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## Population Assessment to Determine the Eligibility for Birth Center Care at University of Kentucky Midwife Clinic

Dolores Polito  
*University of Kentucky*, [djpo228@uky.edu](mailto:djpo228@uky.edu)

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Population Assessment to Determine the Eligibility for Birth Center Care at  
University of Kentucky Midwife Clinic

Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Nursing  
Practice at the University of Kentucky College of Nursing

By:

Dolores J. Polito

Lexington, Ky

2021

## Abstract

**Background:** The COVID-19 crisis prompted patients to inquire about their options to avoid going to the hospital for birth. Outside of the hospital, birth center care has been identified as an evidence-based model for healthy women during pregnancy and birth, but it is not available in Kentucky.

**Purpose** The purpose of this study was to determine if there are women eligible for birth center care who have been part of a nurse midwifery service and given birth in a large, academic, tertiary care setting.

**Methods:** A retrospective chart review was used for this study. It involved a collection of data from the records of 700 patients who have given birth with the University of Kentucky Healthcare Midwife Clinic (referred to throughout as UK Midwife Clinic) for the three fiscal years beginning July 1, 2017 and ending June 30, 2020.

**Results:** The results indicated that 33.2% of the patients who gave birth during the specified time frame would have been eligible for birth center care. This group had the lowest risk going into labor and had a vaginal birth rate of 96.54% and the cesarean birth rate was 3.03%.

**Discussion:** Although it is a hospital-based service, care provided by the midwives showed a higher vaginal birth rate and a lower cesarean section rate than what is discussed in the literature and is consistent with the model of care provided in birth centers.

**Conclusion.** Birth center program development may be a feasible endeavor for the patients at UK Midwife Clinic. Further research is recommended to determine consumer demand, acceptance by other medical providers and administration, and financial feasibility.

## Acknowledgements

I would like to recognize my academic advisor, Dr. Julie Marfell for her encouraging and positive outlook, uplifting discussions, reliable availability and feedback, patience, and willingness to walk me through this project. Along with Dr. Marfell, my DNP committee members have also been a source of guidance and support. The visionary Victoria Burslem has been a dynamic influencer who continues to guide me professionally and personally with her kind, direct advice, and wisdom, empowering me to look toward the future. Dr. Jill Alliman has been an inspiration and role model with her unending passion for birth center care and leadership. I aspire to be as impactful as impactful as she is.

Credits are also due to Dr. Debra Hampton for her guidance; Dr. Amanda Wiggins, Cynthia Cockerham, and Asmita Shrestha for their help with data collection and analysis; Dr. Diana Jolles and Christine Haas for their perspectives and advice on birth centers. I am deeply grateful to each of them for sharing their time and talents with me. I would like to acknowledge the diligent work that Melissa Courtney, Hayden Meza, Chrissie Adams, and JoAnne Burris have added to produce such compelling results in this study and finally, I would like to express my profound gratitude to all the staff of the University of Kentucky Midwife Clinic who have supported me accepted my endless work ethic.

The author recognizes frequent use of woman-centered language in this document which is not meant to exclude any childbearing person or define any role. Acknowledgement is given that language reflects and shapes understandings of genders and roles. Addressing issues of binary gender and cultural bias is outside of the scope of this paper, and feminine references are used.

## **Dedication**

This project, along with all my academic pursuits during this program is just one piece of the puzzle in demonstrating the need for birth centers in Kentucky. Accordingly, I would like to first dedicate this project to all the women and families who are deserving and would be better served under the midwifery-led, birth center model of care. They unfortunately do not have that option, but they should, and eventually they will. Secondly, I dedicate this project to Mary Carol Akers PhD CNM, whose pursuit of a birth center in Kentucky was smothered by many individuals and institutions but whose story ignited my enthusiasm to illuminate her experience and carry the torch onward and continue to blaze the trail for birth centers.

I would like to also dedicate this project to my children who have been a refreshing source of energy and momentum during this program. I hope each one of them finds inspiration to do something very challenging to advance themselves in their own individual way, but more importantly, to make an impact on the world. I dedicate this project to my parents who have continued to support me unconditionally in whatever endeavor I chose. Finally, I dedicate this project to my husband. He has been an unending source of motivation and encouragement. He inspires me to be resilient and tough but is also my gentle, calming presence, being the quiet eye of the storm, which surrounded me at times during this project. His ongoing faith in my abilities is much stronger than my own and he always knows what I need and loves me more.

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## Introduction

A birth center is a freestanding facility that provides an alternative to giving birth at home or in a hospital for low-risk women. The American Association of Birth Centers (AABC) is the nation's foremost authority on Birth Centers and defines a birth center as either a freestanding facility or a separate unit within a hospital – called alongside midwifery unit (AMU) – designed to provide a homelike environment for women who want an option of care that falls between a hospital and a home birth (Cole and Avery, 2017). Both settings are described by Edmonds et al. (2020) as midwife-led units and are exemplars of how midwifery care is incorporated into existing healthcare systems to transform maternal health. Hospitals have labor and delivery units that may be called “birth or birthing centers”, but the care provided there is different from a birth center. Labor and birth in a freestanding facility is individualized and centered around a woman's goals as compared to a hospital birthing unit which often has protocols and policies in place, providing less flexibility to produce efficiency and standardization of care (AABC, 2017).

In addition, the American College of Obstetricians and Gynecologists (ACOG), along with the Society for Maternal Fetal Medicine (SMFM) define diverse levels of maternity care which address the need to improve our current system and reduce maternal morbidity and mortality, including addressing existing disparities in healthcare. In “Obstetric Care Consensus #9” (Kilpatrick et al., 2019), ACOG and SMFM firmly establish different levels of maternal care to encourage the provision of risk-appropriate classification to meet varied maternal health needs. They are freestanding birth centers, basic care (level I), specialty care (level II), subspecialty care (level III), and regional perinatal health care centers (level IV). They define accredited birth centers as providing “Care for low-risk women with uncomplicated singleton term vertex pregnancies who are expected to have an uncomplicated birth” (Kilpatrick et al.

2019). They also affirm that accredited birth centers are an integral part of many regionalized care systems. This Consensus Statement is endorsed by AABC, the American College of Nurse-Midwives (ACNM), the Association of Women’s Health, Obstetric and Neonatal Nurses (AWHONN), the Commission for the Accreditation of Birth Centers (CABC), and the Society for Obstetric Anesthesia and Perinatology (SOAP).

Birth centers feature the midwifery model of care with special regard for physiologic birth and with an understanding that pregnancy and birth are normal (AABC, 2017). The midwifery and wellness model of care in pregnancy and birth is practiced in the birth center setting, guided by the principles of prevention of disease, sensitivity, safety, and cost-effectiveness, and using medical interventions only when appropriate. A feature of birth center care is the distinct regard for physiologic birth and although this feature may be seen in hospital settings, it is the exclusive practice within the birth center model (AABC, 2017). A birth center provides family-centered, personalized care for healthy, low-risk women throughout pregnancy, labor and birth, and the postpartum period as well as throughout a woman’s lifespan. Birth centers are staffed by midwives, obstetricians, family practitioners, pediatricians, and other professionals and work collaboratively with near-by hospitals and physicians for mothers and/or newborns who need their services at any point during their care (AABC, 2017). Midwives work in a system of maternity care with physicians which allows for consultation, collaboration or referral as needed according to the patient’s level of care.

Birth centers also facilitate informed decision making and individual choice as part of the wellness model of healthcare. Hospitals have labor and delivery units that may indeed be called “birth or birthing centers”, but the care provided there is different from the birth center model and may not recognize individualization of care as a priority.

“Risk” is an important consideration in birth center care and refers to maternal and fetal health indicators that can influence birth outcomes. Maternal health conditions such as diabetes or hypertension that exist prior to pregnancy or medical conditions that develop during the pregnancy can influence wellbeing for the mother or fetus and are considered risk factors. Women are monitored for risk factors beginning with the onset of their care in understanding their health history but also throughout the progress of their care during each prenatal visit. Women who have risk factors that influence their health and the potential for influencing their outcomes may not be appropriate candidates for birth center care.

Jolles et al. (2018) summarizes risk appropriate care for birth centers using a study of the AABC’s Perinatal Data Registry and suggests using low medical risk criteria to be eligible for birth center care. Ongoing assessment of a woman’s medical history, previous pregnancy history, and prenatal complications in the current pregnancy is used to determine risk appropriate status. Jolles et al. (2018) define specific medical risk criteria according to assessment findings which are illustrated in Table 1.

## Background and Significance

Birth centers do not exist in Kentucky. There are currently 384 birth centers in 40 states and the District of Columbia, and 41 states have licensing provisions which support regulation of birth centers, including Kentucky (AABC 2020). Birth centers have been beneficial to other states, saving health care dollars and reducing cesarean section rates (AABC, 2020). At this time, if a woman wants an alternative to hospital birth, does not want to give birth at home, and desires the services of a birth center, she will have to leave the state and travel to Indiana, Ohio, West Virginia, or Tennessee where birth centers are in operation.

Birth center development in Kentucky has been met with an obstacle in the past with one certified nurse midwife being unable to obtain a Certificate of Need (CON) which is required for any new health care facility. Currently in Kentucky, there is legislation proposed in the Senate and the House of Representatives which would exempt birth centers from requiring a CON. This effort has been promoted by individuals interested in birth center development in the state as well as a grassroots organization called “Kentucky Birth Coalition”. Exempting birth centers from requiring a CON could eliminate this issue which has been a barrier in the past for Kentucky.

The recent emergence of the COVID-19 pandemic has created a reexamination of birth practices for women who are low-risk and are considering alternatives to giving birth in a hospital. According to American Association of Birth Centers (AABC, 2020), with the threat of hospitals reaching capacity due to COVID-19 admissions, freestanding birth centers across the nation are experiencing an increase in women who desire to transfer their care to a birth center to avoid exposing their families to COVID-19 in a hospital setting. According to AABC President Amy Johnson-Grass ND, LN, LM, CPM “We are seeing hospitals and freestanding birth centers

working collaboratively to put plans in place in the event hospitals are overwhelmed”. The AABC believes this collaborative effort is a paradigm shift for maternity care and birth centers in this country (AABC, 2020).

Reevaluation of chosen location for birth during the coronavirus epidemic has reached Kentucky women and families who have inquired to the UK Midwife Clinic about their alternatives to giving birth in a hospital since March 2020. Phone calls and discussions during prenatal care appointments began to occur when women and families asked what alternatives they had to hospital birth. Those inquiries led to serious consideration of the birth center model as a feasible option for women and families looking for out-of-hospital alternatives for birth. Data from the Centers for Disease Control and Prevention National Center for Vital Statistics shows an incremental rise in the number of birth center births between 2008-2018 (NCHS, 2020). During that time, the annual number of birth center births increased by 60% while the annual number of births in the United States decreased by 12% during the same period. Additionally, the AABC reports that the birth center industry experienced a 97% increase since 2010 (AABC, 2020).

Cole and Avery (2017) describe the forces that lead to creativity and innovation in the development of birth center care and suggest birth centers have demonstrated their role as a disruptive innovation. These forces include social crisis, adversity, and necessity; and these drivers can influence the restructuring of the maternity care system. The current global pandemic can be regarded as a social crisis in which women and families felt a critical urgency to call for innovation for their limited out-of-hospital birth options.

In addition to the current COVID-19 pandemic, rising cesarean section rates, excessive costs of maternity care, and poor maternal outcomes are other issues causing women to evaluate

if going to the hospital for childbirth is their safest option. Dekker (2013) illustrates that we have reached a crossroad in the United States pertaining to maternity care and asserts that it is time to develop other options positing that the solution is the integration of birth centers into the healthcare system. This can lead to high-quality, individualized services with improved outcomes for mothers and babies. Furthermore, it is imperative to follow the suggestions previously defined by Berwick et al. (2008) and the Institute for Healthcare Improvement. *The Triple Aim* of improving the quality of healthcare in the United States, according to Berwick et al. (2018) entails enhancing the care experience and outcomes for a population while reducing the costs of care. These three aims – safe, satisfying, cost-effective care - reflect the primary features of the birth center model.

Reducing cesarean birth rates when they are medically unnecessary is a current public health effort nationally. According to the U.S. Department of Health and Human Services *Healthy People 2030 Objectives* (2020), first-time mothers with potentially low risk births, meaning they have a single, full-term baby in the vertex position, are a target population for measures to reduce the cesarean birth rate. This population is referred to as nulliparous, term, singleton, vertex (NTSV) and the cesarean birth rate for this population is referred to as the NTSV rate. In 2019, the overall cesarean rate nationally was 31.7% and NTSV or low-risk population had a cesarean rate of 25.6% (CDC, 2020). The *Healthy People 2030* target for the NTSV cesarean rate is 23.6%.

Improving maternal and infant outcomes is particularly important for maternity care in Kentucky. The CDC (2020) reports that nationally the cesarean birth rate was 31.7%. Kentucky has the 9<sup>th</sup> highest overall cesarean section rate in the country at 34.3% and NTSV rate of 26.8%. Additionally, according to Kentucky Health News (2019), the Kentucky Perinatal Quality

Collaborative, an organization developed to improve maternal and infant health outcomes, reported the national average for pre-term births is 10%. In 2018, Kentucky's preterm birth rate was 11.3%, a rate that has risen four years in a row. Furthermore, Kentucky's maternal mortality numbers nearly doubled in 2018, rising from 39 deaths in 2017 to 76 deaths in 2018.

Hill et al. (2016) recognize the importance of birth center care for improving birth outcomes at lower costs for Medicaid beneficiaries which can be of particular benefit for Kentuckians, where 27% of the population receive Medicaid benefits and 34% of the population is considered low-income (KFF, 2017). In the *Strong Start Initiative*, Hill et al. (2016) demonstrate lower rates of preterm birth, low birth weight and cesarean section for Medicaid recipients who participated in birth center care. Costs were more than \$2,000 lower per mother-infant dyads during birth and the following year.

The positive outcomes of birth center care have been well documented with the use of the AABC Perinatal Data Registry (PDR), formerly the Uniform Data Set (UDS), an online data registry tool developed by the AABC. Cole and Avery (2017) explain that all birth centers who are accredited by the Commission for the Accreditation of Birth Centers (CABC) are required to track their clinical outcomes through this web-based registry, allowing the centers to document quality assurance data. This data set has become the most complete source of clearly defined measures for use in quality improvement projects and research studies. These efforts have been in place since 2007 and collection of data is ongoing by the CABC. In addition to finding higher satisfaction among birth center clients compared to a similar group of low-risk clients in hospitals, Stapleton et al. (2013) used this data set to document a reduction in the cesarean birth rate for women using birth center care. They found 94% of women had a vaginal birth and 6% had a cesarean birth compared to the cesarean birth rate for similarly low-risk women in



hospitals which was 25%. Stapleton et al. (2013) also found the lower cesarean birth rate during their study, potentially saving \$30 million in facility fees, demonstrated birth centers are an important option in providing high-value maternity care.

### **Purpose**

The purpose of this study is to determine birth center eligibility from the population of women who have recently sought care at the UK Midwife Clinic. The study question asks how many of the women who have delivered with UK Midwife clinic midwives would have been medically eligible by assessment of risk status for birth center care.

This study will begin with an examination of the literature regarding birth center care. Then data will be analyzed to determine how many women assessed to have a low-risk status that were cared for by the UK Midwife Clinic would have been eligible for birth center care. Their demographic information, criteria for meeting birth center care as well as their birth outcomes will be analyzed. This information will be added to existing information to support changes needed to develop birth centers in Kentucky.

## Conceptual Framework

The conceptual framework used in developing this study was inspired by a consensus report published by the National Academies of Sciences, Engineering and Medicine (NASEM) in 2020. Driven by the current state of maternity care in the United States, the NASEM was commissioned to assemble an ad hoc committee of experts to provide an evidence-based analysis of the research on birth settings which influence health outcomes for women and infants in the United States. The ad hoc committee documented ways to improve birth outcomes in a consensus study report for the National Academies of Sciences, Engineering and Medicine titled *Birth Settings in America: Outcomes, Quality, Access, and Choice* (NASEM, 2020). The committee was composed of experts in the fields of midwifery, obstetrics, pediatrics, nursing, public health, health care policy, economics, anthropology, and sociology.

Understanding that the majority of women in the United States give birth in hospitals, with wide variation in availability, resources, capacity and capabilities of hospitals, this committee was tasked with providing an evidence-based analysis of birth settings with a focus on health outcomes of subpopulations of women. An additional factor influencing this consensus report is the small but increasing number of women giving birth outside of the hospital. Although the percentage of birth center and home births are growing, these options are not always accessible across the United States, and once a woman has chosen an alternative to hospital birth, transfer into a hospital for acute care when it is indicated has challenges. This general framework of access to U.S. maternity care leads to two essential questions posed to the committee:

1. How can evidence-based maternity care be designed to allow multiple, safe, and supportive options for childbearing families?
2. How can birth outcomes be improved for all birth settings?

These questions guided the development of the conceptual model used by the committee of experts which give the ability to leverage key opportunities to improve policy and practice across all birth settings. This conceptual model is shown in Figure 1 (NASEM, 2020). It features a circle at the center of the framework, representing the *pregnant person and the infant*, surrounded by the *partner and family*, which is then surrounded by the *care team, the systems and physical settings, and collaboration and integration*. The center circle is encased in a triangle which represent the three elements that contribute to the goal of positive outcomes in maternity care. Those three elements are *informed choice and risk assessment, quality of care, and access to care*. Finally, the center circle inside the triangle is embedded within a complex sociocultural environment that shapes health outcomes. The components of this environment include the *health system, social determinants of health and structural inequities and biases*.

The key elements that contribute to the goal of positive outcomes in maternity care will be the focus and framework for this study with particular attention to *risk assessment*. This foundation is an important consideration in determining the eligibility for birth center care of a sub-population of women giving birth with UK Midwife Clinic midwives. A retrospective review of the data using this framework will help determine if the availability of evidence-based birth center care for childbearing families is an alternative to hospital care. The review will be based on an assessment of identified risk factors related to maternal and infant outcomes during pregnancy and birth.

As the committee report suggests, in most situations, pregnancy and birth occur without complications. However, risk exists in all situations and some groups of women enter pregnancy and birth at a higher risk of complications than others and there is no risk-free option or setting for giving birth. This committee defines risk as the “increased likelihood of an adverse maternal,

fetal, or neonatal outcome” (NASEM, 2020, p. 4). The committee also defines four main influences of risk: “individual, medical and obstetrical factors; health system-related factors such as policy and financing decisions; the social determinants of health; and structural inequities and biases in the health system and in society at large” (NASEM, 2020, p. 4). Two key conclusions of this consensus report address the importance of risk assessment. First is the need for ongoing risk assessment to determine if the appropriate setting for birth is being utilized. A second key conclusion is the need for high-quality, evidence-based risk assessment that considers medical, obstetrical, and social factors that influence birth outcomes and allow for informed decision making in choice of birth settings (NASEM, 2020, p.11). The focus of this study will be on medical and obstetrical factors that influence birth outcomes. As identified in the consensus report (NASEM, 2020, p.87), examples of medical risk factors include chronic, preexisting health conditions such as diabetes or hypertension or having a previous cesarean delivery. Obstetric risk factors which develop during pregnancy include multiple gestation, hypertensive disorders, gestational diabetes, fetal malpresentation or situations that lead to artificial induction of labor or interventions during labor.

The rationale for informed choice and risk assessment in the context of maternity care is to reduce the potential for complications, adverse events or poor outcomes for the mother and baby. This information is used to match the needed and desired level of prenatal care as well as care during labor and birth with the appropriate setting. Risk assessment, according to the consensus report, can help connect the pregnant woman with the most appropriate provider in the most appropriate setting for care during pregnancy, labor, and birth. The committee report suggests that when risk assessment is carried out effectively and continuously, the result is risk

stratification for all birth settings including hospital, home, and birth center (NASEM, 2020, p.86).

It must be noted that each element in this conceptual model exists among a complex sociocultural environment that influences health outcomes not just at the individual level, but at the systems level as well. Each of these elements can affect outcomes, and higher risk during pregnancy and birth is not just the result of medical or obstetrical causes. According to the consensus report, individual-level risk factors can be influenced by a series of systems-level factors such as structural inequalities and biases, policy and financial features of the health system, and social determinants of health (NASEM, 2020). Furthermore, another key conclusion of the consensus report identifies the social determinants of health which are correlated with inequity in care and poor outcomes. These include structural racism, lack of transportation, lack financial resources, housing instability, stress, lack of social support, lack of nutritious food choices, lower-level education, and lack of access to health care including mental health care (NASEM, 2020). The result is limited availability of choices in birth settings and accessible maternity care providers as well as programs which are appropriate for each individual, and the lack of availability is particularly challenging in both inner cities as well as in rural locations. These system-level factors are, however, modifiable and the committee concluded that improving maternal-newborn care in this country will require attention to factors outside of the healthcare system in acknowledging and altering the social determinants of health (NASEM, 2020).

## Literature Review

A literature review was conducted to understand important aspects of birth center care including outcomes, cost effectiveness and demand, as well as characteristics that determine eligibility for this type of maternity care. The online databases of CINAHL and PubMed were utilized in this search using key words: birth center, freestanding birth center, out-of-hospital birth, and birth center risk assessment. The results were limited to publication between 2010-2020 and written in English. Studies were included which discussed birth center care nationally and internationally. Literature regarding birth center care is often found intertwined with home birth care and is compared to hospital care. The literature overwhelmingly supports birth center care for low-risk women and demonstrates birth centers reduce cesarean section rates, are cost-effective, are patient-centered and are in demand. Additionally, the literature supports targeting birth center care toward low-risk women, and the findings of this literature review show various definitions of “low-risk”.

### Birth Centers Improve Outcomes

The often-cited *National Birth Center Study II*, by Stapleton, Osborne, and Illuzzi (2013) is considered a landmark resource that examined data from 22,403 women planning a birth center birth at the beginning of pregnancy, of which 15,574 were eligible for admission to a birth center in labor. This study demonstrated that midwifery led birth center care is a safe and effective alternative to hospital birth for women who are at low risk for medical complications such as diabetes or hypertension. Although it is a retrospective cohort study with moderate risk of bias and a moderate ability to generalize the evidence to a broader population, the *National Birth Center Study II*, according to Cole and Avery (2017), is the most frequently cited study to demonstrate the evidence for birth center care.

Specifically, Stapleton et al. (2013) found that birth center care is associated with a lower cesarean section rate which decreases the risk of maternal morbidity and cost without impacting neonatal health. If cesarean birth is necessary, the client must be transferred to the hospital. Costs are also reduced because birth centers utilize more cost-effective care such as intermittent auscultation of fetal heart tones for example, instead of continuous electronic fetal monitoring. The cesarean section rate for women receiving care in birth centers averages 6.1%. For the same population of low-risk women giving birth in a hospital, the cesarean birth rate is 27%, meaning the rate of cesarean birth for women in birth centers is more than 4 times lower than what is seen among low-risk women in hospitals (Stapleton et al., 2013). Additionally, the *National Birth Center Study II* found that birth center facility fees for care during a normal labor and birth average up to 50% less than charges for an uncomplicated birth in a hospital. In 2011, the average facility service reimbursement from Medicare/Medicaid for an uncomplicated vaginal birth in a hospital was \$3998.00. The same facility service reimbursement to a birth center from Medicare/Medicaid averaged \$1907.00. Additional cost-savings for insurance companies can be explained by the lower cesarean birth rate in birth centers as compared to labor and birth in hospitals (Stapleton et al., 2013).

The data from the *National Birth Center Study II* were obtained from the American Association of Birth Centers (AABC) Uniform Data Set (UDS). Thornton et al. (2016) also utilized data from the UDS for another retrospective cohort study comparing cesarean outcomes among low-risk women admitted in spontaneous labor to birth centers versus hospitals and found birth center care was associated with statistically significant reduction in odds of cesarean birth. Additionally, Thornton et al. (2016) documented a cesarean section rate of less than 5% for women who received prenatal care in a birth center.

More evidence to support that birth center care is associated with less risk for cesarean section is documented by Benatar et al. (2013) who illustrate that randomized control trials are lacking in the existing literature. They compared maternal and infant outcomes of women cared for in a birth center to a very similar group of women who received traditional hospital-based care and used a propensity score reweighting approach to show women who received birth center care were less likely to have a cesarean section, more likely to carry to full term, and more likely to deliver on a weekend suggesting less interventions (Benatar et al. 2013). Finally, Benatar et al. (2013) conclude that, for women without medical complications, midwife-directed prenatal care and labor care have substantial benefits such as lower risk of having a cesarean birth and are a safe alternative to hospital-delivered options.

A literature review by Alliman and Phillippi (2016) examined 9 qualitative studies and 23 quantitative studies describing maternal outcomes in birth center settings. This review demonstrated higher rates of spontaneous vaginal birth for women using a birth center as compared to women in a hospital. Cesarean birth rates were documented to be lower in birth center care and none of the studies reviewed reported maternal deaths. It is imperative to understand the long-term implications of cesarean birth. In a meta-analysis of the long-term risks and benefits of cesarean birth, Keag et al. (2018) discussed results of one randomized controlled trial and 79 cohort studies involving nearly 30 million participants world-wide. Maternal benefits to cesarean birth included decreased risk of urinary incontinence and pelvic organ prolapse. However, long-term risks to children born by cesarean showed increased rates of childhood asthma up to age 12 and obesity up to age 5. Impacting subsequent pregnancies, cesarean birth was associated with increased risk of ectopic pregnancy, miscarriage, and stillbirth, increased



risk of placenta previa, placenta accreta, placental abruption and uterine rupture. Outside of pregnancy, women with a previous cesarean birth had increased odds of hysterectomies.

Alliman and Phillippi (2016) also provided evidence that women utilizing birth centers were satisfied with the care they received. Further evidence of satisfying care is documented by Overgaard et al. (2012) who compared 375 women's birth experiences and perceptions in two freestanding midwifery units and two obstetric units located in Denmark in a prospective cohort study with a matched control group. Not only did the freestanding units receive more positive ratings for birth experience and satisfaction than the obstetric units, but the freestanding units were also found to have significantly better ratings in patient-centered care elements. Those elements included participation in decision-making, attentiveness to psychological needs, information, and the women reported their wishes for birth were heard.

The Birthplace national prospective cohort study by Brocklehurst et al. (2011) examined 11,282 low risk women admitted to a birth center in labor in England. They measured 250 primary outcome events and found women had fewer interventions with no impact on perinatal outcomes in the birth center setting. In examining the literature from the United States, some of the most compelling evidence documenting outcomes for birth center care comes from Hill et al. (2016) in the *Strong Start for Mothers and Newborns Evaluation* which was designed to determine if enhanced prenatal care models could have an impact on preterm birth and other poor outcomes for mothers and newborns while lowering costs and improving quality. The three enhanced prenatal care models that were compared included group prenatal care, maternity care home, and birth center care. The report was funded by the Centers for Medicare & Medicaid Services (CMS) and discussed care for Medicaid beneficiaries. Incidentally, the University of

Kentucky participated in submitting data for this study documenting the outcomes for group prenatal care.

Two peer reviewed papers evaluating the *Strong Start Initiative* are important to note. Evaluating more than 6000 births to Medicaid recipients, Alliman et al. (2019) examined birth center outcomes compared to national outcomes. They showed birth center care was associated with reduced preterm birth rates, reduced low birth weight births, reduced rate of cesarean birth and increased rates of breastfeeding. Additionally, Dubay et al. (2020) compared the birth outcomes and costs incurred by *Strong Start* enrollees insured by Medicaid to those of Medicaid recipients who received typical prenatal care. They also found birth center care to be associated with significantly lower rates of preterm and low-birth weight infants, lower rates of cesarean birth, and higher rates of vaginal birth after cesarean. These improved outcomes were noted to be achieved at lower costs (Dubay et al. 2020).

Maternal outcomes in birth center care were also examined by Bailey (2017) in a retrospective observational study of 47,381 births to women in South Auckland, New Zealand. Bailey (2017) documented evidence of the safety and efficacy of freestanding birth centers for low-risk women and demonstrated significantly lower maternal intervention and complication rates than labor in a hospital without finding any association with increased perinatal morbidity.

### **Birth Centers Are Cost Effective**

Another benefit associated with freestanding birth centers is the savings of healthcare dollars. There is ample literature to support the reduced costs associated with using a freestanding birth center instead of a hospital for low-risk patients' maternity and postpartum care. Howell et al. (2014) explored the possibility of reducing costs associated with Medicaid-paid births in the U.S. using midwives at a birth center versus a hospital setting. Their study

utilized data from a study on infant and maternal outcomes conducted by the Washington D.C.-based Family Health and Birth Center. They documented the utilization of birth center care to decrease total costs and demonstrated a cost savings on average of \$1,163 per birth translating into \$11.6 million per 10,000 births per year.

Other studies, too, found similar results and cost-saving benefits associated with non-hospital birthing alternatives. Schroeder et al. (2017) compared the financial costs associated with intrapartum maternity care for mothers who gave birth in a freestanding midwifery unit to the costs incurred by mothers who opted for hospital-based care. Their study used micro-costing to compare the healthcare services provided at each location. In total, the maternity records of 33 women were analyzed to determine costs. The findings showed that costs decreased by about 39% per patient who used the freestanding midwifery clinic versus the hospital, thereby suggesting major economic benefits to hospital alternatives.

Most recently, Dubay et al. (2020), as previously mentioned, also documented improved outcomes in birth center settings at lower costs for women receiving Medicaid benefits. This study analyzed 14,820 participants using comparison groups and propensity score reweighting and evaluated outcomes in the *Strong Start Initiative*. They documented a \$2010 savings to Medicaid for every mother-baby dyad receiving care in a birth center compared to people living in the same counties with similar risk profiles who received typical prenatal care.

The evidence shows that, despite the reduced costs associated with freestanding birth centers, expenditures often limit a woman's ability to choose midwifery or a birth center care option, particularly if the mother is relying on insurance to pay some or all the medical expenses. MacDorman and Declercq (2018) studied various trends in out-of-hospital births and women's access to these alternative birth options. Their study relied on national birth certificate data

collected between 2004 and 2017. The findings showed that about 66% of all home births and 33% of birth center births were self-paid compared to only about 3% of hospital births. They concluded that a lack of insurance coverage for alternative care is often a limiting factor for women who wish to utilize an option for birth outside of the hospital. This obstacle should be addressed both to save money and to provide women with more autonomy and agency in their maternity care.

### **Birth Centers Are in Demand**

The literature indicates an increased desire for freestanding birth centers and similar alternative maternity care and birthing options within the United States. According to MacDorman and Declercq (2018), the U.S. recently witnessed a steady increase in the number of women who opt for alternative birthing options. Their research reveals out-of-hospital births have increased from 2004 onward, now accounting for approximately 1 in every 62 births (CDC, 2019). Home births have increased roughly 77% between 2004 and 2017, and birth center births more than doubled during this same time (MacDorman and Declercq, 2018). In the *National Birth Center Study II*, Stapleton et al. (2013) documented patient satisfaction with a birth center experience. They found that 98.8% of women utilizing birth center care would recommend it to friends or would return themselves to the center for a subsequent birth.

The demand for freestanding birth clinics is not limited to urban environments. Jolles et al. (2020) explored the role of a birth center care model within a rural context to determine rural needs and maternal care delivery quality. Their study included all childbearing families enrolled in one database for a total of 88,574 individual samples. In all measures, quality outcomes exceeded the national benchmarks. Across various geographic regions, about half of the population was able to remain in the birth center for their care through the perinatal period. The

authors concluded that rural populations cared for within the birth center model experienced positive, quality outcomes with patients reporting high levels of satisfaction.

Part of the reason for the overwhelming increased demand is likely attributed to greater patient satisfaction rates associated with freestanding birth centers compared to hospital care. Alliman and Phillippi (2016) demonstrated in their integrative literature review that average patient satisfaction rates were statistically better for mothers who used a birth center compared to those who opted for hospital-based care. Fleming et al. (2016) studied the prevalence of birth satisfaction for women who gave birth either in their home or a birth center rather than a hospital. The study was quantitative and utilized the 30-item Birth Satisfaction Scale (BSS) and the 10-item Birth Satisfaction Scale-Revised (BSS-R). Their sample was convenience and consisted of 2,229 women. The findings revealed that satisfaction rates were higher for women who gave birth either at home or at a birth center rather than a hospital. Again, this suggests that at least one of the reasons for the steady increase in patient demand for freestanding birth clinics is based on higher patient satisfaction rates. It can be reasonably assumed, therefore, that there is adequate demand and, moreover, that this demand will continue to grow.

### **Risk Status for Birth Center Care**

The literature was reviewed to understand risk status for women using birth centers. Risk refers to maternal and fetal health indicators that can influence birth outcomes. Stephenson-Famy et al. (2017) completed a retrospective cohort study of Washington State birth certificate data for women who had a singleton, term pregnancy and planned to give birth at a birth center from 2004-2011. They assessed risk factors for transfer to hospital birth including demographic, obstetrical, and medical characteristics of 7118 women. Their findings suggested that the

strongest risk for transfer from the birth center to a hospital were nulliparity, maternal age > 40, hypertensive disorders, government insurance, obesity, and less than adequate prenatal care.

MacDorman and Declerq (2018), analyzing national birth certificate data from 2004-2017, discussed risk factors for planned home and birth center births and found women were less likely to have certain characteristics associated with poor outcomes. These characteristics were teen births, smoking, obesity, preterm labor, and multiple gestation. They also found that women were more likely to be highly educated than women utilizing hospital care for birth. They suggest that women having a planned home or birth center birth were typically seen as low risk.

Jolles et al. (2018) used the AABC Perinatal Data Registry (PDR) to evaluate socio-behavioral and medical risks, and core perinatal quality outcomes analyzing 2082 Medicaid recipients who were identified as low medical risk on admission in labor from the *Strong Start* birth center sites between 2012-2014. They found elective hospitalization in labor compared to birth center care was associated with a 4-times greater risk of cesarean birth for low-risk Medicaid recipients. Elective hospitalization refers to the preference a woman has in choosing to go to the hospital when labor began instead of choosing home birth or birth center care when it was available. In this context, Jolles et al. (2018) suggests elective hospitalization is a driver of poor quality among medically low-risk childbearing Medicaid beneficiaries. Specifically, 22% of the low-risk women who were eligible for out-of-hospital birth chose elective hospitalization resulting in a cesarean section rate of 9%, compared to a cesarean section rate of 2.7% for women who chose home or birth center birth (Jolles, et al. 2018). They also emphasized that the birth center model of care has the capability to accomplish *The Triple Aims* of improved population health, patient experience, and value which has been promoted by Berwick et al. (2008) and the Institute for Healthcare Improvement.

Brocklehurst et al. (2011) analyzed perinatal and maternal outcomes by planned place of birth for low-risk women in the Birthplace in England national prospective cohort study. This study defined low-risk women as being healthy and not known to have any obstetrical or medical risk factors. They concluded healthy women with low-risk pregnancies should be offered a choice of birth setting. Hollowell et al. (2017) published a secondary analysis of the same data on low-risk women with singleton, term pregnancies collected in the Birthplace in England study. They found a trend towards lower interventions and fewer adverse maternal outcomes when birth is planned in a freestanding midwifery unit compared to alongside midwifery unit in a hospital. Finally, they recommended that low-risk women be informed about the difference between planned birth in the freestanding midwifery unit which is associated with a lower rate of instrumental delivery and a higher rate of uncomplicated vaginal birth as compared to the alongside midwifery unit.

Bovbjerg et al. (2017) examined data from 47,394 midwife-attended, planned community births in the Midwives Alliance of North America Statistics Project. Their objective was to explore characteristics that may be associated with adverse outcomes. They studied demographic, obstetric history and pregnancy risk factors and outcomes. See Table 2. Four findings were significant in their analysis. First, they found no evidence of additional risk because of age. Secondly, elevated BMI was associated with an increase in adverse outcomes but in the absence of other risk factors, risks associated with obesity were less important than previously thought. Next, breech presentation as well as twin gestation at the onset of labor was associated with higher rates of adverse outcomes. And lastly, women who had a previous cesarean birth without having had a previous vaginal birth had increased rates of adverse outcomes and those women may be better managed in hospitals. However, women with a

previous vaginal birth and are attempting a vaginal birth after cesarean (VBAC) were at lower risk for negative outcomes than previously assumed and banning labor after cesarean in out-of-hospital settings was not supported by the data. Bovbjerg et al. (2017) also concluded the need for further study of these findings.

Jevitt et al. (2021) studied 4,455 pregnancies recorded in the AABC PDR and compared outcomes for women with normal body mass indices (BMIs) and women with BMIs considered obese (> 30 BMI). The study concluded women with obesity but without medical comorbidities are low risk for cesarean section when they receive safe and effective midwifery care at a freestanding birth center. This recent finding opposes current practice guidelines which recommend these women be cared for in hospitals. Jevitt et al. (2021) advises that care for this group of women should be tailored to their individual needs, receiving attention holistically and not exclusively viewed as obese.

### **Gaps in the Literature**

Despite the high-quality research available on birth centers, gaps in the literature persist. Randomized controlled trials are lacking, and literature is dominated by retrospective studies which have the risk of bias and uncertain ability to apply the results to the general population. Understanding the impact of birth center care on addressing racial and ethnic disparities is needed with further exploration into the potential for this model of care to reduce disparities in birth outcomes. Additionally, risk status for birth center care is not uniformly defined and differences in how risk is viewed is varied among studies. Lastly, although the benefits of birth centers are well documented, the feasibility of establishing this model of care in an academic tertiary care setting when birth center care is unavailable in the state is unknown.



## Methods

### Design

This was a retrospective chart review to determine how many patients may have been eligible for birth center care among those who delivered at the University of Kentucky Chandler Hospital with the UK Midwife Clinic midwives from July 1, 2017 to June 30, 2020.

### Agency Description/Setting

The UK Midwife Clinic in Lexington, Kentucky is an outpatient, ambulatory office building which has seven exam rooms with ultrasound and laboratory capabilities. Between three and five certified nurse midwives (CNMs) provide full scope midwifery care at this location, with delivery occurring at the UK Chandler Hospital in Lexington. Full-scope midwifery care entails healthcare for the woman throughout her lifespan, including gynecological and primary care as well as all aspects of prenatal care, addressing all antepartum, intrapartum, and postpartum needs during pregnancy. The midwives practice in conjunction with other obstetric and gynecologic providers at UK HealthCare's OB-GYN department, in consultation, collaboration, and referral as appropriate for patient needs. This project aligns with the vision and mission of the obstetrics department at UK Healthcare in providing the highest quality patient care for the citizens of Kentucky and acting as leaders and advocates in the pursuit of excellence in women's health care. The information gathered in this study can be used to enhance the care for women in Kentucky with the potential development of birth center care.

### Sample

The sample included 696 records from the 700 births that occurred during three fiscal years beginning July 1, 2017 and ending June 30, 2020. Four records could not be located for review. Demographic information was collected, including age, gravity and parity, race, zip

code, insurance information, marital status, and BMI. Each chart was examined to determine each patient's risk status in the context of possible eligibility for birth center care. Records were then analyzed to determine how many patients had a singleton gestation and a full-term birth with a fetus in a vertex presentation. Additional analysis involved determining how many of the patients a.) developed complications during the pregnancy including gestational hypertension or diabetes, b.) had a previous cesarean birth, or c.) had any preexisting medical conditions that placed them at higher risk of complications. If the patient desired interventions such as elective induction, elective cesarean or medications for pain management such as epidural anesthesia or narcotics, their chart was excluded from review. Patients who desired unmedicated, non-interventive care, entered labor spontaneously, and did not chose to receive an epidural or narcotic pain medication were counted as appropriate candidates for birth center care.

### **Procedure**

The study began after initial Institutional Review Board (IRB) approval was obtained on November 24, 2020. Amendments to include additional study personnel were finalized on February 24, 2021. The IRB approved a waiver of documentation of informed consent as the data collected were from a retrospective chart review and no consent was necessary. No intervention was implemented, and descriptive statistics were used to summarize the patient characteristics and outcomes. No barriers to the implementation of this study were identified and what facilitated the project was previously collected data from each birth for three fiscal years.

## Data Analysis

Each patient's medical record number was assigned a unique identification number and recorded into a crosswalk data table. The data from each chart were recorded into the "UK Birth Center Eligibility Data" (See Appendix A). Descriptive statistics, including means and standard deviations or frequency distributions, were used to summarize patient characteristics and outcomes. All data analysis was conducted using SPSS version 25.

## Results

A total of 696 medical records were found to be available for review out of the 700 births logged as being managed by UK Midwife Clinic midwives between July 1, 2017 and June 30, 2020. The midwifery group varied from three to five CNMs during the time frame, and each midwife practiced full-scope midwifery care on a full-time basis. There were 696 recorded births attended by the midwifery group during those fiscal years - 581 vaginal births (83.6%) and 114 cesarean births (16.4%).

Of these patients, 231 were identified as being eligible for birth center care, 33.2% of the total births during that time. Of the group of patients found to be eligible for birth center care, seven had cesarean sections (3.03%) and 223 had vaginal births (96.54%). There was one occurrence of a vacuum assisted vaginal delivery (0.43%), see Table 3.

Analysis of the demographics of the patients who were eligible for birth center care reveal that the ages of the patients ranged from 19 to 45 years, with a mean age of 30. The average BMI of the eligible patient was 25.4, with BMIs ranging between 17-45. With regard to race, three of the patients eligible for birth center care identified as Asian (1.3%), 14 as Black or African American (6.1%), one as Hispanic or Latinx (0.4%), four patients were listed as

unknown or unreported race (1.7%), and 209 eligible patients identified as being White (90.48%).

As to the gravity and parity of the eligible patients, 62 had never given birth before (26.8%), 86 had one prior vaginal birth (37.2%), 49 had two previous vaginal births (21.2%), 25 had three previous vaginal births (10.8%), six had 4 previous vaginal births (2.6%), and three patients had five previous vaginal births (1.3%).

The listed home address of eligible patients for birth center care was predominantly Fayette County - 119 patients (53.5%), followed by Jessamine County - 21 patients (9.4%), Scott County - 13 patients (5.8%), Madison County - 12 patients (5.4%), Clark County - nine patients (4.0%), Woodford County - eight patients (3.6%), Boyle and Franklin Counties - four patients each (1.8% each). Bourbon and Nicholas Counties had three patients each (1.4% each). There were 27 other counties that had either one or two patients eligible for birth center care.

Payors for patients eligible for birth center care were as follows: private payor – 73 (31.6%), UK private insurance – 57 (24.7%), Medicaid - 55 (23.8%), other or unknown insurance - 42 (18.2%), financial assistance - 3 (1.3%) and Medicare - 1 (0.4%).

Finally, patients eligible for birth center care were predominantly married - 175 (75.8%), with 34 (14.7%) reporting as single. Four (1.7%) patients reported as being divorced, and 18 (7.8%) patients did not disclose marital status (see table 4).

## Discussion

The purpose of this study was to determine how many patients in the target population were eligible for birth center care. The patients identified as being eligible for birth center care comprised slightly more than one third (33.2%) of the total births with the UK Midwife Clinic midwives during the time frame. Eligibility was based on medical risk factors and the patient's choices with regard to receiving an epidural or narcotic pain medication during labor.

The literature regarding birth center care demonstrates the safety, cost-effectiveness, and demand for this model. Specifically, the cesarean section rate is lower in the birth center model compared to hospital care. According to Stapleton et al. (2013), for example, the cesarean section rate for women receiving care in a birth center averages 6.1% compared with 27% for a similar population of low-risk women giving birth in a hospital. This dovetails with the results of this study, which showed that only 3.03% and a vaginal birth rate of 96.54%. This finding also aligns with Thornton et al. (2016), who found a cesarean section rate of less than 5% for women who received prenatal care in a birth center.

This finding may indicate that although the care is provided in a hospital setting, the midwifery care from this group correlates with the birth center model in its support of physiologic birth and holistic, patient-centered care leading to a lower cesarean section rate. The AABC identifies characteristics of midwifery care in birth centers stating that midwifery is primary care for pregnancy and supports birth as a normal, natural physiological process (AABC, 2021). The UK Midwife Clinic recognizes their involvement in the normal physiological process of birth with a practice structure that allows for midwives to be available

to patients throughout each 24-hour shift. Their practice structure offers labor evaluation by a CNM and provides for continuous support during active labor.

Separation of primary care from acute care in pregnancy is the most important principle of the birth center concept. It involves dividing uncomplicated, non-interventive care with an understanding of the normalcy of pregnancy and birth from more acute care, or care which may involve attention to risk factors or required medical interventions. The midwives in this practice have the responsibility to provide both primary and acute care, often side by side simultaneously. Additionally, AABC (2021) explains that the birth center model requires an understanding of the interdependent relationship between birth center care and acute care. Although these midwives do not have a birth center environment, the care they are providing may align with birth center philosophy as shown by the low cesarean section rate for those patients in this study who would have been eligible for birth center care.

In their integrative literature review, Alliman and Phillippi (2016) recommend that women desiring birth center care should be encouraged to find one which operates under the AABC standards. Unfortunately, women who desire birth center care in Kentucky have no option to find that model of care. The lack of availability of birth centers here became more widely understood with the onset of the global pandemic and the questions birthing families asked about out-of-hospital options. They can, however, find midwifery care at several hospitals across the state. The UK Midwife Clinic practice participating in this study demonstrates care that might be comparable to the birth center model since none are available in the state.

Finally, the ACOG/SMFM 2019 recommendation to standardize a complete and integrated system of risk-appropriate maternal care suggests establishing levels of care that are described as the freestanding birth center, basic (level I), specialty care (level II), subspecialty

care (level III) and regional perinatal care (level IV). The University of Kentucky Division of Maternal Fetal Medicine has identified the need to be classified as a regional perinatal healthcare service to meet the most acute, high risk needs of the area and state. To provide the most thorough, coordinated system, the birth center model should also be explored along with classification as a regional perinatal care facility in order to first meet the most basic, level I maternal care needs and then to create a complete, integrated system of risk-appropriate maternal care.

### **Implications**

The benefits for reducing the general cesarean birth rate can be financial, but also impactful for the woman and her baby and they can have both short and long-term implications. Not only are hospital stays and recovery times longer for women having a cesarean birth, but there are also potential breathing problems for newborns and placental attachment problems for future pregnancies. Additional benefits of reducing the number of cesarean births relate to current public health efforts which are focused on lowering the rate of cesarean birth for first-time mothers with a potentially low-risk birth or NTSV rate. As suggested by Keag et al. (2018), implications to previous cesarean birth impact both the mother and the child. The impact for the health of future pregnancies is particularly important for the first-time mother, not only because of the risks associated with a previous cesarean, but also because the opportunity for a vaginal birth may be impaired. According to the CDC (2020), in 2019, 86.2% of women with a history of a previous cesarean had a repeat cesarean. Many hospitals and maternity care providers do not

support a woman with a previous cesarean to give birth vaginally, leading to repeat cesarean births. Serious maternal morbidity progressively increases as the number of previous cesarean births increases (Marshall et al., 2011). Given the evidence demonstrating the reduction in cesareans within the birth center model, their wider availability could have an impact on the reduction of NTSV rates.

Reducing cesarean birth is particularly imperative for Kentucky. The national cesarean birth rate in 2018 was 31.7%, and Kentucky had the ninth highest cesarean rate in the country at 34.4% (CDC, 2018). Given the state has trended toward higher cesarean birth rates, the ability of women to have a future vaginal birth can be impaired, even if she has had a previous cesarean birth. The vaginal birth after cesarean (VBAC) rate is the number of births per 100 live births to women with a previous cesarean. Nationally in 2019, the VBAC rate was 13.8 and the VBAC rate in Kentucky was even lower, at 10.2 per 100 (March of Dimes, 2021). VBACs are not available in all counties in Kentucky. Out of 120 Kentucky counties, 42.5% have insufficient numbers to report, 38.3% are under 9.9 per 100 and only 19.2% of counties have VBAC rates at the national average or above (March of Dimes, 2021).

So, the potential for birth center care in Kentucky reaches beyond the evident reduction in cesarean births, but also impacts the NTSV rate, and can ultimately decrease the disparity of VBAC availability in Kentucky.

An important implication of this study is to have data to support midwifery care and eligibility for birth center care in a state where birth centers do not exist. This information can be useful for key stakeholders, hospital administration and leadership, policymakers and legislators when considering programs that can improve access to care, outcomes, satisfaction and can decrease healthcare costs in Kentucky.



## Limitations

First, the number of women who planned to avoid interventions for pain management including epidural anesthesia and narcotics were not identified in data collection. This could be a limitation to this study since it is not known how many in this group were influenced by close access to pain control and how that influenced their decision to obtain an epidural. The data collected did not separate the patients who requested an epidural prior to labor during their prenatal care from those who planned an unmedicated, natural birth as part of their preparation for childbirth. Likely, there was a cohort of women who may have been medically eligible for birth center care who initially desired a natural, non-medicated labor but decided during labor to opt for an epidural or narcotic pain medication. These women could have been counted as patients eligible for birth center care resulting in greater eligibility than what the study found using this design. So, 33.2% may represent a lower percentage of eligibility than what exists. It should be mentioned that a hospital environment consists of a collaboration of many professionals, including obstetric anesthesiologists who generally require an assessment and discussion with a laboring woman upon admission. This discussion involves planning for anesthesia during labor and birth even if the woman has specified that she does not intend to use medication for pain management. This represents a common hospital practice. Proximity to pain control may lead to increased use.

Additionally, a retrospective records review results in an inferior level of evidence compared to a prospective study. The population studied was recruited by convenience, not by a random sampling of the general population, and was prone to selection bias (most midwife patients are highly health literate, which may translate into a healthier population and not represent the general population). This study did not determine what number of patients would

be needed to make birth centers fiscally viable within the university healthcare system. It is unknown if more than 231 patients (33.2% of the 696 patients analyzed over three fiscal years) is a financially feasible number.

### **Conclusion**

In summary, the literature overwhelmingly supports the benefits of a birth center, both freestanding – a facility completely removed from a hospital, and the alongside midwifery unit – a separate area of a hospital dedicated to the birth center model of care. The evidence suggests that birth centers are safe, meaning similar or improved outcomes for both mother and baby as compared to hospital care. Safe maternal outcomes include lower risk of cesarean birth with subsequent lower potential complications of surgery, resulting in higher rates of spontaneous vaginal birth (Alliman et al., 2019; Alliman and Phillippi, 2016; Benatar et al., 2013; Brocklehurst, et al. 2011; Dubay, 2020; Hill et al., 2016; Lotshaw et al., 2020; Caughey & Cheyney, 2019; Stapleton et al. 2017; Thornton, 2016). The results of this study showing a 3.03% cesarean birth rate for women eligible for birth center care at UK Midwife Clinic support these findings.

Also, women who use these options are more likely to carry their baby to term, suggesting fewer interventions (Alliman, 2019; Benatar, 2013; Caughey & Cheyney, 2019; Hill et al., 2016; Stapleton, 2013)). Higher rates of patient satisfaction were documented (Alliman and Phillippi, 2019; Fleming et al., 2016; Jolles, et al., 2020; Overgaard, et al., 2011; Stapleton et al., 2013); Finally, safe neonatal outcomes are documented and include decreased risk of preterm birth and higher birth weights (Benatar et al., 2013; Hill et al., 2016; Stapleton et al. 2013).

The cost-effectiveness of birth centers, too, is significant (Dubay, 2020; Howell et al., 2014; Schroeder et al., 2017), providing yet another excellent advantage. Nonetheless, some

barriers, particularly pertaining to insurance companies not covering costs, need to be addressed (MacDorman & Declercq, 2018). Finally, the evidence shows an increased demand for alternative birthing and maternity care options that is likely to grow in the future (MacDorman & Declercq, 2018). This demand is witnessed both in rural and urban areas (Jolles et al., 2020).

Results of this study demonstrated that the UK Midwife Clinic has a population of women who would be eligible for birth center care. Further research is needed to determine community receptivity and the acceptance by the medical community of birth center development. Future research may also investigate many different points such as the impact of midwifery care on health outcomes, costs, and satisfaction in general at UK and Kentucky, maternity care deserts in Kentucky, and the cost savings of birth center care compared to hospital care for vaginal birth.

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## List of Tables

### Medical Exclusion Criteria to Determine Low-Risk Status

Medical risk/equivocal evidence exclusions (N=1054)	Details
Preexistent medical history (n=522)	Smoking, chronic hypertension, preexistent diabetes, type 1 diabetes, class II-IV heart disease, substance abuse, thrombophilia, bicornate uterus
Previous pregnancy history (n=95)	Previous cesarean
Prenatal complications current pregnancy (n=368)	Abruption or previa, gestational diabetes, gestational hypertension, intrauterine fetal demise, intrauterine growth restriction, malpresentation, multiple gestation, nonreassuring fetal testing, preeclampsia, severe preeclampsia, preterm labor 32-37 weeks, very preterm <32 weeks, preterm rupture of membranes, postterm, >42 weeks and 0 days, sensitization with antibody, "other"—eg, chronic hypertension, seizures, cerclage, cholestasis, oligohydramnios, low lying placenta
Antenatal medical referrals (n=35)	Macrosomia (estimated fetal weight >4500 g), herpes simplex virus, childhood seizure disorder, cholestasis, oligohydramnios, preeclampsia, prelabor rupture of membranes at term
Admission status exclusions (n=34)	Intrauterine growth restriction, nonreassuring fetal testing, preeclampsia, prelabor ruptures of membranes at term, postdates >42 weeks, gestational diabetes

Table 1. Exclusion criteria used to determine selection of low-risk women. (Jolles et al. 2019).

## Demographic, Obstetric History, Pregnancy Risk Factors and Outcomes

**TABLE 2** Demographic, obstetric history, pregnancy risk factors, and outcomes for 47 394 women planning a normal physiologic birth at home or in a birth center with a midwife. Data come from medical records by way of the Midwives Alliance of North America Statistics Project (MANA Stats), versions 2.0 (birth years 2004-2009) and 4.0 (birth years 2012-2014)

Characteristics	N (%)
Data set of origin	
MANA Stats 2.0	20 887 (44.1)
MANA Stats 4.0	26 507 (55.9)
Maternal race/ethnicity	
White, non-Hispanic	41 626 (88.3)
Other	5513 (11.7)
Expected source of payment	
Medicaid	5344 (11.3)
Not Medicaid	42 042 (88.7)
Obstetric history	
Primiparous	14 591 (30.8)
Multiparous with no history of cesarean	30 107 (63.6)
Multiparous, history of both cesarean and vaginal birth	1571 (3.3)
Multiparous, history of cesarean only	1086 (2.3)
Pre gravid body mass index	
<25 kg/m <sup>2</sup>	30 578 (70.1)
25-<30 kg/m <sup>2</sup>	8480 (19.4)
30-<35 kg/m <sup>2</sup>	2954 (6.8)
35+ kg/m <sup>2</sup>	1613 (3.7)
Maternal age 35 y or older	8805 (18.8)
Maternal education—fewer than 4 y of college	20 988 (46.5)
Twin pregnancy	138 (0.3)
Postterm pregnancy (more than 42 completed weeks)	3160 (6.7)
This pregnancy complicated by gestational diabetes	516 (1.1)
This pregnancy complicated by preeclampsia	63 (0.1)
Breech presentation at birth	539 (1.2)
Intrapartum transfer	5720 (12.1)
Cesarean delivery	2548 (5.4)
Perineal/genital tract trauma (any)	23 597 (51.9)
Postpartum hospitalization (maternal indication), first 6 wk	2945 (6.2)
Low 5-min Apgar (<7)	693 (1.5)
Very low 5-min Apgar (<4)	217 (0.5)
Neonatal hospitalization in the first 6 wk	3483 (7.4)
NICU admission in the first 6 wk	1316 (2.8)
Postpartum hemorrhage (estimated blood loss >1000 cc)	1665 (3.8)

Table 2. Demographic, Obstetric History, Pregnancy Risk Factors and Outcomes (Bovbjerg, et al., 2017)

<b>Mode of Delivery</b>				
<b>Mode of Delivery</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Frequency</b>	<b>Cumulative Percent</b>
<b>C-Section</b>	7	3.03	7	3.03
<b>Vaginal</b>	223	96.54	230	99.57
<b>Vacuum assisted</b>	1	0.43	231	100.00

Table 3. Mode of Delivery

### Sample Characteristics

Demographic	Mean (SD); range or n (%)
<i>Age</i>	30.4 (4.7); 19 – 45
<i>BMI</i>	25.4 (4.9); 17 – 45
<i>Race</i>	
Asian	3 (1.3%)
Black or African American	14 (6.1%)
Hispanic or Latinx	1 (0.4%)
Unknown or unreported	4 (1.7%)
White or Caucasian	209 (90.5%)
<i>Previous Deliveries</i>	
None	62 (26.8%)
1	86 (37.2%)
2	49 (21.2%)
3	25 (10.8%)
4	6 (2.6%)
5	3 (1.3%)
<i>County</i>	
Fayette	119 (53.5%)
Jessamine	21 (9.4%)
Scott	13 (5.8%)
Madison	12 (5.4%)
Clark	9 (4.0%)
Woodford	8 (3.6%)
Boyle	4 (1.8%)
Franklin	4 (1.8%)
Bourbon	3 (1.4%)
Nicholas	3 (1.4%)
All Others	27 (11.8%)
<i>Insurance</i>	
Financial Assistance	3 (1.3%)
Medicaid	55 (23.8%)
Medicare	1 (0.4%)
Other/Unknown	42 (18.2%)
Private	73 (31.6%)
Private (UK)	57 (24.7%)
<i>Marital Status</i>	
Divorced	4 (1.7%)
Married	175 (75.8%)
Not disclosed	18 (7.8%)
Single	34 (14.7%)

Table 4. Sample Characteristics

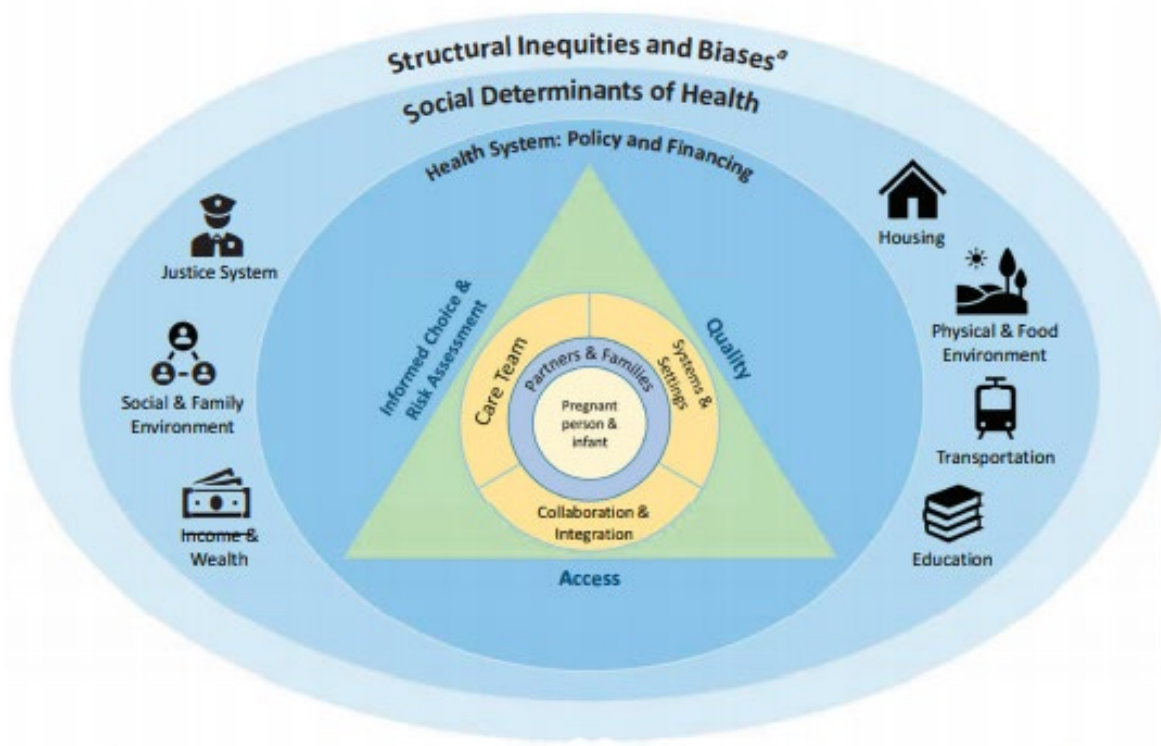


Figure 1. Interactive Continuum of Maternity Care: A Conceptual Framework  
(NASEM, 2020)

# Appendices

## Appendix A. UK Birth Center Eligibility Data.

UKMC BIRTH CENTER ELIGIBILITY DATA															
Unique ID	AGE	G's & P's	RACE	ZIP CODE	INSURANCE	MARITAL STATUS	EDUCATION	STV	BMI	No IOL	PREV. MED. CON.	CON. DURING PREG.	Hx PREV. C/S	ELEC. C/S	NARCS. EPID.