn up to additional 500 calories per day. As such nursing assists the mother in rebalancing nutritional intake with energy expended to return quicker to pre-pregnancy weight (Ramil, 2016). Delayed fertility, due to the suppression of ovulation provided through breastfeeding, in particular, acts as a natural method of family planning allowing the mother to heal and bond with a new infant before conceiving another child (Ramil, 2016). On average, women who do not breastfeed see a return of fertility within weeks of delivery, but mothers who choose to breastfeed often do not menstruate again for up to six months post-delivery (Ramil, 2016). In addition to the physiological benefits, breastfeeding can also promote psychological and increase emotional attachment as well because of the bonding aspect that the act of breastfeeding itself provides (Reeves et al, 2014). Some studies show that women who do not breastfeed are at a higher risk to develop postpartum depression (Ramil, 2016). While the benefits to breastfeeding are numerous, there are also significant challenges which prevent women from initiating or continuing breastfeeding for recommended time frames.

Limitations/Challenges to breastfeeding

For working mothers who return to their professions after maternity leave, breastfeeding can prove challenging. Of particular importance is that African American

women disproportionately return to work sooner than other ethnic groups and often work in environments that are not conducive to breastfeeding infants (Johnson et al, 2015). This trend within African American communities, in particular, has implications on the length of time African American women are able to breastfeed (Gross et al, 2016). Inflexible work schedules, limited lactation facilities and limited maternity leave policies can make formula feeding more advantageous for working mothers as pumping is more difficult (Johnson et al, 2015). As the United States does not have government mandated maternity leave policies, employers are not obligated to provide paid leave for childbirth. As such, in the United States, leave due to childbirth is shorter than in similarly developed nations with government mandated maternity/paternity leave policies (Hedberg, 2013). Less maternity leave time is a challenge to breastfeeding continuation as maternity leave is positively associated with increased breastfeeding duration (Johnson et al, 2015).

Culture and perceptions within the United States regarding breastfeeding publically as taboo is an additional limitation to increasing breastfeeding rates (McCann et al, 2007). Additionally, bottle feeding is viewed as the social norm within this country and breastfeeding may be a cause for embarrassment for mothers (CDC, 2011). Because breastfeeding attitudes and perceptions are very influential on a mother's decision making process when considering feeding methods for her child, fear of facing public ridicule when nursing in public (especially if uncovered) may serve as a deterrent to continued breastfeeding (McCann et al, 2007). Additionally, some mothers may feel as though the practicality of breastfeeding is limited in that pain may be associated with the act in addition to the fact that no other family members can be involved with the infant

feeding process (Gross et al, 2016). Due to a culture and perception of breastfeeding being taboo, a general lack of social support especially when received from an intimate partner, can also act as a limitation to initiation and continuation as well (Reeves et al, 2015).

In addition to a lack of support from intimate partners serving as a limitation to breastfeeding, similarly a lack of support by hospitals can also serve a barrier to breastfeeding initiation and continuation (Gross et al, 2016). Hospitals provide complementary formula packets for new mothers acquired through established business relationships with formula companies (Hedberg, 2013). This practice essentially markets formula products to new mothers whereas the same systematic introduction to breastfeeding best practices with a lactation specialist is not provided (Reeves et al, 2014). Breastfeeding coaches or lactation specialists are not employed through all labor and delivery units of hospitals to encourage breastfeeding initiation and duration for all new mothers (Hedberg, 2013). Baby-friendly hospitals, which make a concerted effort to promote breastfeeding to new mothers, still cannot ensure all new mothers will visit with a lactation specialist concerning best practices for breastfeeding success.

The US Department of Health and Human Service's Healthy People 2020 outlines public health priorities every ten years. Currently, HP 2020 considers increased rates of breastfeeding as one its primary objectives to improve health outcomes for infants in the United States. Data shows that the breastfeeding initiation rate is 81.1%, which is on track to meet the overall goal of 81.9% by 2020 (Centers for Disease Control and Prevention, 2016). Additionally, the Healthy People 2020 goal of 25.5% exclusive breastfeeding at 6 months is also on track, with 22.3% of infants exclusively breastfed

nationally. Unfortunately, these rates are more disparaging in Georgia and among minority and low-income families as well as those participating in the WIC program.

Georgia is a state that shows significant disparities among communities of color and by those of a lower socioeconomic status. This is due in part to the fact that women from nutritionally at-risk communities, neighborhoods with limited access to fresh fruits and vegetables often comprised of lower income and minority populations, have varying levels of knowledge concerning breastfeeding benefits and varying cultural beliefs concerning infant feeding practices (Hurley et al, 2008). In order to promote breastfeeding among less advantaged women, who often seek public health assistance to feed their infants through programs such as WIC, it is important that these public health entities see value in their promotional efforts to support breastfeeding.

Within the southeast region, which is the most underperforming overall, Georgia lags behind in relation to breastfeeding initiation at just 69.2% of infants in the state are ever breastfed (compared to 81.1% nationally) (Centers for Disease Control and Prevention, 2016). Within the WIC population in Georgia, in FY16, the initiation rate drops to 28.6% (US Department of Agriculture, 2016). The state currently ranks above the national average as 25.4% of all mothers statewide are exclusively breastfeeding at 6 months whereas infants exclusively breastfed at the recommended 6-month duration nationally are only 22.3% (Centers for Disease Control and Prevention, 2016). Within the WIC population in Georgia, however, infants fully and exclusively breastfed through the 6-month benchmark decreases to 8.6% (US Department of Agriculture, 2016).

Racial/Ethnic disparities in Breastfeeding

The breastfeeding rates amongst Georgia's women are lowest amongst its African American population with only 61.1% choosing to initiate breastfeeding and 17.2% continuing through the recommended 6-month timeframe (Anstey et al, 2017). Mothers must feel empowered to make the best health decisions for their families and themselves. There are varying reasons as to a mother's decision whether or not to breastfeed. Some of the noted factors include cultural ideas or beliefs, health literacy and self-efficacy, mother's age and health status, education level, occupational status, WIC participation and socioeconomic class (Gross et al, 2016). Social support can influence a mother's decision whether or not to breastfeed. In some communities within the United States, such as the African American community, breastfeeding is less common (Gross et al, 2016). Women who have limited examples of nursing mothers within family and friend circles, and who themselves were not breastfed, are less likely themselves to initiate and continue breastfeeding for the suggested duration (Reeves et al, 2014). Traditionally, higher income, older maternal age and greater education levels are associated with higher rates of breastfeeding; however, for African American women, disparities in breastfeeding rates are not resolved as income, age and education levels increase (Reeves et al, 2014).

Additionally, it has been noted that, African Americans are more directly marketed formula products, and as a result, consequently many don't internally recognize or acknowledge any substantial difference in health outcomes between breastfed and formula fed infants (Reeves et al, 2014). In fact, within this community, the perceived value of formula is a result of aggressive advertising campaigns which not only depicts

formula as a safe and nutritious alternative to breast milk, but has also worked to perpetuate the idea that formula is a status symbol (Reeves et al, 2014). Formula use is often seen as a status symbol with those less financially secure choosing to breastfeed (Rollins et al, 2016). For African American in particular, formula as a nutritious, complete food for infants has been reinforced by generational formula-feeding practices, as well as by WIC formula subsidies and the distribution of formula in hospitals (Reeves et al, 2014). All of these factors contribute to the significant breastfeeding disparity within the African American community. Health education and self-efficacy of African American mothers concerning breastfeeding may stem from these cultural nuances as well despite the proved health benefits for mothers, babies and society as a whole (Gross et al, 2014).

Georgia's Women, Infant and Children's (WIC) Program

The WIC program is responsible for improving nutritional outcomes for expectant and new mothers along with infants under one year of age and children up to age five. The Georgia Department of Public Health manages this program for the state. The GA Department of Public Health has outlined its priorities which include implementing breastfeeding interventions which support increased initiation and continuation rates by improving maternal care practices, workplace support, peer support, professional support, maternal education, and social media and marketing. The WIC programming in Georgia incorporates guidelines outlined by both the national and state authorities.

To be eligible for participation, WIC clients must be below a certain income threshold (185% of the federal poverty level) and determined to be nutritionally at risk (Hurley et al, 2008). Infants are divided into three categories for food package purposes:

fully breastfed, partially breastfed and formula fed. It bases each category on the quantity and cost of the food package received by each infant. Infants fully breastfed receive an infant feeding package which includes no formula costs and no food costs until at least 6 months of age. An infant partially breastfed receives an infant food package with some associated formula costs, but less than what is received by a fully formula fed infant. A fully formula fed infant receives the highest quantity of formula and food costs until 6 months of age (US Department of Agriculture, 2016).

Women who choose to breastfeed receive additional support and peer counseling through WIC trained lactation specialists as a strategy to encourage initiation and a lengthened duration of breastfeeding (WIC, 2016). Additionally, women also receive a greater food benefit for a longer duration of time resulting in a higher quantity of food and participation extended from 6 months to 1 year.

Social support, specifically peer support, from a variety of sources has been recognized as an important factor in the initiation and duration of breastfeeding especially for the African American community (Mickens et al, 2014). The Loving Support through Peer Counseling program sponsored by the GA WIC program is an evidence based breastfeeding intervention strategy which is designed to encourage breastfeeding rates within Georgia's WIC population (GA Department of Public Health, 2016). This strategy is designed to leverage a mother's social circle to encourage breastfeeding initiation and continuation. While African American women are still the least likely to breastfeed, often, a mother's decision to breastfeed her child is directly related to influence from her significant other, as well as her mother, grandmother, friends and other relatives (Mickens et al, 2014). As such, within WIC's African American

population, utilizing peer counselors from within similar racial/ethnic groups is particularly successful as peer social support plays a large role in the decision making processes of new mothers.

To maximize their reach, WIC also partners with community organizations, hospitals and nonprofit organizations who also works in breastfeeding promotion. The Georgia 5-Star program actively work towards this end by hosting continuing education sessions for healthcare providers within hospital settings on how to promote breastfeeding amongst new mothers. Hospitals gain 1 star for every two new implementations (out of a total of 10 strategies) leading towards the “baby friendly” certification (GA Department of Public Health, 2016). As such, WIC is actively engaging with community members and other stakeholders to promote breastfeeding. Training hospital staff is an effective method to ensure that all children born in state hospitals, with a focus especially on WIC participants, receive the most up to date information to encourage breastfeeding initiation and continuation for all.

The Georgia WIC program currently provides all participants with allotments to buy healthy foods from WIC-authorized vendors such as: milk, eggs, bread, cereal, and juice, peanut butter (Georgia Department of Public Health, 2016). In addition to healthy food options, breastfeeding education and support and nutrition education, WIC also provides help in finding health care services. WIC food and benefit packages for mothers are divided into three categories: fully breastfed, partially breastfed and formula fed. These distinctions are based on breastfeeding intensity which is measured by the amount of formula their infants receive (US Department of Agriculture, 2016). Each of the three groups receives a different food package, with different types and amounts of food. As

mothers who breastfeed require higher caloric intake per day, WIC mothers who choose to fully-breastfeed receive an additional food benefit above what mothers who only partially breastfeed or choose to formula-feed receive (US Department of Agriculture, 2017). As an additional method to incentivize breastfeeding, mothers who choose to fully-breastfeed also receive food packages for a year versus 6 months for those who formula feed or partially breastfeed.

The most current FY 2017 data shows the Georgia WIC program with a total of 56,189 infants participating in the program. The breastfeeding initiation rate for WIC in Georgia for this year improves to 43.03% while the continuation rate of exclusive breastfeeding is around 14.1% (GA Department of Public Health, 2017). Based on FY17 data, these statistics indicate that around 60% of WIC participants in Georgia are fully formula fed. Despite the benefits of breastfeeding being well documented and the Georgia Department of Public Health and the WIC program prioritizing breastfeeding for infants, significantly high rates of formula use persist. The choice to breastfeed is a personal decision but sometimes the perceived economic benefit of receiving free formula versus the health benefit of breastfeeding can promote or discourage, especially for WIC, breastfeeding initiation and continuation.

Economic Implications

Additional considerations in whether or not to breastfeed may include direct and indirect economic costs such as the cost of formula, bottles, breast pumps, time and ability. Although a one-time fee, the cost of a breast pump can be prohibitive for some. While formula costs are recurring and regular, the average carton has a significant cost associated with it. If a mother participates in the Supplemental Nutrition Program for

WIC, formula is provided free of charge creating a potential moral hazard. Some women may feel as though not accepting the formula is not a wise economic trade-off as an item is being offered for no additional charge, but not accepted (Jensen, 2011).

While breastfeeding is not a zero cost endeavor, it may be more cost effective over time in comparison to formula feeding as formula costs are frequent and continuous expenditures with a significant cost burden. Nursing women may not require as much in terms of additional resources such as bottles, formula...in order to breastfeed further working to reduce overall costs. Although nursing mothers consume greater quantities of food and therefore an increased cost associated with the purchase of additional food items exist. However, breastfeeding an infant can have lower associated financial burden with the one-time costs of items in comparison to the continuous expenditure of formula. Necessary supplies, while often more expensive, are one-time purchases as opposed to reoccurring expenses. Through WIC programming, mothers who formula feed and those who breast feed receive varying food and benefit packages. As such, the total food and benefit package costs vary depending on feeding category. While breast pumps can be expensive for the average working family, it is a one-time cost associated with breastfeeding. In regards to WIC expenditures, the cost of providing breast pumps for all mothers may or may not outweigh the costs of providing formula to those who choose to formula feed. However, over time and when considering the overall saving in healthcare expenditure, the strategy can be effective. On average, a 144 fluid ounce can cost \$13. This can be a significant expenditure if an infant 6 months of age drinks 6-8 oz. of milk per feeding and feeds on average every 5 hours, more or less.

Short-Term Health Implications of Breastmilk

Infants who are breastfed on average suffer less from adverse health outcomes than those who are formula fed. Therefore, breastfed babies tend to be healthier overall which translates into lower healthcare costs in comparison to formula fed infants (Hansen, 2016). In particular, for indicators related to rates of hospitalizations and length of stay, breastfed babies are hospitalized less frequently and with shorter durations with implications for reduced cost for treatment and medications (Ajetunmobi et al, 2015). Respiratory infections, as a leading cause of morbidity, mortality and hospitalizations for infants under one year of age, is also a leading cause of asthma development in children (Vereen et al, 2014). With no available vaccine preventing such infections, short term implications from reduced respiratory infections in infants leads to fewer incidence rates of hospitalizations from acute infections and as a result, a reduced expenditure related to healthcare treatment costs (Vereen et al, 2014).

Healthier babies also have fewer sick visits to doctor's offices reducing costs associated copayment expenditures and time and travel costs associated with sick visits for families. Additionally, healthier babies with fewer sick visits also translate into fewer medication costs or any other costs related to particular treatment plans. On average, the United States "incurs \$13 billion in excess costs annually and suffers 911 preventable infant deaths per year because breastfeeding rates fall far below medical recommendations" (Ma et al, 2012). This loss represents an adverse effect on society as human capital is significantly decreased as a direct result of over 900 preventable infant deaths per year (Ma et al, 2012). The effects of this are significant on both a state and national level.

Breastfeeding can provide all children with improved health outcomes at the start in life improving equity amongst social classes and racial/ethnic groups (Hansen et al, 2016). Children who are healthier have less absenteeism from school during the critical foundational years. Subsequently, they are able to perform better academically than those who are often out sick (Reeves et al, 2009). These children then have a greater capacity for higher earning potential because they are more likely to continue their education than children that miss out on foundational lessons early (Hansen et al, 2016). Students who miss foundational lessons early tend to struggle through school more than those who grasp initial curriculum lessons during the formative years. The healthier and more educated children become the more productive workers they become which allows all children the opportunity to contribute to growing a national economy (Hansen et al, 2016).

Women who breastfeed, on average, suffer from less from various adverse health conditions which have implications on short term health outcomes. The act of breastfeeding itself, through the release of oxytocin, has emotional and psychological benefits which help the mother and infant to bond (Riley et al, 2015). The implications of this improved bonding experience for mothers who breastfeed result in fewer incidents of post-partum depression but also greater feelings of well-being leading to improvements in confidence and self-esteem (Riley et al, 2015). Additionally, the caloric expenditure necessary to express breastmilk over an extended period of time aids in a mothers return to pre-pregnancy weight (Hansen et al, 2014). The health implications of which lead to improved health outcomes overtime with fewer incidences of hypertension, heart diseases and diabetes. Short term mental health implications related to a faster return to a pre-

pregnancy weight revolve around increases in self-esteem and confidence building due to gradual and consistent weight loss (Riley et al, 2015). Finally, breastfeeding helps the uterus to contract and suppress ovulation delaying the return of fertility for several months (Riley et al, 2015). The short-term health implications of this allow the mother ample time to physical health after birth without reconceiving again shortly after.

Policy Implications

The US Department of Health and Human Service's Healthy People 2020 guidelines provide the goals and objectives for national strategies surrounding breastfeeding rates. Currently, Healthy People 2020 considers increased rates of breastfeeding initiation, duration and exclusivity as the primary objectives to improve health outcomes for infants in the United States. In order to do so, Healthy People 2020 outlines methods which include to reduce the proportion of breastfed newborns that receive formula supplementation within the first two days of life. Currently, 22.4% of all Georgia children receive formula before the first two days of life (Centers for Disease Control and Prevention, 2016). The final objective of HP 2020 breastfeeding priorities is to increase the proportion of live births that occur at "baby friendly" hospitals that provide the recommended care for lactating mothers and babies while encouraging all new mothers to initiate breastfeeding practices (Healthy People 2020). The current rate in Georgia for live births at "baby-friendly" facilities is 12.4% which falls above the targeted 8.1% (Centers for Disease Control and Prevention, 2016)

Several policy initiatives have been implemented by the national WIC program to improve rates of initiation and continuation based on guidelines set forth by HP 2020. The Georgia WIC program has also instituted their own initiatives, in addition to

following national programming, in order to improve rates. The primary Georgia interventions revolve around breastfeeding support through “maternity care practices, workplace support, peer support, maternal education and professional support” (DPH, 2016). Many of the breastfeeding support interventions are collaborations with nonprofit organizations and hospitals in order to expand their reach to the greatest numbers of low income women and infants (and also people of color).

The Georgia 5-Star is an award program which actively works toward improving breastfeeding initiation rates by recognizing hospitals which support and encourage breastfeeding through maternal care within their maternity centers and labor and delivery units. Participating hospitals will collaborate with WIC personnel to host continuing education sessions for healthcare providers within hospital settings on how to best promote breastfeeding amongst new mothers. Hospitals gain 1 star for every two new implementations (out of a total of 10 strategies) leading towards the “baby friendly” certification (GA Department of Public Health, 2016). As such, WIC is actively engaging with community members and other stakeholders to promote breastfeeding. Training hospital staff is an effective method to ensure that all children born in state hospitals, with a focus especially on WIC participants, receive the most up to date information to encourage breastfeeding initiation and continuation for all. There are currently 20 hospitals around the state which participate in this program (DPH, 2016).

In addition to the Georgia 5-Star award program, The Loving Support Makes Breastfeeding Work program implemented by the Georgia Department of Public Health is another strategy that is employed to improve breastfeeding rates through peer and professional support. Loving Support Makes Breastfeeding Work is the national WIC

breastfeeding promotion initiative administered by the USDA's Food and Nutrition Service (FNS) and implemented at the state level by the Georgia Department of Public Health. The program's three primary objectives revolve around increasing breastfeeding initiation and exclusive continuation for at least 6 months while also encouraging behavior change initiatives to normalize breastfeeding in all American communities (US Department of Agriculture, 2016). To do so, the program leverages the influence a mother's social environment and cultural understanding to encourage continued breastfeeding by engaging peer lactation specialists which are recruited from WIC's target population and, as best as possible, are representative of a similar racial/ethnic community as the mothers in which they counsel (US Department of Agriculture, 2016). Social support factors strongly into a mother's decision to breastfeed, especially for the targeted African American population. As such, they are strong determining factors in a mother's decision whether or not to breastfeed. For WIC, this knowledge is critical in that developing peer support counselors to encourage breastfeeding rates can be an effective strategy to improve rates of breastfeeding for the most vulnerable populations within the program.

Additional policy implications as a result of guidelines set forth by HHS in Healthy People 2020 have resulted in a provision as part of the Affordable Care Act which allows nursing mothers a reasonable accommodation for break times in order to express milk as often as is needed for the first year of an infant's life (DOL, 2016). This requirement became effective in 2010 with the passage of the ACA. The Georgia Department of Public Health follows the federal regulations by ensuring that all country

health department also have lactation facilities providing workplace support for nursing mothers which are available to employees and clientele for use.

WIC also engages in nutritional and breastfeeding education classes for clients as a strategy to increase rates of breastfeeding as a parent's knowledge of nutrition practices and benefits of breastfeeding may be limited. Breastfeeding initiation rates indicate that most Georgians understand that "breast is best" as a majority of mothers initiate the practice (CDC, 2016). Prenatal as well as postpartum nutrition education and breastfeeding benefits sessions are available to encourage improved rates of breastfeeding amongst WIC clientele. This benefit is standard for those who choose to partially and fully breastfeed, but it is not a compulsory to receive benefits from the program in general.

Current Study

Breastfeeding is a public health concern as it is considered best practice in infant feeding options, but current prevalence and initiation rates within all communities in the United States do not reflect this standard. Multiple leading public health agencies advise infants should be exclusively breastfed for at least six months, and recommend human milk for as long as is mutually desired by both mother and infant (World Health Organization, 2016). The focus of this study, however, is to examine the health and cost savings of infants who are exclusively breastfed in Georgia versus the expenditures and health detriment for exclusively formula fed infants in Georgia. It will examine, in particular, if Georgia were to increase its rates of initiation and continuation of exclusive breastfeeding to recommend levels identified by the US Department of Health and Human Services what cost and health saving would be evidenced. The hypothesis is that

if rates of breastfeeding within the WIC program increase, specifically for African American populations, a significant cost saving would be seen by the agency due to the low cost nature of breastmilk with health saving implications for the overall healthcare system in Georgia as infants who are breastfed experience less incidence and prevalence rates of common childhood illness. This paper will examine, most especially, breastfeeding initiation and continuation improvements in low income and African American populations as both groups are least likely to breastfeed in comparison to those from higher socioeconomic and other racial/ethnic backgrounds.

Chapter III: Methods and Procedures

Participants

The USDA annually provides publically available WIC program data based on participation numbers of pregnant, nursing and postpartum women along with breastfeeding and formula feeding infants and children up to age 5. This project utilized the most up to date information for FY 2017. Adult participation in the Georgia WIC program was determined by the numbers provided by the USDA for breastfeeding, formula feeding and postpartum/formula feeding women. Adult participants in this study included 6,058 fully breastfeeding women, 12,031 partially breastfeeding women and 24,943 postpartum/formula feeding women (US Department of Agriculture, 2016). Infant participation was determined by the numbers of fully breastfed, partially breastfed and fully formula fed infants in Georgia participating in the WIC program. According to the USDA, program participants include 4,643 fully breastfed infants along with 9,918 partially breastfed infants and 41,627 fully formula fed infants (US Department of Agriculture, 2016). Pregnant participants were excluded from the research data for the purposes of this project.

Materials

The 2017 WIC monthly data by state, category and program costs is part of the data necessary to complete this study. It is publically available from the US Department of Agriculture's Food and Nutrition Service which manages the WIC program. In addition to the most up to date demographic state level participation numbers for

participating women and infants per category, the dataset also includes total food costs and Nutrition Services and Administration (NSA) costs per state (US Department of Agriculture, 2017). Georgia's total food cost amount and total NSA cost in addition to demographic/population data concerning participation numbers was extracted from the USDA data source for this project.

The Georgia WIC approved foods list provided by the Georgia Department of Public Health was utilized to determine monthly food allowances for Georgia WIC participants. Nationally, the WIC program does not have set monthly dollar maximums to determine the quantities of its 5 food packages (US Department of Agriculture, 2016). The USDA sets the national standards for allowable quantities received within each food package and each package receives fish, eggs, bread, fruits and vegetables, dairy (cheese and milk), juice, cereal and legumes (GA Department of Public Health, 2016). This data was publically available from the USDA's WIC Food Package- Monthly Maximum Allowances (US Department of Agriculture, 2017). Infant packages for partially breastfeeding and fully formula feeding receive varying amounts of formula as well. Allowable food and formula quantities vary between the five food packages and are based on breastfeeding categories (fully breastfeeding, partially breastfeeding or formula use). Permissible brands for purchase are regulated by the Georgia Department of Public Health (GA Department of Public Health, 2017). Walmart.com was the price tool used to determine cost of allowable food items in the quantities recommended and accepted brands in Georgia.

Infant hospitalization was used to determine the cost effectiveness of breastfeeding. The data to determine the cost difference between breastfeeding and

formula feeding was obtained from the Kaiser Family Foundation dataset on hospitalizations in GA. The data included information for public, private as well as nonprofit hospitals. This study omitted the data for private and nonprofit hospitals. Publically funded/government run hospital expenditures was the only data point considered given the population of focus.

Design and procedures

In order to analyze the cost effectiveness of improving breastfeeding rates for WIC in Georgia, several data points had to be established based on breastfeeding versus formula feeding categories. As a comparison, and since breastfeeding has health and economic implications, a health condition in which reduced incidence and prevalence rates are positively associated with improved rates of breastfeeding was also selected. And, the cost difference in hospitalizations in order to treat infants based on breastfeeding category was also determined to evidence the effectiveness of improved rates of breastfeeding. Total expenditures based on feeding category, including a complete cost breakdown between formula feeding and breastfeeding infants and mothers participating in WIC in Georgia was necessary to complete the analysis. The USDA determines total costs per person based on a combined food and nutrition services and administration (NSA) cost. As such, food costs and NSA costs were divided per person based on feeding category for both infants and women. The Georgia Department of Public Health provides a WIC approved foods list found publically online. This document cites the types of foods along with allowable brands for purchase with WIC funds.

The WIC food list along with the USDA's monthly maximums were used to determine average food costs for breastfeeding versus formula feeding mothers. To

determine allotted quantities, the USDA's monthly maximum allowances per food category for eggs, milk, bread, cheese, juice, fruits and vegetables, and fish was utilized. The cost per feeding category for women (fully breastfeeding, partially breastfeeding and fully formula feeding) is determined by the food brands and category as outlined by the USDA's monthly maximums and the allowable brands under the GA WIC approved foods list. Cost per item was determined by pricing allowable food sources in recommended quantities from Walmart.com. The cheapest option was chosen to determine price averages. There is not a maximum dollar amount set as food costs vary depending on state as well as urban vs rural settings. A similar technique was used to determine food costs for breastfeeding vs partially breastfeeding vs formula feeding infants. Maximum allowances of food and formula were established nationally and allowable brands are outlined by the GA Department of Public Health. Food items were priced through Walmart.com to determine average cost.

The USDA mandates a minimum of 1/6 of the sum of the total cost expended to determine NSA costs for breastfeeding vs formula feeding mothers (US Department of Agriculture, 2016). The total cost expended for Georgia, according to the data, to administer the WIC program including both food and NSA costs is \$72,896,585 (US Department of Agriculture, 2017). Nutrition service and administration costs are used for nutrition education activities and breastfeeding promotion, breastfeeding aids and support activities and client services and program management. In addition to the 1/6 sum of the total cost expended minimum for NSA costs, at least \$21 per every pregnant and breastfeeding woman must be used for breastfeeding education (U.S. Department of Agriculture, 2017). Additional program and client management services are associated

with program costs derived from this allocation category. To determine the cost difference in NSA funds between breastfeeding and formula feeding, breastfeeding promotion and support and nutrition education costs were subtracted from the total NSA cost with the difference divided by the number of total women and finally multiplied by postpartum (formula feeding) women. This number was then used to determine the total NSA cost for formula feeding women and the cost difference was the NSA cost for breastfeeding women.

In analyzing the cost effectiveness of improving breastfeeding rates for WIC in Georgia, hospitalization cost was used as one benefit (of many) for a comparison data point. This data was divided into three categories based on breastfeeding category and length of stay and was used as a cost differential point. Greater cost effectiveness being seen in the category with the shortest hospital stay is most cost-efficient over time. This element adds to the ability to assess both immediate and longer term benefits seen from breastfeeding and to most effectively determine the overall efficiency of improved rates of breastfeeding.

Chapter IV: Results

The problem underpinning this research study revolves around the question of cost effectiveness in promoting breastfeeding over formula feeding as the primary nutrition source for infants under 1 year of age. Due to significant health and economic benefits associated with improved rates of breastfeeding exclusivity, WIC actively encourages breastfeeding initiation and continuation as a standard part of its monthly benefit program. But, to determine if the practice is more cost effective than formula, all expenditures related to each feeding option were evaluated on an average monthly basis.

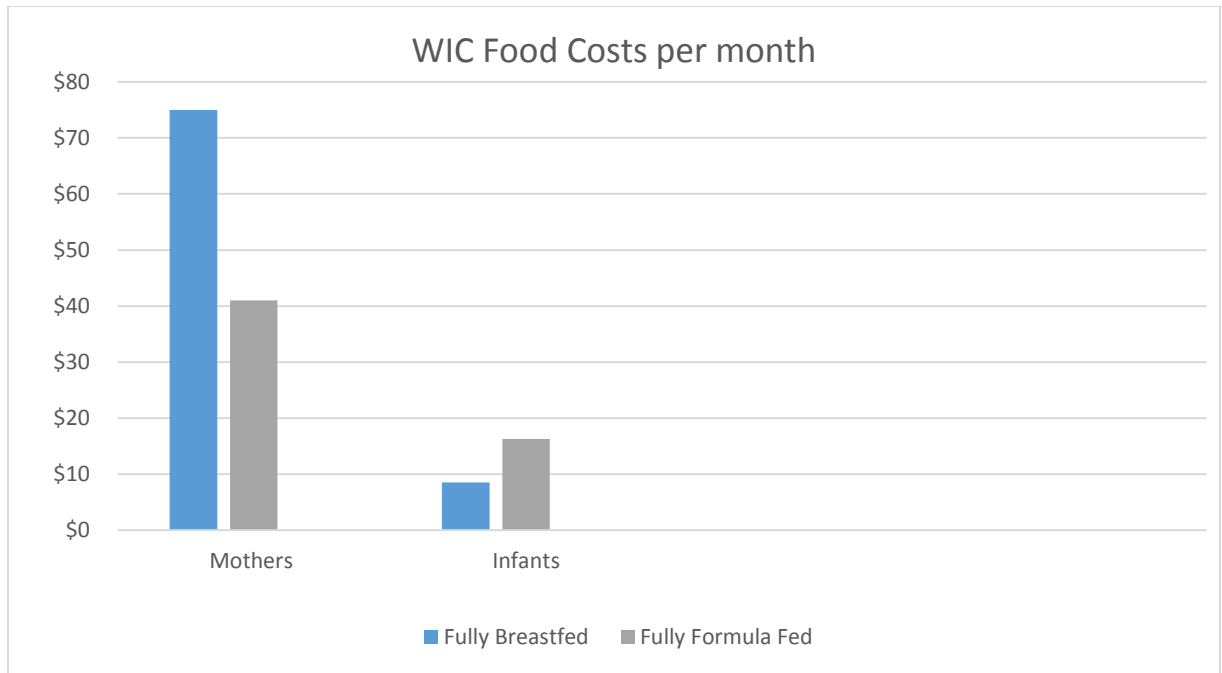
Food Cost

For WIC specifically, promotion of breastfeeding has costs associated with food, program management and evaluation, nutrition education, breastfeeding peer support and counseling (DPH, 2016). With each additional breastfeeding support service provided, costs to the agency increase. Additionally, average monthly food costs of \$75 are higher for fully breastfeeding mothers in relation to \$54 for partially breastfeeding mothers and \$41 for postpartum/formula feeding mothers. Fully breastfeeding mothers receive an increased allowance to purchase greater quantities of food which include juice, eggs, bread, cereal, milk, cheese, beans, certain meats and other options that are not included in the food packages for formula feeding mothers or infants (DPH, 2016). Breastfeeding mothers also receive WIC benefits (including the food package) for 1 year postpartum as opposed to only 6 months, as is customary for formula feeding mothers. Breast pumps are also provided by WIC for women who choose to breastfeed and the cost of breast pumps purchase is taken from the WIC food cost category.

Average monthly food costs related to infants are about \$9 per month for fully breastfed while average monthly food costs for partially breastfed and fully formula fed

are \$31 and \$107 respectively. This cost includes formula as well as food items such as baby food (vegetables, meats, fruits, cereal) and juice. WIC receives rebates from formula companies to offset the cost of formula to the agency. With the rebates included, the total food cost for formula fed infants reduces to about \$18. The graph below depicts total food costs for mothers with the formula rebates for formula fed infants. The rebates received drastically reduce the cost of formula to the agency.

Figure 1. GA WIC Food Costs per Month by Fully Breastfeeding and Fully Formula Feeding Cohorts.



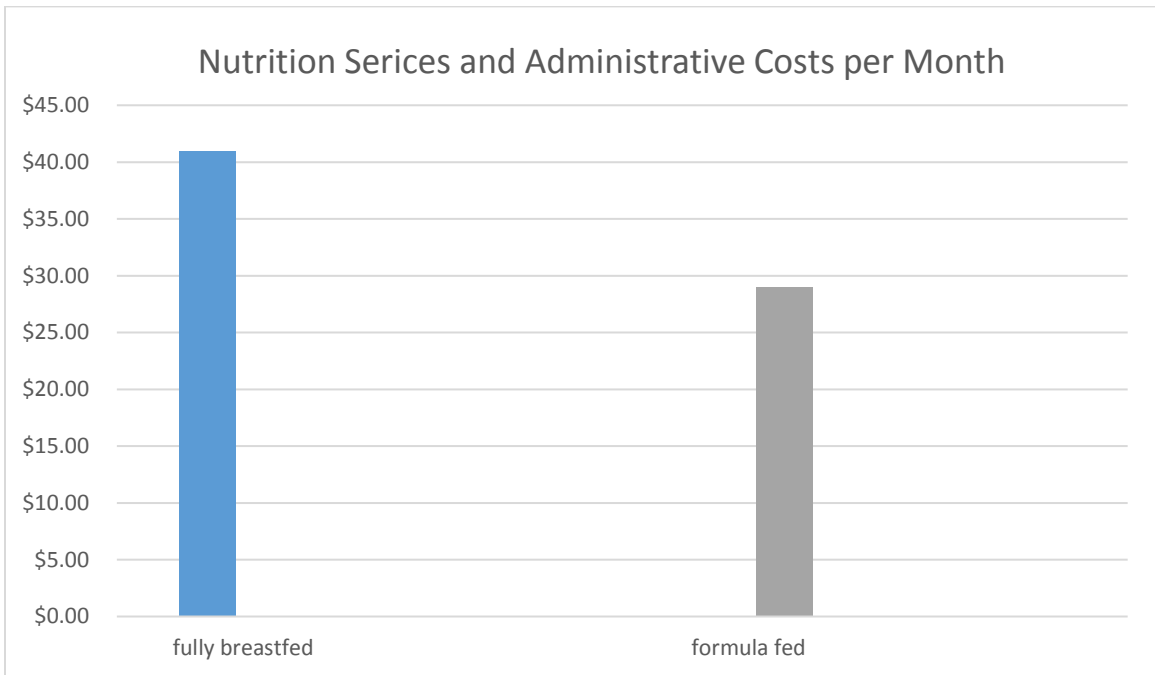
Nutrition Services and Administration (NSA) Costs

Nutrition Services and Administration (NSA) costs for mothers also factor into the total program costs which have been analyzed in order to determine whether or not breastfeeding is more cost effective overall. The NSA costs for WIC include nutrition

education activities and breastfeeding promotion, breastfeeding aids, breastfeeding support activities, client services and program management (USDA, 2016). While all mothers receive client and program management services, only those who choose to breastfeed receive nutrition education activities, breastfeeding promotional items such as such as breast pumps and other support activities increasing the cost of the breastfeeding program.

A minimum of \$21 is earmarked per breastfeeding and pregnant mother to ensure adequate funds are secured to promote the breastfeeding education and support initiatives (USDA, 2016). In the Georgia WIC program, there are 18,317 pregnant participating women along with 18,089 women fully and partially breastfeeding. In addition, 1/6 of the total sum expended by the state for NSA costs must be reserved for nutrition education only (USDA, 2016). The total NSA cost which is expended by Georgia is \$26,546,212 with 1/6 of the total equaling 4,424,368.66 which is the sum reserved for nutrition education (USDA, 2017). These two specific allocations of nutrition education and breastfeeding education/support activities within the WIC budget are attributed to breastfeeding programming only and therefore raise overall costs to the breastfeeding cohort which in turn increases the overall cost to WIC. By subtracting the combined breastfeeding promotion and support amount and nutrition education allocation from total NSA cost and then dividing the difference by the total women and multiplying that by the postpartum women only, it was determined that about \$41 per month is spent on the breastfeeding cohort versus only \$29 spent on average per month per postpartum/formula feeding mother.

Figure 2. GA WIC Nutrition Services and Administration Costs per Month by Breastfeeding and Fully Formula Feeding Cohorts.

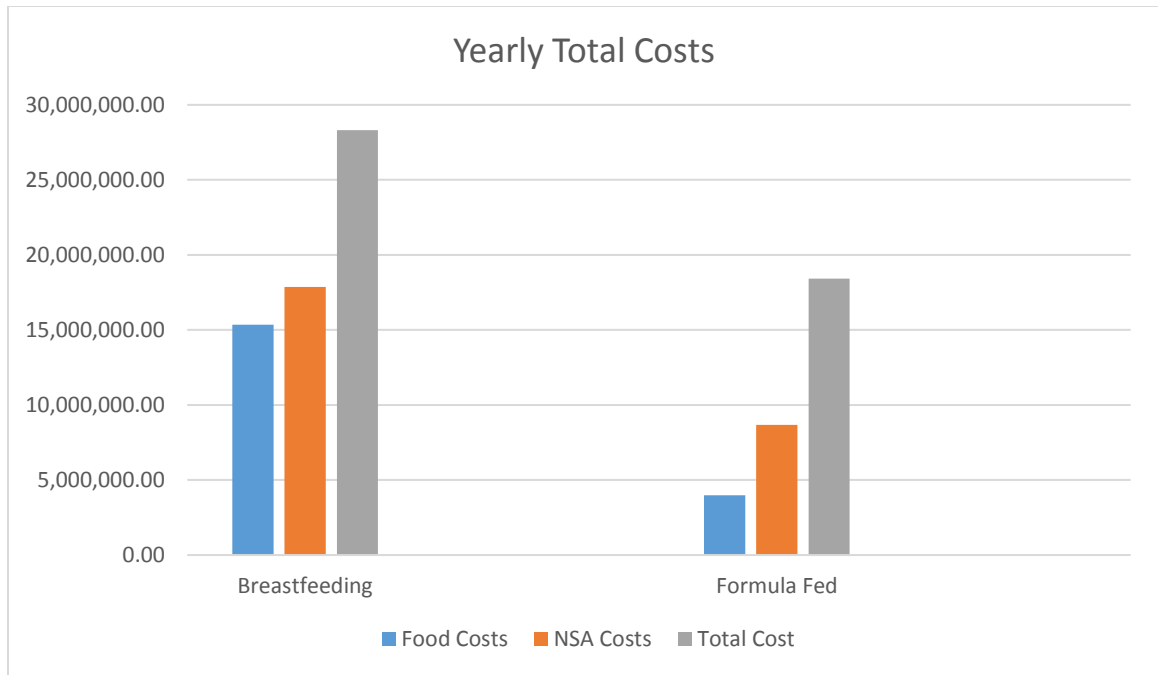


Total Overall Cost

Total expenditures for WIC include both food and NSA program costs. In order to determine the total cost by feeding category, yearly food and NSA totals were combined and analyzed. Total yearly food cost for the breastfeeding cohort including both mothers and infants is \$15,346,807.7. Additionally, total NSA costs for the breastfeeding cohort averaged 17,862,708 for a total benefit including both food and NSA costs for the breastfeeding cohort of 28,312,651.8. The total food cost for the formula feeding cohort including both mothers and infants is 31,240,079.7 without rebates from formula companies. The total NSA cost is 8,683,503.4 which, when combined, leads to a total formula cohort cost of 45,688,098.4. When including 27,260,367 in formula rebates, the

total formula cohort cost reduces to 18,427, 731.4. The data was analyzed with both the rebate included and removed to show the difference for both pre and post rebate totals. Overall, this data shows it to be more expensive for WIC to promote breastfeeding as the optimal nutrition source for infants under age 1. Rebates from formula companies are able to greatly offset the food costs to WIC and as a result significantly lower total program costs.

Figure 3. GA WIC yearly total costs for Breastfeeding and Fully Formula Feeding cohorts per months



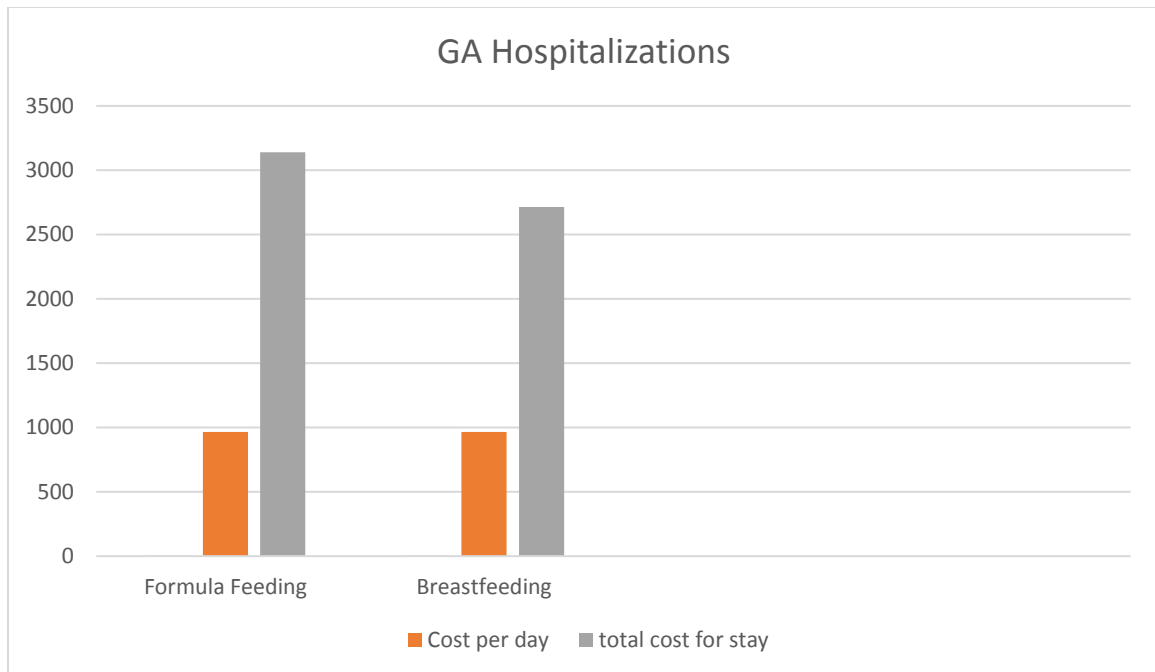
Hospitalizations – Length of stay and cost per day

When considering how breastfeeding improves health outcomes for infants in Georgia, hospitalization rates for infants were analyzed by the average length of stay as well as by the cost per day. In Georgia, over 100,000 infants and children are admitted

into the hospital every year (Georgia Department of Public Health, 2017). Those who are breastfed, on average spend only 2.8 days admitted into the hospital (Ajetunmobi et al, 2015). However, for formula fed infants, the rate increases to 3.2 days admitted into the hospital on average (Ajetunmobi et al, 2015). For each infant that is admitted, the cost per day for treatment averages to \$966 in state run and local government managed hospitals in Georgia (Kaiser Family Foundation, 2016).

When considering the total cost difference in length of stay for children based on breastfeeding category, those who are breastfed save the state significant health costs related to hospitalizations. While the cost per day remains \$966 for both breastfeeding and formula feeding cohorts, the cost varies by the length of stay. A breastfed infants average cost of a hospital stay in Georgia is \$2714.46. However, the cost of a hospital stay for a formula fed infant in Georgia is \$3139.50. This cost difference represents a significant savings when considering all acute bouts of illness do not always equal hospitalization.

Figure 4. GA Hospitalization Rates by Breastfeeding and Formula Feeding Cohorts



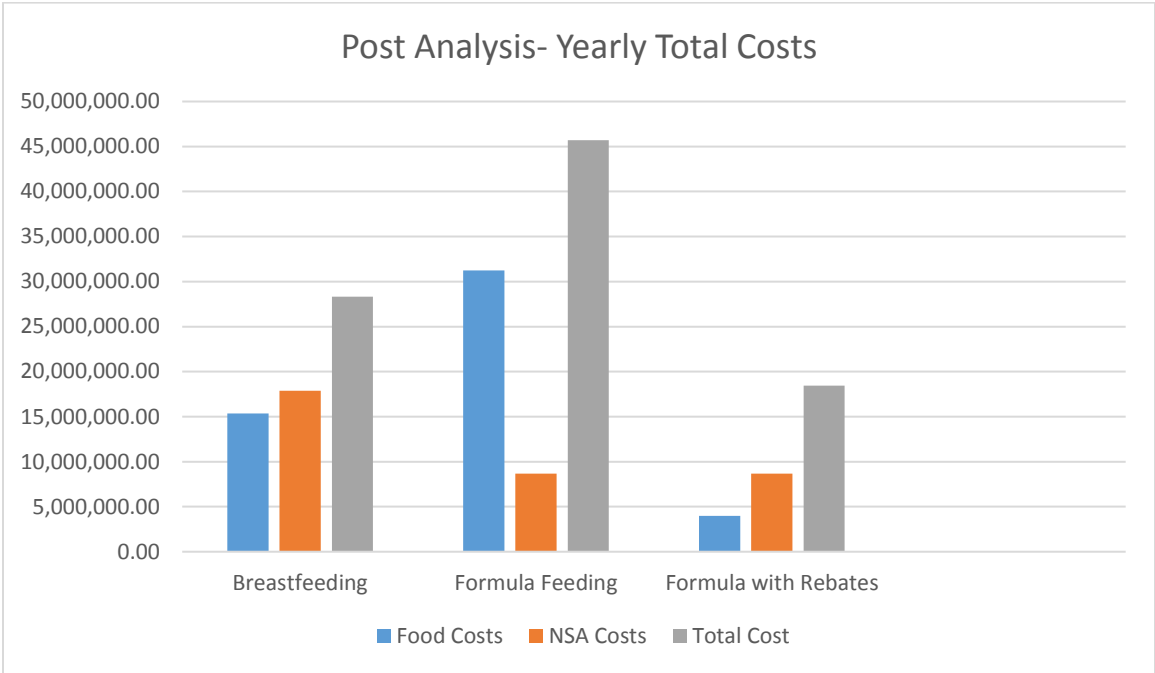
The hypothesis proposed that if rates of breastfeeding within the WIC program increase, specifically for African American populations, a significant cost saving would be seen by the agency due to the low cost nature of breastmilk with health saving implications for the overall healthcare system in Georgia because infants who are breastfed experience less incidence and prevalence rates of common childhood illness. According to the analysis, however, the hypothesis was incorrect in relation to breastfeeding promotion being the more economic feeding practice. Breastfeeding promotion is not the most economically advantageous option for WIC due to expenditures related to breastfeeding and nutrition education and greater benefits provided from the agency as a result of choosing the breastfeeding option over formula feeding. The analysis found that formula use, through subsequent rebates provided from companies, offsets the programming cost of the agency as a whole and as a result WIC is able to offer a wider range of benefits to its clientele.

To determine health savings for the healthcare system in Georgia, rates of hospitalization was used as a comparison data point. Health savings with implications for the healthcare system overall held true. While the benefit to breastfed infants when related to hospitalizations translated into fewer days admitted into hospitals and less frequently, hospitalizations is only one health related outcome which breastfeeding improves. Other health related benefits were not taken into consideration in this study, but still factor into the health savings for the healthcare system in Georgia. Because of the added benefit from hospitalization and other health related improvements, savings from breastfeeding offset the higher cost for WIC promotion.

Post Analysis

In this post analysis, the rebates from formula companies are factored into the overall cost savings to WIC. The rebates received greatly offset the overall program cost as a result of formula purchase. WIC is able to expand its programming and administrative support components for program with the additional resources seen from the rebates. With the rebates included, the total food cost for formula fed infants reduces to about \$18 from \$107 per month for a total annual cost of \$3,979,712. The total NSA cost is 8,683,503.4 which, when combined, leads to a total formula cohort cost of 45,688,098.4. When including \$27,260,367 in formula rebates, the total formula cohort cost reduces to \$18,427,731. Therefore, it is more cost effective to use formula for WIC programmatic purposes.

Figure 5. Post-Analysis: GA WIC Total Costs Including Rebates from Formula Companies



Chapter V: Discussion and Conclusion

Several questions have served as the overall focus of this research project with the most central being that WIC is a publically funded program which has the unique task of merging what is most efficient, effective and equitable. As WIC is a government benefit program with limited available funds and participants from low income and minority communities, this social support service must be efficiently managed for maximum effectiveness and program longevity. The short term and long term implications of programmatic decisions in order to maintain this delicate balance continue to have lasting effects on breastfeeding rates amongst Georgia's most vulnerable populations. The resulting findings from the analysis show current WIC practices may both hinder and promote increased rates of breastfeeding from a health and programmatic perspective with lasting implications. However, in order to continue steady growth of breastfeeding initiation and continuation rates, future directions revolving around improved marketing techniques, cultural awareness and sensitivity as well as improved educational opportunities concerning breastfeeding and nutrition are necessary. While the initial investment for WIC may be less cost effective, in the short term, the return on the investment outweighs the associated expenditures overall.

The results of the analysis demonstrate that it is more cost effective overall for WIC to provide formula than to promote breastfeeding initiation and continuation because both food costs and administrative costs are higher for the breastfeeding cohort versus formula feeding cohort. This is due in large part to the rebate system WIC

currently employs with formula companies who are awarded exclusive contracts for the rights to market their products to WIC participants. This fact is important to understand why participation in WIC, despite improved efforts in recent years, isn't necessarily associated with improved rates of breastfeeding (Jensen, 2011). Previous research has actually found WIC to be inversely associated with breastfeeding. While many women acknowledge the health benefits of breastmilk, for the agency, formula use has proven to be more cost effective.

A programmatic implication of the current established relationship between WIC and formula companies is that WIC relies on the rebates associated with formula in order to offset general costs and therefore the program is able to offer expanded services for its clientele. WIC is able to provide greater benefits to its participants as a result of the rebates received which are supplemental to the allocations provided by the federal government. This includes additional programming related to breastfeeding and nutrition education as well as increased benefits for breastfeeding program participants. WIC relies on a certain percentage of its clientele to use formula in order to maintain its current level of operations. Therefore, the economic incentive for WIC to maintain relationships with formula companies for rebate purposes explains why the rates of women who choose to exclusively breastfeed for recommended durations while participating in the WIC program lag behind both state and national averages. Some health professionals even argue WIC has an opposite than intended effect on breastfeeding rates overall. And, that participation in WIC programming and breastfeeding, in fact, have an inverse relationship (Jensen, 2011).

With the current operating procedures and rebates received from formula companies, meeting Healthy People 2020's outlined objectives would not allow for a significant cost savings to be evidenced by the agency. The immediate costs to WIC associated with encouraging increased rates of breastfeeding initiation and continuation surge overall program expenditures with no increase related to the formula feeding cohort. And, as a result, the strategies and support services in place to improve rates of breastfeeding which include extended participation in the program for mothers, increased food allowances for mothers, nutrition and lactation counselors, among others, increase overall program costs incurred by the agency. Currently, much of these costs are offset by rebates received from the formula companies in exchange for WIC contracts. The pattern of receiving rebates, while it has certain benefits to WIC as an agency, can work against improving rates of breastfeeding overall.

The rebates are a hindrance to a cost savings being realized with improved rates of breastfeeding, when in fact the cost of breastfeeding is significantly lower than the cost of formula purchase. If WIC were to no longer receive rebates from formula companies, the relationship between WIC and breastfeeding would improve significantly. In this case, however, program cost structures would require a reevaluation to determine how to best ensure program support remains feasible based solely on appropriation from the U.S. government. Fortunately, however, while the costs for WIC may be more significant associated with breastfeeding; the improved health benefits to infants (and women) provide a significant return on the investment for the agency and the costly US healthcare system as a whole. As such, the economic benefit to breastfeeding has implications on various levels of healthcare services and government programming. Benefits to

breastmilk reach beyond the interpersonal level of infant and mother. Society can benefit as well from reduced expenditures related to treatment costs for hospital admittance in Georgia.

For the purposes of this project, infant hospitalization was chosen as a gauge to compare the healthcare savings between breastfeeding and formula feeding WIC cohorts. However, in reality, hospitalization is only one indicator in which breastfeeding contributes to health and economic savings as not all episodes of acute illness results in hospitalization (Ajetunmobi et al, 2015). And as such, the benefits for related health outcomes in support of breastfeeding were underestimated.

Generally, prevention is more cost effective than treatment which is why public health professionals promote behavior change initiatives as a primary strategy to reduce incidence and prevalence rates of certain adverse health outcomes. Similarly, the cost benefit for promoting breastfeeding, as a behavior change initiative, is greater than the savings from formula as breastfeeding provides a greater return on investment than formula. Previous research has found that infants who are breastfed on average have stronger immune systems and are therefore sick less often. Short term implications of which are that when breastfed infants are ill, on average, less time is spent admitted into hospitals for treatment. Georgia admits over 100,000 infants annually into state run hospitals and while the cost per day for treating those infants is relatively stable at around \$970 per day, the longer an infant remains admitted the higher the treatment cost. Due to variance in length of hospital stays, the cost difference between the breastfeeding and formula fed cohorts in Georgia have implications of significant cost savings of about \$400 per child per day. In Georgia, the rebates from the WIC program do not outweigh

the savings seen by the healthcare system with fewer hospitalizations and shorter stays overall, especially when considering hospitalizations only capture a percentage of acute bouts of illness in infants.

Implications for Practice and policy

As it is in the best interest of the state to prioritize preventative measures over treatment options due to the cost savings from health reductions, the WIC program in Georgia makes a concerted effort to improve breastfeeding rates amongst its clientele. Increasing rates of breastfeeding within nutritionally at risk communities can act as a primary level intervention method with the objective of closing current health disparities gaps. Improved rates of breastfeeding have significant health and economic benefits in both the short term and long term not only for infants and children, but also for families and society as a whole. While still operating within standard procedures outlined by the USDA, WIC seeks to improve nutritional outcomes for children up to age 5 and participating women in addition to infants as a primary prevention strategy to ultimately reduce disease outcomes related to lifestyle choices. Implications for improved nutritional practices translate into reductions in childhood overweight and obesity leading to reduced incidence and prevalence rates of diseases such as diabetes.

One such strategy the Department of Public Health in Georgia is using to make significant strides with increasing rates of breastfeeding for WIC program participants and non-participants alike is by collaborating with hospitals and nonprofit organizations. Several initiatives including the Georgia 5-Star program actively work towards this end by hosting continuing education sessions for healthcare providers within hospital settings on how to best promote breastfeeding amongst new mothers. Hospitals gain 1 star for

every two new implementations (out of a total of 10 strategies) leading towards the “baby friendly” certification (GA Department of Public Health, 2016). As such, WIC is actively engaging with community members and other stakeholders to promote breastfeeding. Training hospital staff is an effective method to ensure that all children born in state hospitals, with a focus especially on WIC participants, receive the most up to date information to encourage breastfeeding initiation and continuation for all.

The Loving Support Makes Breastfeeding Work program implemented by the Georgia Department of Public Health is one such strategy that has seen great results within Georgia’s WIC office. This program leverages the influence a mother’s social environment, particularly for African American mothers, has to encourage continued breastfeeding. WIC’s ability to leverage collaborations with breastfeeding promotion non-profit organizations is also a best practice which may have success in various agencies across the United States. Collaborations with nonprofit organizations such as La Leche League and others can assist WIC in expanding their reach within communities where breastfeeding is not as common.

However, some other strategies may not be as effective at breastfeeding promotion as are intended. While WIC actively encourages its clientele to pursue breastfeeding, it still has operating procedures which distract from this overall goal. The partially breastfeeding infant food package is one such strategy which may inadvertently convert some mothers away from breastfeeding and into formula feeding. Mothers with lower self-efficacy in regards to their ability to successfully breastfeed may be too apprehensive to attempt the fully breastfeeding option, but feel as though the partially breastfeeding option provides inadequate infant formula and baby food options. The

resulting implication is that some mothers may forgo breastfeeding altogether and opt for the fully formula fed packages as a result. This relationship may serve to explain why a sizable percentage of WIC clients still choose formula as their primary infant feeding method. And, why the smallest food package cohort is that of the fully breastfed infant.

The current established relationship between formula companies and WIC is also detrimental to improving overall rates of breastfeeding for program participants. While women must always have the autonomy to choose what is best for themselves and their children, the current operating standards may hinder an objective decision in terms of breastfeeding versus formula feeding. Mothers who choose to formula feed are provided all required formula complementary as a benefit to participation in the WIC program.

The Georgia WIC program dictates allowable formula quantities per month and also mandates allowable formula brands for purchase. In exchange for the exclusive promotion of particular brands, companies who are awarded WIC formula contracts provide rebates. The rebates received in Georgia greatly reduce the cost to WIC for formula purchase and even offset other programming costs allowing WIC to expand provided support services to its clientele base. However, if these relationships between WIC and formula companies did not exist and WIC paid market price for formula, the costs associated with providing formula would increase the total cost to the agency astronomically. And as a result, in theory, a greater emphasis would be placed on the more cost effective (although not zero cost) breastfeeding method of infant nutrition practices. The relationship between WIC receiving the rebates from formula companies and increased rates of formula feeding are directly related. The rebates work to lower

overall expenditures for the agency and as a result, the relationship between the formula companies and WIC is robust.

An additional strategy to improve rates of breastfeeding would be to improve workplace accommodation through maternity/paternity leave and lactation facilities creating a standard operating procedure for employees within the United States. Mothers are less likely to continue breastfeeding once returning to a place of employment as doing so is substantially less convenient. And, as the United States currently has no laws regarding maternity leave, breastfeeding continuation is often shorter in this country than other similarly developed nations as women often return to work after 6 weeks, which is a standard vacation/sick leave combined allowance. As such, improving workplace support through the standardization of on-site lactation facilities will encourage continued breastfeeding once women return to work.

Worksite flexibility and preparedness for new mothers is key for improving breastfeeding rates within the African American community. Disproportionately, African American women return to work earlier than women of other ethnic groups and often to environments less supportive of nursing mothers (Johnson et al, 2015). Providing the time and space to express milk for infants, while has associated cost to employers, can reduce cost through less absenteeism as well as a more diverse employee base.

Future Directions

As WIC is a publically funded program, the agency must strike an often difficult balance between what is most efficient, most effective and most equitable for its clientele. The relationship between breastfeeding and WIC show that the agency is working towards striking that delicate balance while still operating within the constraints

of a publically funded program with limited resource. WIC continues to have a strong relationship with formula, because it is the most economical feeding option when utilizing the current system of rebates, especially because the rebates offset the cost of programming for the agency in general. However, for WIC to continue improving upon rates of breastfeeding they must leverage influences from various sectors of US society. This shift will rely on national, community and religious leaders in various sectors to create a space in popular culture to promote the importance of breastfeeding through governmental policy changes, social media campaigns, nutrition education, parenting classes among others (Rollins et al, 2014). And, WIC can be at the forefront of these conversations on future directions for breastfeeding within the agency.

In order to begin seeing a cultural shift on a national level, a reframing of marketing around breastfeeding is necessary to normalize the act for all Americans, not just within certain communities. WIC can act as a catalyst to leverage this behavior change initiative, especially amongst populations with historically low levels of breastfeeding initiation and continuation. Breastfeeding promotion and educational resources highlighting the costs associated with breastfeeding in relation to formula use not only from an economic perspective, but also from a health and psychological perspective can sway perspectives towards the more healthful option. Additionally, the act of breastfeeding itself is equally as important for bonding purposes between mother and child as is providing nutrients to the infant. However, within popular culture, witnessing a mother breastfeeding an infant publically can still be considered offensive to some as bottle-feeding is still considered the accepted standard. Leveraging media, and in particular social media, can act as a powerful and low cost tool can help shift the

narrative concerning the acceptance of breastfeeding in today's culture by creating greater access to information and education surrounding the topic. Social media as a resource can be leveraged in a greater way to reframe popular messaging concerning the topic as its reach is expansive, inexpensive and can incorporate the most up-to-date information which is often changing.

Additionally, nutrition education and breastfeeding education could be incorporated into mandatory parenting and life skills classes as a requirement to receive WIC benefits. While women must always have the autonomy to choose what works best for themselves and their families currently, there are no standardized educational requirements in order to receive WIC benefits. Incorporating this as a standard, however, will introduce all new mothers who participate in the WIC program to the health benefits of breastfeeding for both mother and baby. While doing so, some mothers who may have been unfamiliar with the realities of breastfeeding will become more aware and can make a decision on infant feeding based on facts versus opinion.

In order to target key populations with lower current rates of breastfeeding, it is important to understand the culture of those populations in order to leverage institutions within the culture to promote messaging related to breastfeeding improvement. The African American community, for example, is a traditionally matriarchal with elders provided a greater level of respect. Traditionally, it is also an oral society as well. The African American church, or other religious organizations, is a key institution where health messaging can reach maternal elders within the community and be dispersed amongst younger generations. Establishing breastfeeding and nutrition campaigns

centered on the African American church could be an effective strategy to promote breastfeeding within the African American community.

Finally, since WIC currently offsets its programming cost based on rebates from formula companies, the agency could work towards renegotiating a new relationship with formula companies. This new relationship would revolve around purchase and rebates of promotional items related to breastfeeding support as opposed to formula. As opposed to purchasing formula in bulk, WIC could encourage formula companies to include breast pumps and become the primary supplier of those breast pumps to WIC clientele.

Limitations

There is a lack of available data surrounding the topic of WIC breastfeeding rates for Georgia. The USDA provided information regarding program participants from which breastfeeding versus formula feeding rates could be deduced. However, the provided data did not include demographic information such as race/ethnicity, age or length of program participation. This was a significant limitation for the research project as African American participation numbers (nor breastfeeding initiation and continuation rates) could not be extracted from data supplied for Georgia. Breastfeeding terminology and definitions varied between the standards set forth by the US Department of Health and Human Services in the Healthy People 2020 publication which outline breastfeeding objectives for the country and the WIC program which works to meet those objectives within its population. An exclusively breastfed infant by the definition of HHS does not equal a “fully breastfed” infant for the purposes of WIC. Resolving the differences in the terminology presented unique challenges to the research project.

In addition, only one health outcomes was examined for the purpose of this project. Breastfeeding affects various health outcomes, but only hospitalizations were used as a comparison indicator for healthcare system implications. Therefore, not all domains of the health savings implications were examined due to time restrictions as well as limitations from analyzing just one health outcomes. Also this project excluded partially breastfed infants which comprises a significant percentage of infants served by WIC programming in Georgia, limiting the true cost evaluation of the WIC program.

Conclusion

Despite well documented benefits to breastfeeding and guidelines established by various public health agencies, current initiation and continuation rates within Georgia, particularly for low income and the African American community, do not reflect standards mandated by the US Department of Health and Human Services. However, the Women, Infants and Children (WIC) program could be an effective tool to raise breastfeeding rates in Georgia particularly amongst nutritionally at risk populations. WIC is a publically funded, government program with fixed resources. Despite this, the agency is tasked with leveraging its limited resources to serve, as efficiently as possible, the most vulnerable populations of American society. As such, strategies to improve breastfeeding rates must revolve around what is most effective, efficient and equitable to ensure the greatest benefit for the largest amount of people.

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