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Birth Centers and Underserved Populations

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BIRTH CENTERS AND UNDERSERVED POPULATIONS

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Abstract

Background: Disadvantaged women in the United States experience disparities in prenatal and birth related health outcomes.

Purpose: The purpose of this literature review is to answer the question, "Can freestanding birth centers (FBC) improve outcomes for disadvantaged populations?"

Results: FBCs *do* improve outcomes for disadvantaged populations in mode of delivery, low birth weight, prematurity, breastfeeding continuance, enhanced social support, and decreased familial stress, without additional risk for adverse outcomes. FBCs showed a demonstrable financial benefit through decreased facility fees, delivery charges, and fewer costs associated with the adverse health outcomes of cesarean sections, low birth weight, and premature infants.

Conclusion: To meet Healthy People 2020 goals government policies should facilitate further FBC expansion and utilization across the country. Non-profit organizations should consider teaming with FBCs to reach out to underserved women in their communities. Medicaid should expand its coverage for all FBCs; private insurance companies should also be encouraged to include FBCs within their provider networks.

Implications for Research and Practice: Research is currently lacking in Level I and Level II studies. The majority of the research focused on comparisons of a single FBC site against a nearby hospital. Future research should target tackling the challenges of creating Level I and Level II studies, and broaden the number of sites sampled in qualitative and retrospective studies, in order to strengthen the current gaps in research.

Keywords: freestanding birth center, birth center, pregnant, midwives, low-income, disadvantaged, underserved

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Chapter I: Introduction

As a labor and delivery travel nurse, and a nurse-midwifery student, I have born witness to a variety of hospital birth environments and cultures. With experience in Minnesota metro facilities, as well as a small hospital north of Miami, Florida, the difference in quality of care was significant. Most discussions regarding the United States' worsening cesarean section rates, poor performance with health disparities and increasing rates of low birth weight (LBW) and preterm deliveries examines our healthcare on a national level, without regard to regional differences. Throughout the course of my nursing education I also frequently encountered literature about the healthcare disparities in our country for underserved or disadvantaged populations (low-income and ethnic minorities). With such variety in practices across the country, I wondered if a system was in place that provided quality care with improved outcomes for all individuals outside of the inconsistencies of individual hospital systems. This led to the question, "Can freestanding birth centers improve outcomes for disadvantaged populations?"

Using results from the revised birth certificate data, Osterman and Martin (2014) noted that in 2012, primary cesarean deliveries for Minnesota were 18.0% and for Florida were 26.9%. In general the Midwest holds a primary cesarean rate of less than 20%, while the South Eastern states fall above 20% (Osterman & Martin, 2014). See Figure 1. I posit that these statistics are indicative, not of a physiological difference between women in each region, but rather a difference in medical practice of providers. Despite an array of access to the latest research and standards, physician and hospital practices vary greatly. Nationwide hospitals are accredited by the Joint Commission on Accreditation of

Healthcare Organizations (JCAHO), physicians engage in the professional organizations such as the American Congress of Obstetricians and Gynecologists (ACOG), and birth professionals of all types may subscribe to ACOG publications and the "Journal of Obstetric, Gynecologic, and Neonatal Nursing." Providers across the United States have equal access to the latest research for evidence-based practice, and yet they are not equally committed to updating their policies and procedures to meet current practice standards.

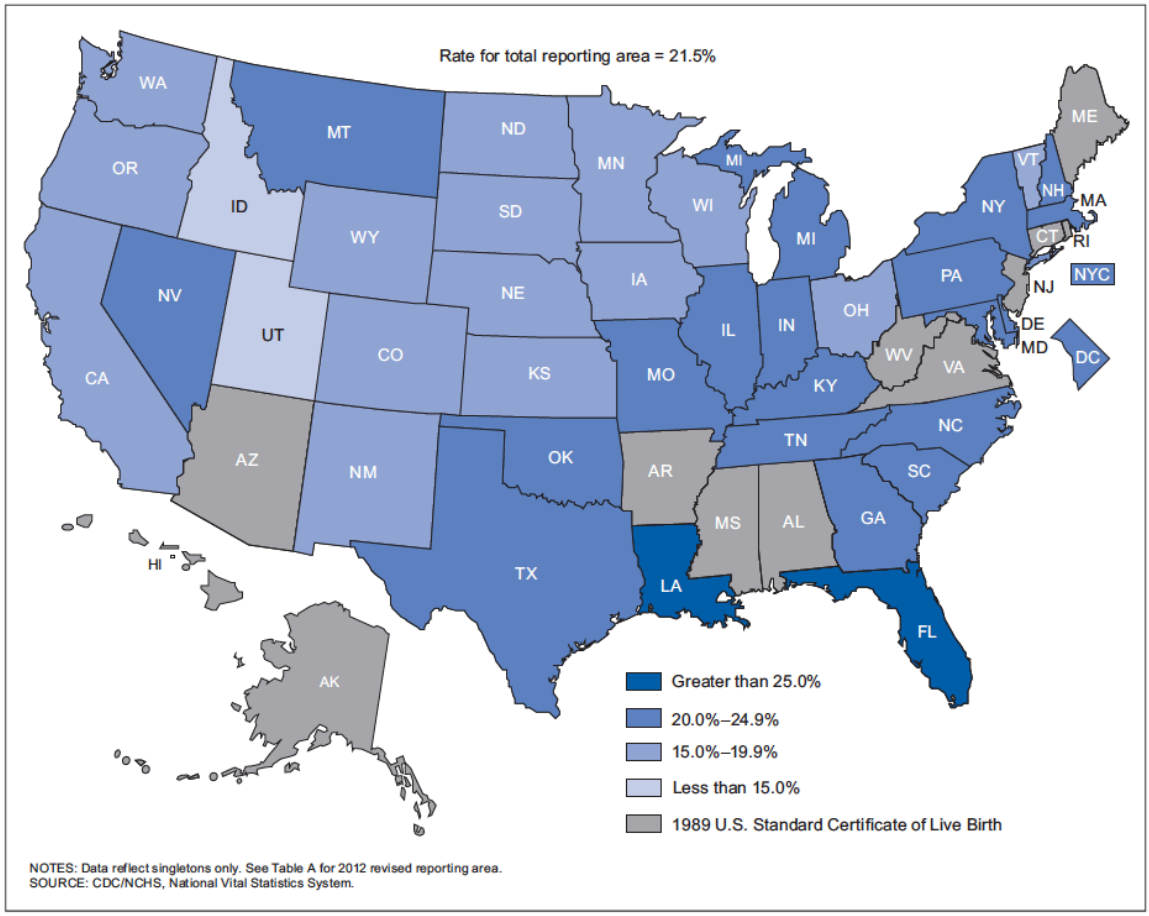

Figure 1. Primary cesarean delivery rates, by state: 38 states, New York City, and District of Columbia (2012 revised reporting area, 2012. (Osterman & Martin, 2014, p. 6)

In Minnesota I have witnessed continuous improvement efforts at each of the metro hospitals where I have worked. Examples include protocols designed to create better outcomes in induction methods, group B strep treatment and follow-up, on-going gestational diabetes intrapartum management initiatives, new labor pain initiatives (such as hydrotherapy and the use of nitrous oxide), and concerted efforts towards monitoring and enhancing breastfeeding outcomes. Actively laboring patients typically have a 1:1 nurse to patient ratio. Women are also triaged appropriately when entering labor and delivery units for evaluation of labor onset; typically women are discharged during the early stages of labor with guidelines to help them cope with this discomfort.

However, in Florida, if the woman was over 39 weeks gestational age whether in early or active labor, the physicians typically instructed the triage nurse to admit the patient for labor and to start Pitocin per protocol. These women were told that they were in labor without being advised that it was merely the early stages; they were not informed that such early augmentation might hold a higher risk of cesarean section. With nursing ratios of one nurse to every two actively laboring patients, the nurses were unable to attend to the individual needs of each mother. Furthermore, despite a hospital policy encouraging patients to labor in upright positions the nurses in this small Florida hospital insisted that all laboring women remain in bed; they were “not allowed” to even get up to use the bathroom, but instead were given a bedpan. Doctors routinely ordered enemas on admission, and perineums were prepped with a betadine solution before delivery. Should a woman deliver vaginally, they kept their babies in the room with them for roughly one hour after which the babies were sent to the nursery to transition safely under the supervision of another nurse. These out-of-date practices exemplify the process of

following “tribal medicine” or modeling the practices and cultures of those you work with based on the way you initially learned and without application of current evidence.

The population delivering under these abysmal circumstances in this Florida hospital was primarily low-income, undereducated, and unmarried minorities with few resources available to them beyond this small community hospital. Zhao and colleagues (2015) indicated that financial stressors in the prenatal period contribute to low birth weight (LBW), with significantly greater impact among African Americans. Furthermore, Getahun and colleagues (2009) indicates that while primary cesarean section rates increased for women of all races, the rate of increase among African American women was 25% higher. There are evident disparities in birth outcomes across this country, contingent upon class and race.

Statement of Purpose

I desire to contribute to offering disadvantaged women in the United States superior care experiences during the prenatal, intrapartum, and postpartum phases. Since I have resolved to leave Minnesota and head to the southeastern United States after graduation, I debated whether a greater impact would occur working to change current hospital systems and cultures, or if another means of care would provide better outcomes. As such, the intent of this critical appraisal of the literature is to investigate whether freestanding birth centers improve outcomes for disadvantaged populations.

Need for a Critical Review of the Nurse-Midwifery Problem

The government program, Healthy People 2020, created a 10-year agenda with focused goals related to improving the welfare of its citizens. One of the overarching topics within Healthy People 2020 is maternal, infant, and child health. Recognizing the

need for improvement across the United States, specific objectives include: reduction of cesarean births for low-risk women, reduction of LBW and very low birth weight (VLBW), lower rates of preterm birth, fewer fetal and infant deaths, and increasing the percentage of pregnant women who obtain early and adequate prenatal care (Healthy People 2020, n.d.).

Nurse-midwives are perfectly situated to help address this nation's needs, and these 2020 goals, through their work with childbearing women. In particular, midwives working within birth centers, as opposed to hospital-linked clinics, are believed to offer lengthier appointments and spend more time addressing the full needs of their patients. Many articles have been written offering insight into the benefits of birth center care. This literature review is necessary to synthesize the best of that research into results that are generalizable across the nation, and address the needs of our country for updating birth support practices.

Significance to Nurse-Midwifery

Certified Nurse-Midwifery falls under the umbrella of Advanced Practice Registered Nursing (APRN). Certified Nurse-Midwives (CNM) obtain licensure nationwide through the same credentialing process. In other words, all individuals with the APRN, CNM credential have relatively equal levels of training and have all passed the same examination to obtain licensure. Despite matching ability, laws regarding ability to practice independently differ from state to state. According to the National Council of State Boards of Nursing [NCSBN] (2014) only 14 states have legalized full independent practice and prescribing authority to APRNs. The remaining states include at least some requirement of physician collaboration in order for APRNs to practice; these

collaboration agreements outline scopes of practice and medical acts allowed with general or direct supervision of licensed physicians (NCSBN, 2014). By further demonstrating the capability and superior outcomes of midwifery-run birth centers we add to the ever increasing evidence in support of ongoing legislative efforts in favor of independent practice for APRNs.

Not only does such evidence highlight the need for independent practice legislation, it also demonstrates how the uniqueness of the midwifery model of care contributes to beneficial outcomes. In defining the term "birth center" the American Association of Birth Centers (as cited in Stapleton, Osborne, & Illuzzi, 2013) described them as a homelike facility existing within the health care system with a program of care designed in the wellness model of pregnancy and birth. Birth centers provide family-centered care for healthy women before, during and after normal pregnancy, labor, and birth" (p. 3). In birth centers, practices tend to be more consistent with the philosophy and goals of nurse-midwifery practice with greater belief in the natural health processes of pregnancy, and less frequent utilization of interventions throughout the prenatal and intrapartum periods.

Theoretical Framework

The interplay of freestanding birth centers on health outcomes is viewed within the framework of the family stress theory as put forth by Pauline Boss. Boss (1988) describes the individual, and familial response, to an event as a catalyst for strain or stress that may negatively impact the family system. In this framework, the external elements are outside of the control of the individual. These external elements include: culture, history, economy, development, and heredity. Internal contextual elements are controlled

or influenced by the individual's structural, psychological, and philosophical characteristics. Both internal and external contexts are viewed as an expansion of the ABC-X theory put forth by Hill (as cited in Boss, 1988), that discusses the interplay of the event (A) based upon familial resources (B), perceptions of the event (C), and ultimately their ability to cope or succumb to the stress with the potential for crisis (X). See Figure 2.

While providers may view pregnancy as a health concern affecting primarily the mother, and secondarily the fetus, the role of the mother and new baby need to be considered within the greater context of the family system. Furthermore, the midwifery model, and birth center environments, factor into the systemic context with the capacity to address stress or strain on the family system.

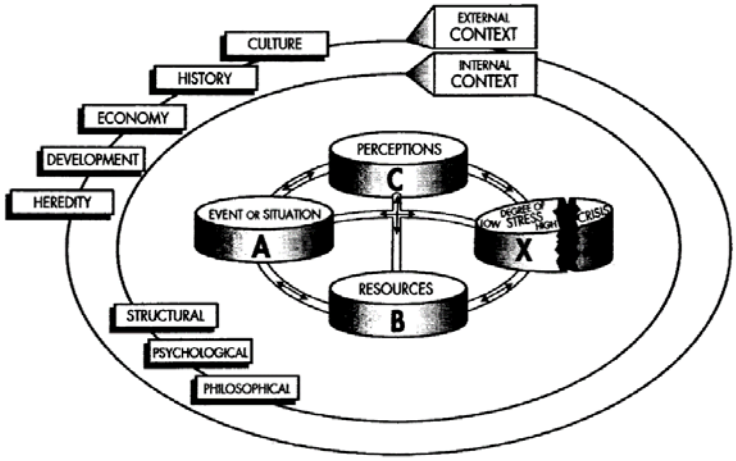

Figure 2. The contextual model of family stress. (Boss, 1988, p. 28)

In light of this theoretical framework, pregnancy would be considered the stressor event or situation. The pregnant mother, when compared to the other members of her family, may perceive the pregnancy differently. While birth might be considered a normative event, likely to occur within the woman's lifetime, its placement in her

historical context might not be of her choosing. The external factors of culture influences whether or not a pregnancy at this point in her life is considered a welcome event, or a stress inducing event. For instance, a married couple, striving for years for pregnancy perceives this event as a blessing. An unmarried adolescent in the same situation may experience shame if the culture of her family context has told her that she needs to wait until marriage to begin sexual relations. Furthermore, with the added disappointment of her family, this event becomes a disruption leading to significantly greater stress.

Birth centers offer the opportunity to influence the external element related to the culture in which women are giving birth. With more of your community giving birth within a birth center context, the stories told about birth become reflective of an empowering narrative. In such a context women are seen as strong, capable of birthing or delivering their babies without intervention, and without medications separating them from the experience. Within the midwifery model of care the women are supported to take active roles in the decision making process and supported in achieving the birth they desire.

Contrast that with a narrative, in which nearly one third of the community delivers their baby via cesarean section. If women are told they must remain in bed, they must not eat, they are incapable of coping with contractions, and must have pain medication, their perceptions are likely to increase the external stressors of birth in the context of the community. Is there truth when women say, “My body won’t deliver a baby naturally”? Or has this become the cultural expectation where the medical model of birth is prominent?

Boss (1988) further explains that the response to the stressor is dependent on the internal context of a fatalistic or mastery-oriented belief system. Within the fatalistic belief system, life simply is what it is; individuals lack the power to influence the outcomes of the events in their lives. When imbued with a mastery perspective, the individual finds they can impact outcomes to achieve better results. Boss (1988) additionally remarks that while western society typically adopts the mastery belief system, poor women and ethnic minorities (even within the western society) are more inclined to have a fatalistic viewpoint.

Returning to the discussion of community perception of birth, the underserved populations are at greater risk, grounded in a fatalistic perspective, to believe that they have little to no control over both the health of their fetus and events related to the birth experience. Freestanding birth centers generally offer much lengthier prenatal appointments. Women are offered greater opportunity to discuss their feelings related to the pregnancy, and midwives have substantially more opportunity to discuss prenatal health as well as to identify individual patient needs.

The midwifery model, present in freestanding birth centers, will be shown to address the needs of the underserved populations. The enhanced prenatal care offered has the potential to mitigate significant family stress as it addresses the changing family roles, advocates for a mastery perspective in control of prenatal events and mode of delivery, and helps women to identify the resources available to them to prevent this event from developing into crisis.

Summary

Hospital birth practices vary greatly across the United States. Underserved populations experience disparate health outcomes to a greater degree than other citizens. The government funded program, “Healthy People 2020” calls for an end to healthcare disparities. In light of these findings this literature review will address whether or not freestanding birth centers improve outcomes for underserved populations. The family stress theory will be used as the conceptual framework when addressing the results.

Chapter II: Methods

This chapter covers the process utilized in obtaining articles for the purpose of this literature review. It outlines search strategies, and describes the inclusion and exclusion criteria. In addition, it further covers the quantity and quality of articles obtained for review and discusses the use of Johns Hopkins criteria for evaluating level and quality of research design.

Description of Search Strategies

The evidence search primarily included journal articles found through the Cumulative Index to Nursing and Allied Health Literature (CINAHL) database. Search terms were also run through the Scopus database, but the majority of the results merely duplicated those located via CINAHL. Search terms included independent, and combinations of, "birth center, midwives, low-income, disadvantaged, and disparities." On a few occasions, articles were located after noting their reference in a retrieved article.

Another subset of articles was obtained through an Internet search to discover the government's interest and involvement in the pursuit of decreasing health disparities related to birth outcomes. It was during this search that the Strong Start for Mothers and Newborns program came to light. This four-year enterprise, to be discussed in future chapters, provided considerable research on this specific topic. After identifying this extensive program, CINAHL was once more accessed using the search term "Strong Start" to retrieve any further articles identifying birth center research related to this program. References contained within the Strong Start year one annual report were also reviewed for relevance to this project.

Inclusion/Exclusion Criteria

The majority of search efforts yielded results tangential to the topic of inquiry. For instance, searching "midwife and birth" in CINAHL yields 3,397 articles, clearly more articles than is reasonable for a literature review. These results were inclusive of all studies related to midwifery, not necessarily just those involving birth centers. Similarly, searching for articles related specifically to freestanding birth centers resulted in many articles from other countries that were not generalizable to outcomes in the United States. For instance, the Netherlands and United Kingdom have a strong history of midwifery and birth center use. Their midwives are well incorporated into the culture of birth in those countries. This leads to unique collaborative efforts between midwives and physicians, creates easier transfers of patients from birth center to hospital, and thus potentially impacts external influences on the midwifery practice. Citizens in the United Kingdom also have access to a single-payer healthcare system; even the poorest citizen should have equal access to healthcare services. In contrast, despite the implementation of the Affordable Care Act in the United States, not all American citizens are insured. In addition, those who are insured have varied coverage based on income level and the state in which they reside.

After reviewing results limited to midwifery care in freestanding birth centers, and further limiting the majority to studies that took place in the United States, few articles remained. A portion of the articles discussed outcomes specific to disadvantaged populations. Articles discussing birth center outcomes, without reference to the underserved populations, were included in the analysis and provided reasonable generalizations that could be made from the study outcomes.

While more current evidence indicates a greater likelihood to both quality and applicability for this research topic, this literature review includes five articles older than 10 years. These articles complement more recent materials and offer additional insight into the discussion.

Johns Hopkins Evidence Evaluation Model

Dearholt and Dang (2012) thoroughly outline article analysis based upon the Johns Hopkins Nursing Evidence-Based Practice model. Utilizing the research and non-research evidence appraisal tools provided by Dearholt and Dang, each article in the literature review was classified by level and quality. Level I and Level II studies both require an intervention upon study subjects; as discussed in the following section, this analysis does not include any such studies. Level III studies are considered non-experimental, but are still research studies. Typically, these level III articles involve retrospective analysis comparing the group of interest to a control group. Level IV studies involve clinical practice guidelines or position statements. Finally, Level V papers encompass the remainder of non-research evidence; this review includes expert opinion and program evaluations as level V studies.

After determining the appropriate level of each article, they were further dissected to determine quality of evidence. Quality of research was determined based on quality of results, generalizability, adequacy of sample size for study design, quality of literature review, quality of results, and whether conclusions were based upon evidence obtained in the study. Articles were graded as A-high quality, B-good quality, or C-poor quality.

Non-research articles (Levels IV and V) were similarly reviewed and graded. Level IV articles required the same judgment criteria as Level III noted above, with the

additional recommendation to review sponsorship for the position statement. Level V articles were judged with consideration of author expertise, strength of conclusions based upon scientific rationale, and logic for arguments or opinions. These non-research materials were also graded as A-high quality, B-good quality, or C-poor quality.

Quantity and Quality of Included Articles

Both pregnant women and the fetuses they carry are considered vulnerable populations. This poses an additional ethical burden on researchers who are attempting to learn more regarding interventions related to either population. In particular, randomizing the population into groups when the researcher suspects that one intervention will show benefit ultimately denies the beneficial intervention to a portion of the study subjects. Retrospective analyses carry less of an ethical burden yet offer critical insight to studied variables.

Given the challenges with creating higher-level studies, I was unable to discover any level I, or level II research articles. Lower level articles, such as expert opinion pieces, were included to achieve an adequate volume of input from articles reviewed. The matrix at the end of this paper includes a full article breakdown including identification of each article's level and quality of study. In essence, this literature review involves sixteen level III studies (8 high quality, 7 good quality, and 1 of poor quality); one level IV study of good quality; and four level V studies (3 high quality and one poor quality).

Summary

This chapter discussed the research efforts in determining articles for inclusion in this literature review. Methods for evaluating and categorizing articles were based upon Johns Hopkins Nursing Evidence-Based Practice models. Twenty-one articles remained

for literature review synthesis after meeting strict inclusion criteria. Chapter III will provide a more detailed analysis of the articles remaining for review.

Chapter III: Literature Review and Analysis

This chapter discusses organization of reviewed articles. Through article analysis three major themes emerged: maternal and infant health delivery outcomes, social support and the family stress model, and economic benefits of the freestanding birth center model of care. Lastly, this chapter will outline the strengths and weaknesses of the articles reviewed.

Synthesis of Matrix

Each of the 21 articles was analyzed to create a matrix (see Table 1: *Matrix of the Literature*). The matrix headings include: Citation, Purpose, Sample, Design, Measurement, Results/Conclusions, Recommendations, and Level & Quality. Matrix creation provided the first level of understanding regarding the available research, how studies were conducted, as well as major findings. Evaluating the level and quality of the studies facilitated understanding of the strengths and weaknesses of the studies, which will be discussed later in this chapter.

Synthesis of Major Findings

After the creation of the matrix, the articles were once more examined in depth. With this additional analysis a variety of themes became noticeable (See Table 2: *Emerging Themes)*. Ten of the articles discussed the maternal and fetal health outcomes of birth center clients compared to women giving birth in the hospital setting. Nine of the articles examined social support concerns. Eight of the articles addressed the economics of birth centers and the potential cost savings to the United States' healthcare system. The design methods varied, including five qualitative studies, three expert opinions, one

program evaluation, and one systematic review. The largest portion of articles consisted of ten non-experimental studies that were primarily retrospective analyses.

Maternal and infant health outcomes. Birth centers offered comparable, or better results, in comparison to standard hospital care for low-risk women in terms of maternal and fetal health (See 3: *Health Outcomes)*.

Mode of delivery. All births occurring in birth centers were vaginal deliveries; cesareans only take place in the hospital setting. However, studies considered cesarean rates with regard to transfers from birth center to hospital. Women tend to transfer from birth centers if they become high risk during their pregnancy, choose alternative pain relief measures (i.e. desire an epidural), or if their health status changes in labor warranting a higher level of care. Whether the authors considered all birth center clients as a whole when calculating cesarean rates, or only reviewed the cesarean rate of transferred patients, women who received prenatal care at the birth center had lower cesarean rates and lower rates of instrumental delivery as well.

Benatar, Garrett, Howell, and Palmer (2013) determined that the care at the birth center resulted in a 19.7% cesarean section (CS) rate compared to 29.4% for a matched population receiving standard care in a hospital. Instrumental deliveries were also lower (2.1% versus 4.4% in favor of birth centers), and the birth center had a higher rate of successful vaginal births after cesarean (26.9% versus 9.4%) (Benatar et al., 2013). Of particular note, this study focused on the Family Health and Birth Center in Washington, D.C., which specifically targets low-income, minority women. When Benatar and colleagues further broke down the data, they discovered that the subgroup for low-income, African American women had even better results than those noted above.

Gottvall, Waldenström, Tingstig, and Grunewald (2011) compared outcomes of 2,555 women delivering in a birth center against 9,382 low-risk women in a standard delivery ward in Stockholm Sweden over the course of four years. Gottvall and colleagues noted CS rates for primiparous women were 18.9% in the birth center group and 25.6% in the hospital group; multiparous women had rates of 3.3% and 14.9% respectively. Instrumental deliveries were also lower with 15.4% versus 16.8% for primiparous women, and 1.6% versus 3.2% for multiparous women (Gottvall et al., 2011).

Jackson and her colleagues (2003) evaluated the BirthPlace birth center in San Diego, California. In this study, qualifying women were provided the option to choose a birth center program and deliver at a freestanding birth center (FBC) or to enroll in traditional care with deliveries planned at the hospital. This study also had a large sample size with 1,808 women in the FBC group and 1,149 women in the standard model. Vaginal deliveries occurred more frequently in the FBC group (80.9% versus 62.8%); instrumental deliveries were lower (8.4% versus 18.1%) and CS rates were also lower (10.7% versus 19.1%) (Jackson et al., 2003).

Several other studies also concluded that birth center care results in either CS rates that are lower than the national average or lower than comparative standard hospital models (Centers for Medicare & Medicaid Services [CMS], 2014; Lubic & Flynn, 2010; Overgaard, Fenger-Grøn, & Sandall, 2012; Palmer, Cook, & Courtot, 2010). Overgaard and colleagues also noted lower incidents of instrumental delivery in the birth center group.

Stapleton and her colleagues (2013) also found significant improvements in mode of delivery; they evaluated data from 79 birth centers across 33 states in the United States and over a four-year evaluation period. Only 6.1% of women intending to deliver in a birth center had cesarean sections while only 1.2% had instrumental deliveries; and among those attempting a vaginal birth after cesarean, 70% were successful (Stapleton et al., 2013).

Infant outcomes. Women receiving prenatal care with midwives in birth centers had lower rates of preterm births; Benatar, Garrett, Howell, and Palmer (2013) noted an incidence rate for preterm birth of 7.9% in birth center patients compared to 11% for standard care. Jackson and her colleagues (2003) found a less significant difference in preterm deliveries of 6.4% of birth center patients compared to 6.5% of standard care. MacDorman, Declercq, and Mathews (2013) reviewed birth certificate data to break down preterm rates for home, birth center, and hospital deliveries (5.4%, 2.2%, and 12.1% respectively). Furthermore, studies from CMS (2014) and Lubic and Flynn (2010) also noted a lower rate of preterm deliveries for birth center clientele.

Low birth weight (LBW) is especially prevalent among African American women, as well as women with low-income status (Collins, Wambach, David, & Rankin, 2008). Women in the birth center models also experienced fewer LBW births. Benatar, Garrett, Howell, and Palmer (2013) showed rates of 8.4% in the birth center group compared to 10.2% for standard care. Rates in the Jackson et al. (2003) study were 3.8% versus 4.0% in standard models. MacDorman, Declercq, and Mathews (2013) noted LBW rates of just 2% for birth center deliveries compared to 12% for hospital deliveries.

Two other studies noted lower rates of LBW infants in birth center models as well (CMS, 2014; Lubic & Flynn, 2010).

APGAR scores are minimally evaluated for infants at one minute and five minutes of age. The APGAR provides an indication of fetal wellbeing and the necessity for resuscitation measures. Four of the studies found that when birth center deliveries were compared to hospital deliveries, APGAR scores were not different, indicating that birth center deliveries are just as safe for infants as standard hospital care (Benatar, Garrett, Howell, & Palmer, 2013; Gottvall, Waldenström, Tingstig, & Grunewald, 2011; Jackson et al. 2003; Overgaard, Fenger-Grøn, & Sandall, 2012). Furthermore Jackson and colleagues, Gottvall and colleagues, as well as Stapleton, Osborne, and Illuzzi (2013), noted that mortality rates were similar for both groups.

Breastfeeding. Few of the articles reported whether or not breastfeeding rates improved with a birth center model of care. CMS (2014) does not have a hospital comparison group but noted that postpartum surveys indicated that 90% of birth center moms intended to breastfeed and that 86% were breastfeeding. Jackson and her colleagues (2003) found higher breastfeeding rates at discharge among women receiving birth center care than standard hospital care (91.8% vs. 82.6% respectively).

Social support and family stress. As discussed in Chapter 1, one of the centerpieces of the Family Stress Model hinges on available resources to mitigate degree of stress for a particular event or situation. Enhanced prenatal care, offered through the birth center model, provides an additional level of support by establishing relationships with the midwives. Underserved populations particularly benefit from this resource (See Table 4: *Social Support & Family Stress)*.

Risk for adverse outcomes. Participants in the Strong Start program evaluated by CMS (2014) are exclusively considered underserved as they are all either Medicaid or Children's Health Insurance Program (CHIP) beneficiaries. The CMS Strong Start evaluation found that 1% of participants in the birth center model were living in a homeless shelter, 55% were unemployed, 22% experienced food insecurity, 23% experienced antenatal depression, and 23% had experienced intimate partner violence.

Nkansah-Amankra, Dhawain, Hussey, and Luchok (2010) discussed the unfavorable effects of living in neighborhoods with medium or high levels of income inequality. Regardless of independent maternal socioeconomic factors, low birth weight occurred more frequently in neighborhoods with medium levels of income inequality. Nkansah-Amankra and colleagues noted less social support in these neighborhoods and that increased social support structures help offset detrimental effects on maternal psychological and emotional wellbeing. In fact, isolation and insecurity worsen maternal psycho-neuroendocrine hormones that affect birth weight and gestational length (Nkansah-Amankra et al., 2010). Improving social networks correlates strongly to improved birth outcomes (Nkansah-Amankra et al., 2010).

Access barriers. Loveland Cook, Selig, Wedge, and Gohn-Baube (1999) noted that African American women are more likely to delay beginning prenatal care until after the first trimester. Beginning prenatal appointments later in pregnancy is particularly linked to LBW, neonatal death, and postpartum complications (Loveland Cook et al., 1999). Additionally, women experiencing major life stressors (like those mentioned in the CMS review), are more likely to give birth prematurely than those with fewer stressors (Williams et al. as cited in Loveland Cook et al., 1999). Further highlighting the

importance of social support during pregnancy to mitigate adverse outcomes, Loveland Cook and colleagues identified several access barriers that were intrapersonal and interpersonal in nature: embarrassment or dissatisfaction about the pregnancy, lack of transportation to the clinic, insufficient weekend and evening hours to allow for work schedules, long clinic waiting times, crowded clinics and dissatisfaction with the kind of care received at the clinic, and inability to find support through family or friend to overcome access barriers were some of the primary difficulties.

In contrast, Phillippi, Myers, and Schorn (2014) found that women were quite willing to overcome access barriers in pursuit of quality care when it is available. As the only FBC available in a 50-mile radius in rural Appalachia, much of the clientele at this center traveled a long distance for care; 19% crossed at least two county lines to obtain prenatal care (Phillippi et al., 2014). The women in this qualitative study particularly appreciated the unrushed and personalized care, stating that they enjoyed their time with the midwives and that they felt valued as whole and unique individuals. One woman, commenting on the birth center stated:

> ... to feel like I am a human – and to feel like I'm not just another name on a piece of paper to be checked off and – almost like a cattle call kind of thing. You know, I like prenatal care to be when they actually care about – you know, not just how's the baby doing, but how's Mom doing, you now, physically, emotionally, you know. And that to me is really, really important, and that's what I get here. That's why I like it here. (Phillippi et al., 2014, p. e31)

Many of the study participants received their prenatal care at the FBC, despite planning to birth at regional hospitals; they reported wanting more prenatal care options

and observing that previous clinic care was “unfulfilling or even dehumanizing” (Phillippi et al., 2014, p. e32). Additional FBC components motivating these women to overcome access barriers included knowing they could safely ask questions and receive answers, pleasant atmosphere, greater appointment availability with off hours, and activities to occupy their children (Phillippi et al., 2014). Despite the high rate of poverty and poor perinatal outcomes for the state where this FBC is located, this center had a preterm birth rate less than one-fourth of the state average (Phillippi et al., 2014). Clearly this FBC is meeting the needs of the community to entice women to overcome barriers and to achieve quality outcomes as well.

Birth spacing and the role of the birth center. Bryant, Fernandez-Lamothe, and Kuppermann (2012) engaged in a qualitative study to explore attitudes regarding spacing between births for low-income women. Bryant and her colleagues reported a fundamental lack of knowledge regarding the risk factors related to short interpregnancy intervals (less than 18 months between delivery and subsequent pregnancy), which included preterm deliveries, LBW, fetal death, and maternal depletion of nutrient stores (especially concerning for women who risk lower baseline nutritional stores such as low-income women). Bryant and her colleagues further noted that low-income women, with closely spaced pregnancies, are more likely to experience uterine rupture if they have had a prior cesarean, third trimester bleeding, and increased risk for school unreadiness in their children. While most study participants expressed some understanding for a benefit in spacing their pregnancies, a large proportion acknowledged that their healthcare providers did not offer them information to facilitate spacing such as discussing birth control options or the influence of lactation on birth spacing; one participant stated that

the only education she had received related to pregnancy was the advice to abstain from sex for 40 days following delivery (Bryant et al., 2012).

The findings of Bryant, Fernandez-Lamothe, and Kuppermann (2012) highlight the necessity for providers to offer education related to birth spacing and options related to birth control to decrease the chances of unintended pregnancy. The CMS (2014) study found that among Strong Start birth center participants, 78% of postpartum respondents reported that someone had spoken to them regarding birth control usage.

Mastery and social support. As discussed in chapter one, underserved women are more likely to experience a fatalistic worldview, one in which they have few choices, little control over their lives and what happens to them, and an inability to influence outcomes. In contrast, the mastery worldview supports the belief that an individual has control over her or his living situation, has options, and can change their status and influence outcomes in their lives. In addition to the access barriers, poor control over birth spacing, and adverse outcomes noted so far, Overgaard, Fenger-Grøn, and Sandall (2012) found that "disadvantaged pregnant women perceive themselves as having little knowledge and little choice, and that they have considerable faith in medical 'experts'" (p. 2). Enhanced prenatal care, offered through freestanding birth centers, provides greater social support and enhances a mastery perspective for their patients.

Overgaard, Fenger-Grøn, and Sandall (2012) determined that women receiving care in a freestanding midwifery unit (similar to FBC) rated their experiences higher in regard to psychosocial outcomes particularly as it related to their care. Furthermore, such care lessened the effects of social disadvantage for their birth experiences (Overgaard et al., 2012). Nkansah-Amankra, Dhawain, Hussey, and Luchok (2010) found that low

social support systems were an independent risk factor for pregnant women increasing likelihood of LBW and prematurity; improving social support (which FBCs frequently offer) directly correlates to improving these outcomes.

Lubic and Flynn (2010) highlight how beneficial FBC care is in improving the mastery worldview; they noted that the encouragement and demonstration for taking charge of their own pregnancies, the greater level of support to birth their babies, and learning to nourish their babies by breastfeeding "empowered them to take charge of other aspects of their lives, such as ending abusive relationships, finishing their education, and obtaining employment" (p. 59).

Similarly, the Strong Start program demonstrated valuable social and emotional support through FBC care. CMS (2014) found that Strong Start participants experience greater quantities of psychosocial and emotional needs. Strong Start participants benefit from the emphasis on the relationship between patient and provider in FBCs that specifically target emotional and social support in their prenatal care. Third trimester and postpartum surveys indicated very high rates of satisfaction with prenatal care in the Strong Start models (CMS, 2014).

In perhaps the most demonstrable of articles outlining improvement in mastery versus fatalism, Esposito (1999) conducted a qualitative study among women delivering at an inner New York City FBC who had previously had a hospital birth experience. In an effort to encourage women to understand their pregnant bodies, the women were taught to test their urine, and keep track of changes in their charts. They described feeling isolated and angry over the loss of power in their hospital experiences. Regarding her hospital experience one woman commented,

> The obstetrician who delivered me I never saw before…. But, I had no control. I had to go by what they said…. I didn't want to be medicated, [but they medicated me] and I was groggy. Then when I was fully dilated, they said, "push" and made me leave the LDRR because the doctor had a bad back and couldn't or wouldn't deliver me in a bed. I had to make it convenient for other people … doctors do good when people are sick, but when you aren't sick, you need people who will support you. (Esposito, 1999, p. 121)

In contrast, a participant who received FBC care said,

> I wasn't nervous … because I was relaxed, the labor went faster … it was mostly me and the midwife, it was just her talking to me, just telling me what to do, just her listening to the baby's heart, it wasn't a midwife here, then a doctor, then another doctor…. *I didn't feel like a rat in a cage, I felt like a woman about to give birth.* (Espositio, 1999, p. 120, emphasis mine)

Again and again the women highlighted the social support, the sense of closeness they established with their midwives, and even the community support they achieved because the FBC environment facilitated the opportunity to linger before or after appointments and chat with other mothers.

> There is something like treating you like a person. No titles, a closeness, they care about you as a person…. Not like a city hospital where people are rude and obnoxious, here, they remembered my name…. It was an intimate thing to share my pregnancy with the ladies here, to get to know them; they're very special. (Espositio, 1999, p. 118)

Another qualitative study by Pewitt (2008) also acknowledges the sense of empowerment achieved with FBC care, as well as the strength of the relationships formulated between midwife and patient. The women described their relationships with the midwives as friendships. In describing the sense of self-mastery and accomplishment achieved through giving birth, one participant described her experience this way:

> I'm pretty much convinced if I could go through that, I can do anything. I grew wings; I'll go as high as I want now. I believe I can do anything now. And if it wasn't for the midwives, I would not believe that because they helped me believe that. They supported me on it, and they just, they're my backbone…. I feel more powerful. (Pewit, 2008, p. 46)

Economics. Not only does the freestanding birth center model of care provide the many beneficial outcomes outlined thus far, it is also a significantly superior model in terms of cost-effectiveness. Nine of the articles reviewed discuss the cost saving benefits in either direct or indirect terms of their study (See Table 5: *Freestanding Birth Center Economics)*.

Medicaid covers primarily underserved populations. These populations, as discussed previously, are at increased risk of adverse outcomes. Costs associated with prematurity, low birth weight, and cesarean sections are naturally higher than the costs for healthy, uncomplicated vaginal deliveries. Alliman, Jolles, and Summers (2015) noted that Medicaid is responsible for almost *half* of all births each year; this is a financial burden of over $54 billion in facility charges. Howell, Palmer, Benatar, and Garrett (2014) also noted the large financial burden placed upon our federal budget in terms of Medicaid being the leading payer for maternity services. With Medicaid's federal funding

and focus on underserved populations, if birth centers can provide better outcomes and greater cost savings, then Medicaid should increase its coverage for FBCs which would provide more options for enhanced prenatal care for low-income and minority women.

Looking at historical cost savings, the systematic review done by Henderson and Petrou (2008) evaluated eleven studies related to home births and birth centers. Four of those studies involved birth center care within the United States. In 1980 obstetric fees ranged from $2,250 to $5,000 in New York while a birth center in the same area charged only $1,275 (Lubic as cited in Henderson & Petrou, 2008). At 1996 pricing, differences in prenatal care were not statistically significant; however, mean inpatient costs for the birth center were $4,257 compared to hospital charges of $5,729 (Stone et al. as cited in Henderson & Petrou, 2008). Walker and Stone (as cited in Henderson & Petrou, 2008) further outlined total fee differences including prenatal care and delivery; the birth center charged $1,076 per delivery and the hospital charged $2,228 in this work from 1996. Henderson and Petrou, also included data from the article in this project's matrix for Stone and Walker (1995). Stone and Walker (1995) more clearly noted that the hospital fees were on average 38% more expensive and provided a less appropriate model of care among low-risk pregnant women. Furthermore, Stone and Walker (1995) identified the additional cost burden when patients required transfer from FBC to hospital and determined that a transfer rate would need to exceed 62% before the FBC was no longer the most cost-effective strategy.

Palmer, Cook, and Courtot (2010) focused on comparing models of maternity care for women at risk of poor birth outcomes in the area of Washington, D.C. Attributing cost savings to a reduced use of resources, and decreased medical

interventions (such as induction costs, cesarean sections, and epidurals), Palmer and colleagues determined the average cost for an uncomplicated vaginal delivery at the birth center was $1,624 compared to vaginal delivery charges at the hospital of $6,239; cost savings were even greater in light of average cesarean section charges of $11,524. Howell, Palmer, Benatar, and Garrett (2014) also reviewed data in this location. While their findings were less impressive than Palmer and colleagues, Howell et al., still noted an average cost savings of $1,163 per Medicaid birth and extrapolated potential Medicaid cost savings of $11.6 million per 10,000 births per year (as calculated in 2008 constant dollars). Phillippi, Alliman, and Bauer (2009) likewise determined much lower facility fees, describing average FBC charges of $1,872 versus average hospital facility charges of $6,973. Furthermore, Stapleton, Osborne, and Illuzzi (2013) determined that birth center care could yield a possible savings of $27,245,000 among the 13,030 birth center clients at current Medicaid rates based on average FBC charges of $1,907 versus the $3,998 charged by hospitals. Stapleton et al. (2013) also noted that even if Medicaid facility reimbursement rates increased in FBCs to more reasonable levels, there would still be significant cost savings.

In an expert opinion piece, Krans and Davis (2014) further discussed the ongoing Strong Start study and noted that it will have the ability to conduct a thorough detailed review on a national level, and provide insight into identifying prenatal care models that accomplish the best fetal and maternal outcomes with the lowest consumption of healthcare resources. As part of their findings it was further noted that for every $1 spent on prenatal care there would be an associated $3.38 in savings through reduction of adverse outcomes (Institute of Medicine as cited in Krans & Davis, 2014).

Freestanding birth centers face challenges in facilitating these fantastic cost saving measures. Alliman, Jolles, and Summers (2015) found that birth centers in the United States are underutilized; despite a 42% increase over the previous five years, only 0.39% of all births occurred in FBCs. There are only 300 birth centers in the United States; regulatory barriers, inadequate insurance reimbursement (including Medicaid payments), or outright denial of the FBC into the insurance network hampers FBC growth (Alliman et al., 2015). Phillippi, Alliman, and Bauer (2009) identified three challenges to financial sustainability for FBCs: "the current malpractice insurance crisis, the need for a federally mandated birth center facility fee, and reimbursement issues, such as the rate for CNM/CM reimbursement" (p. 388). In further discussing the difficulties related to malpractice insurance costs, Palmer, Cook, and Courtot (2010) examined the malpractice premiums at the FBC, "When the birth center first opened in 2000, their malpractice premium was roughly $25,000 per year. By 2008, the birth center's malpractice premium rose to $300,000 despite a record of no incidents or claims" (p. 54). Lubic and Flynn (2010) further noted that since reimbursements are not equitable, the FBC in their study is required to raise at least half of its operating budget to support the work they do in the very poor Washington D.C. district through private, foundation, and DC council funding). Lubic and Flynn furthermore noted that they are unable to charge for additional services that provide improved benefits leading to increased costs for the FBC, without additional costs to the payors who then reap the benefits of the improved outcomes.

Critique of Strengths and Weaknesses

This literature review is strengthened as a whole through the inclusion of multiple studies covering multiple sites. In particular, the three articles discussing or reviewing the Strong Start program, utilized data involving ten FBCs, across multiple states, with outcome data for this paper's target population of underserved populations (Alliman, Jolles, & Summers, 2015; CMS, 2014; Krans & Davis, 2014). Continuing the theme of data volume, five additional studies also included participant sample sizes of over 2,500 women. In particular Stapleton, Osborne, and Illuzzi (2013) had a sample size of 15,574 women at 79 different FBCs from 33 states, and provided data related to both the themes of economics as well as the beneficial health outcomes.

In addition to the Strong Start articles focusing on underserved populations, four further articles involved the Family Health and Birth Center (FHBC) located in a very poor district of Washington, D.C. (Benatar, Garrett, Howell, & Palmer, 2013; Howell, Palmer, Benatar, & Garrett, 2014; Lubic & Flynn, 2010; Palmer, Cook, & Courtot, 2010). The FHBC provides prenatal care and delivery for primarily African American, low-income women, and additionally utilizes social support programs to enhance access to services in the community. Despite having a higher rate of hospital deliveries than many FBCs (around 45%) the women receiving care with the FHBC still achieved better outcomes as outlined on the previous pages of this chapter. Esposito (1999) also targeted marginalized women in her study with a review of an inner city FBC in the Bronx, NY. Likewise Jackson and colleagues (2003), as well as Nkansah-Amankra, Dhawain, Hussey, and Luchok (2010) focused their studies on underserved populations.

While this review did not find any Level I or Level II articles, the articles included represent a good variety of Level III, IV and V studies. The variety of non-experimental, qualitative, expert opinions, program evaluations, and position statements, enhanced the depth and diversity of knowledge obtained to fully address the impact of FBCs for underserved populations.

Individually, eleven of the included studies were weakened in their discussion by targeting only one FBC for review. Including additional FBCs may have provided data demonstrating that the results were further generalizable across many locations to advocate for further FBC growth as a sustainable, and beneficial model of care.

All of the articles were of high or good quality with the exception of one. Palmer, Cook, and Courtot (2010) provided a poor quality study that remained in this review. The decision to keep the Palmer et al. study in the critical appraisal was based on the overall quality of data contained. The study was poor quality because it attempted to measure information across three sites (hospital clinic, safety net clinic, and FBC), through a variety of means, and failed to match data for each site. For instance, in part they utilized focus groups and observations at a local safety net clinic, and at the FBC, and failed to obtain focus group samples from the hospital group. However, the data obtained from the FBC, and safety net clinic was good quality, and the data related to hospital health outcomes was also accurate.

The problem of selection tarnished eight of the articles included in this review. Stapleton, Osborne, and Illuzzi (2013) offered particular insight into this dilemma. Reviewing data for 15,574 women over the course of four years, FBC demographics trended toward Non-Hispanic White (77.4%), married (80.1%), privately insured (53.5%)

and educated (71.8% with 13 or more years of schooling). Esposito (1999) likewise described FBCs as a "predominantly middle-class phenomena [that] developed in the 1970s" (p. 114). Non-Hispanic White, married, educated, privately insured women do not carry the same risk factors for adverse birth outcomes as underserved populations. While beneficial outcomes for this group may or not be generalizable, the remaining twelve articles that focused on low-income and ethnic minorities strengthen their inclusion in this study.

We can safely assume that maternal and fetal benefits regarding preterm and low birth weight reflect the enhanced prenatal care delivered at FBCs. However, the trend toward lower cesarean rates may reflect a mix of this prenatal care, the lower incidence of epidural usage, and alternate fetal monitoring used at FBCs. None of the articles addressed the possibility that spontaneous vaginal delivery rates versus cesarean section rates, could come from the interruption of the normal physiological process that occurs when women are restricted to bed, with blood pressure altering pain medication. Epidural use, and possible cesarean rate increases, may alter the full cost analysis as well. Is it possible that a future trend toward alternative pain relief measures could additionally improve outcomes in a similar manner as those achieved by the FBCs? Jackson and colleagues (2003) additionally remarked that delivery outcomes at FBCs could be linked to intermittent fetal monitoring with the use of Doppler auscultation, rather than the standard continuous electronic fetal monitoring (EFM) typically utilized by standard hospital care; continuous EFM may increase the incidence of identification of abnormal fetal heart tones resulting in an increase in cesarean sections as well.

Summary

Underserved populations benefit from freestanding birth usage for prenatal care regardless of final location for delivery. Women receiving care at FBCs have lower incidences of preterm deliveries, low birth weight infants, and cesarean section deliveries. Furthermore, they demonstrated no greater risk to fetal health in terms of five minute APGAR scoring or rates of fetal demise. Breastfeeding rates were also improved for these participants. Beyond the physical outcomes, women receiving care at FBCs found enhanced social support, demonstrated a willingness to overcome access barriers to achieve this quality of care, and reported feeling empowered and learning that they could influence their health and delivery outcomes. Additionally, FBC care is a cost effective measure for underserved women that deserves inclusion in Medicaid plans with comparable reimbursement rates as physicians, and hospital facility fees.

Chapter IV: Discussion, Implications, and Conclusion

This chapter expands upon the literature review to more fully answer the practice question, "Can freestanding birth centers improve outcomes for disadvantaged populations?" It will cover the current trends and gaps in the literature. After the critical review of the findings in the previous chapter, this chapter furthers the discussion with implications for nurse-midwifery practice and recommendations for future research. Lastly, it will demonstrate integration and application of the family stress theory.

Birth Centers Improve Outcomes in Underserved Populations

The literature reviewed in chapter three provides strong support for the use of a freestanding birth center (FBC) model of care to improve maternal and fetal health outcomes in underserved populations. Furthermore, whether women receiving prenatal care at a birth center ultimately delivered at the birth center, or within a hospital, these benefits still remained. Birth centers provide prenatal care that is linked to fewer preterm deliveries, fewer infants with low birth weights, and fewer cesarean section deliveries. Infants had no greater risk of adverse outcomes as noted through fetal demise or decreased APGAR scoring.

In addition to the physical benefits, underserved women additionally benefited from enhanced social support. The quality of the care provided influenced women to overcome access barriers, leading to greater prenatal appointment attendance. With the use of the midwifery model of care, women receiving FBC care reported feeling empowered, strengthened in their knowledge of their pregnant bodies, and emboldened to believe they could impact their health and delivery outcomes.

Underserved women are commonly Medicaid beneficiaries. Medicaid also covers almost half of the births in the United States each year. This amounts to a significant financial burden, especially when additional healthcare dollars are needed to cover added birth expenses of prematurity, low birth weight (LBW), and cesarean sections. The FBC model reduces these events, and thus provides a significant cost savings to the federal government and ultimately to tax payers. Costs further decrease with FBC deliveries given the less expensive facility fees, even when midwifery payments match their physician counterparts. Not only does FBC care improve outcomes for underserved populations, the economics associated with such care make it a viable model for increased Medicaid funding and widespread inclusion into public and private insurance networks.

Current Trends and Gaps in Literature

Studies involving FBCs trended toward qualitative and retrospective non-experimental methods of study, and the lack of Level I, and Level II studies presented a noticeable gap in the available research. The midwifery model of care recognizes that the journey to motherhood involves more than the complexities of the biological processes of fetal cell development. It is much easier to discuss the multifaceted social, emotional, and spiritual influences of this journey through qualitative measures in which the mothers are able to describe and express their feelings related to the process. Additionally, FBC researchers appear to begin with a philosophy that FBCs are friendlier, and more welcoming, than the hospital counterparts, which the researchers viewed as cold and sterile. This viewpoint is thus highlighted in qualitative discussions in which women speak favorably of their FBC care, and contrast it with negative opinions related to

hospital experiences. Retrospective non-experimental studies provide comparable data between the FBC group and hospital groups, but they do so without an intervention on the front end of the study. Such studies allow for adequate comparison, without requiring the rigor of determining an intervention before data collection. In addition to easier standards, retrospective studies carry less of an ethical burden to get approval from a review board for permission to conduct the study. These factors likely make such Level III and Level IV studies more appealing.

Level I studies requires creation of a randomized controlled trial. This is readily done in the pharmaceutical industry where researchers easily navigate double-blind and randomized controlled trials for medications; replicating the look of a placebo pill to match the real thing and hiding the knowledge regarding which is which, occurs on a regular basis. This is simply not feasible with FBCs. The difference between FBC and hospital/clinic environments is too great to create a method of blinding for participants and researchers.

Adding to the difficulty of randomized controlled trials (Level I studies), Level II studies begin with a participant group open to being placed into either the intervention or control group. For Level I and Level II studies, the intervention must take place prior to, or during the study period, and not in a retrospective manner. As discussed in chapter two, retrospective analyses carry less of an ethical burden when passing an institutional review board to obtain permission to conduct the study when compared to Level I, and Level II studies. Since pregnant women and the fetuses they carry are both considered vulnerable populations, researchers are presented with significant challenges to pass an ethical review board for a study that removes women's autonomy in choosing prenatal

care options and birthing locations. This challenge is further aggravated when researchers suspect that one group benefits from the intervention, thus denying the benefits of the intervention to the vulnerable control group.

Nurse-Midwifery Application Implications

Chapter one discussed the need for this critical review in light of the United States' government program Healthy People 2020. This program recognized the need for improvement in the areas of maternal, child, and infant health with specific objectives including: reduction of cesarean births for low-risk women, reduction of LBW infants, fewer preterm births, reduction in fetal and infant deaths, and an increase in the percentage of pregnant women obtaining early and adequate prenatal care (Healthy People 2020, n.d.). As the literature review has shown, FBC care, with its unique inclusion of the midwifery model, does a better job of meeting these goals than the standard hospital care model. Not only do FBCs reduce cesarean rates, LBW infants, and prematurity, without any additional risk in fetal or infant mortality, they also do this in such a way that underserved women are more likely to overcome access barriers to receive this superior care.

The unique FBC environment provides midwives with greater support to truly practice in the midwifery model. Without technocratic hospital policies and procedures nudging them into the medical model, nurse-midwives in FBCs are likely to more readily embrace the holistic, relationship-focused midwifery model that may contribute to these positive results. Freestanding birth centers present nurse-midwives with an opportunity, not only to practice as their training indicates, but to also improve outcomes for underserved women across the United States.

Recommendations for Future Research

Should researchers discover a way to overcome the challenges presented in Level I and Level II studies, their addition to the wealth of literature regarding the benefits of FBCs, particularly as they relate to underserved populations, would greatly strengthen the rigor of existing data. Barring these additions, Level III studies that document results across multiple sites should also be conducted. For instance, utilizing the same qualitative questionnaires at birth centers caring for the underserved across multiple states will provide stronger evidence in comparison to a single study with a small sample at just one site. Even the non-experimental retrospective studies in which matched cohorts were used could benefit from branching out to cover multiple sites. Such multi-site data is beginning to come forth from the Strong Start for Mothers and Newborns Initiative, which is defining outcomes of FBC care. This study, unfortunately, does not have a standard for comparing FBC outcomes to matched participants in a standard hospital care model.

Family Stress Theory

This literature review demonstrates how FBCs utilize aspects of the family stress theory. Empowering women in their pregnancy-related healthcare influences them towards a mastery belief system rather than a fatalistic one. This change in their belief system increases their resilience to pregnancy-related stressors. Facilitating resource access through connections to community resources further enhances health outcomes and may reduce the degree of stress, thereby helping the family to avoid coming to a state of crisis. Birth centers become known in their communities as areas of such support, further influencing women to seek out these resources, despite access barriers. Since FBCs create a welcoming environment in which women feel supported they are more

likely to engage in early prenatal care, women who are at even greater risk of adverse health outcomes and potential states of crisis are reached earlier.

Conclusion

This literature review answered the practice question, "Can freestanding birth centers improve outcomes for disadvantaged populations?" The results emphatically demonstrated that FBCs *do* improve outcomes for disadvantaged populations with regard to mode of delivery, low birth weight, prematurity, breastfeeding continuance, enhanced social support, and decreased familial stress without any additional risk for adverse outcomes. Overcoming access barriers to begin early and consistent prenatal care is a significant challenge for underserved women. However, women are more likely to be willing to overcome access barriers in order to obtain care in which they feel honored, empowered, and respected as new mothers. The review indicated that mothers' belief systems evolve towards mastery and away from fatalism, further facilitating their own capabilities in improving the health outcomes for their infants. Lastly, FBCs showed a demonstrable financial benefit through decreased facility fees, delivery charges, and fewer costs associated with the adverse health outcomes of cesarean sections, low birth weight, and premature infants. Such cost savings provide grounds for enhanced Medicaid and private insurance reimbursement and inclusion in networks, especially networks targeting underserved populations.

As the government seeks to meet the goals of Healthy People 2020, it should work towards policies that facilitate further FBC expansion across the country. Likewise, non-profit organizations with mission statements supporting pregnant, underserved populations should consider teaming with FBCs to reach out to these women in their

communities. Future research should target tackling the challenges of creating higher levels of study, and broaden the number of sites sampled in qualitative and retrospective studies, in order to strengthen the current gaps in research.

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Loveland Cook, C., Selig, K., Wedge, B., & Gohn-Baube, E. (1999). Access barriers and the use of prenatal care by low-income, inner-city women. *Social Work, 44*(2), 129-139. doi:10.1093/sw/44.2.129

Lubic, R., & Flynn, C. (2010). The family health and birth center--a nurse-midwife-managed center in Washington, DC. *Alternative Therapies in Health & Medicine, 16*(5), 58-60. Retrieved from http://www.alternative-therapies.com

MacDorman, M., Declercq, E., & Mathews, T. (2013). Recent trends in out-of-hospital births in the United States. *Journal of Midwifery & Women's Health, 58*(5), 494-501. doi:10.1111/jmwh.12092

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Nkansah-Amankra, S., Dhawain, A., Hussey, J., & Luchok, K. (2010). Maternal social support and neighborhood income inequality as predictors of low birth weight and preterm birth outcome disparities: Analysis of South Carolina pregnancy risk assessment and monitoring system survey, 2000–2003. *Maternal & Child Health Journal, 14*(5), 774-785. doi:10.1007/s10995-009-0508-8

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Overgaard, C., Fenger-Grøn, M., & Sandall, J. (2012). Freestanding midwifery units versus obstetric units: Does the effect of place of birth differ with level of social disadvantage? *BMC Public Health, 12*(1), 478-478. doi:10.1186/1471-2458-12-478

Palmer, L., Cook, A., & Courtot, B. (2010). Comparing models of maternity care serving women at risk of poor birth outcomes in Washington, DC. *Alternative Therapies in Health & Medicine, 16*(5), 48-56. Retrieved from http://www.alternative-therapies.com

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Phillippi, J., Myers, C., & Schorn, M. (2014). Facilitators of prenatal care access in rural Appalachia. *Women and Birth, 27*(4), e28-e35. doi:10.1016/j.wombi.2014.08.001

Stapleton, S., Osborne, C., & Illuzzi, J. (2013). Outcomes of care in birth centers: Demonstration of a durable model. *Journal of Midwifery & Women's Health, 58*(1), 3-14. doi:10.1111/jmwh.12003

Stone, P., & Walker, P. (1995). Cost-effectiveness analysis: Birth center vs. hospital care. *Nursing Economic$, 13*(5), 299-308. Retrieved from http://www.nursingeconomics.net

Zhao, Y., Kershaw, T., Ettinger, A., Higgins, C., Lu, M., & Chao, S. (2015) Association between life event stressors and low birth weight in African American and white populations: Findings from the 2007 and 2010 Los Angeles Mommy and Baby (LAMB) surveys. (2015). *Maternal & Child Health Journal, 19*(10), 2195-2205. doi:10.1007/s10995-015-1734-x

Table 1: *Matrix of the Literature*

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Alliman, J., Jolles, D., Summers, L. (2015). The innovation imperative: Scaling freestanding birth centers, CenteringPregnancy, and midwifery-led maternity health homes. *Journal of Midwifery & Women's Health, 60*(3), 244-249. doi:10.1111/jmwh.12320	Commentary to provide direction for midwives and health policy advocates as they promote midwifery-led innovation and decrease barriers to implementa-tion.	NA	Expert Opinion	NA	Midwife-led innovations of Freestanding birth centers, CenteringPregnancy, and Midwifery-led Maternity Health Homes result in optimal outcomes including lower cesarean and preterm birth rates, cost savings, and increased client satisfaction.	Midwives and policy makers should focus on the following four areas to help drive change and support scaling of midwifery innovation: 1) Midwifery Data Collection. 2) Revitalized research. 3) Urge Centers for Medicare and Medicaid Services (CMS) to mandate inclusion of nurse-midwives and birth center facilities in their Medicaid Managed Care organization networks. 4) Urge CMS to develop and fund other initiatives to advance and demonstrate innovations in perinatal care beyond the Strong Start Initiative. Including reducing barriers and increasing access to midwifery, CenteringPregnancy, and birth center care.
Level & Quality						
Level V Quality A (High)						

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Benatar, S., Garrett, A., Howell, E., & Palmer, A. (2013). Midwifery care at a freestanding birth center: A safe and effective alternative to conventional maternity care. *Health Services Research, 48*(5), 1750-1768. doi:10.1111/1475-6773.12061 Level & Quality Level III Quality A (High)	To estimate the effect of a midwifery model of care delivered in a free-standing birth center on maternal and infant outcomes when compared with conventional care.	43,859 Women with at least 2 prenatal visits, a singleton birth and gestational age ≥ 24 weeks Family Health and Birth Center (FHBC) births group - 872 Usual care births (hospital) group – 42, 987	Non-experimental, retrospective analysis	Data collected from birth certificate information for all women giving birth in D.C. as well as District residents who gave birth in other jurisdictions between 2005-2008. Logistic regression model propensity score analysis. Controlled for a set of underlying predisposing demographic and health characteristics of the mother. Variables include mother's age, race, marital status, zip code, education, cigarette use, parity, pregnancy risk factors, health risk factors exogenous to mother's pregnancy, and month prenatal care initiated. Instrumental variable (IV) analysis to control for unobserved characteristics that may affect outcomes.	FHBC group statistically significant for– fewer obstetrical interventions: less likely to have C-section (19.7 vs. 29.4%), forceps or vacuum delivery (2.1 vs. 4.4%), more VBACs (26.7 vs. 9.4%), fewer preterm births (7.9 vs. 11.0%), greater birth weight, more likely to carry to term, less likely to deliver "early term", fewer C-sections between 37-39 weeks. No differences in APGAR scores. IV analysis concurred or showed greater statistically significant differences than propensity scores noted above. Better outcomes remain with subgroup analysis of low-income African American women.	Birth outcomes improve for higher need infants and mothers that are at greater risk of experiencing poor or undesirable birth outcomes with highly individualized prenatal care delivered in a culturally relevant and comfortable environment of FHBC. Alternative models of maternity care can be safe and effective in promoting noninterventionist approaches, improving maternal and infant outcomes and addressing problem of low-birth weight and preterm babies in the USA.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Bryant, A., Fernandez-Lamothe, A., & Kuppermann, M. (2012). Attitudes toward birth spacing among low-income, postpartum women: A qualitative analysis. *Maternal & Child Health Journal, 16*(7), 1440-1446. doi:10.1007/s10995-011-0911-9	To explore attitudes about birth spacing among low-income, recently postpartum women, probing knowledge and attitudes related to desired birth spacing.	43 women of low-income, recently post-partum women between April and July 2008. Most recent birth paid for by Medicaid, within 12 weeks prior to study enrollment. Rosters of women delivering at the University of California, San Francisco Medical Center and San Francisco General Hospital during this period reviewed for potentially eligible participants. Ineligible if less than 18 years of age, had had a stillbirth or desired to communicate in a language other than English or Spanish.	Qualitative	Groups stratified by race/ethnicity and language. 90min groups sessions in a university meeting room. Focus group guide used by moderators to present concepts for discussion; moderators granted leeway to follow-up on themes introduced by participants that were not in the guide. Discussion topics included experiences with health care during the most recent pregnancy, access to and need for health care in between pregnancies, pregnancy planning and birth spacing.	1)Knowledge gaps related to consequences of short birth intervals. Often an underestimation of the interpregnancy interval associated with lowest risk of adverse outcomes. 2) Lack of emphasis of the role of breast feeding was disappointing; women from low-income, Black and Hispanic backgrounds less likely to initiate and continue breast feeding. Role of birth control methods to effect spacing also limited. 3) Dominate theme of social circumstances on women's desire to have another child at a given interval, if at all. Birth and childrearing are primarily social phenomena and thought of by women as such. Wish for children close in age raised together prevalent and often stemmed from positive experiences in their own families; no data to support benefit/harm on family dynamics, psychological indicators or educational experience.	1)Improving knowledge of the consequences of short intervals among women and their families could be a relatively straightforward intervention. 2) Efforts to improve breast feeding rates among these populations may have downstream effects on birth spacing. Policy efforts in this area are needed. 3) Strategies to reduce incidence of short interpregnancy intervals requires input at many levels. Key pillars include educating women and providers about importance of birth spacing. Understanding role played by partners and family norms will help to develop acceptable and successful interventions.
Level & Quality						
Level III Quality B (Good)						

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Centers for Medicare & Medicaid Services. (2014). *Strong start for mothers and newborns evaluation: Year 1 annual report.* Retrieved from https://innovation.cms.gov/files/reports/strongstart-enhancedprenatal-yr1evalrpt.pdf **Level & Quality** Level V Quality A (High)	Independent year one evaluation of the Strong Start for Mothers and Newborns initiative. This 5-year study is charged with evaluating the implementation and impacts of Strong Start on health care delivery, health outcomes, and cost of care. Purpose is to present early findings from the evaluation, summarize the status of the evaluation's research efforts, and present a plan for the next year of work.	The initiative is currently supporting service delivery through 27 awardees and 213 provider sites, across 30 states, the District of Columbia, and Puerto Rico, with a proposed target of serving up to 80,000 women. Four-year cooperative agreements were awarded on February 15, 2013.	Program Evaluation	Evaluation includes three primary components: 1) Qualitative case studies-to provide an in-depth understanding of how Strong Start models are designed and implemented, document barriers or challenges awardees encounter during implementation, and describe perceived success and factors that contribute to success. 2) Participant-level process evaluation – to collect detailed information on the demographic and risk characteristics, service use, and outcomes of all Strong Start participants. 3) Impact analysis – to assess whether and to what extent Strong Start has had an impact on rates of premature births, low birth weight, and Medicaid/CHIP costs, through pregnancy and the first year after the birth. The impact analysis will also assess whether these impacts vary by model type, awardee, site, and type of services offered and received.	SS participants have high levels of emotional and psychosocial needs, which enhanced care models are designed to address. A common element among the 3 enhanced prenatal care models is an emphasis on relationship-centered care. Consistency in implementation varies considerably across models and among sites. Women being served by SS, thus far, have lower than average Cesarean section rates, higher rates of breastfeeding, and in some cases lower rates of preterm deliveries than the nation as a whole. SS participants express overwhelming satisfaction with their prenatal care, though satisfaction with delivery experiences is somewhat lower.	Preliminary evidence suggests not only very high levels of satisfaction with the care being provided, but also better birth outcomes – including lower rates of Cesarean section and, in some cases, preterm births – than the nation as a whole. Future years will be devoted to precisely analyzing SS's impacts on birth outcomes, prenatal care delivery, and costs. At this relatively early stage in implementation, CMMI officials can be satisfied that the initiative is off to a solid start.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Esposito, N. (1999). Marginalized women's comparisons of their hospital and freestanding birth center experiences: A contract of inner-city birthing systems. *Health Care for Women International, 20*(2), 111-126. Retrieved from http://www.tandfonline.com/loi/uhcw20 **Level & Quality** Level III Quality B (Good)	To describe two divergent birthing cultures by (a) providing a brief context for birth practices in New York City and then (b) describing the stories of those inner-city women who have childbirth experiences in both a hospital setting and at the birth center.	29 women, 5 midwives, 6 staff members at the birth center. The women were age 16-33, representing countries of Belize, Dominican Republic, Guatemala, Puerto Rico, St. Croix, Somalia, Virgin Islands and the United States. All had reached at least 8th grade. All except one qualified for food the program Women, Infants, and Children (WIC).	Qualitative Ethnographic interviews and participant observations of births and everyday activities at the birth center and in the immediate neighborhood.	Conversational style, open-ended interviews. Participant observation was conducted on various days of the week, at various times in and around the birthing center. Ongoing analysis guided the indexing, grouping, categorizing and reanalysis of data.	In contrast to barriers encountered during their hospital experiences, at the birthing center the women (a) had access to their medical records, (b) could document in their own charts, (c) were encouraged to socialize with other pregnant women, and (d) had ready access to the midwives. Women emphasized the importance of the intimate connections they developed with the nurse-midwives as well as feelings of control over (a) the environment, (b) the activities around them, and (c) their birth experiences.	To better understand inequities in health care, researchers must continue to document women's voices in various contexts. Further research needed with comparison groups. Room to study differences in how health care settings and providers use their policy, power, and structure with clients who differ by class, race/ethnicity, gender and sexual orientation. Explore variations in health care practices to better understand how to provide equitable healthcare for all.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Gottvall, K., Waldenström, U., Tingstig, C., & Grunewald, C. (2011). In-hospital birth center with the same medical guidelines as standard care: A comparative study of obstetric interventions and outcomes. *Birth: Issues in Perinatal Care, 38*(2), 120-128. doi:10.1111/j.1523-536X.2010.00461.x	To investigate the effects of modified birth center care on obstetric procedures during delivery and on maternal and neonatal outcomes.	2,555 women who signed in for birth center care during pregnancy compared with all 9,382 low-risk women who gave birth in the standard delivery ward in the same hospital (South General Hospital, Stockholm, Sweden) from March 2004 to July 2008. Modified birth center attached to the hospital. Exclusion criteria: diabetes, hypertension, epilepsy, obesity, cesarean section prior to present pregnancy, history of perinatal mortality, multiple pregnancy, maternal age >40 if nulliparous, and smoking	Non-Experimental	Odds ratios were calculated with 95% confidence interval and adjusted for maternal background characteristics elective cesarean section, and gestational age.	Modified birth center group included fewer emergency cesarean sections, and in multiparas the vacuum extraction rate was reduced. Epidural analgesia was used less frequently. Fetal distress was less frequently diagnosed in the modified birth center group, but no statistically significant differences were found in neonatal hypoxia, low Apgar score less than 7 at 5 minutes, or proportion of perinatal deaths. Anal sphincter tears were reduced. Midwife-led comprehensive care with the same medical guidelines as in standard care reduced medical interventions without jeopardizing maternal and infant health.	A modified version of comprehensive birth center care for women at low medical risk, with the same medical guidelines as those in standard care and with medical technology available on site, may reduce interventions during labor and birth without jeopardizing maternal or infant health; it may possibly improve them.
Level & Quality						
Level III Quality A (High)						

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Henderson, J., & Petrou, S. (2008). Economic implications of home births and birth centers: A structured review. *Birth: Issues in Perinatal Care, 35*(2), 136-146. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1523-536X **Level & Quality** Level III Quality A (High)	Studies that have examined the economic implications of home birth or birth centers are compared and critically evaluated to assess the factors that may influence the costs and cost-effectiveness of alternative places of birth.	Twelve papers describing 11 studies were included in the review.	Systematic review	Bibliographic databases MEDLINE (from 1950), CINAHL (from 1982), EMBASE (from 1980), and an "in-house" database Econ2, were searched for relevant English language publications using MeSH and free text terms. Data were extracted with respect to the study design, inclusion criteria, clinical and cost results, and details of what was included in the cost calculations.	Resource use was generally lower for women cared for at home and in birth centers due to lower rates of intervention, shorter lengths of stay, or both. However, this fact did not always translate into lower costs. Quality of much of the literature was poor, although no studies were excluded for this reason. Selection bias was likely to be a problem in those studies not based on randomized controlled trials because, even where birth center eligibility was applied throughout, women who choose to deliver at home or in a birth center are likely to be different in terms of expectations and approach from women choosing to deliver in hospital.	Further economic research that involves detailed bottom-up costing of alternative options for place of birth and measures multiple outcomes, including women's preferences, would help address the question of whether out-of-hospital birth is beneficial in economic terms.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Howell, E., Palmer, A., Benatar, S., & Garrett, B. (2014). Potential Medicaid cost savings from maternity care based at a freestanding birth center. *Medicare & Medicaid Research Review, 4*(3), E1-e13. doi:10.5600/mmrr.004.03.a06 **Level & Quality** Level III Quality B (Good)	To determine if care by midwives at a birth center could reduce costs to the Medicaid program compared to usual obstetrical care.	Findings from a prior quantitative case study of maternal and infant health outcomes at the Family Health and Birth Center in Washington, D.C. compared to a "usual care" group constructed using birth certificate data for other women who gave birth in the District of Columbia during the study period.	Non-experimental predictive correlational design	Outcomes experience from the birth center group and the matched usual care comparison group, along with a variety of proxy measures of Medicaid costs nationally in 2008, to estimate what national Medicaid savings would be if low-risk Medicaid obstetrical care was provided with the midwifery model of care used at the FHBC. Costs are estimated from the Medicaid payer perspective and do not include all societal costs.	Birth center care could save an average of $1,163 per birth (2008 constant dollars), or $11.6 million per 10,000 births per year.	Medicaid is the leading payer for maternity services. As Medicaid faces continuing cost increases and budget constraints, policy makers should consider a larger role for midwives and birth centers in maternity care for low-risk Medicaid pregnant women.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Jackson, D., Lang, J., Swartz, W., Ganiats, T., Fullerton, J., Ecker, J., & Nguyen, U. (2003). Outcomes, safety, and resource utilization in a collaborative care birth center program compared with traditional physician-based perinatal care. *American Journal of Public Health, 93*(6), 999-1006. doi:10.2105/AJPH.93.6.999	To compare outcomes, safety, and resource utilization in a collaborative management birth center model of perinatal care versus traditional physician-based care.	2,957 low-risk, low-income women. 1,808 received collaborative care. 1,149 received traditional care.	Non-experimental Prospective cohort study	Majority of data obtained from medical records. Data collected on maternal, perinatal and neonatal mortality and morbidity; antepartum, intrapartum, and postpartum risk factors and complications; sociodemographics; use of resources and procedures; and neonatal outcomes such as birthweight, gestational age, and Apgar scores. Prenatal care utilization measured with the Adequacy of Prenatal Care Utilization Index.	For low-risk women, both scenarios result in safe outcomes for mothers and babies. However, fewer operative deliveries and medical resources were used in collaborative care.	Resources and procedures, such as operative deliveries and hospital stays are substantially reduced with collaborative care compared with the traditional US model of perinatal care. Because these resources and procedures are major determinants of the cost of prenatal care, managed care organizations, local and state governments, and obstetric providers should consider inclusion of collaborative management/ birth center programs in their array of covered or offered services.
Level & Quality						
Level III Quality A (High)						

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Krans, E., & Davis, M. (2014). Strong start for mothers and newborns: Implications for prenatal care delivery. *Current Opinion in Obstetrics & Gynecology, 26*(6), 511-515. doi:10.1097/GCO.0000000000000118 **Level & Quality** Level V Quality A (High)	To review previous prenatal care expansion efforts and provide insights into the alternative prenatal care delivery models currently being tested for low-income patient populations at high risk for adverse birth outcomes.	NA	Expert Opinion	NA	Increased prenatal care access has not reduced low-birth weight trends. Enhanced prenatal care content is needed to improve outcomes. The future of prenatal care delivery lies in healthcare providers' and program leaders' ability to conceptualize prenatal care as a flexible model that can be tailored to maternal and fetal risks while recognizing the value and importance of prenatal care in terms of content and objectives.	Findings from Strong Start will provide much-needed evidence-based recommendations for future prenatal care content, structure and frequency in the hopes of improving the efficiency and effectiveness of obstetric healthcare delivery for high-risk women and their children.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Loveland Cook, C., Selig, K., Wedge, B., & Gohn-Baube, E. (1999). Access barriers and the use of prenatal care by low-income, inner-city women. *Social Work, 44*(2), 129-139. doi:10.1093/sw/44.2.129 Level & Quality Level III Quality B (Good)	To identify access barriers that place women at most risk of receiving inadequate prenatal care.	115 low-income adult women hospitalized on the postpartum unit of a large university-affiliated, urban medical center.	Non-Experimental Cross-sectional descriptive research design.	24-item Access Barriers to Care Index (ABCI). 5-Point Likert scale used to rate the degree that a given situation posed a barrier to prenatal care. Data obtained from medical records for sociodemographic characteristics and maternal risk factors (high BP, diabetes, multiple fetuses, smoking, sickle cell anemia, previous fetal death, maternal age <17 or >40). Adequacy of Prenatal Care Utilization Index (APNCU) for summary index for adequacy of prenatal care. Multiple logistic regression model to calculate odds ratios.	Most frequent access barriers: depression or unhappiness with pregnancy (44.3%), long wait times in the clinic (35.1%), too tired (29.6%), transportation (26.1%), clinic too crowded (24.6%). On average these barriers rated moderately difficult. Most difficult barriers: embarrassment about the pregnancy, hearing bad things about the prenatal clinic, not wanting family or friends to know about pregnancy, disliking the kind of care received at the clinic, lacking trust in health care system, being affected by the personal problems of family or friends, lack of evening or weekend clinic hours. Women with one or more medical risk factors experienced a greater number of access barriers (mean 5.5 vs. 2.7), and difficulty of those barriers rated higher. No significant difference with sociodemographic factors between those who did or did not receive prenatal care.	Develop innovative service delivery models that facilitate accessible care to better meet needs of pregnant women. Screen for access barriers with first prenatal clinic visit. Provide on-site childcare in prenatal clinics and offer incentives to encourage regular clinic attendance. Study limited in generalizability with sample predominantly African American women, and data only collected from one urban hospital.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Lubic, R., & Flynn, C. (2010). The family health and birth center--a nurse-midwife-managed center in Washington, DC. *Alternative Therapies in Health & Medicine, 16*(5), 58-60. Retrieved from http://www.alternative-therapies.com Level & Quality Level V Quality B (Good)	To highlight the Family Health and Birth Center (FHBC) – the authors perspective on the history of the founding of this center as a nurse-midwife-led model of care.	NA	Expert Opinion	NA	The combined elements of nurse-midwife-led maternal and child care with a focus on the social and educational context of pregnancy, birth, and infant/toddler better meets the needs of the population than do the comparison models. Until the total costs of an episode of care for FHBC's model of care can be compared to the total costs for usual care, it is difficult for FHBC to argue that the model is cost-effective, should be fully reimbursed, and should be replicated. The model is not fully reimbursed leading to cost benefits for payors while FHBC raises at least half of its operating budget to sustain the model	Urge insurance and policy change to improve funding for services not currently reimbursed and for full reimbursement for services such as group care which are only partially reimbursed. Additional studies needed to evaluate FHBC's impact on select birth outcomes.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
MacDorman, M., Declercq, E., & Mathews, T. (2013). Recent trends in out-of-hospital births in the United States. *Journal of Midwifery & Women's Health, 58*(5), 494-501. doi:10.1111/jmwh.12092 Level & Quality Level III Quality B (Good)	Although out-of-hospital (OOH) births are still relatively rare in the United States, it is important to monitor trends in these births, as they can affect patterns of facility usage, clinician training, and resource allocation, as well as health care costs. Trends and characteristics of home and birth center births are analyzed to more completely profile contemporary OOH births in the United States.	Data was culled from all birth certificates for the approximately 4 million live births registered in the United States in 2010 and equivalent data from previous years.	Non-Experimental	Birth certificate data used to determine variances in birth location across race/ethnicity, within each state, attendant present for delivery, maternal age, live birth order, marital status and preterm, low-birth-weight and multiple births.	After a gradual decline from 1990-2004, the number of OOH increased from 35,578 in 2004 to 47,028 in 2010. In 2010, 1 in 85 US infants (1.18%) was born outside a hospital; about two-thirds of these were born at home, and most of the rest were born in birth centers. The proportion of home births increased by 41%, from 0.56% in 2004 to 0.79% in 2010, with 10% of that increase occurring in the last year. The proportion of birth center births increased by 43%, from 0.23% in 2004 to 0.33% in 2010, with 14% of the increase in the last year. About 90% of the total increase in OOH births from 2004 to 2010 was a result of increases among non-Hispanic white women, and 1 in 57 births to non-Hispanic white women (1.75%) in 2010 was an OOH birth. Most home and birth center births were attended by midwives.	Home and birth center births in the United States are increasing, and the rate of OOH births is now at the highest levels since 1978. There has been a decline in the risk profile of OOH births, with a smaller proportion of OOH births in 2010 than in 2004 occurring to adolescents and unmarried women and fewer preterm, low-birth-weight, and multiple births.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Nkansah-Amankra, S., Dhawain, A., Hussey, J., & Luchok, K. (2010). Maternal social support and neighborhood income inequality as predictors of low birth weight and preterm birth outcome disparities: Analysis of South Carolina pregnancy risk assessment and monitoring system survey, 2000–2003. *Maternal & Child Health Journal, 14*(5), 774-785. doi:10.1007/s10995-009-0508-8	1. Evaluate the relationships among neighborhood income inequality, social support and birth outcomes (low birth weight, and preterm delivery). 2. Assess variations in racial disparities in birth outcomes across neighborhood contexts of income distribution and maternal social support.	Probability sample from South Carolina live births from 2000-2003, receiving and responding to PRAMS survey (overall response rate approximately 72%. Final sample size 5,730 mothers with complete information on all variables from 548 census tracts across the state.	Non-Experimental	South Carolina Pregnancy Risk Assessment and Monitoring System (PRAMS) survey for 2000-2003 geocoded to 2000 US Census data for South Carolina. Multi-level analysis was used to simultaneously evaluate the association between income inequality, maternal social relationships and birth outcomes.	Residence in neighborhoods with medium levels of income inequality was independently associated with low birth weight, but not preterm birth; low social support was an independent risk for low birth weight or preterm births. Non-Hispanic black mothers were at increased risk of low birth with or preterm birth primarily due to greater exposures of neighborhood deprivation associated with low income and reduced social support and modified by unequal income distribution.	Interventions to improve social support or networks need to recognize the levels of social resources or cohesion in each population subgroup to avoid adding support resources to those already available. It is important for public health advocacy to consider making proposals to municipal and state legislators to adopt living wage laws for low income mothers or workers in order to meet basic needs for improved health outcomes across the state.
Level & Quality						
Level III Quality A (High)						

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Overgaard, C., Fenger-Grøn, M., & Sandall, J. (2012). Freestanding midwifery units versus obstetric units: Does the effect of place of birth differ with level of social disadvantage? *BMC Public Health, 12*(1), 478-478. doi:10.1186/1471-2458-12-478 Level & Quality Level III Quality A (High)	To study whether the effect of birthplace on perinatal and maternal morbidity, birth interventions and use of pain relief among low risk women intending to give birth in two freestanding midwifery units (FMU) versus two obstetric units in Denmark differed by level of social disadvantage.	839 low-risk women intending to give birth in an FMU, who were prospectively and individually matched on nine selected obstetric/ socio-economic factors to 839 low –risk women intending obstetrical unit (OU) birth. Data were sampled during a 3.5-year period between 2004-2008.	Non-experimental	Cohort study with a matched control group. Educational level was chosen as a proxy for social position. Analysis was by intention-to-treat.	Women intending to give birth in an FMU had a significantly higher likelihood of uncomplicated, spontaneous birth with good outcomes for mother and infant compared to women intending to give birth in an OU. Likelihood of intact perineum, use of upright position for birth and water birth was also higher. No difference in perinatal morbidity or third/fourth degree tears, while birth interventions including c/section and epidural analgesia were significantly less frequent among women intending to give birth in an FMU. Positive results of intending to birth in FMU compared to OU held true for both women with and without post-secondary education. In some cases benefits were greater in the non-post-secondary educated group of women.	All women should be provided with adequate information about different care models and supported in making an informed decision about the place of birth.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Palmer, L., Cook, A., & Courtot, B. (2010). Comparing models of maternity care serving women at risk of poor birth outcomes in Washington, DC. *Alternative Therapies in Health & Medicine, 16*(5), 48-56. Retrieved from http://www.alternative-therapies.com Level & Quality Level III Quality C (Low)	1) To describe the organization, delivery, and content of care of the three models of maternity care: obstetric clinic at a large teaching hospital, federally qualified health care center or "safety net clinic" and freestanding birth center. 2) To analyze how the models of care might be improved to better serve this population efficiently and cost-effectively.	Multiple semi-structured key stakeholder interviews with maternity care staff and administrators (9 hospital obstetric clinic, 9 safety net clinic, 7 birth center). 1 focus group with 7 women at the safety net clinic and 1 focus group with 8 women at the birth center, none for hospital clinic. Structured observation of prenatal visits (9 observations of 2 different providers in the safety net clinic. 6 observations of 3 different providers in Birth center. No observations at hospital clinic.	Qualitative comparative case study of three different models of maternity care delivery to low-income women at risk of poor birth outcomes in Washington.	Comparative descriptive tables created to outline similarities and variances across the three study sites regarding: prenatal care, staff roles and content of care during labor and birth, postnatal care, and interviewees' perception of care.	All three models vary distinctly in how they organize and deliver care and what composes the content of care. Further, findings suggest that pregnant low-income women require the allocation of additional and nontraditional maternity care resources such as prenatal group care and breastfeeding peer counselors. These nontraditional components of care help providers address underlying social risk factors that may be negatively affecting the health of pregnant women and their unborn children while nontraditional maternity care models may provide grater value for money than traditional obstetric models, they face funding and sustainability challenges.	The results provide evidence that adopting practices such as group prenatal care and increased use of CNMs, nurse practitioners, or alternative providers may increase efficiency and improve provision of nonclinical care. The study suggests that the birth center model provides the most competitively priced pre- and postnatal care. Models relying mostly on health insurance reimbursement or government subsidy are more financially stable than those relying heavily on donor funding.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Pewitt, A. (2008). The experience of perinatal care at a birthing center: A qualitative pilot study. *Journal of Perinatal Education, 17*(3), 42-50. Retrieved from http://www.ingentaconnect.com/content/springer/jpe **Level & Quality** Level III Quality B (Good)	To describe women's experiences of care and satisfaction at a freestanding birth center.	Convenience sample of seven women who had given birth within 12 months of participant selection at a freestanding birth center located in a rural county in southeastern United States. Participants were all insured and aged 18 or older, English speaking and primiparous. Additionally all participants were Caucasian, stay-at-home moms.	Qualitative	Qualitative content analysis of semi-structured interviews	Three overarching themes emerged from the narrative data: (1) Empowerment, (2) Sense of Motherhood, and (3) Establishing and Strengthening Relationships. All women described the overall experience as satisfying. No one expressed negative psychological outcomes although some did experience physical complications. Women value caring providers, that caring providers support positive psychosocial outcomes, and that those outcomes may equate to a satisfactory birth experience.	There may be benefits to incorporating the midwifery care model into standards of practice for all perinatal health-care providers. Those in practice and those writing policies should consider that one solution to decreasing litigation rates is to connect with patients through caring relationships, which results in satisfied clients and positive outcomes.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Phillippi, J., Alliman, J., & Bauer, K. (2009). The American Association of Birth Centers: History, membership, and current initiatives. *Journal of Midwifery and Women's Health, 54*(5), 387-392. doi:10.1016/j.jmwh.2008.12.009	To discuss the history and current policy initiatives of American Association of Birth Centers (AABC) as it works to maintain the birth center model as a vibrant, sustainable part of the changing healthcare system.	NA	Position Statement	NA	AABC is committed to the birth center model of care. It promotes birth centers through national standards, initiatives, lobbying, research, and education. Several forces are greatly affecting birth center financial sustainability, including the malpractice crisis, low rates of professional reimbursement, and the lack of a federally mandated birth center facility fee.	Through promotion of research, collaboration with other organizations, and affecting national policy, AABC safeguards the birth center as a safe, evidence-based location for normal birth and the care of women.
Level & Quality						
Level IV Quality B (Good)						

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Phillippi, J., Myers, C., & Schorn, M. (2014). Facilitators of prenatal care access in rural Appalachia. *Women and Birth,* 27(4), e28-e35. doi:10.1016/j.wombi.2014.08.001 **Level & Quality** Level III Quality A (High)	To explore the experience of women receiving care at the exemplar birth center in rural Appalachia with low rates of preterm birth to identify facilitators of care.	29 women receiving care at a rural, Appalachian birth center in the United States with low rates of preterm birth.	Qualitative descriptive design.	Three types of data used to explore the women's experience of access: interviews, demographic questionnaires, and filed notes. Data were analyzed using conventional (inductive) qualitative content analysis of manifest content. Semi-structured interviews were the primary data source. Interviews were coded and entered into ATLAS-ti, a qualitative analysis computer program.	There is a connection between compassionate and personalized care and positive birth outcomes. Women were willing to overcome barriers to access care that met their needs. To facilitate access to prenatal care and decrease health disparities, healthcare planners, and policy makers need to ensure all women can afford to access prenatal care and allow women a choice in their care provider. Clinic administrators should create a welcoming clinic environment with minimal wait time. Unrushed, woman-centered prenatal visits can increase access to and motivation for care and are easily integrated into prenatal care with minimal cost.	Future research should further explore the link between women's perceptions, engagement, and health outcomes. More information is needed on effective models of prenatal care.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Stapleton, S., Osborne, C., & Illuzzi, J. (2013). Outcomes of care in birth centers: Demonstration of a durable model. *Journal of Midwifery & Women's Health, 58*(1), 3-14. doi:10.1111/jmwh.12003 Level & Quality Level III Quality A (High)	To examine outcomes of birth center care in the present maternity care environment.	Women who received care in birth centers that contributed to the UDS, entered labor eligible for and planning a birth center birth, and had estimated dates of birth during 2007-2010. 79 birth centers in 33 US states contributed data to the AABC UDS during the study period. 15,574 women planned and were eligible for birth center birth at the onset of labor and had complete UDS records.	Non-Experimental	Data were collected using the American Association of Birth Centers (AABC) Uniform Data Set, an online data registry developed by the AABC with a task force of maternity care and research experts. UDS collects data on 189 variables that describe the demographics, risk factors, processes of care and maternal-infant outcomes of women receiving care in a birth center. Data were transferred from the MySQL database to SAS version 9.1 for analysis. Descriptive statistics for demographic variables and perinatal outcomes calculated and frequencies reported.	Of 15,574 women who planned and were eligible for birth center birth at the onset of labor, 84% gave birth at the birth center. Four percent were transferred to a hospital prior to birth center admission, and 12% were transferred in labor after admission. Regardless of where they gave birth, 93% of women had a spontaneous vaginal birth, 1% an assisted vaginal birth, and 6% a cesarean birth. Of women giving birth in the birth center, 2.4% required transfer postpartum, whereas 2.6% of newborns were transferred after birth. Most transfers were non-emergent, with 1.9% of mothers or newborns requiring emergent transfer during labor or after birth. There were no maternal deaths. The intrapartum fetal mortality rate for women admitted to the birth center in labor was 0.47/1000. Neonatal mortality rate was 0.40/1000 excluding anomalies.	Future research should be carried out to describe the cost components of birth center care that have contributed to these outcomes. Future research should be carried out to describe the cost components of birth center care and strategies for optimizing and expanding this high-value care model. Qualitative studies exploring the experiences of childbearing women and families in birth center and hospital models of care are also critical.

Citation	Purpose	Sample	Design	Measurement	Results/ Conclusions	Recommendations
Stone, P., & Walker, P. (1995). Cost-effectiveness analysis: Birth center vs. hospital care. *Nursing Economic$, 13*(5), 299-308. Retrieved from http://www.nursingeconomics.net Level & Quality Level III Quality B (Good)	To answer questions regarding the cost and quality outcomes of labor and delivery care in birth centers compared to hospitals, when care is provided by a CNM in both settings.	NA	Non-experimental prospective case-control	Decision analysis using a decision tree format with SMLTREE computer software to model this cost-effectiveness analysis of a birth center versus hospital care.	A birth center is a cost-effective strategy for labor and delivery of low-risk women. Average cost of a delivery at the birth center is less, $3,385 compared to the average cost of labor and delivery at the hospital $4,673. On average the hospital was 38% more expensive and a less appropriate model of care for a low-risk birth. Rate of transfer (birth center to hospital) must exceed 62% before the birth center stops dominating the decision analysis as the most cost-effective strategy for low-risk birth.	Insurers and health policy decision makers should view a birth center as an economical model of health care delivery.

Table 2: *Emerging Themes*

Authors	Discusses Health Outcomes	Discusses Social Support/ Family Stress	Discusses Economics	Potential selection bias	Sample Size	Study Locations	Study Design
Alliman, Jolles, & Summers, 2015			Yes			Strong Start	Expert Opinion
Benatar, Garrett, Howell, & Palmer, 2013	Yes	Yes			Women: 872 FBC, 42,987 in hospital	FHBC	Retrospective
Bryant, Fernandez-Lamothe, & Kuppermann, 2012	Birth Spacing	Yes			43 women	2 CA hospital sites	Qualitative
CMS, 2014	Yes	Yes			10 FBC	Strong Start	Program Eval
Esposito, 1999		Yes			29 women	Inner city Bronx, NY	Qualitative
Gottvall, Waldenström, Tingstig, & Grunewald, 2011	Yes			Yes	Women: 2,555 FBC, 9,382 hospital	Stockholm Sweden	Non-experimental
Henderson & Petrou, 2008			Yes	Yes	12papers/11 studies	Multiple	Systematic review
Howell, Palmer, Benatar, & Garrett, 2014			Yes			FHBC	Non-experimental
Jackson et al., 2003	Yes				Women: 1,808 FBC, 1,149 hospital	BirthPlace in San Diego	Non-experimental
Krans & Davis, 2014			Yes			Strong Start	Expert Opinion

Table 2: *Emerging Themes (continued)*

Authors	Discusses Health Outcomes	Discusses Social Support/ Family Stress	Discusses Economics	Potential selection bias	Sample Size	Study Locations	Study Design
Loveland Cook, Selig, Wedge, & Gohn-Baube, 1999		Yes			115 women	One urban Hospital	Non-experimental
Lubic & Flynn, 2010	Yes	Yes	Yes			FHBC	Expert Opinion
MacDorman, Declercq, & Mathews, 2013	Yes			Yes	Approximately 4,000,000		Non-experimental
Nkansah-Amankra, Dhawain, Hussey, & Luchok, 2010		Yes			5,730 women	All South Carolina	Non-experimental
Overgaard, Fenger-Grøn, & Sandall, 2012	Yes	Yes			Women: 839 FBC, 839 hospital	Denmark	Non-experimental
Palmer, Cook, & Courtot, 2010	Yes		Yes		15 women in focus groups	FHBC	Qualitative comparison
Pewit, 2008		Yes		Yes	7 women	One TN FBC	Qualitative
Phillippi, Alliman, & Bauer, 2009			Yes	Yes		AABC	Position statement
Phillippi, Myers & Schorn, 2014		Yes		Yes	29 women	Rural Appalachian TN	Qualitative
Stapleton, Osborne, & Illuzzi	Yes		Yes	Yes	15,574 women	79 FBCs	Non-experimental
Stone & Walker, 1995			Yes	Yes		One FBC and nearby hospital	Non-experimental

Table 3: *Health Outcomes*

Authors	C-Sections	Vaginal	Instrumental Delivery	VBAC	Preterm	Low Birth Weight	APGAR	Breast-feeding
Benatar, Garrett, Howell, & Palmer, 2013	FBC*-19.7% H-29.4%		FBC-2.1% H-4.4%	FBC-26.7% H-9.4%	FBC-7.9% H-11%	FBC-8.4% H-10.2%	No differences	
CMS, 2014	FBC- Lower than national average	FBC-77%			FBC-Lower than national average	FBC-2%		FBC-Higher than national average.
Gottvall, Waldenström, Tingstig, & Grunewald, 2011	Primip: BC-18.9% H-25.6% Multip: BC-3.3% H-14.9%	Primip: BC-65.7% H-57.6%. Multip: BC-95% H-81.8%	Primip: BC-15.4% H- 16.8% Multip: BC-1.6% H-3.2%				No significant differences in 5 min APGAR or mortality	
Jackson et al., 2003	FBC-10.7% H-19.1%	FBC-80.9% H-62.8%	FBC-8.4% H-18.1%		FBC-6.4% H-6.5%	FBC-3.8% H-4.0%	Insignificant differences 5m APGAR or mortality	Higher 91.8 v 82.6% p1002
Lubic & Flynn, 2010	Lower in FBC vs. Hospital				Lower in FBC vs. Hospital	Lower in FBC vs. Hospital		
MacDorman, Declercq, & Mathews, 2013					FBC-2.2% Home-5.4% H-12.1%	FBC-2% Home-5% H-12%		
Overgaard, Fenger-Grøn, & Sandall, 2012	Less in FBC vs. Hospital	Higher in FBC vs. Hospital	Fewer in FBC vs. Hospital				Insignificant differences 5m APGAR	
Palmer, Cook, & Courtot, 2010	FBC-16.3% H- 30%							
Stapleton, Osborne, & Illuzzi, 2013	FBC-6.1% H-25%	FBC-92.8%	FBC-1.20%	FBC 70% success			Insignificant differences in mortality	

*FBC=Freestanding Birth Center. H=Hospital

Table 4: *Social Support & Family Stress*

Author	Social support and family stress model content
Bryant, Fernandez-Lamothe, & Kuppermann, 2012	Short interpregnancy interval (<18 mo) = Increased rates of preterm, LBW, IUFD, uterine rupture after C/S, maternal death, and school unreadiness among low-income children. Low-income women at highest risk of nutrient depletion. Sampled women were not educated regarding optimal spacing or birth control options.
CMS, 2014	78% reported discussing birth control. Rates of: homeless 1%, unemployed 55%, food insecure 22%. Rates: antenatal depression 23%, experiencing IPV 23%. FBC emphasizes relationship-centered care. Relationship provides valuable social and emotional support; also important vehicle for providing education on pregnancy, preterm risks, and self-care, and for facilitating connections to external resources in the community. FBC participants satisfied with prenatal care & delivery.
Esposito, 1999	Easy access to FBC provided opportunities for the women to build relationships with the midwives and each other. Women repeatedly emphasized the importance of being treated like a person and feeling respected during their health care experiences at FBC. "It's your body; here you can read and keep track of how it's going" re: self charting urine tests and vital signs. Hospital-sense of isolation and loss of power and control angered them; exaggerates the subservient role of the patient in the technocratic model. FBC-established trust and interpersonal connections with a humanistic advocate who has power in the birthing environment allows the woman freedom to focus on the birth.
Loveland Cook, Selig, Wedge, & Gohn-Baube, 1999	African American women are more likely to initiate prenatal care after their first trimester, have fewer prenatal clinic visits, or receive no prenatal care at all. Women who experienced major life stressors during and before their pregnancy were more likely to deliver prematurely than those who experienced fewer stressors. Most common access barriers: embarrassed about pregnancy, heard bad things about clinic, didn't want people to know about pregnancy, didn't like care received at clinic, didn't trust health care system, lack of evening and weekend clinic hours.
Lubic & Flynn, 2010	Women report that being treated with respect, being encouraged and shown how to take charge of their own pregnancies, being supported to birth their own babies, and learning to provide essential nutrients to their children with the help of the 24/7 in-home lactation support has empowered them to take charge of their lives, such as ending abusive relationships, finishing their education and obtaining employment.
Nkansah-Amankra, Dhawain, Hussey, & Luchok, 2010	Residence in a neighborhood with medium levels of income inequality was associated with higher risk of LBW; independent of maternal socio-economic factors. Mothers with low social support systems were independently at increased risk of LBW or preterm births. Improved community social support leads to improved outcomes.
Overgaard, Fenger-Grøn, & Sandall, 2012	Disadvantaged pregnant women perceive themselves as having little knowledge and little choice, and they have considerable faith in medical "experts." Women rate their experience of care in terms of psycho-social outcomes more positively in FBC compared to hospital. Results provided no support for the claim that women pursue different birth models and that their aims and wants for pregnancy and birth vary according to their socio-demographic backgrounds.
Phillippi, Myers & Schorn, 2014	FBC region known for high rates of poverty and poor health outcomes. 19% of FBC's pregnant clients crossed at least two county lines for prenatal care. Women enjoyed their time with the midwives, and felt each provider viewed them as a whole and unique person. Valued "unrushed" prenatal visits. Many participants had previous prenatal care in other locations and with other provider types and felt their previous care was unfulfilling or even dehumanizing. Women motivated to come in for care since they knew their questions would be answered.

LBW=low birth weight. IUFD=intrauterine fetal demise. C/S=cesarean section. IPV=intimate partner violence. FBC=freestanding birth center.

Table 5: *Freestanding Birth Center Economics*

Author	Economics content
Alliman, Jolles, & Summers, 2015	Medicaid programs fund nearly half of all births each year, totaling more than $54 billion in facility charges for mothers and newborns; single largest Medicaid budget expenditure. Strong Start enhanced prenatal care models have lower C/S and preterm birth rates, greater cost savings. Inadequate reimbursement and regulatory barriers causes underutilization of FBC. Possible savings of $27,245,000 for FBC care.
Henderson & Petrou, 2008	NY OB fees $2250-5000 vs $1,275 for childbearing center in 1982. Mean cost per delivery: FBC $3,385 vs hospital $4,673. Mean cost of maternity care FBC $6,987, hospital $6,803; inpatient expenses FBC $4,257, hospital $5,729. Prenatal care and delivery fees: FBC $1,076, hospital $2,228
Howell, Palmer, Benatar, & Garrett, 2014	Medicaid leading payer for maternity services. Estimate that birth center care could save an average of $1,163 per birth or $11.6 million per 10,000 births per year (2008 constant dollars). Calculated as cost savings for decreased risk of C/S, reduced induction rates (and associated complications), facility fees, and lower payments to midwives for prenatal care.
Krans & Davis, 2014	Strong Start will be able to rigorously compare outcomes in Medicaid beneficiaries receiving enhanced prenatal care at a national level to identify the model that achieves the best maternal and fetal outcome with least consumption of healthcare resources. Institute of Medicine committee estimated that for every $1 spent on prenatal care services, $3.38 would be saved because of reduction in low birth weight and adverse birth outcomes.
Lubic & Flynn, 2010	Extra services that are yielding better outcomes are not charged to health care system or not reimbursed. Unable to determine cost-effectiveness this way. FBC raises half its operating budget (private, foundation and DC council funding) while payors benefit from the savings.
Palmer, Cook, & Courtot, 2010	Cost savings at FBC may result from lower resource utilization and lower rates of medical intervention (C/S and epidural). Average cost of FBC birth $1,624; hospital $6,239 for vaginal delivery and $11,524 for C/S. In 2000, malpractice premium was $25,000/year; by 2008 $300,000/year despite a record of no incidents or claims (covers all 4 CNMs).
Phillippi, Alliman, & Bauer, 2009	3 main pressures on FBC financial sustainability: current malpractice insurance crisis, the need for a federally mandated birth center facility fee, and reimbursement issues, such as the rate for CNM/CM reimbursement. Average FBC fee in 2007 was $1,872, hospital was $6,973.
Stapleton, Osborne, & Illuzzi, 2013	Medicaid facility fees still vary by state. 2011 average vaginal delivery at FBC $1,907, and hospital $3,998. Thus the 13,030 FBC births in this cohort saved an estimated $27,245,469 in payments for facility services compared with hospital vaginal births at current Medicare rates. Even with birth center facility reimbursement rates increased to more equitable levels, cost savings would remain significant.
Stone & Walker, 1995	Average delivery fee of FBC $3,385 compared to hospital $4,673. Hospital average 38% more expensive; less appropriate model of care for low-risk birth. Considering costs associated with transfer from FBC to hospital, the transfer rate would need to exceed 62% before the FBC stopped being the most cost-effective strategy.

FBC=freestanding birth center. C/S= cesarean section