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Perinatal Outcomes of Infants Born to Women Living in Prison: A Systematic Review

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Abstract

Introduction: Prison policies often overlook the specialized needs of women and their health leading to poor maternal outcomes and high-risk pregnancies. The number of women in prison worldwide has increased from 466,000 in 2000 to more than 740,000 today. This rise combined with the lack of data collection on women living in prisons has resulted in a gap in the literature on perinatal outcomes.

Purpose: The primary purpose of this thesis is to summarize the current state of the science on the perinatal outcomes of women living in prisons through a systematic review of common types of outcomes. From this synthesis, recommendations can be made for practice and policy to mitigate barriers to care and thus improve the perinatal outcomes of this vulnerable population.

Methods: A systematic literature review was conducted with PubMed, CINAHL, PsycINFO, and Web of Science using search terms related to women living in prisons and perinatal outcomes. Included articles had to be published 1992-2023 and research conducted in developed countries. The articles were reviewed by 3 reviewers through 2 phases: 1) text and abstract, 2) full text review.

Results: This review included a total of 22 articles. Perinatal outcomes measured were sorted into common categories: types of births and birthweights; Apgar scores; labor and delivery outcomes; hospital and NICU stays; dental health; breastfeeding and doula care; and the effect of interventional programs.

Conclusion: Although the majority of the articles identified negative perinatal outcomes associated with women who gave birth in prisons, further data collection and research are needed to truly determine whether there is a correlation between the prison environment and adverse perinatal outcomes.

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Chapter 1

Introduction

The public discussion on the unjust pregnancy experiences of women who live in prisons and their lack of reproductive health and rights within the criminal justice system made global headlines in the 2000s. In the United States, female inmates spoke out about being shackled during pregnancy and even during labor despite the medical community and lawmakers opposing this practice (Hernandez, 2022). Despite the American College of Obstetricians and Gynecologists opposing the criminalization of women for behavior that allegedly harms their pregnancies, prosecutors across the country regularly and criminally charge pregnant women for exposing their fetuses to drugs, arguing that imprisonment is needed to protect the women's "unborn" and born children. In reality, the criminalization of women who are pregnant puts both parent and fetus at greater risk by creating barriers to child custody, drug treatment, and prenatal care (Lati, 2022). These problems are not solely limited to the U.S. In the United Kingdom, information requests sent to 11 National Health Services (NHS) trusts serving women's prisons revealed that from 2020-2022, a quarter of babies born to women in prison were admitted to neonatal intensive units afterward – almost double the national figure of 14%. The British newspaper, the *Observer*, also found that women who were pregnant in jails were seven times more likely to suffer stillbirth than those in the general population (The Guardian, 2023). These reports alongside the rapid growth of the incarceration of women over the last few decades are exceptionally concerning.

According to the Institute for Crime and Justice Policy Research (ICPR), the number of females in prison worldwide has increased by nearly 60% since 2000 from 466,000 to more than 740,000 prisoners today, while the male prison population increased only by around 22% (Fair &

Walmsley, 2022). Females make up 6.9% of the global prison population with the United States possessing the highest female population rate – it has 4% of the world’s female population but 30% of its female population living in prisons. In addition, 5% of women in jail, 4% in state prison, and 3% in federal prison report they are pregnant upon intake (Sufrin et al., 2019). The substantial rise in these numbers is a cause of profound concern as it has long been recognized that most female prisoners are extremely vulnerable with histories of poverty, mental illness, and sexual and physical victimization. Their incarceration makes little contribution to public safety while imposing high financial and social costs, as most women (70%) are in prison for nonviolent crimes such as property, alcohol, and drug offenses (Lapidus et al., 2005).

The situation is worsened by the lack of federal mandates to track and report the number of women who are pregnant and their birth outcomes. It was not until the passage of the First Step Act of 2018 (Carson, 2021) in the U.S. that the Bureau of Justice Statistics (BJS) was required to collect and report data on a select number of topics from their prisons annually. These new requirements include the number of female prisoners known to be pregnant, their pregnancy outcomes, and the number of incidences and circumstances in which restraints were placed on female prisoners during pregnancy, labor, or postpartum. Further research needs to be conducted to identify the needs of women who are pregnant and living in prisons, their access to perinatal care, and pregnancy outcomes as this population rapidly grows. If research is not conducted, the health and safety of mothers and babies will continue to be threatened. Adverse pregnancy outcomes also result in substantially higher financial healthcare costs for prisons, governments, and the taxpayers of these affected countries.

Significance of Problem

Prison policies often overlook the specialized needs of women and their health leading to poor maternal health outcomes and high-risk pregnancies. Women who are pregnant and live in prisons are a marginalized and vulnerable population. They predominantly come from socioeconomically disadvantaged backgrounds and have histories of substance/opioid abuse and poor health profiles (Augsburger et al., 2022). Without incarceration, women in the United States are already more likely to die from childbirth than women living in other developed countries (Healthy People 2030, n.d.). Women's health before, during, and after pregnancy can have a major impact on infants' health and well-being. Data from studies can be used to develop national standards of care and advocate for legislation that ensures adequate, safe pregnancy care. Nurses need to understand the holistic factors behind women who are pregnant and living in prisons to improve public health efforts and care for this population. In addition, it is in the best interests of countries to provide satisfactory care as adverse pregnancy and birth outcomes directly contribute to healthcare spending. Preterm and low-birthweight infants have some of the highest expenditures of any patient population with significant medical, social, and economic costs (Beam et al., 2020). Adverse pregnancy outcomes can be major causes of maternal and neonatal morbidity and mortality.

Purpose of Thesis

Much of the research on the perinatal outcomes of women who are pregnant and living in prisons is outdated and understudied focusing mostly on maternal outcomes. Only a few articles investigate perinatal outcomes and when they do, they only focus on a small subtopic such as birthweights and deaths. As the population of women living in prison has grown at twice the pace of men's incarceration in recent decades (Kajstura & Sawyer, 2023), it is crucial to take an

in-depth look at their pregnancy outcomes which affect mother and fetus well-being. Women who are pregnant and living in prisons are a highly marginalized and vulnerable population who remain at risk for adverse health outcomes. One of the major issues regarding their pregnancy outcomes is the lack of accessible perinatal care these women receive. This systematic review aims to paint a more comprehensive picture of all current pregnancy outcomes including labor and delivery and newborn outcomes by analyzing the available research on perinatal care provided by global prison systems. This review will aim to answer the following questions:

- (1) What are the perinatal outcomes of women who are pregnant and living in prisons?
- (2) Is there a negative or positive association between incarceration and perinatal outcomes?
- (3) What factors contribute to these perinatal outcomes? Are women in correctional facilities receiving sufficient perinatal care and living in safe environmental conditions?

From this synthesis, recommendations can be made for practice and policy to mitigate any barriers to care and thus improve the perinatal outcomes of women who are pregnant and living in prisons.

Chapter 2

Background

As the number of women who are living in prisons and babies behind bars increases, pregnancy during incarceration and its perinatal outcomes has become a concern. Correctional facilities are not mandated to track or report pregnancy-related data leaving a gap in the literature. Caring for women who are pregnant and living in prisons is a challenge complicated by the lack of standardized perinatal care, substance abuse, poor socioeconomic status, and barriers within the criminal justice system. As correctional facilities were originally designed for men, it can be difficult to meet the unique and complex needs of women who are pregnant. Investigating the current literature on the perinatal outcomes of women who are pregnant and living in prisons can reveal valuable insight into whether this population receives adequate care and the resulting health and well-being of the mother and fetus. Incarcerating more women for longer sentences does little to address the underlying problems of structural inequality such as socioeconomic circumstances that led to these women living in prisons in the first place. The majority of prison systems focus more on punishment causing further harm to those incarcerated, their families, and communities rather than rehabilitating them back into society as reformed members.

Characteristics of Women Who Are Pregnant and Living in Jails

Over the past 20 years, “the war on drugs” has caused a significant rise in the number of women living in jails and their access to adequate drug treatment (Lapidus et al., 2005). The “war on drugs” was a global campaign launched by the U.S. federal government in the 1980s to reduce the illegal drug trade. It implemented laws, policies, and practices that prohibited and

harshly punished the use, possession, and sale of drugs deemed illegal or controlled. This campaign costs approximately \$50 billion (about \$150 per person in the U.S.) annually and led to no measurable decline in illegal drug use or availability since its inception. Drug addiction was treated as a crime. Addicts could not obtain treatment and were subjected to police harassment, arrest, and incarceration with no access to drug treatment. These punitive attitudes have carried over to the last half-century, leading to a drastic increase in the number of women living in jails for drug offenses. The majority of women (70%) are in prison for nonviolent crimes including property, alcohol, and drug offenses which are often related to the socioeconomic disadvantages that characterized their lives prior to incarceration (Lapidus et al., 2005). Contributing to this drug epidemic are correctional facilities justifying the lack of rehabilitative programs by referencing the relatively low number of women living in prisons compared to the overall prison population.

Risk Factors

Women who live in jails frequently have predisposing risk factors for poor pregnancy outcomes. Female offenders often neglect their health in the community before incarceration. For instance, research has shown the complex and chronic health problems (i.e., asthma, cardiovascular disease) are more prevalent among women living in jails compared to their male counterparts (Augsburger et al., 2022). Women living in prisons are also more likely to be pregnant and carry STDs upon admission. 74% of women living in jails are between the ages of 18 and 44 - parameters of reproductive age. Previous studies have reported that 84% of women who lived in jails were sexually active before incarceration and 78-84% of those who were sexually active were not using contraceptives prior to arrest. Available data illustrates the prevalence of STDs, histories of trauma and abuse, drug addiction, and mental health among

women in jails and prisons. It is significantly higher than its prevalence in the U.S. general population and among men who live in jails (Sufrin et al., 2015).

HIV affects 2.4% of women in prison compared with 0.18% of women not living in jails and 1.8% of men living in jails. 50% of women in prison and 80% of women in jail report a history of physical or sexual abuse and nearly three-quarters of women living in jails demonstrate symptoms of psychiatric illness (Kajstura & Sawyer, 2023). Many women who are pregnant and living in jails are more likely to experience high-risk pregnancies due to the economic and social problems that lead to their imprisonment: poverty, lack of education, inadequate healthcare, discrimination, and substance abuse. As most women in prisons face structural inequalities that manifest themselves in higher rates of poor health outcomes including disease, it is important to consider whether the pregnancy outcomes of these women are solely the result of their incarceration environment or a byproduct of these health disparities and living conditions of correctional facilities. (Sufrin et al., 2015).

Perinatal Substance Abuse

Drugs that affect the mother can affect the fetus in multiple ways either directly or indirectly. Drugs taken early in gestation can cause significant teratogenic effects. Many women who are substance abusers do not receive treatment for their addictions from barriers to receiving necessary care. These include social stigma, labeling, guilt, and the fear of losing custody of their children or criminal prosecution. Substance abuse in pregnancy is defined as child abuse in 23 states and the District of Columbia with three states defining it as a reason for civil commitment (Lowdermilk et al., 2020). Commonly abused drugs include tobacco, alcohol, marijuana, opioids, cocaine, and methamphetamines. Opioids are a class of drugs used to manage pain but can have serious risks such as addiction and withdrawal symptoms. Opioid use disorder among pregnant

women is a significant public health concern in the U.S. It has been linked with severe negative health outcomes for women who are pregnant and developing babies including preterm birth, stillbirth, maternal mortality, and neonatal abstinence syndrome (Centers for Disease Control and Prevention, n.d.).

Differences in National Prison Systems

There are arguments in favor and against incarceration being a supportive environment for women who are pregnant. Since many people in jails and prisons lack access to health care before incarceration, this setting could theoretically be an opportunity to provide much-needed health care and public health interventions. Those in favor argue that correctional facilities provide a relatively safe shelter from the outdoors, three meals a day, shower access, and basic healthcare that protects mother and fetus from harm, especially if the woman was homeless prior. However, some argue that incarceration poses serious health risks such as exposure to violence, sexual assault, injury, communicable diseases, poor nutrition, and living conditions. There are also inconsistencies in the quality of pregnancy care and accommodations, contraceptive services, and abortion access across prisons (Sufrin et al., 2015).

U.S. jails and prison conditions tend to operate on gender-neutral policies which has a negative impact on the mental and physical health of women prisoners. Reflecting a general lack of oversight, no federal government body has established national standards for medical and perinatal care in prisons. In the absence of a clear policy mandating treatment, women who live in prisons face many barriers to care. Some countries including select states in the U.S. and the U.K. have prison nursery programs that allow a mother to parent her infant for a finite period anywhere from 30 days to 30 months (Child Welfare League of America, 2023). A study examining the quality of antenatal care in Canadian prisons found that women who experienced

imprisonment were substantially less likely to receive adequate antenatal care compared to women in the general population regardless of whether they were in prison during pregnancy. In a sample size of 626 prison pregnancies, they found that 30.8% of women received a first-trimester visit, 48.4% had at least 8 antenatal care visits, and 34.6% received first-trimester ultrasonography (Ramirez et al., 2020).

Babies Born in Correctional Facilities

Women who are pregnant are typically transported to community-based providers for prenatal care and women in labor are transferred to medical facilities for delivery. Policies vary by jurisdiction, but women are frequently shackled during transportation to prevent escape (Clarke & Simon, 2019). The problem is this practice poses a risk to the woman's health and baby. Some individuals have questioned whether women in labor are truly flight risks. The number of escape attempts made in the past 15 years during labor in the U.S. has been zero (Thomas & Lanterman, 2017). Most women who live in prisons are immediately separated from their newborns after delivery. After giving birth, most mothers who live in prisons are only allowed 24 hours with their newborns in the hospital. Infants are then either placed with relatives or in foster care and mothers return to prison or jail. This separation can lead to multifaceted, detrimental emotional and behavioral problems for these infants later in life due to disruptions to ordinary mother-baby bonding after birth. For mothers, this experience can be equally traumatizing and has been shown to increase the risk of recidivism – the tendency of a criminal to re-offend. Some facilities provide newborn services. As of 2013, the departments of corrections in 12 U.S. states offer prison-based nursery programs. However, these facilities have widely differing capacities and rehabilitative services with less than half of these nursery

programs offering appropriate services such as substance abuse treatment, mental health care, and domestic violence counseling (Clarke & Simon, 2013).

Mother-Baby Bonding

Most women in prisons are not afforded the opportunity to raise their children behind bars as most are forced to give up their newborns to a relative or foster care just days after birth. This significantly interferes with parental bonding leading to adverse health outcomes for the infant. Research has shown that infants undergo major neurological, cognitive, and emotional development during the first two years of their life that is heavily dependent on a loving bond or attachment relationship with a primary caregiver, usually a parent. Longitudinal studies have reported that a child's ability to form and maintain healthy relationships throughout life may be significantly impaired by having an insecure attachment to a primary caregiver (Winston & Chicot, 2016). Thus, it stands to reason that newborns born in prisons may be at risk of not developing the necessary pathways in the brain for development and may be less likely to grow up to become happy, independent, and resilient adults without good initial bonds.

Prison nursery programs are rare nationwide, but as of 2016, half of the countries in the world including select states in the U.S., Mexico, Costa Rica, and Afghanistan allow children to live with their mothers in prison (Eulich, n.d.). Most of these programs are enforced through prison nurseries that allow mothers to keep their infants with them while they serve their sentences. Mothers can be provided with parenting classes, support groups, substance abuse counseling, and complementary day-care services while they attend classes or vocational programs (Johnson, n.d.). Other prison systems allow children to live with their mothers in prisons until they reach a certain age. The biggest benefits are maintaining a mother-child bond and providing them with the tools to succeed upon leaving prison. However, some critics are

concerned about raising a child in the correctional setting and whether spending time in prison at a young age will encourage cycles of crime or break them.

Newborn Assessment

Each newborn is carefully checked at birth for potential problems or complications. Assessments include Apgar scoring, birth weight, head/abdominal circumference, length, vital signs (temperature, pulse, breathing rate), and a general physical exam from head to toe including the newborn's general appearance, skin, head/neck, face, mouth, lungs, cardiovascular system, abdomen, genitals/anus, and musculoskeletal system. APGAR scores are quick assessments performed on babies one and five minutes after birth to evaluate how well they are doing outside the mother's womb. Scoring exams the baby's breathing effort, heart rate, muscle tone, reflexes, and skin color (Lowdermilk et al., 2020). The average weight of a newborn is 2700-4000 g (6 lb – 9 lb) while the average length is 50 cm or 20 inches (Lowdermilk et al., 2020). Assessment of gestational age is important because perinatal morbidity and mortality rates are related to gestational age and birth weight.

Classification of Newborns by Gestational Age

Infants may be classified in the following ways according to gestational age. The American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) recommend classifying newborns in the ways listed below (2017). The gestational age of an infant at birth is an important predictor of survival. Infant morbidity and mortality are inversely related to gestational age (Lowdermilk et al., 2020).

Gestational Age and Birth Weight

The gestational age is typically compared with the newborn's birth weight to assess its appropriateness of growth. Classifying newborns at birth by both these metrics provides a more

accurate method of predicting mortality risks and providing guidelines for care management (see Table 1 for different classifications). The newborn's birth weight, length, and head circumference are plotted on standardized graphs that identify normal values for gestational age. These weights can be broken into 3 categories: appropriate for gestational age (AGA), large for gestational age (LGA), and small for gestational age (SGA); (see Table 2 for further details). The lower the birthweight, the higher the mortality (Lowdermilk et al., 2020).

Table 1: Gestational Age Classifications

Preterm (or premature)	Born before 37 0/7 weeks of gestation, regardless of birth weight
Late preterm	34 0/7 through 36 6/7 weeks
Early term	37 0/7 through 38 6/7 weeks
Full term	39 0/7 through 40 6/7 weeks
Late term	41 0/7 through 41 6/7 weeks
Post term	42 0/7 weeks and beyond
Postmature	Born after completion of week 42 of gestation and showing the effects of progressive placental insufficiency

Table 2: General Definitions

Correctional facility	A jail, prison, or other detention facility used to house people who have been arrested, detained, held, or convicted by a criminal justice agency or court
Miscarriage (Spontaneous abortion)	Loss of a baby before the 20 th week of pregnancy (result of natural causes)
Ectopic pregnancy	Occurs when a fertilized egg grows outside of the uterus; will not result in the birth of a live baby
Cesarean birth (C-section)	Delivery of a baby through incisions (surgical cuts) made in the belly and uterus
Hysterectomy	Surgery to remove the uterus
Gestational age	Length of time that a fetus grows inside the mother's uterus
Still birth	Death or loss of baby before or during delivery typically after 20 weeks
Preterm or premature birth	Birth that occurs between 20 0/7 and 36 6/7 weeks of gestation
Low birth weight	Weight at time of birth is 2500 g or less
Full-term birth	Birth that occurs between 38-42 weeks
Post-term	Birth that occurs after 42 weeks
Birth injury	A physical injury a baby may suffer during the birth process. Sometimes called birth trauma
Prenatal (or antenatal)	Meaning "before birth"
Perinatal	The period of time from onset of pregnancy and up to a year after giving birth
Postnatal (or postpartum)	Meaning "after birth"

(American College of Obstetricians and Gynecologists [ACOG], 2018) and (Lowdermilk et al., 2020)

Perinatal Outcomes

This review aims to identify and explore the perinatal outcomes of infants born to women who are pregnant and living in prisons. These perinatal outcomes will include pregnancy and birth outcomes. Perinatal outcomes can be defined by several metrics. For this systematic review,

pregnancy outcomes, perinatal outcomes, reproductive outcomes, outcomes of pregnancy, and birth outcomes will be used interchangeably. Perinatal outcomes are defined as any quantitative data about the newborn following birth or the results of conception and pregnancy such as abortion, miscarriage, ectopic pregnancy, stillbirth, death, preterm delivery/birth, term birth, birth weight, birth injuries, and gestational weight.

Costs Associated with Adverse Perinatal Outcomes

In addition to the well-being of the mother and fetus, it is in the best interests of countries to provide competent care as adverse pregnancy and birth outcomes directly contribute to healthcare spending. Preterm and low-birthweight infants have some of the highest expenditures of any patient population with significant medical, social, and economic costs. These include the costs of treating a premature baby versus treating a baby with no complications, maternal well-being such as anxiety, and the costs of taking care of post-partum mothers and infants that are sick, premature, or possessing other medical conditions (Beam et al., 2020).

Prenatal and Perinatal Care

Prenatal care is designed to monitor the growth and development of the fetus and identify abnormalities that will interfere with the course of normal labor and birth. It is sometimes referred to as antenatal care. It includes regular prenatal visits, ideally beginning soon after the first missed menstrual period, to promote the health of the expectant mother and infant. The goal of prenatal care is to promote the health and well-being of the mother and fetus. Prenatal care includes regular physical exams from a medical provider, health screenings, Pap tests, pelvic exams, lab work, calculating the mother's due date, vital signs, weight assessment, abdominal measurements to check the baby's growth, and fetal heart monitoring. It also should provide education and support for maternal self-care and parenting (Lowdermilk et al., 2019). Perinatal

care is care provided to the mother before, during, and after birth. It encompasses all aspects of pregnancy care and includes prenatal care. Examples of perinatal health issues are accessibility to prenatal care, tobacco/drug use during pregnancy, maternal medical conditions, premature birth, breastfeeding, Shaken Baby Syndrome, and perinatal depression (Alaska Department of Health, 2023). The quality of prenatal and perinatal care can be measured by qualitative (e.g., personal experiences of women who live in prisons) and quantitative measures (e.g., number of prenatal visits and health screenings) indicators. The quality of perinatal care will have a crucial impact on the pregnancy outcomes of women who are pregnant and living in prisons.

Gold Standards of Care

Developed countries including the United States, the United Kingdom, Australia, Canada, Finland, France, Japan, Netherlands, and Sweden recommend similar prenatal education, prenatal visits/guidelines, and psychosocial services for low-risk women with slight variations. Some countries differed in their recommended number of visits, longer intervals between visits, and less reliance on obstetrician-gynecologists for routine, low-risk prenatal care (Pehl et al., 2020).

In the U.S., well-known sets of standards for correctional health care come from the National Commission on Correctional Health Care (NCCHC), the American Congress of Obstetricians and Gynecologists (ACOG), and the American Public Health Association (APHA). Although there are slight variations between these standards, most share common themes including routine prenatal medical examinations, lab screenings, and perinatal education. For this systematic review, we will be using the ACOG for our gold standards (American Civil Liberties Union, n.d.). The American College of Obstetrics and Gynecology (ACOG) standards for perinatal care in correctional settings include pregnancy testing, access to pregnancy counseling

and abortion services, assessing and treating for substance abuse, HIV, depression, appropriate vitamins and diet, delivery in a licensed hospital with facilities for high-risk pregnancies, and postpartum contraception (2017).

On the federal level, there are several agencies with policies in place that regulate the provision of healthcare to pregnant inmates and the use of restraints. There are slight variations between them. Immigration and Customs Enforcement (ICE) possess the most comprehensive requirements regarding the provision of obstetrics and gynecological healthcare, while the Federal Bureau of Prisons (FBoP) similarly requires family planning, pregnancy care, and social services, but it permits the use of some restraints. However, there are only pregnancy or reproductive health care correctional standards for half of the U.S. states and the District of Columbia. Only 21 states had standards that mentioned both health care for inmates who are pregnant planning to carry to term and for those who seek an abortion. Very few included standards that closely tracked the NCCHC or APHA standards and the majority failed to address most of these standards including the explicit need for medical examinations to be included as a component of prenatal care, provision of adequate nutrition, requirements to document pregnancies and their outcomes, special treatment for high-risk pregnancies, and restrictions on restraints during labor and delivery (American Civil Liberties Union, n.d.).

Other Variables

Incarceration imposes unique restrictions on the daily lives of women who are pregnant and living in prisons. Other variables that may impact pregnancy outcomes include nutrition, living conditions, access to general health care, availability of substance abuse programs/mental health services, and social needs. With the lack of mandated documentation on this vulnerable population, it is hard to identify what improvements, if any, need to be made to existing care in

correctional facilities if we do not have a baseline. Many countries such as the United States also lack clear comprehensive national guidelines on healthcare for women who are pregnant and living in jails. There are several gaps in the literature on both the care provided to women who live in jails and their health outcomes.

Summary

Through an analysis and comparison of the characteristics of women who are pregnant and their babies in correctional facilities to women who are pregnant in the community and whether these facilities meet gold standards for perinatal care, this chapter describes the results of the current literature on the risk factors of women who are pregnant and their perinatal outcomes in correctional facilities. In summary, the current literature reveals that women in correctional facilities tend to have poor health outcomes and risk factors even before being incarcerated that put them at risk for maternal and pregnancy outcomes. Some studies argue that these risk factors along with the poor environmental conditions of prisons are associated with adverse health outcomes, while others argue that incarceration provides shelter and helps these women meet basic needs (food, healthcare) and protects them from external events such as access to drugs and crime. Thus, their health outcomes should improve from incarceration. Research on women who are pregnant and living in prisons is a relatively new and understudied topic with data limitations. There are many gaps in the literature due to a lack of federal mandates to track and document statistics on women who are pregnant in correctional settings, which makes studying their health outcomes challenging.

Chapter 3

Methods

To ensure a true systematic review with relevant articles from interdisciplinary fields, four databases were searched: PubMed, CINAHL, PsycINFO, and Web of Science. This chapter describes the process of the search and strategies used to find and select the articles to be used in this review. I conducted the initial search. Afterwards, three reviewers were selected to conduct the review including myself. All the articles were inputted into Zotero. There were two phases. The first phase consisted of a text and abstract review phase where all the articles were divided evenly among the three reviewers. Then each person reviewed another person's maybe articles which were finalized into a list that was reviewed under the full-text review. The articles were divided among the three reviewers again and a final list of full-text articles was selected.

The initial search was conducted with only the search terms in four main categories: women who live in jails, women who are pregnant, perinatal care, and perinatal outcomes. Four separate searches were conducted on each database. They included ("female inmates" OR "female prisoners" OR "incarcerated women" OR "incarcerated mothers" OR "women in prisons" OR "women in jails" OR "women in correctional facilities" OR "women who are incarcerated") AND ("pregnant women" OR "pregnant woman" OR "women who are pregnant" OR "pregnant" OR "pregnancy" OR "pregnancies" OR "expecting mother" OR "expecting mothers" OR "mothers") AND ("prenatal care" OR "antenatal care" OR "pregnancy care" OR "pre-natal care" OR "perinatal care") AND ("pregnancy outcomes" OR "delivery outcomes" OR "labor outcomes" OR "vaginal birth" OR "care outcomes" OR "health outcomes"). From this search, there were 113 articles from PubMed, 15 articles from CINAHL, ten articles from PsycINFO, and seven articles from Web of Science.

The final search was conducted with MESH terms to impose uniformity and consistency and with additional inclusion and exclusion criteria. The second search yielded 115 articles from PubMed, eight articles from CINAHL, six articles from PsycINFO, and seven articles from Web of Science. These searches resulted in 136 articles across all four databases. There were 117 articles after 14 duplicate articles were removed and five articles were excluded due to their research not taking place in a developed country. After screening titles and abstracts, 78 were excluded and 39 remained for full text review. Further evaluation of the full text of these articles resulted in the rejection of 17 articles because they either did not measure any type of relevant perinatal outcomes or they failed to completely meet all inclusion criteria. Thus, 22 articles were selected for this systematic review of the literature.

Inclusion and Exclusion Criteria

Articles in the review were included in the review if they were (1) peer-reviewed original research or original findings obtained from a secondary data set analysis or articles obtained from peer-reviewed systematic literature reviews, (2) available in English, (3) published after 2013, (4) were conducted in developing countries, (5) included data specific to women who were pregnant and lived in prisons, and (6) included and discussed pregnancy or birth outcomes of children born to women who were pregnant directly in correctional facilities. Articles were restricted to those published from 1992-2023 because the purpose of the review is to explore data on recent pregnancy and birth outcomes over the last decade. Articles were excluded if the study did not take place in developing countries because the prison systems in those countries differ drastically from those of developed countries and have outlier variables such as cultural differences that will be hard to account for. Articles were excluded if the population was not pregnant and living in prisons and if they did not discuss pregnancy or birth outcomes because

that is the specific topic within healthcare we are reviewing. We also excluded studies not available in English.

Figure 1: Article Selection Tree

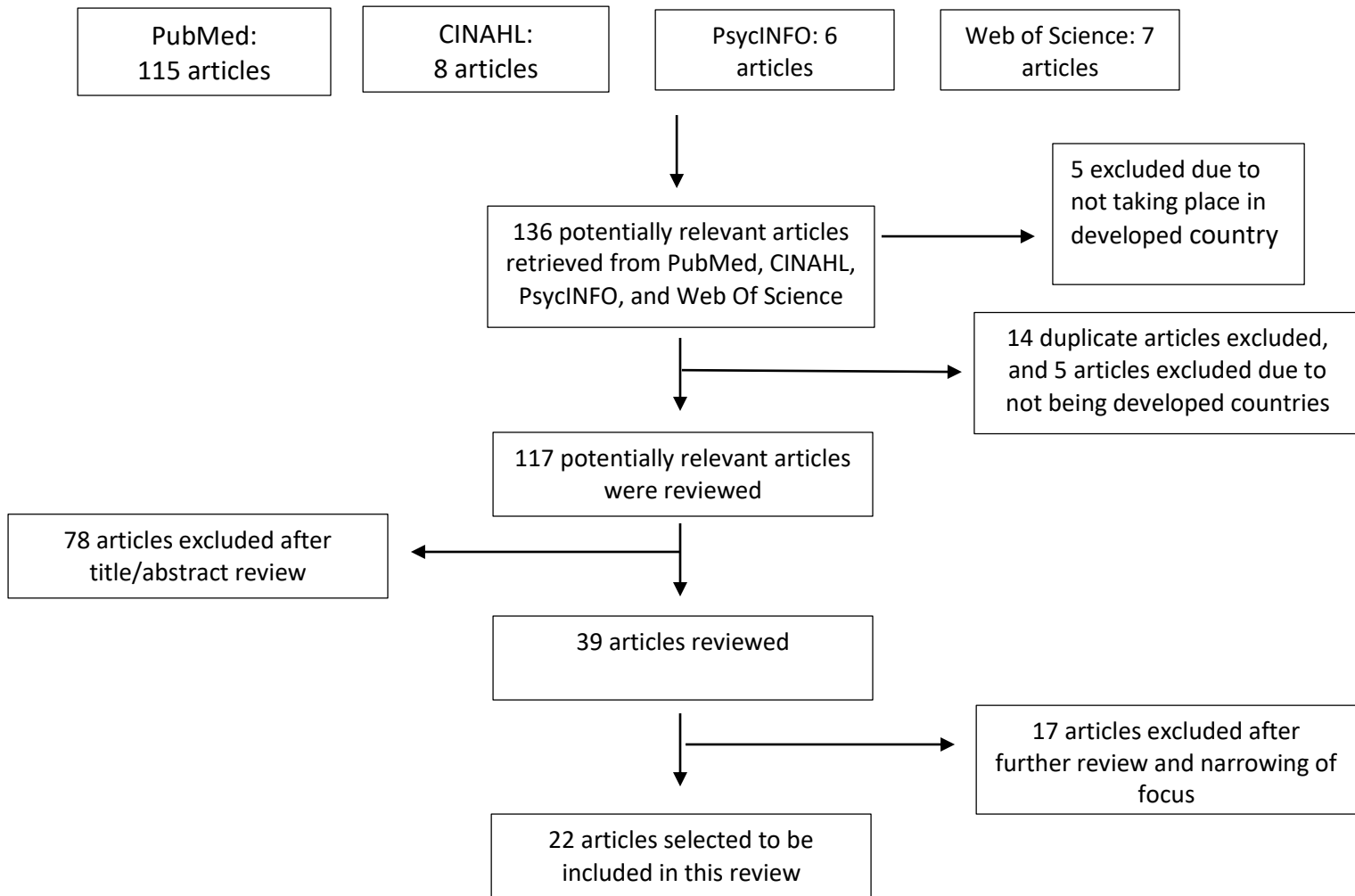


Table 3. Summary and Rating of the Evidence in Articles Reviewed

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Salami, A., Halabi, M., Hussein, I., & Kowash, M. (2018).	<p>Design: Cross-sectional comparative study</p> <p>Purpose: To evaluate the oral health of preschool children of women living in prisons and assess oral health knowledge/attitudes of prison nurseries' caregivers</p>	<p>Sample/Setting: 9 United Arab Emirates (UAE) prison nurseries.</p> <p>Study group (n = 128). Control group (n = 254) for preschool children</p> <p>Caregivers (n = 45)</p>	<p>Despite the non-significant difference in the cavities prevalence between the study and control groups, oral hygiene and care level of children to mothers living in prisons were significantly poorer. Prison caregivers had poor knowledge and attitude of dental health matters.</p>	<p>The prevalence of cavities was not significantly different between the 2 groups with 89.9% in the study group and 92.1% in the control group. Oral hygiene in the control group was better with 18.2% having good hygiene compared to 6.2% in the study group.</p> <p>Higher scores of grade 1 gingivitis (53.1% in study, 28% in control) and higher scores of debris/plaque in study (93.8%) compared to 81.8% in control</p>	<p>Strengths: Control and study groups were matched by age, gender, nationality, and geographic location. Random selection, sample size of control group was doubled that of study group. Intra and inter-examiner reliability calculated using Kappa statistics, use of WHO criteria</p> <p>Limitations: Small sample size of caregivers</p> <p>EG: Level 1, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Barkauskas, V., Low L., & Pimlott, S. (2002)	<p>Design: Cross sectional, case control study</p> <p>Purpose: To compare health outcomes (L&D, postpartum, newborn) of women who lived in prisons that participated in residential program and those that did not</p>	<p>Sample/Setting: Women in residential program (n = 52). Comparison group (n = 73). Correctional facility in large, midwestern metropolitan area in U.S.</p>	<p>No significant differences in birth or neonatal outcomes between residential and control groups</p> <p>Level of smoking is very high among mothers living in prisons</p> <p>Difference in breastfeeding may be explained by comparison group infants being separated from mothers within a day or two of birth</p> <p>Slightly higher APGAR scores in comparison group infants (88.2% with scores >7) compared to 78.3% in residential group</p>	<p>88% of residential program mothers and 84% of comparison group mothers smoked during their pregnancies</p> <p>Breastfeeding was initiated for seven (19.4%) of residential program infants but for only 1 comparison infant</p> <p>2 of residential and comparison group infants were low birth weight. 1 residential infant was small for gestational age.</p>	<p>Strengths: demographics of residential and comparison groups collected; drug screens performed</p> <p>Limitations: Ethical and legal constraints did not enable experimental design with random assignment, small sample size and design limit conclusions that can be drawn</p> <p>EG: Level III, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
<p>Bell, J., Zimmerman, F., Cawthon, M., Huebner, C., Ward, D., & Schroeder, C. (2004)</p>	<p>Design: retrospective cohort</p> <p>Purpose: to examine the relationships between jail incarceration during pregnancy and infant birth weight, preterm birth, and fetal growth restriction</p>	<p>Sample/setting: Women in jail for part of pregnancy (n = 496) compared Medicaid-funded births as matched community controls (n = 4,960)</p> <p>Jail in Seattle, Washington U.S</p>	<p>For women in jail at all ages, post release maternity case management was associated with decreased odds of LBW (low birth weight), whereas prenatal care was associated with decreased odds of preterm birth</p> <p>Efforts to ensure all pregnant women released from jail have access to enhanced prenatal health services may improve perinatal outcomes</p>	<p>Women living in prisons during pregnancy had progressively higher odds of low birth weight (LBW) and preterm birth through age 39 years. Conversely, jail detainees older than 39 years were less likely to experience LBW and preterm birth.</p>	<p>Strengths: adjusted for potential confounding variables, excluded twins and higher order multiple births, multivariate methods</p> <p>Limitations: use of vital statistics data, study restricted to urban jail, some women in control group may have lived in jails in other counties</p> <p>EG: Level III, grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Byrne, M., Goshin, L, & Joestl, S (2011)	<p>Design: Longitudinal study</p> <p>Purpose: to describe the quality and compare the attachment styles of mothers living in jails co-residing with their infants with low-risk community samples</p>	<p>Sample/setting: New York State Department of Correctional Services prison system. 30 mother-infant pairs</p> <p>Group 1 (Year-long co-residence group): n = 16; Group 2 (Brief Co-residence group): n = 14</p>	Mothers in prison nursery setting can raise infants who are securely attached to them at rates comparable to healthy community children even when mother's own internal attachment representation is insecure.	<p>Group 1: 75% of infants were classified as secure in their attachment. 6% avoidant, 0% resistant, 19% disorganized</p> <p>Group 2: 43% secure, 14% avoidant, 29% resistant, 14% disorganized</p>	<p>Strengths: Blind and random coding by 2 researchers, Strange Situation Procedure (SSP) and Adult Attachment Interview (AAI) used</p> <p>Limitations: Reliance on between-group and normative comparisons in absence of randomly selected control group, small sample size</p> <p>EG: Level II, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Ramirez, A.C, Liauw, J., Costescu, D., Holder, L., Lu, H., & Kouyoumdjian, F. G. (2020)	<p>Design: Respective cohort study of in-hospital deliveries</p> <p>Purpose: To describe the population-level risk of infant and maternal outcomes for women who experience imprisonment and compare their outcomes with general population</p>	<p>Sample/Setting: 3 exposure groups for Ontario singleton* deliveries from 2005-2015</p> <p>Data for women released from provincial prisons in 2010</p> <p>Prison pregnancies (n=544), prison controls (n=2156), general population deliveries (n=1,284, 949)</p>	<p>Compared with general population deliveries, <u>odds ratios were significantly higher</u> for prison pregnancies and controls for primary infant outcomes</p> <p><u>Higher risk for secondary infant outcomes</u> (extreme prematurity, very low birthweight, NICU admission, placental abruption, etc.)</p> <p>Preterm risk was 15.5% and 12.5%, LBW* risk was 18.1% and 19.2%</p>	<p>Primary infant outcomes:</p> <p>Preterm birth: 2.7 (95% CI 2.2-3.4) and 2.1 (95% CI 1.9-2.4)</p> <p>Low birth weight: 3.1 (95% CI 2.4-3.9) and 2.7 (95% CI 2.3-3.1)</p> <p>SGA birth weight: 1.6 (95% CI 1.3-2.1) and 1.8 (95% CI 1.6-2.0)</p>	<p>Strengths: population-based study using comprehensive databases; large representative sample, prison control group, calculated odds ratios for statistical analysis</p> <p>Limitations: does not represent all deliveries to women imprisoned between 2005 and 2015, only a subset; lower linkage rates between deliveries for prison groups than general population</p> <p>EG: Level I, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Dallaire, D., Forestall, C., Kelsey, C., Ptachick, B., & MacDonnell, K. (2017).	<p>Design: Longitudinal observational study</p> <p>Purpose: to examine the impact of a nutrition-based program (William & Mary Healthy Beginnings Program) on birth outcomes among women living in jails</p>	<p>Sample/setting: Pregnant women who participated in W&M HBP (n = 116). Women living in jails who recently gave birth but did not participate in W&M program (n = 51)</p> <p>7 jails in southeastern state</p>	<p>There were higher birth weights and marginally significant longer gestational lengths among offspring born to W&M HBP than women in comparison group.</p> <p>Participation in W&M program increased pregnancy and nutritional knowledge which was associated with longer gestational periods.</p>	<p>W&M mothers had babies that weighed ~1/2 pound more than babies born in comparison group</p> <p>W&M mothers also reported their pregnancies lasting an average of 5 days longer than comparison sample</p>	<p>Strengths: Demographic info collected during intake interviews; VA PRAMS used, large sample size, comparison sample</p> <p>Limitations: components of program (identification, prenatal vitamins, counseling, referrals for other services) makes it difficult to identify which part benefited the women</p> <p>EG: Level II, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Dowell, C., Mejia, G., Preen, D., & Segal, L. (2018)	<p>Design: Retrospective longitudinal cohort study</p> <p>Purpose: to examine the extent of the population of infant children in contact with child protection services when their mothers are incarcerated</p>	<p>Sample/setting: Western Australia. Children born 2001-2011 whose mothers were incarcerated during pregnancy (n = 533), children whose mothers were incarcerated from birth to before age 2 between 2001 and 2013 (n =1199).</p>	<p>Children born to mothers who are incarcerated are more vulnerable including higher child protection system contact and infant mortality.</p> <p>Children whose mothers had a hx of incarceration had an infant mortality rate 2.36 (Indigenous), 2.28 times (non-Indigenous) times higher than children whose mothers had no hx</p>	<p>Half of the children with a hx of maternal incarceration in pregnancy to ages 2 years encountered child protective services by their 2nd birthday</p> <p>Infant mortality for children whose mothers were incarcerated up to 5 yrs before birth or within their first year after birth was higher than for children without mothers incarcerated for both Indigenous and non-Indigenous children</p>	<p>Strengths: Random selection, comparison group, looked at differences between Indigenous and non-Indigenous children</p> <p>Limitations: Did not include full census of women incarcerated during pregnancy in Australia, data not available on gestational age and DOB</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
<p>Drago, M., Shabanova, V., Hochreiter, D., Grossman, M., & Mercurio, M. (2022)</p>	<p>Design: Retrospective cohort study</p> <p>Purpose: to examine the impact of maternal incarceration on length of stay (LOS) for infants with in-utero opioid exposure</p>	<p>Sample/setting: Infants with neonatal abstinence syndrome (NAS) at women's prison in Connecticut (n = 166). 28 born to women who are incarcerated, 138 born to women who non-incarcerated</p>	<p>Infants with NAS born to women who are incarcerated had longer LOS, lower rates of being fed breast milk, and different prenatal substance exposure than infants born to non-incarcerated women.</p> <p>Maternal incarceration associated with a 2 day increase in overall adjusted LOS</p>	<p>Women who are incarcerated were more likely to report prenatal alcohol use (14.3% vs 2.2% in control). Infants in study group were 3.6% likely to be fed breastmilk at discharge compared to 37% in control.</p> <p>Adjusted mean LOS was 18.5 days in infants whose mothers who were incarcerated and 16.6 days in control group.</p>	<p>Strengths: Maternal data collected</p> <p>Limitations: Was not able to include involvement of social services for each infant and its impact on LOS</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Egley, C., Miller, D., Granados, J., & Fogel, I. (1992)	<p>Design: Comparative study</p> <p>Purpose: to examine the pregnancy outcomes of women who are incarcerated over 1 year</p>	<p>Sample/setting: Women who were pregnant and incarcerated (n = 69), control group (n = 69)</p>	<p>There was a tendency toward better pregnancy outcomes among prisoners. They were less likely to deliver prematurely (10% vs 22%) and less significantly likely to experience premature rupture of the membranes (2.8% vs 2.6%).</p>	<p>36% of prisoners acknowledged using illicit drugs, primarily cocaine during their pregnancy compared to 3% in control group.</p> <p>68% of study group smoked. 20% of controls smoked.</p>	<p>Strengths: One year period for data collection, control group</p> <p>Limitations: Was not able to include involvement of social services for each infant and its impact on LOS</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Fogel, C. (1993).	<p>Design: Descriptive correlational study</p> <p>Purpose: to document the risk factors and outcomes of women who are pregnant and living in a maximum-security prison</p>	<p>Sample/setting: 89 women who are pregnant and incarcerated during the 3rd trimester of pregnancy</p>	<p>There is a need for intensive prenatal education for women who are incarcerated and for chemical dependency treatment programs designed for this population</p> <p>The mean birthweight of infants was 7.3 lbs. 7.8% of neonates were low birthweight. 1 neonate was born with congenital defect</p>	<p>Numerous risk factors during pregnancy include chemical dependency, poor nutritional status, poor OB histories, high anxiety levels, depression, and inadequate prenatal care.</p> <p>15% had consumed alcohol during pregnancy. 27.3% delivered preterm neonates, 24.7% delivered LBW neonates, 19.3% had bleeding problems, and 30.3% had UTIs.</p>	<p>Strengths: Researcher read all study instruments and defined all unfamiliar terms to participants to ensure comprehension, identified risk factors</p> <p>Limitations: Was not able to include involvement of social services for each infant and its impact on LOS, inaccuracy of last menstrual period date</p> <p>EG: Level III, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Howard, D., Strobino, D., Sherman, S., & Crum, R. (2009).	<p>Design: Cross-sectional study</p> <p>Purpose: to examine whether there are racial differences between the timing of incarceration during pregnancy and birth outcomes among women who are incarcerated</p>	<p>Sample/setting: Women who were imprisoned and pregnant in Texas (n = 267)</p>	<p>Racial differences were found in the association between gestational age at admission to prison and the 2 birth outcomes examined (infant birth weight, gestational age).</p>	<p>Among Whites, there was a 360.8 g lower mean birthweight for infants born to women living in prisons during weeks 14-20 relative to infants born to women during weeks 1-13</p> <p>Among Blacks and Hispanics, incarceration after the 1st trimester was not associated with a significant decrease in birth weight relative to incarceration during the 1st trimester</p>	<p>Strengths: 3 sampling phases, random selection, records from Department of CPS used to compute mean birth weight and month of delivery</p> <p>Limitations: Was not able to assess factors related to complexities of prison environment that could have impacted results</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Howard, D., Strobino, D., Sherman, S., & Crum, R. (2008).	<p>Design: Cross-sectional study</p> <p>Purpose: to determine whether there is an association between the quality of prenatal care and infant birthweight among women who are pregnant and incarcerated</p>	<p>Sample/setting: All deliveries to Texas female prisoners in 2003 (n = 285)</p>	<p>There is a positive association between the amount of prison prenatal care and infant birthweight among women who are pregnant and incarcerated delivering at term, but it is limited to women entering prison during the 1st trimester</p>	<p>There was a statistically significant 120.5 g increase in adjusted mean birthweight with each additional prison prenatal care visit among infants whose mothers entered prison during the 1st trimester</p>	<p>Strengths: 3 sampling phases, random selection, good sample size, regression model was repeated with restriction of sample to women delivering in 2003</p> <p>Limitations: Study limited to 1 prison system in Texas</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Martin, S., Kim, Haesook, Kupper, L., Meyer, R., & Hays, M. (1997).	<p>Design: Cohort study</p> <p>Purpose: to examine the effect of incarceration during pregnancy on infant birthweights</p>	<p>Sample/setting: Women living in North Carolina prisons during pregnancy (n = 94), women not living in North Carolina prisons during pregnancy (n =94)</p>	<p>Certain aspects of the prison environment (shelter, food) may be health promoting for high-risk pregnant women.</p>	<p>After cofounders were controlled for, infant birthweights among women in prisons during pregnancy were not significantly different from women never in prisons. However, infant birthweights were significantly worse among women living in prisons at a time other than during pregnancy than among women never in prisons and women living in prisons during pregnancy.</p>	<p>Strengths: Large and diverse sample sizes, demographics collected</p> <p>Limitations: Restricted to examination of live infant births, potential differences between groups of women in terms of spontaneous abortions and fetal deaths would not have been detected</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Mertens, D. (2001)	<p>Design: Cohort study</p> <p>Purpose: to examine low birthweight (LBW) and fetal death rates for women living in a large county jail during their pregnancy</p>	<p>Sample/setting: Women living in county jail during pregnancy (n = 71)</p>	<p>Women living in prisons for short periods of time experienced higher rates of LBW than the national average of 7.4%</p> <p>In study group of infants born to women living in prisons, 25% were preterm, 17% were LBW, 16% required cesarean, none had APGAR scores <5, and there was one fetal death</p>	<p>Analysis indicates the LBW of women living in the jail to be statistically higher ($p < 0.05$) than that of county and state but comparable to a matched group residing in high risk areas of same residing city</p>	<p>Strengths: Compared study group both to data of pregnancies in county and respective to high risk areas of same county</p> <p>Limitations: Only 1 county jail used, small sample size</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Morse, D., Wilson, J., Driffill, N., Lauture, J., Khan, A., & King-Turner, S. (2019).	<p>Design: Mixed methods retrospective case series and qualitative descriptive study (2-year period)</p> <p>Purpose: to describe pregnancy outcomes during the post-incarceration period</p>	<p>Sample/setting: 106 women initially recruited from correctional facilities. Final sample: 27 pregnant to 79 women who were not pregnant.</p>	<p>Complication rates in this population far exceeded that of the general population. The criteria for obstetric levels of care are not clearly defined and need more study as most women with high risk pregnancies were not referred for additional medical care.</p> <p>Compared with the national rate, abortions and miscarriages were much more frequent in this study sample.</p>	<p>27 women completed 29 pregnancies (2 women with 2 deliveries each), all of which were unplanned. There were 11 live births, 8 pregnant at study closure, 7 miscarriages, and 3 terminations.</p> <p>Among the 5 births, 4 tested positive for substance use during pregnancy. All 11 infants had pregnancy or delivery complications, but only 4 were placed in special care obstetrics clinics. Almost 90% of women in the sample were unmarried</p>	<p>Strengths: Patient sociodemographics, substance use, diagnosis, and pregnancies collected upon intake</p> <p>Limitations: Study was not designed to assess the degree to which personal loss of children impacted decisions that resulted in these pregnancies, lack of matched comparison group among patients of WISH-TC program (pilot program)</p> <p>EG: Level I, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Shlafer, R., Davis, L., Hindt, L., Goshin, L., & Gerrity, E. (2018)	<p>Design: Cross sectional study</p> <p>Purpose: to document rates of breastfeeding intention/initiation among mothers participating in prison-based pregnancy and parenting support programs, examine associations among breastfeeding intention and initiation, and identify key themes from doulas' reports about efforts to support breastfeeding</p>	<p>Sample/setting: Females enrolled in group-based and 1 on 1 doula support program in 1 Midwestern U.S. state female prison (n = 39)</p>	<p>Some of the barriers to breastfeeding in incarcerated population included the short time before women were forced to separate from their newborns and substance use during pregnancy.</p> <p>Findings show many women who are incarcerated have desire to breastfeed. These women need to be offered the same quality of breastfeeding education and support as women in the community.</p>	<p>At enrollment, 45.5% (n = 15) of the women reported they intended to breastfeed in hospital. During 1:1 meetings, most women (69.2%) discussed breastfeeding at least once with doula.</p> <p>3 overarching themes from doulas' narratives: benefits of breastfeeding, barriers to breastfeeding,</p>	<p>Strengths: Doulas recorded notes for each encounter and prepared written narrative of birth revealing qualitative themes, qualitative and quantitative data analysis</p> <p>Limitations: Small sample size</p> <p>EG: Level I, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Shlafer, R., Saunders, J.B., Boraas, C.M., Kozhimannil, K.B., Mazumder, N., & Freese, R. (2020)	<p>Design: Cross-sectional survey</p> <p>Purpose: to examine maternal and neonatal birth outcomes among women who gave birth in custody</p> <p>to examine outcome differences between women who received enhanced pregnancy support and a historical control group of women who received standard prenatal care</p>	<p>Analytic sample (n = 117)</p> <p>Women aged 18+ years who had a singleton birth while incarcerated in state women’s prison between 2007 and 2016</p> <p>De-identified records with both state DOP* data and EHR* data</p>	<p>No differences in outcomes were found between women who were incarcerated receiving enhanced pregnancy support and historical control group</p> <p>Integrated data from prison/hospital records are innovative but limited by sample size</p> <p>Future research should include primary data collection on maternal, neonatal, and dyadic outcomes longitudinally and across prisons</p>	<p>Descriptive statistics Fisher exact tests and Pearson <i>t</i> tests</p> <p>Adverse maternal and neonatal birth outcomes in sample were rare</p> <ul style="list-style-type: none"> • 23% of women gave birth by cesarean • < 5% of women birthed low birthweight infants • 6% of women had preterm births • Median Apgar score 9 • 6% of infants admitted to NICU 	<p>Strengths: historical control group (standard prenatal care), intervention group (enhanced pregnancy support), maternal demographic characteristics measured</p> <p>Limitations: sample size, incomplete data sources, limited variable availability</p> <p>EG: Level II, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
<p>Sufrin, C., Beal, L., Clarke, J., Jones, R., & Mosher, W. D. (2019)</p>	<p>Design: Longitudinal study over 12 months</p> <p>Designated reporters at different sites reported data monthly</p> <p>Data collected/managed with REDCap</p> <p>Purpose: To collect national data on pregnancy frequencies and outcomes among women in U.S. state and federal prisons</p>	<p>Sample: 1396 women who were pregnant admitted to prisons</p> <p>Geographically diverse: included 22 U.S. state prison systems and the Federal Bureau of Prisons (FBoP)</p> <p>Institutions recruited via purposive and snowball sampling</p>	<p>Proof that ongoing pregnancy surveillance is feasible</p> <p>Majority of prison pregnancies end in live births.</p> <p>Findings may enable policymaker and researcher change to optimize health outcomes for women who are pregnant and incarcerated</p>	<p>3.8% of newly admitted women and 0.6% of all women found pregnant in sample</p> <p>753 live births (92% of outcomes)</p> <p>46 miscarriages (6%) 11 abortions (1%) 4 stillbirths (0.5%)</p> <p>3 newborn deaths No maternal deaths</p> <p>6% of live births were preterm, 30% were cesarean deliveries</p> <p>Distribution of outcomes varied by state</p>	<p>Strengths: Captured data from prisons housing 57% of imprisoned women in U.S., could compare state prison differences due to diverse sample</p> <p>Limitations: unable to gather specific demographic characteristics (e.g., race, age) due to aggregate data collection; could not assess gestational age at entry; cannot make associations due to high variability of conditions at different state prisons</p> <p>EG: Level II, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Sufrin, C., Jones, R., Mosher, W., & Beal, L. (2020).	<p>Design: Prospective study</p> <p>Purpose: To describe the number of admissions of individuals who are pregnant to U.S. jails and the outcomes of pregnancies that end in custody</p>	<p>Sample: 1622 admitted individuals who were pregnant in 12 months in 6 selected jails (5 largest U.S. jails). These include Los Angeles County (CA), Rikers Island (NY), Cook County (IL), Harris County (TX), and Dallas County (TX).</p>	<p>About 3% of admissions of females to U.S. jails are of pregnant people; extrapolating study results to national female jail admission rates suggests nearly 55,000 pregnancy admissions in 1 year. It is feasible to track pregnancy statistics about this overlooked group</p>	<p>Of the 224 pregnancies that ended in jail, 144 (64%) were live births, 41 (18%) were miscarriages, 33 (15%) were induced abortions, and 4 were ectopic (1.8%). One third of the births were cesarean deliveries and 8% were preterm. There were 2 stillbirths, 1 newborn death, and no maternal deaths.</p>	<p>Strengths: large and geographically diverse sample size,</p> <p>Limitations: could not assess gestational age at entry, selection bias could influence results, all but 1 study site was a large, urban jail</p> <p>EG: Level II, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Walker, J. R., Hilder, L., Levy, M. H., & Sullivan, E. A. (2014)	<p>Design: a retrospective cohort study using linked health data</p> <p>Purpose: to investigate whether women who were imprisoned and pregnant in New South Wales have improved maternal and perinatal outcomes</p>	<p>Sample: Comparison of 3 study groups</p> <ul style="list-style-type: none"> • women aged 18-44 years pregnant and imprisoned between 2000-2006 • women imprisoned at times other than pregnancy • community controls <p>Selected 1st singleton (index) birth during study period for each woman</p> <p>Setting: New South Wales, Australia</p>	<p>Imprisonment during pregnancy did not improve maternal and perinatal outcomes for similarly disadvantaged women</p> <p>Babies born to women imprisoned during pregnancy were significantly more likely to be born pre-term, low birthweight, and admitted to hospitals compared to community controls</p>	<p>Babies born to pregnant prisoners were significantly more likely to be admitted to hospital with 50% greater risk of spending 5+ days in intensive care</p> <p>Babies were significantly more likely to have poorer outcomes than community controls for every outcome investigated (pre-term birth, LBW*, Apgar scores, higher order resuscitation, neonatal admission, days in NICU, perinatal deaths)</p> <p>Pregnant prisoners were significantly less likely to have optimum baby outcomes</p>	<p>Strengths: population based, women with hx of incarceration as control group, linkage of data on mental health/substance abuse disorders controlling for confounding variables, chi-square tests</p> <p>Limitations: Prisoners who were pregnant were at extreme end of social disadvantage, small population of pregnant women prisoners,</p> <p>EG: Level II, Grade A</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Tanner R. (2010)	<p>Design: longitudinal study</p> <p>Purpose: to investigate whether women who are pregnant and incarcerated are receiving prenatal care comparable to national standards for prenatal care</p> <p>To measure general pregnancy population data, birth weight data, delivery data, and pregnancy complications at Indiana Women's Prison (IWP)</p>	<p>Sample: 200 pregnancies at the Indiana Women's Prison (IWP) over last 4 years</p>	<p>Perinatal outcomes in study were better than published outcomes for pregnancies in Indiana</p> <p>The longer the pregnant inmates are incarcerated and receiving prenatal care provided, the better their birth weight outcomes for newborn infants</p> <p>81% of the women who were pregnant smoked prior to incarceration</p> <p>Because inmates were not allowed to smoke, their pregnancy outcomes improved</p>	<p>5.5% of the pregnancies had low birth weight outcomes</p> <p>Rate was only 2% for women who were incarcerated for > 4 weeks and received prenatal care</p> <p>Rate of C-sections at IWP comparable with current rate of the nation</p>	<p>Strengths: longitudinal study over 4 years, sample size of 200</p> <p>Limitations: Only observes one prison and gathers data with no analysis</p> <p>Evidence Grade: Level V, Grade B</p>

Author(s), Year	Design and Purpose	Sample and Setting	Relevant Findings/Conclusions	Results/Statistical Significance	Strengths, Limitations, Evidence Grade
Terk, J., Martens, M., & Williamson, M. (2009).	<p>Design: Cohort study</p> <p>Purpose: to examine the pregnancy outcomes of incarcerated women in comparison to control group</p>	<p>Sample: 76 women who were pregnant and living in prisons compared to control group of 117 women not living in prisons in the U.S.</p>	<p>Pregnancy outcomes with respect to cesarean section, premature birth, and low birth weight, significantly improved with increasing duration of gestation spent in prison. Therefore, enforced provision of prenatal care and cessation of high-risk behavior appears to have a beneficial effect on maternal and fetal outcome.</p>	<p>There was a statistically greater number of drug abusing patients in the incarcerated group as expected ($P < 0.001$). When length of incarceration is excluded, only a greater prevalence of low birth weight ($P < 0.04$) and premature birth ($P = 0.05$) in the former group is noted.</p>	<p>Strengths: Control group, random selection</p> <p>Limitations: Limited sample size</p> <p>Evidence Grade: Level II, Grade B</p>

Chapter 4

Results

This chapter will detail the characteristics of the scholarly articles selected for review. Twenty-two articles (n = 22) were reviewed, and all were published between 1993 to 2022 (Salami et al., 2018; Barkauskas et al., 2002; Bell et al., 2004; Byrne et al., 2011; Ramirez et al., 2020; Dallaire et al., 2017; Dowell et al., 2018; Drago et al., 2022; Egley et al., 1992; Fogel, C., 1993; Howard et al., 2008; Howard et al., 2009; Martin et al., 1997; Mertens, D., 2001; Morse et al., 2019; Schlafer et al., 2018; Schlafer et al., 2020; Sufrin et al., 2019; Sufrin et al., 2020; Walker et al., 2014; Tanner, R., 2010; Terk & Williamson., 2009). The purpose of this chapter is to explore and analyze the current literature surrounding the perinatal outcomes of women who are pregnant and living in jails in developed countries. This will provide a depiction of the current state of the science.

Study Samples

Study Design and Sample Size

The sample sizes of the studies reviewed range from 117 to 11,534 participants. All studies only included females who were pregnant and living in jails and type(s) of perinatal outcomes. Five of the studies examined similar quantitative perinatal outcomes – types of births including live births, stillbirths, miscarriages, abortions, deaths, and birthweights of the infants including number of low birth weights, SGA birth weights, mean birth weight (Ramirez et al., 2020; Sufrin et al., 2019; Baker, B., 2019; Tanner, R., 2010; Schlafer et al., 2020). Three of the studies measured labor and delivery outcomes, the number of cesarean births to vaginal deliveries, and pregnancy complications such as premature rupture of membranes. Three of the

studies measured the number of neonatal admissions and neonatal-specific outcomes including Apgar scores and resuscitation (Walker et al., 2014.)

Five studies were cross-sectional, case-control studies (Salami et al., 2018; Barkauskas et al. 2010; Howard et al., 2008a; Howard et al., 2008b; Shlafer et al., 2018). Five studies were retrospective cohort studies (Bell et al., 2004; Drago et al. 2022; Ramirez et al., 2020; Walker et al., 2014; Shlafer et al., 2020), but Walker and Ramirez used linked health data. Byrne et al., 2011, Dallaire et al. (2017), Tanner (2010) and Sufrin et al. (2019) were longitudinal observational studies. Tanner (2010) and Dowell et al. (2018) were retrospective longitudinal studies. Egley et al. (1992) is a comparative study. Fogel (1993) is a descriptive correlational study. Terk & Williamson (2009) and Mertens (2001) were cohort studies. Morse et al. (2019) is a mixed methods retrospective case series and qualitative descriptive study. Sufrin et al. (2020) was a prospective study.

Study Settings and Recruitment

Eighteen studies took place in the United States (Barkauskas et al., 2002; Bell et al., 2004; Byrne et al., 2011; Dallaire et al., 2017; Drago et al. 2022; Egley et al., 1992; Fogel, 1993; Howard et al. 2008a; Howard et al., 2008b; Martin et al., 1997; Mertens, 2008; Morse et al., 2019; Shlafer et al., 2018; Shlafer et al., 2020; Sufrin et al., 2019; Sufrin et al. 2020; Tanner, 2010; Terk & Williamson, 2009). Two studies took place in Australia (Dowell et al., 2018; Walker et al., 2014), another (Ramirez et al., 2020) occurred in Canada, one in the United Arab Emirates (Salami et al., 2018).

Participant Demographics

The women in these studies mainly came from women's correctional facilities. Most women in the studies were sentenced for small nonviolent crimes with the most common being

failure to appear in court, probation violations, property crimes, and drug offenses. Several studies found that women living in jails are more likely to engage in nicotine and substance abuse. The women in jails used alcohol, drugs, or both at much higher rates than estimates for women who had Medicaid-funded births in Washington state (Bell et al., 2004). Egley et al. (1992) found that 36% of prisoners acknowledged using illicit drugs, primarily cocaine, during their pregnancies compared to 3% of the controls. 68% of these women smoked cigarettes compared with 20% of the controls. In the Barkauskas et al. (2002) sample, the majority of mothers smoked during pregnancy. About 88% of the residential program mothers and 84% of the comparison group mothers smoked during their pregnancies. This is extremely high relative to the 13% of women who report smoking in the general population. Substance abuse was found with 1/10 drug screens coming back positive for a comparison group mother and two residential program mothers testing positive for substance use. More than half the subjects smoked, more than a quarter had used drugs, and about 15% had consumed alcohol during their pregnancies. The nutritional statuses of the subjects were also poor. Almost a third were overweight before conception and 15% were underweight. Pica (the compulsive eating of nonnutritive substances) was practiced by 16.5% of women during their pregnancies (Fogel, 1993). Drago et al. (2022) support that women living in jails were more likely to report prenatal alcohol use (14.3% compared to 2.2% control). They are also more likely to use benzodiazepine (21.4% vs 7.3%). There was a statistically greater number of drug abusers among women who were living in jails in Terk and Williamson's study (2009). Four of the studies found that the majority of women admitted to correctional facilities were drug users or had been incarcerated for a drug offense (Sufrin et al., 2019; Walker et al., 2014; Schlafer et al, 2020, Terk & Williamson, 2009).

Participants were also predominantly of low socioeconomic status. Fogel's (1993) sample were mostly poorly educated young women of color who were single heads of household. These women reported numerous medical and obstetric history risk factors including prior deliveries of preterm neonates, hypertension, diabetes, and bleeding disorders. Ramirez et al. (2020) found that the unadjusted and adjusted odds of hypertensive disorders of pregnancy and gestational diabetes were lower in prison pregnancies than in general population deliveries. However, the difference between these two outcomes was not significant after adjusting for maternal age and parity. Compared with the general population, both prison groups had higher odds of preterm prelabor rupture of membranes and placental abruption. Morse et al. (2019) is the only study that examined pregnancy outcomes during the post-incarceration period.

Perinatal Care

One of the studies conducted a systematic review and meta-analysis to assess the risk of inadequate prenatal care and pregnancy outcomes among women who were pregnant and living in jails in the United States. Nine studies were included in the final review with a total of 11,534 individuals who were pregnant. Of those, 2,544 were living in prisons while pregnant, and 8990 were matched individuals who were pregnant and living outside of prisons to serve as a control group. They found that when compared to individuals who were pregnant and not in prisons, individuals pregnant and living in prisons were at higher risk of inadequate prenatal care (OR 2.99 [95% CI: 1.60, 5.61], $p < 0.001$) and were more likely to have newborns with low birthweight (OR 1.66 [95% CI: 1.19, 2.32], $p = 0.003$). There was no significant difference between incarcerated and matched control pregnancies in the rates of preterm birth and stillbirth. These findings suggest that individuals who were incarcerated and pregnant had an increased risk of inadequate prenatal care.

Barriers to Care

Potential causes could be lack of funding, historical design of prisons to be male-dominated, lack of statistics and data on women who are pregnant and incarcerated, lack of mandated federal regulations/laws, and no gold standards for perinatal care in correctional facilities. Mertens (2001) found that health care and support services provided to the inmate population that was pregnant were limited. During intake, all females receive a medical history and screenings for tuberculosis, cervical cancer, STDs, and drugs. Information is obtained on the last menstrual cycle and if pregnancy is known or suspected, they are scheduled for a pregnancy test and exam. All services are voluntary. Only one full-time equivalent counselor was available to serve the entire population of the women's unit. Nutrition services were not formally available outside of the basic food service at the jail. A mandatory periodic head count caused inmates to miss their prenatal appointments and if a patient was released before her prenatal appointment, no message was forwarded to the clinic to facilitate follow-up.

Pregnancy Frequencies and Outcomes in the U.S.

Sufrin's landmark study in 2019, *The Pregnancy in Prison Statistics (PIPS)*, was the first national-scale, systematic investigation of pregnancy frequencies and outcomes in prisons. It collected data from 2016-2017 from 22 state prison systems, the Federal Bureau of Prisons, 6 jails, and three juvenile justice systems. Its sample size (n= 1396 for U.S. prisons, n = 1622 for U.S. jails) represented 57% of females in U.S. prisons and 5% of females in jails. 3% of females entering jails were pregnant and 4% of females entering state prisons were pregnant. In U.S. prisons, there were 753 live births, 46 miscarriages, 11 abortions, four stillbirths, and two ectopic pregnancies. 117 women who were pregnant were admitted with opioid use disorders. In U.S.

jails, there were 144 live births, 41 miscarriages, 33 abortions, two stillbirths, and four ectopic pregnancies. 50 individuals who were pregnant were admitted to U.S. jails with opioid use disorders (Sufrin et al., 2019).

Incarceration during Pregnancy and Infant Birth Weight

Howard et al. (2008b) found that there was only a positive association between exposure to prison during pregnancy and infant birth weight among women incarcerated during the first trimester of pregnancy, and the relation is sensitive to the method used to measure and model exposure to prison during pregnancy. The association between incarceration during pregnancy and birth outcomes appears to be non-linear with the association appearing the strongest among infants born to women living in prisons during the first trimester and very weak to non-existent among infants born to women living in prisons after the first trimester. It makes clinical sense that incarceration during the first trimester of pregnancy would have a larger effect on infant birthweight than incarceration after the first trimester because fetal growth is solely due to hyperplasia - increased cell production in normal tissues or organs. Therefore, any deprivation or insult occurring early in gestation could affect both length and weight by interfering with early hyperplasia in all body organs. Approximately 1/3 of women sentenced due to drug offenses are of low socio-economic status. This tends to correlate with poor nutritional status and lack of prenatal care. Consequently, women living in jails are at high risk for poor birth outcomes such as low infant birth weight due to predisposing risk factors such as poor nutritional status and drug use (Howard et al., 2011).

Adverse Outcomes

Walker et al. (2014) found that babies born to women who were imprisoned during pregnancy were significantly more likely to be born pre-term, have low birth weight, and be

admitted to the hospital compared to community controls. The study found no association between imprisonment during pregnancy and improved perinatal outcomes for women who were imprisoned or their neonates. It was notable that for every outcome measured, babies born to women in the prison pregnancy group were significantly more likely to have poorer outcomes than community controls. However, prisoners who were just pregnant but did not give birth directly in prisons were not significantly more or less likely than prison controls to have poorer perinatal outcomes. A history of imprisonment remained the strongest predictor of poor perinatal outcomes, reflecting the relative health disadvantages experienced by this population. Morse et al. (2019) found that among the 5 births at the clinic, 4 tested positive for substance use during pregnancy.

Dowell et al. (2018) also found that children born to mothers who lived in jails were more likely to face adverse outcomes both at birth and in early childhood. Children born to mothers who lived in jails are more vulnerable including higher child protection system contact and infant mortality. Half of the children with a history of maternal incarceration in pregnancy encountered child protective services by their 2nd birthday. Of those children, 31% Indigenous and 35% non-Indigenous children were removed and placed in out-of-home care by age two. It was also discovered that children whose mothers had histories of incarceration, both indigenous (2.36) and non-indigenous (2.28) had higher infant mortality rates than children whose mothers had no history. There was one study that found the rates of adverse maternal and neonatal outcomes to be rare (Shlafer et al., 2020).

Types of Births and Birthweights

Twelve studies focused on births, birthweights, or a combination of both (Barkauskas, Bell, Ramirez, Dallaire, Fogel, Howard, Martin, Mertens, Schlafer, Walker et al., 2014; Tanner, Turk).

Walker et al. (2014) found that babies born to women who were imprisoned during pregnancy were significantly more likely to be born pre-term, have low birth weight, and be admitted to the hospital compared with community controls. In contrast to published literature at the time, the study found no evidence that contact with prison health services during pregnancy was a “therapeutic” intervention and no association between imprisonment during pregnancy and improved perinatal outcomes for women who lived in jails or their neonates. Bell et al. (2004) found that women living in jails during pregnancy had progressively higher odds of low birth weight (LBW) and preterm birth through age 39 years. Conversely, jail detainees older than 39 years were less likely to experience LBW and preterm birth. Unadjusted birth weights were significantly lower for infants whose mothers had been living in jails. Compared with controls, women in jails also had higher odds of preterm birth. However, the duration of incarceration was not significantly associated with the odds of having preterm births. Ramirez et al. (2020) found in their study that compared with general population deliveries, odds ratios were significantly higher for prison pregnancies and controls. Prison controls were when women were not in prisons during pregnancy. For both groups, the risks of primary outcomes were 15.5% and 12.5% for preterm birth, 13% and 11.6% for LBW. There was a higher risk for secondary infant outcomes – extreme prematurity and very low birth weight.

Tanner (2010) found that perinatal outcomes in its study were better than published outcomes for pregnancies in Indiana. They found that 5.5% of pregnancies had low birth weight

outcomes. Ramirez et al. (2020) found that compared with general population deliveries, odds ratios were significantly higher for prison pregnancies and controls for primary infant outcomes. Preterm risk was 15.5% and 12.5%, 13% and 11.6% for LBW, and 18.1% and 19.2% for small for gestational age (SGA) birth weight. This is worse compared to the general population whose numbers were respectively 6.4% for preterm birth, 4.8% for LBW, and 12.5% for SGA birth weight. In Fogel's study (1993), the mean birth weight for the subjects' offspring was 7.3 pounds and 7.8% of neonates were LBW. Racial differences were found in the associations between gestational age at admission to prison, infant birth weights, and gestational age (Howard et al., 2008a). Among Whites, there was a 360.8g lower mean birth weight for infants born to women who lived in jails during weeks 14-20 of gestation relative to infants born to women during weeks 1-13. However, among Blacks and Hispanics, incarceration after the first trimester was not associated with a statistically significant decrease in infant birth weight relative to incarceration during the first trimester. Martin et al. (1997) found that among women who never lived in jails, the unadjusted mean birth infant weight (3340 g) and percentage of infants being LBW (7%) were higher than women who lived in jails during pregnancy or lived in jail at some point but not during pregnancy. However, after cofounders were controlled for, infant birthweights among women who were jailed were not significantly different from women never jailed. Infant birthweights were worse among women living in jails at a time other than pregnancy. Mertens (2001) found that almost 17% of births to women who lived in a large county jail were LBW.

The Schlafer et al. (2020) study is an outlier in that they found < 5% of women who lived in prisons gave birth to infants that were LBW and 6% of births were preterm indicating no negative correlation between the prison environment and perinatal outcomes. The Fisher and

Pearson tests indicated no statistically significant differences between the control and intervention groups for low birth weight and preterm birth. According to Terk and Williamson (2009), when length of incarceration is excluded, only a greater prevalence of LBW and premature birth in women who were drug abusers was noted.

Apgar Scores

There were no significantly lower Apgar scores among women who lived in jails and were pregnant compared to those not living in jails (controls). Barkauskas et al. (2010) measured the Apgar scores of two groups of women: both resided in jails, but the study group received supplemental prenatal care and services on top of the typical prison care provided to the control group. The overall Apgar scores for both groups had positive outcomes. 78.3% of the residential group infants and 88.2% of comparison group infants had 1-minute Apgar scores > 7. Five-minute Apgar scores were all greater than 7 except for one program group infant with a score of 6. None of the births to women who lived in prisons had Apgar scores < 5 in Mertens's study (2001). There was one fetal death identified. When the LBW and fetal death rates for the study population were compared to those of the control group, no differences were found. The LBW rate was statistically higher for the cases when compared to the county and state. LBW rates were comparable when compared to the city, neighborhood, and control groups. In Shlafer's study (2020), the median Apgar score was 9 showing APGAR scores were within normal limits in children born to women living in prisons compared to those in the community.

Labor and Delivery Outcomes

Tanner (2010) found that the rate of cesarean sections at the Indiana State Prison was comparable to that of the nation. Shlafer et al. (2020) concluded there were no differences in outcomes between women who lived in jails receiving enhanced pregnancy support and one

historical control group. Adverse maternal and neonatal birth outcomes in the sample were rare. They found that 23% of women gave birth by cesarean, < 5% of women birthed low birthweight infants, 6% of women had preterm births, the median Apgar score was 9, and 6% of infants were admitted to NICU. Walker et al. (2014) found that the Caesarean section rate for birthing prisoners was comparable with community controls (28% and 26% respectively). Former pregnant prisoners were significantly less likely to have a Caesarean birth than birthing prisoners as were prison controls. The highest rate of spontaneous onset of labor was found among former prisoners who were pregnant (77.6%). There was no significant difference between the groups in fetal presentation. It is notable that despite limited antenatal care, levels of maternal morbidity (gestational diabetes, pre-eclampsia) were the lowest among prisoners who were pregnant. Compared with general population deliveries, deliveries for both prison pregnancies and controls had at least twice the odds of preterm birth and very low birth weight. There was no significant difference in the risk of cesarean section for delivery in either prison group compared with the general population (Ramirez et al., 2020). Egley et al. (1992) found that despite women who lived in jails having a higher usage of drugs during their pregnancies, they were less likely to deliver prematurely (10% vs 22%) and experience premature rupture of the membranes (2.8% vs 2.6%). Mertens (2001) found that 25% of births were preterm in their study group of 71 women who were pregnant and lived in a large county jail. In Morse's study of women entering a pilot, uncontrolled primary care transitions clinic post-incarceration, complication rates in this population far exceeded that of the general population. Compared with the national rate, abortions and miscarriages were much more frequent. 27 women completed 29 pregnancies, all of which were unplanned. There were 11 live births, eight pregnancies at study closure, seven

miscarriages, and three terminations. Shlafer et al. (2020) had 23% of women who lived in prisons give birth by cesarean.

A national study by Sufrin et al. (2019) found that the majority of U.S. prison pregnancies end in live births (92%). Miscarriages make up 6%, abortions 1%, and stillbirths 0.5%. There were 3 newborn deaths and no maternal deaths. 6% of live births were preterm and 30% were cesarean deliveries. The distribution of outcomes varied by state. An updated study by Sufrin in 2020 found that of the 224 pregnancies that ended in U.S. jails, Of the 224 pregnancies that ended in jail, 144 (64%) were live births, 41 (18%) were miscarriages, 33 (15%) were induced abortions, and 4 were ectopic (1.8%). One-third of the births were cesarean deliveries and 8% were preterm. There were 2 stillbirths, 1 newborn death, and no maternal deaths. Tanner (2010) found that the rate of cesarean deliveries at the Indiana Women's Prison was comparable with the rate of the nation at that time.

Hospital Stays and Neonatal Intensive Care Outcomes

Walker et al. (2014) found that babies born to prisoners who were pregnant were significantly more likely to be admitted to the hospital with a 50% greater risk of spending 5+ days in intensive care. Babies were significantly more likely to have poorer outcomes than community controls for every outcome investigated (i.e., pre-term birth, LBW, Apgar scores, higher order resuscitation, neonatal admissions, days in NICU, and perinatal deaths). Pregnant prisoners were also significantly less likely to have optimum baby outcomes which were defined as gestational age ≥ 37 weeks, birthweight ≥ 2500 g, Apgar score ≥ 7 , no higher order resuscitation, no admission to NICU or special care nursery, and survival ≥ 28 days. NICU admissions were significantly higher for prison pregnancies and controls than the general population at 16.6% and 11.8% respectively compared to 5.3% in the general population. The

median length of NICU stay for infants in the prison pregnancy and control groups was over twice as long as that for the general population. It is also noted that the odds of neonatal abstinence syndrome were over 20 times higher in both prison groups compared to the general population.

Drago et al. (2022) found that the adjusted mean length of stay (LOS) was longer overall among infants born to mothers who lived in prisons (18.5 days vs 16.6) in their samples. In Morse's sample of women attending a post-incarceration transitions clinic, all 11 infants had pregnancy or delivery complications, but only 4 were placed in special care obstetrics clinics (2019).

Dental Health

One case-control study (Salami et al., 2018) examined the oral health status of preschoolers of women living in prisons in nine United Arab Emirates (UAE) prison nurseries along with the oral health knowledge of their caregivers. The study group consisted of all healthy children under 6 years of age who had resided for more than 6 months with their mothers who were in prisons. The control group consisted of healthy preschoolers of mothers who were not living in prisons and were matched by age, gender, nationality, and geographic location to the study group. Clinical examination of the primary dentition status of these children revealed the difference in cavities prevalence between the study group of children whose mothers had been living in prisons and the control group – 89.8% in the study group, and 92.1% in the control group. However, the restorative index (RI) and care index (CI) were significantly higher than the control group – 4.43 and 4.2% compared to 0.34 and 0.3% in the control group. In contrast, the tooth extracted index (TEI) in the study group was higher than the control group with respective scores of 2.1% and 1.4%. In terms of overall oral hygiene status, the control group had better

outcomes in all categories: healthy gingiva (68.9% vs. 40.7%), grade 1 gingival inflammation (28% vs. 53.1%), calculus-free (96.9% vs 99.6%). There was a higher score of debris/plaque observed in the study group where only eight (6.2%) of children in the study group were debris-free compared to the 46 (18.2%) in the control group.

A structured questionnaire was given to assess the dental health knowledge and attitude of 10 prison nursery caregivers toward children's oral health through face-to-face interviews. Questions included sugar's contribution to tooth decay, definitions of dental plaque and gingivitis, and whether fluoride in toothpaste made a difference. Prison caregivers had poor knowledge and attitude of dental health matters. The caregivers' knowledge of dietary habits received the lowest scores. When asked about the best time to treat a child with a sugary snack and what drink a child could take in a bottle overnight, only 8.8% answered the first question correctly. 15.5% selected water as the best night-time drink while the majority chose milk formula (91.1%) followed by milk (84.4%) and juices (40%). There was a direct association between caregivers' knowledge and attitudes. 80% of those with a satisfactory level of knowledge presented positive attitudes, while only 20% of those had a negative attitude. In contrast, the level of positive attitudes of caregivers with poor knowledge reduced to 48%.

Interventional Programs

Barkauskas et al. (2010) wanted to determine if an experimental, community-based residential program afforded women who were pregnant and living in jails improved health outcomes compared with women who received traditional prison-based health care. Health outcomes for both groups of women and their infants were similar and more optimal than expected given their preexisting health conditions and risk factors. About a third of mothers in both groups experienced some medical problem during their pregnancies (e.g. smoking,

gestational diabetes). There were no significant differences in birth or neonatal outcomes between the residential program and comparison groups. Two of the residential program infants were born < 2,500g and one infant was assessed as small for gestational age. The overall Apgar scores for both groups had positive outcomes. 78.3% of the residential group infants and 88.2% of comparison group infants had 1-minute Apgar scores > 7. Five-minute Apgar scores were all greater than 7 except for one program group infant with a score of 6.

Bell et al. (2004) found that for women in jails of all ages, post-release maternity case management was associated with decreased odds of low birth weight, and prenatal care was associated with decreased odds of preterm birth. Dallaire et al. (2017) examined the perinatal and health outcomes of women enrolling in a nutrition-based program (W&M HBP) during their incarceration compared to women who were just normally living in jails. Results showed higher birthweights, longer gestational periods, and better birth outcomes among children born to W&M HBP than women in the comparison group. Participants had babies that weighed about half a pound or 8 oz more than babies in the community group. W&M HBP women significantly increased their pregnancy and nutrition-related knowledge which in turn predicted longer gestational periods. Howard et al. (2008b) found that there is a positive association between the amount of prison prenatal care and infant birthweight among women who are pregnant and live in prisons. There was a statistically significant increase of 120.5 g in adjusted mean birthweight with each additional prison prenatal visit among infants whose mothers entered during the 1st trimester. et al, 2020). It will reference the Minnesota Prison Doula Project. This section will explore whether mothers who are pregnant and live in prisons had fewer opportunities for or poor quality of mother-baby bonding during incarceration.

Breastfeeding and Doula Care

Correctional policies that affect a woman's ability to breastfeed vary across the U.S. There were 9 states with prison nursery programs in 2017, which allow infants to stay with their mothers for 12-36 months after birth. Even with these programs, women face barriers such as limited knowledge and support. The vast majority of women who live in prisons serve their sentences in facilities that do not allow infants to remain with their mothers which hinders breastfeeding (Shlafer et al., 2018). At enrollment, 45.5% of women living in prisons reported they intended to breastfeed in hospitals. During 1:1 meetings, 69.2% discussed breastfeeding at least once with a doula. Results of the Fisher exact test showed that whether doulas and mothers discussed breastfeeding during 1:1 meetings was associated ($p = .01$) with breastfeeding initiation. Women who discussed breastfeeding with their doulas were seven times more likely to initiate breastfeeding than women who did not.

According to Sufrin, 11 prisons and five jails allowed pumping and/or breastfeeding. There was a monthly average of eight breastfeeding individuals out of 44 postpartum people in state prisons and a monthly average of six breastfeeding individuals out of 22 postpartum people in jails (Sufrin et al., 2019). Barkauskas et al. (2010) found a significant difference in the initial breastfeeding rate between the two infant groups in their study. Breastfeeding was initiated for seven (19.4%) of the residential program infants but for only one comparison infant. This may suggest that breastfeeding is a rare occurrence in a typical correctional facility without additional prenatal interventions and support. According to Drago et al. (2022), infants of women who lived in prisons were less likely to be fed breast milk at discharge (3.6% vs 37%).

Protective Environment Provided by Correctional Facilities

Two studies (Tanner, 2010 & Baldwin et al., 2020) concluded that the longer inmates who were pregnant and living in prisons received prenatal care, the better their birth weight outcomes for newborn infants. Tanner found that 81% of the women who were pregnant smoked before incarceration and because inmates were prohibited from smoking in jails, their pregnancy outcomes improved. Baldwin et al. (2020) found some studies show longer lengths of imprisonment can be related to better birth outcomes. This may be because incarceration in some ways provides guaranteed meals, shelter, and basic health care to women who live in prisons while protecting them from adverse circumstances such as homelessness, drug use, and violence.

Chapter 5

Discussion

The goal of this systematic review is to review the current literature on the perinatal outcomes of infants born to women who live in prisons. This chapter will summarize the findings of the included studies, the study limitations, implications for clinical practice, and the need for further research. The purpose of this chapter is to determine if the findings answered the research questions:

- (4) What are the perinatal outcomes of women who are pregnant and living in prisons?
- (5) Is there a negative or positive association between incarceration and perinatal outcomes?
- (6) What factors contribute to these perinatal outcomes? Are women in correctional facilities receiving sufficient perinatal care and living in safe environmental conditions?

In addition, this chapter will highlight prison policies related to the specialized needs of women and their health, especially those who are pregnant. Given the specialized needs of these women, it is evident that quality, consistent women's health care is minimal, leading to poor maternal health outcomes and high-risk pregnancies.

Summary of Findings

This systematic review provides a comprehensive picture of the state of the science on the perinatal outcomes of women who are pregnant and living in prison in developing countries. Countries included are the United States, Canada, Australia, and the United Arab Emirates. This research examined several types of perinatal outcomes including types of births and birthweights; Apgar scores; labor and delivery outcomes; hospital and NICU stays; dental health, breastfeeding, and doula care; and the effect of interventional programs in prisons to facilitate and support the health of mothers who lived in prisons and their newborns. It is important to

recognize that women living in prisons are a complex and vulnerable population with many factors that make it difficult to quantify and identify the causes of perinatal outcomes whether positive or negative. These include race/ethnicity, age, geographic location, correctional facility systems, and coexisting physical, mental, and behavioral health diagnoses. Women living in prisons are highly stigmatized which makes it even more difficult for them to seek help both within correctional facilities and post-incarceration. It is also difficult to determine whether there is an association between incarceration and the quality of perinatal outcomes due to the limited data and lack of regulation on tracking the incarceration population. It was not until Sufrin's study in 2019 that the first national study on the frequency and nature of perinatal outcomes was recorded in U.S. jails. Since then, there has been limited collection of such data.

The majority of the studies ($n = 12$) examined types of births and birthweights. Five studies found that babies born to women living in prisons during pregnancy or even those that were not born directly in prisons, but their mothers who lived in prison had a higher risk of negative birth types and weights (Walker et al., 2014; Bell et al., 2004; Ramirez et al., 2020; Mertens, 2001; Ramirez et al., 2020). Bell et al. (2004) found that relative to the controls, women who lived in prisons during pregnancy had progressively higher odds of LBW and preterm birth through age 39 years. Conversely, those older than 39 years were less likely than controls to have LBW and preterm births. It is expected that the perinatal outcomes of women in jails are the same as those in the control groups. This is because younger women may be resilient to more stress, possess better health in general, be less severely chronically dependent, or be more successful in drug treatments. Martin et al. (1997) and Shlafer et al. (2020) support the association of lower birthweights and preterm births with incarceration at first glance, but when adjusted for confounding variables, this becomes not statistically significant. Only one study

(Tanner, 2010) found that perinatal outcomes among women who lived in prisons were better than the outcomes among women in the nation.

There were no significantly lower Apgar scores among infants born to women living in prisons while pregnant compared to those in the general population. In terms of labor and delivery outcomes, outcomes are not statistically worse among women in prisons compared to those not living in prisons. The rates of cesarean sections among women in prisons were within the national average in Tanner (2010); Shlafer, 2020; Walker, 2014; Sufrin, 2019; Sufrin, 2020). Walker (2014) found the highest rate of spontaneous onset of labor was found among former prisoners who were pregnant (77.6%). All the studies found delivery types and outcome rates were comparable to their control groups except in three studies (Ramirez, 2020; Mertens, 2001; Morse, 2019). Compared with the general population, deliveries for prison and control pregnancies were twice as likely to result in preterm birth and very low birth weights (Ramirez et al., 2020). Egley et al. (1992) made a surprising discovery that despite women who lived in prisons having a higher usage of drugs during pregnancy, they were less likely to deliver prematurely and experience premature rupture of the membranes.

All studies found that children born to women in prisons were at higher risk of admission to the NICU or specialty care clinics and longer durations of hospital stays. Walker (2014) found babies to be significantly at higher risk of having poor outcomes than community controls for all outcomes measured across the board: pre-term birth, LBW, Apgar scores, higher order resuscitation, NICU admissions, days spent in NICU, and perinatal deaths). Drago et al. (2022) found a longer adjusted mean of stay associated with children who were born to mothers who were in prison. Morse (2019) also found all 11 infants in their study sample had pregnancy/delivery complications and had to be placed in special care obstetrics clinics. Most

interventional programs initiated in prisons had beneficial effects on women. Bell et al. (2004) found that for women in jail of all ages, post-release maternity care management was associated with decreased odds of LBW, and prenatal care was associated with decreased odds of preterm birth. The nutrition-based program W&M HBP showed higher birthweights, longer gestational periods, and better birth outcomes associated with children born to mothers enrolled in the program than those unenrolled. Howard et al. (2008b) found a positive association between the amount of prison prenatal care and infant birthweight among women who were pregnant and living in prisons. There were no significant differences in birth or neonatal outcomes between women who lived in prisons and the control group in one study's experimental, community-based residential program (Barkauskas et al. 2010).

Correctional policies impacting breastfeeding in the U.S. vary. Only 9 states as of 2017 had prison nursery programs that allowed babies to stay with their mothers. Schlafer et al. (2018) found that women who discussed breastfeeding with their doulas were seven times more likely to initiate breastfeeding than women who did not. This highlights the benefits of enrolling women who live in prisons into doula and prison nursery programs that could provide education and support to mothers to breastfeed. The surprising theory that correctional facilities could provide a protective element for women who are in prisons and could potentially improve perinatal outcomes was mentioned in two studies (Tanner, 2010; Baldwin et al., 2020). They concluded that the longer people who were pregnant were in prisons, the better their birthweight outcomes for their newborns. This is because prisons could provide prenatal care that these women may not have access to in the community and could also provide necessities such as food, clothing, shelter, and protection from external elements such as the cold and violence.

Strengths and Limitations

A strength of this review is that it has encompassed several subtopics for perinatal outcomes to be as comprehensive as possible and determine whether there is a positive or negative association between incarceration and perinatal outcomes. The articles have also been restricted to only developed countries to control for third variables such as cultural differences and different prison systems. This review has also only focused on perinatal outcomes to narrow its scope. Previous reviews have examined mainly maternal outcomes or one specific type of perinatal outcome, while this review looks at branching fields of perinatal outcomes since almost all of them share an overlap.

A limitation of this study is that our findings and conclusions are limited to what is currently available in the literature and the controls that the original researchers set on their studies. There is less research on the perinatal outcomes of women who are living in prisons outside of the U.S. and some research is not published in English. For these reasons, this systematic review may be missing potentially valuable data. There are also confounding variables that cannot be controlled for such as the demographics of female inmates skewing results. We know from the literature that this population is vulnerable and more likely to have poor health along with being more susceptible to illnesses and negative life events. These include the need to commit crimes due to poverty, substance abuse, and rough childhood upbringing.

Implications for Clinical Practice

Research has shown that breastfeeding improves perinatal outcomes. These include positive effects on infant immune systems, reducing the risk of sudden infant death syndrome, protecting against obesity and diabetes, decreasing the risk of specific pediatric cancers, and improving cognitive development (Yuen et al., 2022). Breastfeeding also nurtures a profound

emotional and psychological bond between the mother and her infant. The release of oxytocin, a neurochemical released during breastfeeding and skin-to-skin contact, plays a pivotal role in forming this bond. Research indicates that this maternal-infant bond enhances the mother's and child's emotional well-being by promoting love, trust, and attachment (Modak et al., 2023). Due to this evidence, specific interventions that increase the initial breastfeeding rate in prisons essential to improve perinatal outcomes. Findings from Drago et al. (2022) suggest that supporting the maternal-infant dyad until infant discharge may mitigate the potential negative impact of maternal incarceration on the care of infants with neonatal abstinence syndrome (NAS). This is significant as maternal involvement in caring for infants with NAS has been shown to decrease length of stay (LOS), yet women who give birth while they are living in prison are removed from their infant at 48-72 hours of life. However, more research needs to be done to examine the relationship between maternal incarceration and NAS.

The implementation of supplemental services and resources in correctional facilities that can contribute to a safer environment, absence of or lower substance use, adequate nutrition, and prenatal care can also improve perinatal outcomes. These can include better staff to prison ratios to meet the needs of women living in prisons; consistent prenatal visits throughout pregnancy; educational services for women on pregnancy and childcare; and substance abuse programs since women living in correctional facilities are at higher risk for substance use and poor health.

Conclusion

In summary, the majority of the articles supported that the perinatal outcomes of women in prisons are worse compared to the perinatal outcomes of infants born outside of prisons. These included worse dental outcomes amongst preschool children raised in prisons; higher odds of LBW and preterm birth; higher risk for NICU admissions and birth complications (e.g. placental

eruption); higher infant mortality; higher risk of contact with child protective services, lower initiation of breastfeeding, and higher rates of exposure to substance and drug use. Three articles found positive perinatal outcomes associated with incarceration. These included better perinatal outcomes respective to less preterm births and higher birthweights, the longer the period of gestation was spent in prisons.

However, whether there is a positive or negative correlation between the prison environment and quality of perinatal outcomes, there are many confounding variables that were not controlled or accounted for in the included studies. . For instance, research has supported the complex and chronic health problems faced by women before, during, and after prison sentencing. Chronic conditions (e.g. asthma, cancers, cardiovascular disease) have been found to be more prevalent among women living in prisons compared to their male counterparts (Augsburger et al., 2022). Women living in prisons also display a wide variety of mental health problems from depression to postpartum stress resulting from histories of violence and abuse (Augsburger et al., 2022). Those admitted to prisons also have higher rates of substance use, especially smoking and opiates, when compared to the community population, which further contribute to negative perinatal outcomes (Augsburger et al., 2022). Due to the general demographic (e.g., race, ethnicity), lower socioeconomic status, and risk factors (e.g., health status) of this population, it cannot be conclusively stated that incarceration leads to worse perinatal outcomes. Essentially, perinatal outcomes only represent data points in time and do not reflect what occurred prior to and after incarceration.

There is also a paucity of research on the perinatal outcomes of women living in prisons and the general health status of this population, which limits our ability to have a full understanding of the relationship between the prison environment and subsequent perinatal

outcomes. Reasons for the absence of research are primarily from a lack of mandated regulations on the tracking and reporting of pregnancy related data in correctional facilities leading to a gap in the literature for this population. The first national-scale, systematic investigation of pregnancy frequencies and outcomes in prisons did not occur until 2019 with Sufrin's landmark study of pregnancy outcomes in U.S. national prisons. There is also the barrier of improving perinatal outcomes due to the absence of mandatory standards for prenatal and pregnancy care for women in prisons. Although U.S. Marshals Service (USMS) and Federal Bureau of Prisons (FBoP) began tracking data on women who were pregnant in correctional facilities from 2017-2019 and began implementing policies that address these concerns, these policies do not fully reflect national guidance recommendations set by the American College of Obstetricians and Gynecologists.

Additional research is needed to better understand the short- and long-term outcomes to children born in prison. Interventions that may improve these outcomes include mandated reporting and tracking of pregnancy data in prisons, legislature establishing a set of standards for perinatal care in prisons, and implementation of programs that target risk factors for adverse perinatal outcomes. These include doula support, breastfeeding initiatives, substance abuse programs, nutritional support/planning for women who are pregnant, legislature opposing shackling during labor, and better perinatal care provided in prisons (e.g. full physicals, prenatal visits for monitoring, and screenings).

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*Note: Articles with * are articles included in systematic review*

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