

Spring 2017

A Systematic Review: The Prenatal and Postnatal Events Associated with Infant Mortality Rate (IMR)

Ariel L. Thomas
alt79@zips.uakron.edu

Sarah A. Awwad
sma106@zips.uakron.edu

Briana E. Clark
bec36@zips.uakron.edu

Please take a moment to share how this work helps you [through this survey](#). Your feedback will be important as we plan further development of our repository.

Follow this and additional works at: http://ideaexchange.uakron.edu/honors_research_projects

 Part of the [Community Health and Preventive Medicine Commons](#), [Maternal and Child Health Commons](#), [Maternal, Child Health and Neonatal Nursing Commons](#), [Pediatric Nursing Commons](#), [Public Health and Community Nursing Commons](#), and the [Women's Health Commons](#)

Recommended Citation

Thomas, Ariel L.; Awwad, Sarah A.; and Clark, Briana E., "A Systematic Review: The Prenatal and Postnatal Events Associated with Infant Mortality Rate (IMR)" (2017). *Honors Research Projects*. 473.
http://ideaexchange.uakron.edu/honors_research_projects/473

This Honors Research Project is brought to you for free and open access by The Dr. Gary B. and Pamela S. Williams Honors College at IdeaExchange@UAkron, the institutional repository of The University of Akron in Akron, Ohio, USA. It has been accepted for inclusion in Honors Research Projects by an authorized administrator of IdeaExchange@UAkron. For more information, please contact mjon@uakron.edu, uapress@uakron.edu.

A Systematic Review: The Prenatal and Postnatal Events Associated with Infant Mortality Rate

(IMR)

Sarah Awwad, Briana Clark, and Ariel Thomas

The University of Akron: School of Nursing

Authors' Note

Sarah Awwad, Briana Clark, and Ariel Thomas, School of Nursing, The University of Akron. This paper is in fulfillment for the Honors College Senior Research Project requirement. Due on April 28th, 2017. Sponsor: Michele Zelko, DNP, RNC-OB. Readers: Karen Fitzgerald MSN, PPCNP, PMHS and Sheau-Huey Chiu PhD, RN.

Abstract

Infant mortality rate (IMR) is an indication of overall population health, maternal and child health, accessibility and quality of primary health care, and the availability of community resources. The current IMR in the United States is high despite advances made in the medical field. The purpose of our systematic review is to describe and critically appraise research about prenatal events, postnatal events, and increased infant mortality rate and to give nursing practice recommendations to help decrease the rate. We used CINAHL, Medline and PubMed to find 20 research articles. Overall, the research stated that going to prenatal visits had a direct correlation to the outcomes of the infant after delivery, the importance of patient teaching after delivery is imperative to help prevent infant deaths through sudden infant death syndrome (SIDS), and that smoking before, during, or after pregnancy puts both the mother and infant at risk for a multitude of complications including ones that lead to infant death. Limitations across studies included small sample sizes, self-reported data, small population sizes, and government statistics being used to determine causation of death in infants.

The Prenatal and Postnatal Events that affect Infant Mortality Rate (IMR)

Both the World Health Organization (WHO) (2011) and United States (U.S.) Center of Disease Control (CDC) (2016) define Infant Mortality Rate (IMR) as an estimate of the number of infant deaths for every 1,000 live births. Despite increased medical advances in the U.S., infant mortality rates (IMR) are higher than those of many developed countries (Central Intelligence Agency, 2015). Further, IMR in the U.S. vary substantially across and within states and groups of people (National Vital Statistics Report, 2016). The U.S. IMR places the U.S. alongside countries that don't have access to the same resources such as public health services, adequate nutrition, healthcare, or freedom. According to the National Vital Statistics Reports of Death in 2013 (Xu, Murphy, Kochanek, & Bastian, 2013),

The infant mortality rate was 5.96 per 1,000 live births, the neonatal mortality rate (deaths of infants aged 0–27 days per 1,000 live births) was 4.04, and the post neonatal mortality rate (deaths of infants aged 28 days through 11 months per 1,000 live births) was 1.93 in 2013.

According to The Central Intelligence Agency (CIA) World Factbook (2015), the United States placed 167th out of 224 countries listed for infant mortality rates, having a rate higher than countries such as Canada, Hong Kong, Japan, Czech Republic, Cuba, Guam, South Korea, Monaco and many others. According the CIA World Factbook, the IMR is 5.87 in 2015 with some ethnic groups being more affected than others. For example, the National Vital Statistics Reports (Xu et al., 2013) says, “the infant mortality rate for Hispanic infants was 5.27 deaths per 1,000 live births and by comparison, for non-Hispanic white infants, the infant mortality rate was 4.96; and for non-Hispanic black infants, the infant mortality rate was 11.6” (p.12).

The prevalence of IMR in the U.S. and the disparities across states and groups could be

related to several different factors, such as race, age, socioeconomic status, and access to healthcare and community resources (CDC, 2016). Infant mortality is associated to the mother's health status, public health systems, financial status, and utilization of available health care for infants and pregnant women (Federal Interagency Forum on Child and Family Statistics, 2015). As healthcare professionals in the United States, it is important to identify high risk populations and implement interventions that could collectively help lower the nation's infant mortality rates. This is a part of the Healthy People 2020 Initiative, which outline one of the objectives, in the topic of Maternal, Infant, and Child Health, as decreasing the frequencies of death in fetuses and infants (Office of Disease Prevention and Health Promotion, 2016). Awareness and increased understanding may lead to more interventions in populations who are at the most risk.

IMR is very relevant to nursing because nurses are interested in population health and can intervene to affect factors that contribute to the infant mortality rate. Hopefully as nurses intervene, collaborating with other health professionals, community planners, religious groups, and social workers, IMR will start to decline. The focus of the project is to identify and describe research about IMR and prenatal care/education, smoking, and postnatal care/education. The purpose of this review is to identify, describe, and critically appraise evidence about prenatal factors/events, postnatal factors/events, and IMR in pregnant women and new mothers. Practice and research implications will be advanced, based on the validity and reliability of the studies and evidence. This review will answer the following PICOT question: In pregnant women and new mothers in the US, how do prenatal factors/events and postnatal factors/events influence IMR outcomes?

Methods

We used reliable search engines such as CINAHL, Medline and PubMed. Key words

included: alcohol abuse, smoking, prenatal care, postnatal care, and SIDS, using Boolean operators, words such as and, or and not, that specify the relationship between search terms to help us narrow down searches. Key words related to population included: Native American, white, black and Latino women in the United States who have been pregnant or are at childbearing ages. Inclusion criteria were: 2011-2016 publications, settings in United States, primary sources of evidence, neonates 0-12 months at time of death, research articles, and peer reviewed journals. We critically evaluated the quality of research by making sure we knew study research questions, design, and credibility of authors, affiliations, and journals. Studies were further selected based on that they answered the PICOT question. We originally identified 20 different studies that helped answer the PICOT question.

Review of Literature

According to the CDC (2016) most causes of infant mortality are congenital abnormalities, births occurring before term status, complications that occur within the pregnancy, SIDS, and trauma. Early identification of some prenatal events, such as the ones listed above, and prevention of other fetal development or pregnancy difficulties, can be through prenatal care. The factors that we are specifically reviewing for prenatal events are prenatal care, preterm birth and weight gain of fetuses in utero.

Prenatal Events

Prenatal care. Researchers have studied prenatal care and found that inadequate prenatal care is associated with poor birth outcomes and is an important predictor of maternal and fetal well-being (Partridge, Balayla, Holcroft, & Abenhaim, 2012). For example, Partridge et al. (2012) found a direct relationship between inadequate prenatal care and infant mortality events such as stillbirth, early neonatal deaths, late neonatal deaths, and infant deaths. Declines in

prenatal care increases chances of infant death from time of birth to infant stage of life. The Office on Women's Health in the U.S. Department of Health and Human Services (2012) reports that compared with mothers who receive prenatal care, mothers who do not receive prenatal care are three times more likely to have a low birth weight baby and five times more likely to have a birth that ends in fatality. Further, when researchers have identified barriers to prenatal care, patients and providers have agreed that identification of these barriers, as well as motivators and facilitators, play a vital role to the initiation of care (Johnson et al., 2011). Johnson et al. (2011) identified numerous barriers, specifically in the low socioeconomic population, being no transportation, decreased knowledge of insurance coverage, hours of operation of healthcare facilities, poor treatment from healthcare facility staff, lack of relationship development between providers and patients, fear of medical interventions, and extensive waiting periods before being seen by a healthcare provider. The identification of the same barriers may lead to an overall understanding between patients and providers where the breakdown of the barriers to prenatal care can be initiated. The consistent finding on prenatal care is that the amount of prenatal care is a very important predictor of infant well-being. There were also consistent findings in how high risk populations need to be targeted more with education and awareness about prenatal care to decrease the instance of infant mortality. Johnson et al. (2011) and Partridge et al. (2012) both identified consistent findings of the African American and Hispanic populations being high risk populations due to factors that prevent sufficient prenatal care. There were some inconsistent findings between the two articles, where Johnson et al. (2011) says that there is debate as to if adequate prenatal care makes a difference in combating poor birth outcomes in all populations of child bearing women outside of high risks populations, while Partridge et al. (2012) stated adequate prenatal care is an important predictor of infant well-being with all births. The studies

targeting prenatal care used different designs such as correlational and retrospective population based cohort design, with different levels of evidence. The settings were different, one was set in a low-income area of Washington, D.C. so it was limited to one area while the other study used randomly retrieved data from the CDC's infant death and fetal death database. While one study was based on information from a database one study was based in a setting and targeted the high risk population that inadequate prenatal care targets. The study in Washington D.C. was smaller while the study using data from the CDC's database was very large consisting of analyzing a little under 29,000,000 births. Each study used specific criteria for their subjects to be included in the study and were divided into different categories based on race, age, education or occupation, to catch certain results within certain populations.

Preterm birth studies. Researchers have studied factors of preterm births, such as age, ethnicity and number of fetuses being carried (King, Gazmararian, & Shapiro-Mendoza, 2014). According to the CDC (2016), prematurity is a high predictor of infant mortality rate. Prematurity also has long-term complications. For example, Sullivan, Msall, and Miller (2012) accessed long term effects of prematurity and found that 64% of school-aged children who were preterm had functional limits physically, neurologically, and psychologically. Further, some ethnicities are more at risk for preterm births than others. According to the Federal Interagency Forum on Child and Family Statistics the racial groups Black, non-Hispanic and American Indian or Alaska Native infants have higher mortality rates compared to the other national racial groups (Federal Interagency Forum on Child and Family Statistics, 2015). King, Gazmararian, and Shapiro-Mendoza (2014) compared preterm births across racial/ethnic groups and, found of late preterm infants, the highest IMR in American Indian/Alaskan Native, non- Hispanic black or teenage mothers at 14.85, 9.90, and 11.88, sequentially, per 1,000 births. Of early preterm

infants, IMR were 5.69 for American Indian/Alaskan Native, 4.49 for non-Hispanic black, and 4.82 for teenage mothers (King et al., 2014).

Researchers suggest that identifying disparities affecting infant mortality rates among premature infants may help health professionals implement interventions aimed at infants in more vulnerable populations (King et al., 2014). Consistent findings were that ethnicity plays a huge part in predictability of prematurity. There were inconsistent findings in the long-term effects of prematurity and how it affects these specific populations that are at high risk of prematurity. The severity of the long-term effect was encircled around social status and sex. There were consistent findings in the studies stating that late preterm infants should not be looked past. They should still be assessed as if they are premature. They have a high risk of mortality and developing complications as well. While Sullivan et al. (2012) used sample size of 213 participants for their prospective, longitudinal study, King et al. (2014) used a sample size of 4,039,016 births which was divided into early preterm and late preterm infants. The settings were both in the United States. Each study used measures that consisted of dividing data into specific category and completing a cross comparison of the findings. Sullivan et al. (2012) looked at neonatal measures and compared it with health status, chronic conditions, neurological status, psychological status 17 years later while including the influence of environment and sex on these categories. King et al. (2014) categorize data looked at three different categories of mortality (neonatal, post-natal and infant) mortality rates and two different categories of gestational age (early preterm and late preterm) and how maternal race, age, and number of children affected them.

Gestational weight gain studies. Education interventions about nutrition and healthy weight gain are important because, Davis and Hofferth (2012) found that small gestational age

(newborns weighing less than normal for gestational age) correlates with IMR. Specifically, babies born with poor gestational weights had more negative outcomes than normal weight babies. In addition to Davis and Hoffeth's (2012) findings, Cooper et al. (2012), identified how infants born at a younger gestational age than term infants are at increased risk for neonatal complications, such as hypoglycemia, hypothermia, sepsis work-up, feeding issues, respiratory distress, and hyperbilirubinemia. They also found that risks were higher with infants with younger gestational ages which put them at higher risk of health complications. Young gestational ages can be linked to poor weight and development. The consistent findings were that gestational weight has a major impact on the well-being of the child. Some inconsistent findings were that Davis and Hoffeth (2012) found that maternal weight gain influenced infant death but there was a correlation to the fact that poor maternal weight gain can be linked with low gestational weight for the baby. Davis and Hoffeth's (2012) study was a descriptive design with a sample size little over 80,000 using a convenience sampling measure while Cooper et al.'s (2012) study was of a descriptive design of prospective analysis and consisted of a sample size of 802 using a purposive sampling method. Both studies had the same level of evidence.

Smoking cessation studies. Researchers have consistently found that smoking during pregnancy leads to an increased infant mortality rate (Batech et al., 2013; Chao et al., 2010; Dietz et al., 2010; Paul et al., 2008). Prenatal smoking interventions include: educating the moms about the harmful effects of smoking (Batech et al., 2013), and including the families in their education (Shaw, Pickett, & Wilkinson, 2010). In teaching the whole family about the different risk factors for an increased IMR, the hope was that the family support would increase the likelihood that the mother would either stop smoking or cut down on her smoking. This study was even more effective in the Hispanic and African American cultures because of the increased

family involvement in prenatal and postnatal care. Kennedy et al. (2013) and Batech et al. (2013) examined the effect of an education/support call center on birth outcomes and smoking cessation for pregnant women. They found that the more they publicized the hotline number, the more people there were that used it. Out of the people that used the hotline, all of them stated that the hotline helped answer any questions that they had. Chao et al. (2010) identified a specific population in California that had seen a dramatic increase in the IMR over a three-year time span. They investigated further and noted that the factors that were causing the increase in the infant mortality rate were high blood pressure before and during pregnancy, excessive weight gain during pregnancy not falling within the recommended range, smoking during the pregnancy, not taking a multivitamin during the pregnancy, and feeling unhappy during their pregnancy. The interventions that this study used dealt a lot with community services and awareness. They focused on increasing case management, increasing family planning services and resources, better training for nurses, and a large public health initiative to increase the awareness of the community about infant safety.

Limitations. In spite of findings of prenatal events, findings are limited due to under reporting of data, over reporting of data, error in data analysis, exclusion of specific state in U.S. population, lack of follow-ups, clinical interpretation, and lack of blinding. Most of the practice implications included developing programs to make timely and effective prenatal care available, increasing healthcare professionals awareness on children's prematurity histories and functional deficits, increasing the importance of preconception care, changing the emphasis on patterns of weight gain rather than amount of weight gain to ensure that the fetus is growing, and most importantly increasing health provider awareness of the barriers amongst African American and Latino mothers and offering more support to their specific situations and concerns. This is

important for all populations that infant mortality affects the most.

Postnatal events

Safe sleep practices studies. According to Hauck, Tanabe, McMurry, and Moon (2014), since the launch of the Back to Sleep campaign in 1994, the rates of sudden infant death syndrome (SIDS) have declined by more than 50 %. Despite this tremendous progress, the United States continues to rank 49th among nations in overall infant mortality rates [34], and SIDS (ICD 10 R95) remains the leading cause of death for infants 1 month to 1 year of age. Researchers have studied how “sudden infant death syndrome and other sleep-related causes of infant mortality have several known risk factors” (Collie-Akers, Colvin, Moon, & Schunn, 2014, p. 406). Akers, Colvin, Moon, and Schunn (2014) conducted a cross sectional study of sleep related infant deaths from 24 states, and found that the younger infants were more likely to die while sleeping on the same surface (usually a bed) with adults, whereas the older infants were more likely to have been found prone with objects, such as blankets and stuffed animals, in the sleep area. This study was aimed at finding the associated risk factors for sleep-related deaths at different ages in infants, and how, “parents should be warned about the dangers of bed-sharing, particularly in 0- to 3- month-old infants” (Collie, Colvin, Moon & Schunn, 2014, p. 411). Thach (2014) found that “incidents” [of infant death due to bed sharing on maternity wards] are underreported in the United States and are preventable. There are many other factors that could lead to infant sleep-related death that Hogan (2013), tried to tie back to infant death during unsafe sleep practices, which were race and poverty risk factors.

According to Thach (2014), some ways to improve safety practices in maternity wards include,

“hospital personnel and expectant parents should be made aware of potential hazards of

skin-to-skin and bed-sharing practices. Mothers should be taught to assess breathing, skin color and response to stimuli in their infants, and when in close contact there should be sufficient light in the room to allow assessment. When a mother is in close contact with her infant, a person trained to monitor the infant's wellbeing as well as the mother's wakefulness should undertake one-on-one supervision of infant and mother (p. 276).

Mothers should be taught this information, especially if there are language barriers.

Hauck, McMurry, Moon, and Tanabe (2014) objectives were to show parental knowledge and practices regarding infant sleep position, bed sharing, pacifier use, and feeding practices before and after receipt of a free crib and safe sleep education. They surveyed parents in the prenatal stage, postnatal stage, and follow up surveys, to assess how much they learned from the education by the distribution program. Some of the data that was collected regarding safe sleep was:

Parental knowledge of recommended infant sleep position improved from 76 % (prenatal) and 77 % (postnatal) to 94 % after crib receipt ($p < 0.001$). Intended use of supine positioning increased from 84 % (prenatal) and 80 % (postnatal) to 87 % after the intervention ($p < 0.001$). Although only 8 % of parents intended to bed share when asked prenatally, 38 % of parents receiving the crib after the infant's birth reported that they had bed shared the night before. This decreased to 16 % after the intervention (Hauck et al., 2014, p. 1)

Breastfeeding studies. The World Health Institute (WHO) (2016) states that breast milk promotes sensory and cognitive development, and protects the infant against infectious and chronic diseases. To make sure infants get the adequate nutrients they need, WHO (2016) states that exclusive breastfeeding for the first 6 months of life is essential for optimal health of the infant. Researchers Auld, Baker, and Weddig (2011) conducted a qualitative focus study to

assess if nurses from different hospitals, specifically baby friendly hospitals and non-baby friendly hospitals use evidenced based practice about breast feeding practices when teaching patients how to feed their infant. At the BF/BFI hospitals there were clear evidence-based policies about breastfeeding initiation, and the nurses understood how to support best practices. According to Auld et al. (2011), the non-BF/BFI hospitals lacked policies about breastfeeding, and the nurses lacked the knowledge of breastfeeding best practices necessary to support initiation. In the hospitals that are baby friendly, the nurses are aware of evidenced based practice pertaining to effective breastfeeding practices, which helps to educate the patients, and decrease diseases in infants, and an example of this is “the nurses at the BF/BFI hospitals reported primarily using human milk, either mother’s own pumped milk, or HDM, in the NICU. Nurses were aware of the research that supports exclusively using expressed breast milk with NICU babies to decrease the risk for necrotizing enterocolitis (NEC) and other diseases” (Auld et al., 2011, 172). According to Coles et al. (2011) initiating breastfeeding after 24 hours leads to increased mortality rate in infants. Even though this study takes place in India it shows how low socioeconomic status, low resource communities, and first time mothers need education about initiating breast feeding before 24 hours (Coles et al., 2011).

Neurodevelopmental outcome studies. Some infants are born with severe intracranial hemorrhage, which can result in death or worsening of neurodevelopmental impairment (Cotton, Gantz, Goldstein, Poole & Shankaran, 2012). Researchers looked at how gestational age affects the outcome of neurodevelopment after an intracranial hemorrhage, and how there are preventable factors to teach new parents, such as preventing late onset infection and severe necrotizing enterocolitis. According to Cotton et al. (2012) “when all common risk factors for neurodevelopmental impairment (NDI) are considered, lower GA is important in predicting early

death in premature infants, but not NDI among survivors with the most severe IC” (p. 30)

Incentives and support after delivery. The Los Angeles Mommy and Baby (LAMB) project in the Los Angeles area identified what was lacking in the area of community support for mothers who had recently delivered and used incentives to increase participation in the education classes by the mothers. The main incentive they used was letting the mothers pick items from a list to help aid in the care of their newborn such as formula, diapers, and clothing items. They had a protocol that included continuous contact and repeatedly trying to get in contact with the mothers if they stopped responding or showing up to the meetings and information sessions (Chao et al., 2010). This protocol was significant because it allowed for a higher follow through and commitment to this program as compared to others like this program and provided rewards to the mothers for participation to further increase the follow through and compliance with the program.

Limitations. After finding studies encompassing postnatal factors, there are a few limitations that need to be addressed. Some of the studies use smaller sample sizes, or too large of a sample size. Other studies used a specific population from one city, and some studies had samples from some states, and not others. Another study used hospitals and samples from one state, which does not show an accurate depiction of all populations regarding infant mortality rates. A lot of sampling methods were convenient sampling, and non-controlled sampling methods used, because the researchers could not control those factors, if infants had already passed away.

Timeline of Project Completion

The Honors Proposal was submitted in the month of September 2016 to fulfill the Honors Proposal Deadline date of October 1, 2016. It was submitted in this month to ensure enough time

for consultation with our sponsor. After discussion with the sponsor and evaluation of senior course work, all three group members have decided to enroll in two credits worth of senior honors project independent study in both the Fall 2016 Semester and Spring 2017 Semester each. The discussion of the review of literature and making of recommendations about clinical practice, education, and future research will mostly take place in early in the spring 2017 semester. Research on improvements in clinical practice, education and future research will be done during the Fall 2016 Semester. The synthesis of the information and concluding components for the project will take place early in the spring 2017 Semester. There will be collaboration between group members to create a poster that descriptively and creatively explained our findings in the project. Our sponsor is Dr. Michele Zelko DNP, RNC-OB. Our readers are Sheau-Huey Chiu PhD, RN and Karen Fitzgerald MSN, PPCNP, PMHS.

Critical Appraisal

Prenatal events. Throughout all articles being used for the synthesis of evidence for prenatal events affecting IMR, limitations in the studies reviewed were mostly due to errors in data collection or methods to data collection. In some studies, there were instances where an entire geographical area of people was left out or other factors affecting infant mortality was not considered. Limitations in findings were also caused by reporting bias or instances of underreporting or over-reporting in the data that was collected. There were also instances in the studies where there was suspected misreported or misinterpreted information. With these articles, findings were pulled from the articles that the authors were confident about. Overall, any limitations in the findings across all articles would have been due to any type of data collection error. Each article exhibited ethical, thorough, and consistent methods to collecting and organized data. Most of the data used to analyze prenatal events were collected from reliable

sources available in the United States, or official records such as birth certificates or death certificates. Most of the sample sizes taken were randomized and a double blinded sampling method was used. The information was then categorized using inclusion and exclusion criteria based on variable being examined. Therefore, valid methods of data collection were used in each study. Well-documented and reliable data was used, information was categorized efficiently and the findings are reliable which lead to the correlations that were found between factors that contributed to prenatal events affecting IMR. Whether the correlation was between weight gain and infant outcomes or race and prenatal care, all correlations were presented well and provided reliable information to support the correlations.

The Determinants of Prenatal Care Initiation among African American and Latino Patients. This study examined if patient and providers had the same views as to what are the barriers, motivators, and facilitators to prenatal care use. The study was based in Washington D.C. which at the time of data collection was one of the cities with the highest infant mortality rates in the United States, babies with small birth weights, and inadequate prenatal care use. Washington D.C.'s infant mortality rate at the time of the study was "11.3 deaths per 1000 live births" (Johnson et al., 2011, p. 27) There were 331 African American and Latino patients with a confirmed pregnancy, residency in Washington D.C., and English or Spanish language comprehension, and 61 healthcare providers that included physicians, midwives, nurses and social workers (Johnson et al., 2011). Patients and providers were pulled from 14 various facilities that provide prenatal care which included 4 clinics connected to hospitals, 5 clinics in the community, and 5 facilities under private ownership that worked with minority women of low socioeconomic status (Johnson et al., 2011). The authors identified African American and Latinos women as the population to investigate because both populations were found to have a

low percentage of starting prenatal care within the first trimester and African American women were found 3 times more likely than white women to start their prenatal in their third trimester or not at all. 63 variables that included barriers, motivators, and facilitators of prenatal care use. A 30-45-minute interview was conducted and the women were given 20 dollars for their participation. The study included information that was reliable and valid because they made sure that they interviewed women during their pregnancy to avoid recall error and asked the patients and providers the same questions (Johnson et al., 2011). The authors reported a P-value of <0.05 which indicated some similarities in the answers that were provided by the patients and providers (Johnson et al., 2011).

Inadequate Prenatal Care Utilization and Risks of Infant Mortality and Poor Birth Outcome. This study specifically examined the correlation between prenatal care use and infant mortality. This was retrospective study that examined a sample size of 28,729,765 deliveries over an 8-year period from 1995-2002 (Partridge et al., 2012). There were actually 32,206,417 deliveries that occurred during this period of time according to the Center for Disease Control and Prevention's Linked Birth-Infant Death and Fetal Death database that included the United States, Hawaii, and Alaska, but only 28,729,765 deliveries could be used for the study due to their inclusion criteria (Partridge et al., 2012). The study excluded non-singleton gestations, deliveries occurring before 22 weeks gestation and deliveries occurring after 44 weeks gestation, and infants who were reported to have a congenital birth defect (Partridge et al., 2012). The Adequacy of Prenatal Care Utilization Index was used to categorize the variable regarding prenatal care utilization into four categories being "inadequate care, intermediate care, adequate care, and adequate-plus care" (Partridge et al., 2012, p. 788). In each of these categories, the study looked at maternal race, maternal age, education, marital status, number of previous births,

and the history of smoking and alcohol use during pregnancy. They also looked at 8 birth outcome variables which were “small for gestational age, intrauterine growth restriction, large for gestational age, preterm birth, stillbirth, early neonatal death, late neonatal death, and infant death” (Partridge et al., 2012, p.789). The study ultimately found that the target population for inadequate prenatal care were women “younger than the age of 20, black or Hispanic, not married, education less than 12 years, 3 or more prior live births, and women who participated in smoking or drinking alcohol during their pregnancy” (Partridge et.al, 2012, p. 789). They also found that inadequate prenatal care was correlated with increased risk of birth outcome variables that were examined as mentioned above. The study used well published information but came across problems where data was missing from specific areas in the United States as well as stating a limitation was the Adequate Prenatal Care Utilization Index having a “gestational age bias” (Partridge et al., 2012, p. 792). However, the findings of this study showed a strong correlation between prenatal care and infant well-being as well as identifying target populations who are most at risk.

Disparities in Mortality Rates Among U.S. Infants Born Late Preterm or Early Term. The aim of the study was to isolate disparities in “neonatal, post-neonatal, and overall infant mortality rates” of late preterm or early term babies in the United States (King et al., 2014, p. 234). The factors the study examined were race, maternal age, and the number of births. Late preterm for this study was classified as babies born at the gestational age of 34, 35, or 36 weeks, and early term was defined as babies being born at the gestational age of 37 or 38 weeks (King et al., 2014). The study used data pulled from the National Center for Health Statistics’ Linked Birth/Infant Death Database analyzing the years of 2003, 2004, 2005 resulting in a sample size of 874,532 late preterm and 3,164,489 early term infants (King et al., 2014). The study used

reliable methods by using birth certificates and information that was published nationally. One of the study's limitations was that gestational ages of infants in California were not reported in the birth certificates so therefore could not be pulled from the dataset (King et al., 2014). However, they separately configured gestational ages based on the women's last menstrual period for the infants in California and identified the same results as the rest of the dataset.

17-year Outcome of Preterm Infants with Diverse Neonatal Morbidities. The objective in this prospective, longitudinal study was to look at the effects of prematurity on the physical, neurological, and psychological health 17 years later. The study initially started off with a sample size of 213 born between 1985-1989 weighing less than 1,850 grams (Sullivan, Msall, & Miller, 2012). The stratified the sample into groups including "healthy preterm infants (HPTs) without medical or neurological illness; medical preterm infants (MPTs) with clinical illness such as bronchopulmonary dysplasia, necrotizing enterocolitis or sepsis (high clinical suspicion with administration of antepartum antibiotics, plus all culture-positive episodes) without neurological abnormality; neurological preterm infants (NPTs) with severe neurological illness such as intraventricular hemorrhage grade III/IV, seizures, or meningitis; and small for gestational age preterm infants defined as birth weight less than the 10th percentile of expected weight for gestational age with or without medical problems" (Sullivan et al., 2012, pp. 229-230). Full term infants were included in the study based on the qualifications being absent of neonatal health issues and having a gestational age of 37 weeks or greater (Sullivan et al., 2012). The mothers of the infants qualified by being free of any illnesses, being the age of 16 years old or older, and having English as their first language (Sullivan et al., 2012). The variables physical health including chronic conditions, neurological status, psychological were looked at as well as socioeconomic status and sex. The study stated that that retained 85% of their sample from the

time of birth while 13% didn't participate in the study due to medical conditions such as cerebral palsy, blindness, and deafness. "For the groups with neonatal morbidity, the 18–29% increase in suspect and abnormal conditions included more vision problems and special health care needs" (Sullivan et al., 2012, p. 235). Males were found they have poorer health than females at 17 years old (Sullivan et al., 2012). "The amount of chronic conditions did not statistically differ across the neonatal groups, between males and females, or by SES level however, the study did find the children with abnormal or suspect neurological status at age 8 had lower cognitive, reading, and math scores than children with normal neurological status" (Sullivan et al., 2012, p. 236). While the reliability and validity of this study can be challenged through length of the study and the effort needed to keep up with the participants, it is study whose findings are valuable because of the lack of information on the long-term effects of premature infants.

The association between inadequate gestational weight gain and infant mortality.

This study focuses on the how a fetus's poor weight gain during a pregnancy can increase the risk of infant mortality. The study used a random sample of 100,000 infants from the National Center Health Statistics Linked Birth/Infant Death dataset from the year 2002. The study evaluates how in 2007, a small birth weight was one of the principal reasons for infant death in the United States and a key factor in infant mortality (Davis & Hofferth, 2012). 19, 776 of the 100,00 records were not included in the study because they didn't meet the study measures, which led to an overall sample size of 80,224 infants (Davis & Hofferth, 2012). The study found that "of the infants whose mothers gained an inadequate amount of weight during pregnancy, 1.17% died, compared with 0.42% of those whose mothers gained a normal or excessive amount of weight while of the infants born low birth weight (7.75%), 5.48% died compared with 0.23% of those of normal birth weight" (Davis & Hofferth, 2012, p. 122). "Infants born to women with

inadequate gestational weight gain had odds of infant death that were 1.84 times the odds for infants born to women with normal weight gain with taking” the infant’s weight at birth, the race of the mother, and education of the mother into consideration (Davis & Hofferth, 2012, p. 123). Overall, the study presented reliable and valid data with the limitation of not including the height of weight for the mothers during their pregnancy. This study also offer public health implications which emphasizes the need to educate pregnant women on the importance of diet and physical activity.

Newborn clinical outcomes of late preterm infants. This study considers the instances of late preterm infants’ experiences with neonatal health complications such as “hypothermia, hypoglycemia, hyperbilirubinemia, respiratory distress, the need for a septic workup, and feeding difficulties” (Cooper et al., 2012, p. 774). The study looked at 802 late preterm infants taken from 14 hospital in Canada and the United States. 36% of late preterm infants received care in a special care nursery and half the infants were transferred to a normal postpartum unit (Cooper et al., 2012). Forty six percent of the late preterm infants received care occurred on a normal mother-baby unit, and “only 10% of those infants were transferred to a special care unit or NICU” (Cooper et al., 2012, p. 776). The study identified in what time frame specific neonatal complications occurred. For example, hyperbilirubinemia started to occur in infants from 24-72 hours (Cooper et al., 2012). Most of the neonatal complications as stated above aren’t found until after the first few hours of life. This study’s findings were reliable and valid they took a random sample and analyze the different neonatal complications that may occur and when they started to occur within the late preterm population. This overall helps present the idea to healthcare providers that late preterm infants are a population that should be assessed differently than full term infants.

Integrated Approaches to Improve Birth Outcomes: Perinatal Periods of Risk, Infant Mortality Review, and the Los Angeles Mommy and Baby Project. The purpose of this study was to determine why Antelope Valley in Los Angeles County's infant mortality rate is so much higher than all of the surrounding areas and to develop a program to try and combat the increased infant mortality rate. There were 53 infant deaths out of 4903 live births. This study found that the current IMR in Antelope Valley is 10.4 deaths per 1,000 births (Chao et al., 2010). This is almost double that of the national average which is 5.96 deaths per 1,000 births (Xu et al., 2016). The study also looked at the fetal deaths that occurred as well and included this in a separate rate. Including both the fetal deaths and the infant deaths, the mortality rate in 2002 was 17 deaths per 1,000 births which is more than three times that of the United States IMR. This study developed the Los Angeles Mommy and Baby Project which was a survey mailed to a random sample of recently delivered mothers in the Antelope Valley. The survey had a 55% response rate, and 366 women completed the survey. The results of this survey were used to formulate the Antelope Valley Best Babies Collaborative. This program provided mothers with resources, group meetings, education and incentives for participating in the program. This study used birth records, death records, and LAMB surveys completed by mothers as sources of data which are all reliable forms of data (Chao et al., 2010).

Increasing Tobacco Quitline Calls from Pregnant African American Women: The "One Tiny Reason to Quit" Social Marketing Campaign. This study focused on how a social marketing campaign's smoking quitline that was promoted to pregnant African American women was effective in promoting quitting smoking in Richmond, Virginia. This location and population was chosen because statistically African Americans have the highest percentage of premature births and infant mortality. The percentage in this area was 13.2 deaths per 1,000

births compared to the state average of 7.4 deaths per 1,000 births. In a survey conducted at an obstetrics clinic in the area “41% of the pregnant women reported lifetime daily use of tobacco and 39.3% reported smoking cigarettes in the past 3 months” (Kennedy et al., 2013, p. 433). The quit line provided individualized smoking cessation counseling to all callers and sent cessation materials to their homes if the callers wanted it. The campaign was featured through a radio ad, distribution of ad flyers, billboards, and in local clinics. While the study provided helpful information, there were several issues with this study. First, the study ran out of funding halfway through the study. There are two sets of data, each 2 years apart from running out of funding. The study had a total of 2713 callers in the first wave and 3503 callers in the second wave (Kennedy et al., 2013). This study had no real way of determining if the callers quit smoking or how the counseling went since there was no follow up. This study showed that campaigning for smoking cessation in pregnant women would be beneficial.

Estimating the Impact of Smoking Cessation During Pregnancy: The San Bernardino County Experience. The focus of this study was investigating the relationship between maternal smoking and adverse infant outcomes in San Bernardino County, California. This study consisted of 1430 mothers in 2007 and 1355 mothers in 2008 who smoked during their pregnancy. This data was obtained from California’s Department of Public Health which recorded all of the births and deaths in each year along with demographic information obtained from the parents. This study found that the percentage of women who never smoked had a 10% chance of having a preterm infant in 2007 and 2008. Women who smoked during their pregnancy had a 14.4% chance in 2007 and a 13.8% chance of having a preterm baby in 2008. Women who previously smoked but stopped smoking when they found out they were pregnant had a 10% chance in 2007 and 2008 of having a preterm infant. The information showed that

individuals who never smoked or stopped smoking after finding out they were pregnant had a lower chance of having a preterm infant than those women who smoked during their pregnancy. This study had a large sample size of 65,228 women who delivered over a two year period. The limitations include not being completely generalizable for the country as a whole because the sample size was not a random sample of all births. Another limitation includes the under-reporting of smoking during pregnancy (Batech et al., 2013).

Infant Morbidity and Mortality Attributable to Prenatal Smoking in the U.S. The purpose of this study was to estimate the ratio of preterm births, low birth weight babies, and infant deaths related to smoking in 2002. The study found that overall, 11.5% of infants born in 2002 were exposed to prenatal smoking. Out of all of the mothers who delivered preterm infants, 13.7% of them smoked during their pregnancy. The percentage of adverse outcomes went up to 23.4% when the researchers looked at the number of mothers who smoked and delivered low birth weight infants. Nationwide, the Sudden Infant Death Syndrome mortality rate in the United States was 0.57 per 1,000 live births. Out of all of the women who had babies that died from SIDS, 36.8% of those individuals smoked during their pregnancy. The preterm related death rate in 2002 was 2 for every 1000 live births. Out of all of the individuals who had infants die from preterm related causes, 15.7% of their mothers smoked during their pregnancy. The study consisted of a little over 3.3 million individuals throughout the United States. The limitations in this study include the smoking information being self-reported at the time of birth of the baby or from the maternal medical record so the number of smokers could potentially be under reported (Dietz et al., 2010).

Ethnic Density Effects on Birth Outcomes and Maternal Smoking During Pregnancy in the U.S. Linked Birth and Infant Death Data Set. The focus of this study was

to investigate whether mothers from ethnic minority groups have better birth outcomes and lower rates of maternal smoking during pregnancy when they live in counties with higher densities of people from the same ethnic group as themselves. This study concluded that despite living in counties with higher densities of individuals with the same ethnic backgrounds, African American women had the higher rate of infants with low birth weight, delivered preterm, or who died during their first year when compared to Hispanic Americans. When living in higher densities, African Americans and Hispanic Americans had a lower rate of smoking during their pregnancy. This study determined that there was little evidence between same ethnic density and infant mortality rate. Ethnic density had a greater effect on smoking during pregnancy or not. The limitations in this study include being able to definitively say that the ethnic density was the reason for the increase or decrease in maternal smoking during pregnancy. Also ethnic densities could only be narrowed down to counties and not any farther (Shaw, Pickett, & Wilkinson, 2010).

Excess Infant Mortality Among Native Hawaiians: Identifying Determinants for Preventive Action. The goal of this study was to identify potential determinants and sources of increased infant mortality rate among Native Hawaiians. The data was collected from the Hawaii State Linked Birth/Infant Death Cohort Files from 2002 to 2009. The Native Hawaiian infant death records were compared to those of Whites. Over the eight year period, the Native Hawaiians had a 7.9 per every 1,000 IMR compared to Whites who had a 3.5 per every 1,000 IMR. Based on these statistics, every year an additional 22 deaths could have been prevented if Native Hawaiians had the same IMR as Whites. The limitations included in this study included under-reporting of medical risk factors on birth certificates and risk factors that aren't collected. Other risk factors such as stress, social support, and poverty were not taken into account when

discussing possible causes of the increased IMR with Native Hawaiians (Hirai et al., 2013).

State Infant Mortality: An Ecologic Study to Determine Modifiable Risks and Adjusted Infant Mortality Rates. The focus of this study was to determine factors contributing to state infant mortality rates. The data from this study was gathered from the National Center for Health Statistics and National Census Bureau from 2001 to 2002. All fifty states and the District of Columbia were included in this study. The risk factors chosen for this study include state demographics, insurance factors, maternal disease factors, and pregnancy related factors. The results of this study determined that smoking during pregnancy and babies of adolescent mothers were associated with an increased infant mortality rate. Normal body mass index and having a caesarian section show an inverse relationship with IMR. The limitations of this study include the information not being able to be generalized on a state by state basis. Also, the data was collected from secondary sources and could therefore be misclassified or entered incorrectly (Paul et al., 2009).

Bed sharing on maternity wards. The journal article titled “Deaths and near deaths of healthy newborn infants while bed sharing on maternity wards” by Thach (2014), describes how “members of the National Association of Medical Examiners were contacted requesting information on deaths of healthy infants while bed sharing on maternity wards”. The purpose of this study was to figure out how hospitals that promote bed sharing could lessen the risks associated with bed sharing practices. The limitations of the findings in this study are that “the incidents reported here are probably a substantial underestimate of such occurrences in past years. We did not request information on near deaths. The three cases reported here were brought to our attention by individuals aware of our interest in such cases” (Thach, 2014, p. 276). This study only looked at 18 cases infants who were presumed to be healthy that died of a “presumed

to be accidental and preventable death” (Thach, 2014, p. 275). Even after this study, doctors are still not certain what cause these deaths exactly. The methods of retrieving information in this study were what was intended to be measured. According to Thach (2014), “in 2011, information on deaths of healthy newborn infants while bed sharing in hospital was requested by email from members of the National Association of Medical Examiners using a listserv” (p. 275). What was sent to the researchers was “15 deaths and 3 near deaths of infants” (Thach, 2014, p. 275). The data could have been more valid if they had the opportunity to interview all the parents of the newborns in the study. There was reliability in the methods, because the study compiled deaths related to bed sharing on maternity wards, and how the infants died. There were common factors shown to further increase the risk of bed sharing which were, “infants’ age <4 months in all 17 cases; maternal sedating drugs in 7 cases; cases excessive of maternal fatigue, either stated or assumed if the event occurred within 24h of birth in 12 cases; pillows and/or other soft bedding present in 9 cases; obesity in 2 cases; maternal smoking in 2 cases; and infant swaddled in 4 cases” (Thach, 2014, p. 275). According to Thach (2014), “Factors presumed to potentially reduce the risk of bed sharing were present in most of the cases. These included mother awake when the death or near death occurred in 4 cases and other individuals in the room when the event occurred in 10 cases” (p. 276). This study suggests that “the majority or all of the deaths and near deaths reported here were preventable” (Thach, 2014, p. 276).

Breast-feeding initiation time and neonatal mortality risk among newborns in South India. This study’s objective was to “examine the association between breast-feeding initiation time and neonatal mortality in India, where breastfeeding initiation varies widely from region to region” (Coles et al., 2011, p. 397). The limitations in this study were that, a lot of the data was provided by the families through the visiting physicians, and “that almost half (49.8%) of the

neonatal deaths occurred during the first 48 hours of life and were excluded from this analysis (not included)” (Coles et al., 2011, p. 399). When you exclude the neonates that died before 48 hours of life, you don't take into account what caused this death. According to Coles et al. (2011), “assuming that there is no association between early breastfeeding initiation and mortality before 48 hours (49.8% of deaths), universal early breastfeeding initiation might prevent 3.0% of neonatal deaths in this community in southern India” (p. 401). Another limitation of this study is that “no information on the duration of breastfeeding, breast-feeding exclusivity or prelacteal (foods introduced other than mother’s milk before breast feeding initiation begins) feeding habits, which are proven interventions to reduce child mortality, was obtained in this study” (Coles et al., 2011, p. 401). The validity of this study found that, “late initiation was associated with a 78% increase in the mortality risk after adjusting for confounders. Using the mortality risk estimates from the adjusted multivariate model, 6.2% of neonatal deaths after 48 h could be prevented with initiation of breastfeeding within 24 h of delivery” (Coles et al., 2011, p. 401). In this study that was conducted in Tamil India, “the data for this analysis were collected as part of the VASIN study, which was a community-based, randomized, placebo-controlled trial” (Coles et al., 2011, p.398). There were major reliability strengths to this study based on “the large sample size^[11]_{SEP} (n 1/4 10 464), which is comparable to the previous breastfeeding initiation studies, and the short average recall period. The prospective nature of this study allowed mothers to be enrolled in the study before delivery and allowed most infants to be visited shortly after birth.” (Coles et al., 2011, p. 401). According to Coles et al. (2011), “an early first visit minimized the likelihood of recall bias and differential misclassification of breast-feeding status among infants” (p. 401).

Evaluation of Bedtime Basics for Babies: A National Crib Distribution Program to

Reduce the Risk of Sleep-Related Sudden Infant Deaths. The primary objective of the “BBB program was to provide a safe crib to mothers who otherwise did not have access to one to reduce the prevalence of bed sharing, a potentially unsafe sleep environment for a newborn infant. The results of the analysis show that this objective was achieved” (Hauck et al., 2014, p. 7). Some limitations that this study had were “the inability to link participants’ responses between the pre-intervention and post-intervention surveys. This also prevented analyses of results in the post-intervention survey by race-ethnicity, since information was collected only in the prenatal and postnatal pre-intervention questionnaires” (Hauck et al., 2014, p. 8). Another limitation to this study is that, “since this program included provision of a free crib and safe sleep education, we cannot determine if one aspect of the program was more important in modifying parental practice” (Hauck et al., 2014, p. 8). Validity of this experiment was good, because the sample size was large. According to Hauck et al. (2014), “in total 4,786 parents completed the initial survey at the time of crib receipt. Of these 3,303 cribs were delivered prenatally and 1,483 were delivered postnatally. A total of 1,729 parents also completed the follow-up survey and 92 received a follow-up home visit” (p. 5). This could have been more valid if all of the recipients completed the follow-up survey, but that was not something the experimenters were controlling. According to Hauck et al. (2014) the effectiveness of this experiment was good because the results were consistent, in that “after the intervention, bed-sharing rates decreased to 16 %” (p. 6) and “while only 51 % of mothers in the postnatal survey responded that their baby slept in a crib or bassinet ($p < 0.01$). In the follow-up survey and after crib receipt, 90 % of mothers responded that their baby slept in a crib or bassinet” (p. 7). Overall “parental knowledge of recommended infant sleep position improved from 76 % (prenatal) and 77 % (postnatal) to 94 % after crib receipt” (Hauck et al., 2014, p. 1).

Perspectives of Hospital Based Nurses on Breastfeeding Initiation Best Practices.

Nurses are important in contributing to teaching towards patients before and after they give birth, and this study's purpose was "to assess the variation in breastfeeding knowledge and practices of registered nurses in hospital women and family-care units and the informal and formal hospital policies related to the initiation and support of breastfeeding" (Auld, Baker & Weddig, 2011, p. 166). The limitations of this study were, "it was conducted with a purposeful sample of hospitals and nurses in a single state" (Auld et al., 2011, p. 176), and so it doesn't represent a bigger sample size. Another limitation of the study was that it only had 40 participants total, who were, "forty female registered nurses from labor and delivery (9), postpartum (13), labor and delivery/recovery/postpartum care (LDRP) (12) and neonatal intensive care unit (NICU) (6)" (Auld et al., 2011, p. 166). This study showed validity, because it did show what they intended on measuring which was the variation in breastfeeding knowledge and practices of registered nurses on measuring in breastfeeding knowledge and practices of initiation of breastfeeding practices in hospital women and family care units and the informal and formal hospital policies related to the initiation and support of breastfeeding (p. 167). The data showed that "only those in BF/BFI hospitals actually reported practicing behaviors that are consistent with evidence-based best practices and thought the nurse was responsible for providing support, education, and hands-on help" (p. 169), and that "in the BF/BFI hospitals, breastfeeding initiation policies had recently been updated, enabling the nurses to follow evidence-based best practices" (p. 168). Regarding validity, this study originally thought they would see a difference in breastfeeding practices "between large and small hospitals and between high-SES and low-SES hospitals" (p. 176), but "the only differences occurred between the BF/BFI hospitals and the non-BF/BFI" (p. 176). This study showed validity because "the focus group questions, developed by a team of experts in

breastfeeding initiation who reviewed the literature and project objectives, addressed the following: hospital-policy (formal and informal) regarding breastfeeding; nurses' attitudes about breastfeeding and knowledge of current breastfeeding best practices for the first 72 hours of life; and hospital- policies and actual practice of observing and documentation of breastfeeding (see Table 1). The questions were reviewed by a registered nurse (RN) and three International Board Certified Lactation Consultants (IBCLC) to confirm content validity" (p. 167).

This study was reliable, because it looked at 8 hospitals and had a total of 40 participants that had an LPN, RN, or master's degree in nursing. Another reason why this study showed reliability was that "Rosenberg found that hospitals with clear breastfeeding policies similar to those reported in the focus groups at the BF/BFI hospitals are more likely to provide better breastfeeding support services and have couplets with improved breastfeeding outcomes" (p. 174).

Sleep Environment Risks for Younger and Older Infants. Collie-Akers, Colvin, Moon and Shunn (2014) did a study to determine any risk factors for sleep related deaths at different ages. The method of data collection for this study was "a cross-sectional study of sleep-related infant deaths from 24 states during 2004–2012 contained in the National Center for the Review and Prevention of Child Deaths Case Reporting System, a database of death reports from state child death review teams" (Collie-Akers et al., 2014, p. 406), which included a total of 8207 deaths being analyzed. This study's limitations were that the infants included in the study were "mostly male (58.2%) and did not have a CCC (98.8%). Most of the deaths occurred in non-Hispanic whites (44.9%), with a larger percentage of non-Hispanic black deaths occurring in the younger age group (31.0% vs 28.0%)" (p. 408). Another limitation of this study was that "the diagnosis "un- known" was the most frequent diagnosis (38.2%)" (p. 408). This study showed

what the researchers intended on finding out, because “the predominant risk factor for younger infants (0–3 months of age) is bed-sharing, whereas rolling to prone, with objects in the sleep area, is the predominant risk factor for older infants (4 months to 364 days)” (p. 411). This evidence from the study shows that the researchers found answers to their objectives. They wanted to see what caused infant deaths in the sleep environment more specifically at different ages. This study is reliable because “states use a standardized reporting tool and record all data online. A data dictionary and data codebook is provided to ensure accuracy and consistency in reporting” (p. 407). This helps to achieve consistent results with a standardized reporting tool.

Socioeconomic Factors Affecting Infant Sleep-Related Deaths in St. Louis. The objective of this study was to “determine whether there is a relationship between maternal socioeconomic factors and sleep-related infant death” (Hogan, 2013, p. 10). One limitation of this study is that it only sampled infants born between 2005 through 2009 in St. Louis, Missouri. Another limitation is “the study population is a limitation, as it is largely an African American community. The generalizability of the findings is limited only to this population and cannot be generalized for other populations where the racial distribution is more diverse” (p.15). This study is reliable, however it has different results compared to previous research, because previous research has suggested that socioeconomic factors have an impact on infant sleep-related deaths (p.13). However, this study found “a significant relationship only between race and sleep-related infant death” (Hogan, 2013, p.13). In this study specifically, poverty did not have as big an impact on infant death, and “these research findings are contrary to results of previous studies” (p.14). This study is valid, because this “study once again found that African American mothers had a higher likelihood of experiencing sleep-related infant death (62.5%) than Caucasian mothers (25.7%) or mothers of another ethnicity (33.3%)” (p. 14) and this is one of the factors

the researchers were looking for to determine what is causing infant death.

Influence of gestational age on death and neurodevelopmental outcome in premature infants with severe intracranial hemorrhage. This study's objective was "influence of gestational age on death and neurodevelopmental outcome in premature infants with severe intracranial hemorrhage" (Cotton, Gantz, Goldstein, Poole & Shankaran, 2012, p. 25). The researchers hypothesized that "lower gestational age is associated with higher risk of death or neurodevelopmental impairment (NDI) in infants with a severe intracranial hemorrhage" (p. 25).

Even though this study used a large number of infants from multiple centers participating in the NICHD NRN,

"It has been shown that there are center differences need to be accounted for when reporting multicenter results in death and neurodevelopmental outcome. Some of these center differences are in defining viability that impacts the incidence of early death, treatment practices including parameters for supplemental oxygen that impacts the diagnosis of BPD, use of PNS, incidence and types of late onset infections and NEC, and demographic variables such as race and maternal education" (p. 30).

This study shows validity, because "multiple factors contribute to the early death of premature infants. In our study, lower GA contributed significantly to early death for all infants studied. For infants with grade 3 ICH, in addition to lower GA, SGA, low APGAR and lack of ANS contributed significantly to early death. This study showed that gestational age was not a major contributor to NDI, but it did contribute to early death in premature infants. Another factor found that wasn't expected in the beginning of the study to affect NDI was that, "male gender has been found to increase risk of death, pulmonary complications and NDI in premature

infants” (29). Some other factors that influenced NDI were “Factors that predicted NDI among survivors with grade 3 ICH included less maternal education, black non-Hispanic race (versus white non-Hispanic), and male gender, as well as late onset infection, PNS and post hemorrhagic hydrocephalus requiring a shunt.

The reliability of this study is shown because, “demographic, perinatal and neonatal morbidity variables were obtained from the NRN Registry of Morbidity and Mortality (GDB (Generic Data Base)) and neurodevelopmental outcome data were obtained from the ELBW Follow-up Study by trained staff using standard definitions listed in the study’s Manual of Operations” (p. 26).

Synthesis of Evidence

Prenatal events. There are some gaps in knowledge as to how society plays a role in the initiation of prenatal care. Johnson et al. (2011), summarizes how there needs to have a greater emphasis on needs and concerns of the pregnant patients when providing prenatal care but there are no suggestions on the initiation of this action. There also a gap in knowledge on the education of the importance of prenatal care. There were no suggestions about how we can educate women differently on the importance of prenatal care. Johnson et al. (2011) summarizes that in their study it was found that this at risk population actually wanted more information on how they can enhance their health. With this finding, it can be seen that this population identifies the correlation between their health and the fetus’s health. There was also a gap in knowledge about the importance of preconception care. King et al. (2015) talked about the importance of preconception care and how it affects infant mortality by combating the congenital anomalies that may be developed during a pregnancy. There was a gap in knowledge defining admission rates of these populations into special care nurseries or neonatal intensive care units. In Cooper et

al.'s (2012) article, there was a gap in knowledge as to what population had increased instances of neonatal complications due to younger gestational ages. Davis and Hoffeth (2012) closed this gap with their finding of identifying infants born black women as the minority race that is at the highest risk of infant mortality due to poor weight gain. There was also a gap in knowledge in as to what is the best way to determine gestational age in utero for maybe a mother who consistent with her prenatal care checkups. Cooper et al. (2012) summarized how the New Ballard Score, frequently used on low risk and high risk babies, provided overestimations of gestational age.

The common limitation among numerous articles in the research is why certain factors contribute to infant mortality rate more than others. In addition to that, why certain factors even effect infant mortality rate at all. The research was able to discover factors that effected infant mortality rate but the reasoning behind it was harder to determine. The research also did not have much information about why some areas and states have a higher infant mortality rate than others do. For example, the infant mortality rate in Ohio is one of the highest in the United States. Some of the factors that we have addressed that contribute to infant mortality rate are prenatal care, smoking, safe sleep, and breastfeeding. These factors do not explain why Ohio would have a higher infant mortality rate as compared to other states.

Since many of the articles used birth and death records from many different states as a part of their methods, they seem to be valid. The information is coming from state records which would be much harder to fabricate. Other sources of research found in the articles include information from the National Census Bureau, National Center for Health Statistics, State Departments of Public Health, and US Linked Birth and Infant Death Data Sets. Data about parent demographics are kept on record for all births in the United States. This information has been a key aspect in the research due to being able to analyze the similarities and differences

between the parent demographics among infant deaths.

Some of the limitations found in the research were several studies did not include fetal deaths, small sample sizes, excluded information from some states due to difficulty obtaining the information, the inability of the study to determine which education method was the most successful in smoking education, lack of accurate reporting from survey participants, ethnicity percentages in population of the study is different from overall population of the United States, inclusion of all infant deaths even when cause was accidental, and the factor the study is associating an increased infant mortality rate to might not be the actual cause but a masking of the real cause. Fetal deaths were not included because of the difficulty attributing the exact cause of the fetal demise. During the short time period of 6 months that the LAMB project conducted their research, 53 deaths occurred. Taking the information from those 53 deaths and applying the results to the population of the United States could lead to false assumptions due to the small sample size. Several different studies included surveying participants and it is possible that the participants did not tell the truth in the surveys or omitted information that would have been pertinent to the study. A few studies consisted of populations that were not accurate in the percentages of those ethnicities in the overall population of the United States but fit the population in that area. This would cause a problem because the researchers are taking results from the study and applying it on a national level even though the sample population was not a completely accurate representation of the overall population. Some studies included all deaths occurring in infants between birth up to one year of age even though the cause of death was accidental and had nothing to do with the potential cause being studied. Several studies focused on specific topics such as smoking as a cause to an increased infant mortality rate even though there could have been other unidentified factors that could have contributed to the death of the

infant in addition to the smoking.

Postnatal events. The articles that were synthesized and reviewed for the postnatal events for neonatal mortality rates were from credible and reliable sources. Most of the articles were presented within the past 5 years or have been updated. A common limitation seen throughout the studies were that they used a small sample size, or one that only sampled participants in one geographical area or community. One of the breast-feeding studies took place in India, which could cause some conflict when comparing that data with US data. There are different resources, environmental and educational factors that differ from country to country. A positive part of most of these post-natal studies is that they were randomized sampling method. Another good aspect of data collection noted for the study on crib distribution programs was that they had pre and post surveys to evaluate parents learning, which is good for the experimenters to see if they need to change anything about their study or for the future. Data can be generalizable if certain studies are conducted in a specific manner like the crib distribution study. Some of the articles included focus groups, which contributes to reliability factors, because that generates good qualitative data.

Recommendations

Based on the information obtained about infant mortality rate, there are a few recommendations for healthcare providers that should be made to enhance clinical practice. First of all, staff members who will be coming in contact with mothers either prenatally or postnatally should be properly educated on all of the aspects and risk factors of infant mortality rate. It's also important that hospitals strive to be "baby friendly" hospitals (Auld, Baker & Weddig, 2011). Before the nurse starts educating the population, all staff that will potentially be in contact with pregnant women or mothers already need to be educated to provide the most up to date

information. Nurses should be educated about current evidence based research regarding infant care and learn how to incorporate that into everyday practice. When all personnel including nurses are more educated on the topics of discussion, they are better able to assess the learning needs of their clients and then provide the information in a way they can understand. Second, working on educating the higher risk populations such as individuals who smoke or have inadequate prenatal care should be made a higher priority, especially in locations where the infant mortality rate is higher. These individuals with the greater number of risk factors would benefit from the extra education and teaching. Third, including more than just individuals from the nursing perspective in the education and strategies for helping decrease the infant mortality rate would be a great asset. The mothers would have a greater amount of exposure to information when it is being provided through multiple different avenues and specialties in addition to nursing. Some of the disciplines that can be focused on the most are all individuals that provide healthcare services such as dieticians, physicians, advance practice providers, physical therapists, occupational therapist, speech and language pathologists, nutritionists, dieticians, social workers, case managers, etc. Anyone who will be or potentially will be coming in contact with the patients need to be educated about infant mortality rates and the risk factors that can increase the chances of infant mortality (Auld, Baker & Weddig, 2011).

Access and adequacy of prenatal care is a public health issue within itself. The next step in fixing prenatal events affecting IMR after educating the individuals coming in contact with the mothers would be to educate the mothers themselves. Mothers should be educated on the importance of prenatal care but also on the resources that are available for them to access adequate prenatal care (Kennedy et al., 2013). It should be considered that the interactions in the healthcare setting have an impact on the consistency of prenatal care and follow up

appointments. Healthcare providers must always create an environment where are patients feeling comfortable and can express their concerns and their concerns be heard and taken into consideration. Providers can provide interventions and educations at an earlier time within the pregnancy to try and prevent the instances of prematurity within these high-risk populations. The healthcare field also must treat “late pre-term” infants as if they are pre-term and not full term. Providing pre-term infants with extra assessments and observations before discharging them home should be considered due to the increased risk of complications related to their prematurity (Johnson et al., 2011). Prenatal education is important for combating inadequate gestational weight gain. Mothers must be educated on how important nutrition is and what their diet should consist of to make sure they birth a strong and healthy infant. While most potential prenatal complications can be lessened with education, healthcare providers, especially nurses, must be aware of our education strategies. Be aware of the target population being addressed, and any special needs or considerations they may have. Make sure the patient is able to understand all of the resources and educational information they are provided with. For example, a fifteen-year-old should not be given a pamphlet written for college level readers of the importance of folic acid during pregnancy. It is important that education is done in a way that can be understood across the specific populations that are being addressed to create a positive outcome.

The recommendations that should be made to future research studies are to focus more research on programs that provide positive feedback and rewards to mothers and families who participate in health promoting actions that in turn promote the health of their children. Some of the research done discussed programs within the United States in which mothers received vouchers for items that they needed to help take care of their babies. Research should also be conducted that focused on why certain areas have a higher infant mortality rate than other areas

around the United States. This can be done also by researching the areas with really low IMR's and comparing them to areas with high IMR's. This research would potentially figure out the differences between areas with higher infant mortality rates in comparison to areas with lower infant mortality rates. Research needs to be done to figure out if the infant mortality rate is related to environment, maternal prenatal factors, or postnatal factors more than others. Future research studies should focus more on selecting a truly random population sample that would be more generalizable to the entire population. Many of the studies that are out there now focus specifically on one ethnicity and are not taking into account all ethnicities in the population.

Racial disparity in sleep-related infant death among the African American population in cities is an important risk to consider for community health providers and government officials. They need to present safe sleep practices to these communities in a way that will relate to their culture and identity more. Therefore, cultural competency in hospitals and awareness of community resources are important. With women of high risk populations should have easy access to education that can understandable and relatable. Overall, infant mortality can be decreased if there continues to be identification of high risk populations and interventions created that are specific to the high-risk populations, and interventions that reinforce the education that has been given like within their communities when they leave the hospitals setting and go back to the normal environments.

References

- Auld, G., Baker, S. S., & Weddig, J. (2011). Perspectives of hospital-based nurses on breastfeeding initiation best practices. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 40*(2), 166-178.
- Batech, M., Tonstad, S., Job, J. S., Chinnock, R., Oshiro, B., Merritt, T. A., . . . Singh, P. N. (2013). Estimating the impact of smoking cessation during pregnancy: The San Bernardino County experience. *Journal of Community Health, 38*(5), 838-846.
- Centers for Disease Control and Prevention. (2016). *Infant mortality*. Retrieved from <http://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm>
- Central Intelligence Agency. (2015). Country comparison: Infant mortality rate. The World Factbook. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2091rank.html#download>
- Chao, S. M., Donatoni, G., Bemis, C., Donovan, K., Harding, C., Davenport, D., . . . Peck, M. G. (2010). Integrated approaches to improve birth outcomes: Perinatal periods of risk, infant mortality review, and the Los Angeles mommy and baby project. *Maternal and Child Health Journal, 14*(6), 827-837.
- Coles, C., Garcia, C. R., Katz, J., Mullany, L. C., Rahmathullah, L., Sheeladevi, S., & Thulasira, R. D. (2011). Breast-feeding initiation time and neonatal mortality risk among newborns in South India. *Perinatal Journal of Perinatology, 31*(6), 397-403.
doi:10.1038/jp.2010.138
- Collie-Akers, V., Colvin, J. D., Moon, R. Y., & Schunn, C. (2014). Sleep environment risks for younger and older infants. *Pediatrics, 134*(2), 397-403.

- Cooper, B.M., Holditch-Davis, D., Verklan, M. T., Fraser-Askin, D., Lamp, J., Santa-Donato, A.,.... Bingham, D. (2012). Newborn clinical outcomes of the AWHONN late preterm infant research-based practice project. *JOGNN: Journal Of Obstetric, Gynecologic & Neonatal Nursing*, 41(6), 774-785. doi:10.1111/j.1552-6909.2012.01401.x
- Cotten, C.M., Gantz, M.G., Goldstein, R. F., Poole, W.K. & Shankaran, S.(2012). Influence of gestational age on death and neurodevelopmental outcome in premature infants with severe intracranial hemorrhage. *Perinatal Journal of Perinatology*, 33(1), 25-32. doi:10.1038/jp.2012.91
- Davis, R., & Hofferth, S. (2012). The association between inadequate gestational weight gain and infant mortality among U.S. infants born in 2002. *Maternal & Child Health Journal*, 16(1), 119-124. doi:10.1007/s10995-010-0713-5
- Dietz, P. M., England, L. J., Shapiro-Mendoza, C. K., Tong, V. T., Farr, S. L., & Callaghan, W. M. (2010). Infant morbidity and mortality attributable to prenatal smoking in the United States. *Obstetrical & Gynecological Survey*, 65(10), 601-602.
- Federal Interagency Forum on Child and Family Statistics. (2015). Infant mortality. *America's Children: Key National Indicators of Well-Being, 2015*. Retrieved from <http://www.childstats.gov/americaschildren/health.asp>
- Hauck, F. R., McMurry, T., Moon, R. Y., & Tanabe, K. O. (2014). Evaluation of bedtime basics for babies: A national crib distribution program to reduce the risk of sleep-related sudden infant deaths. *Journal of Community Health*, 40(3), 457-463.
- Hirai, A. H., Hayes, D. K., Taulii, M. M., Singh, G. K., & Fuddy, A. L. (2013). Excess infant mortality among native hawaiians: Identifying determinants for preventive action.

- Public Health American Journal of Public Health*, 103(11), 88-95.
- Hogan, C. (2013). Socioeconomic factors affecting infant sleep-related deaths in St. Louis. *Public Health Nursing*, 31(1), 10-18.
- Johnson, A., Wesley, B., El-Khorazaty, M., Utter, J., Bhaskar, B., Hatcher, B.,... Laryea, H. (2011). African American and Latino patient versus provider perceptions of determinants of prenatal care initiation. *Maternal & Child Health Journal*, 15(S1), 27-34 8p. doi:10.1007/s10995-011-0864-z
- Kennedy, M. G., Genderson, M. W., Sepulveda, A. L., Garland, S. L., Wilson, D. B., Stith- Singleton, R., & Dubuque, S. (2013). Increasing tobacco quitline calls from pregnant African American women: The “one tiny reason to quit” social marketing campaign. *Journal of Women's Health*, 22(5), 432-438.
- King, J., Gazmararian, J., & Shapiro-Mendoza, C. (2014). Disparities in mortality rates among U.S. infants born late preterm or early term, 2003-2005. *Maternal & Child Health Journal*, 18(1), 233-241. doi:10.1007/s10995-013-1259-0
- Office of Disease Prevention and Health Promotion. (2016). *Maternal, Infant, and Child Health: Objectives Morbidity and Mortality*. Retrieved from <https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives>
- Office on Women’s Health, U.S. Department of Health and Human Services. (2012). *Prenatal care fact sheet*. Retrieved from <http://womenshealth.gov/publications/our-publications/fact-sheet/prenatal-care.html>
- Partridge, S., Balayla, J., Holcroft, C. A., & Abenhaim, H. A. (2012). Inadequate prenatal care utilization and risks of infant mortality and poor birth outcome: A retrospective analysis of 28,729,765 U.S. deliveries over 8 years. *American Journal Of Perinatology*, 29(10),

787-793. doi:10.1055/s-0032-1316439

- Paul, D. A., Mackley, A., Locke, R. G., Stefano, J. L., & Kroelinger, C. (2008). State infant mortality: An ecologic study to determine modifiable risks and adjusted infant mortality rates. *Maternal and Child Health Journal*, *13*(3), 343-348.
- Shaw, R. J., Pickett, K. E., & Wilkinson, R. G. (2010). Ethnic density effects on birth outcomes and maternal smoking during pregnancy in the US linked birth and infant death data set. *American Journal of Public Health*, *100*(4), 707-713.
- Sullivan, M. C., Msall, M. E., & Miller, R. J. (2012). 17-year outcome of preterm infants with diverse neonatal morbidities: Part 1-Impact on physical, neurological, and psychological health status. *Journal for Specialists In Pediatric Nursing*, *17*(3), 226-241 16p. doi:10.1111/j.1744-6155.2012.00337.x
- Thach, B. T. (2014). Deaths and near deaths of healthy newborn infants while bed sharing on maternity wards. *Perinatal Journal of Perinatology*, *34*(4), 275-279.
- World Health Organization Indicator and Measurement Registry. (2011). *Infant mortality rate (probability of dying between birth and age 1 per 1000 live births)*. Retrieved from http://apps.who.int/gho/indicatorregistry/App_Main/view_indicator.aspx?iid=1
- Xu, J., Murphy, S.L., Kochanek, K.D., & Bastian, B.A. (2016). Deaths: Final data for 2013. *National Vital Statistics Reports*, *64*(2), 1-118. Retrieved from http://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_02.pdf

Systematic Review Table of Evidence

APA formatted reference	Purpose statement. Research question.	Clinical Practice Setting, Sampling methods, Sample size.	Design. Level of Evidence.	Findings, Conclusion	Practice & Research Implications	Limitations of Findings
<p>Thach, B. T. (2014). Deaths and near deaths of healthy newborn infants while bed sharing on maternity wards. <i>J Perinatal Journal of Perinatology</i>, 34(4), 275-279.</p>	<p>Purpose Statement: Evaluate programs in maternity wards that promote bed sharing between infants and mothers, and how to reduce mortality risks. Research question: Is bed sharing really harmful and are deaths preventable in bed sharing scenarios.</p>	<p>Setting: Maternity wards in US Sampling method: all records from national Association of medical examiners were reviewed. Sample size: 18 cases of infant mortality</p>	<p>Design: observational, Members of the National Association of Medical Examiners requesting data. Level of Evidence: 2nd level</p>	<p>Findings: In eight cases, the mother fell asleep while breastfeeding Obesity and swaddling major risk factors. Suffocation major key in bed sharing that leads to infant death. Conclusion: majority or all of the deaths and near deaths reported here were preventable.</p>	<p>Nurses must make frequent bed checks every 5-10 min. Mother can't fall asleep with baby. Teach mothers how to assess infants breathing, color, etc.</p>	<p>Small sample size, not a lot of variation with the population.</p>
<p>Coles, C., Garcia, C. R., Katz, J., Mullany, L. C., Rahmathullah, L., Sheeladevi, S., Thulasira, R. D. (2011). Breast-feeding initiation time and neonatal mortality risk among newborns in South</p>	<p>Purpose statement: To examine the association between breast-feeding initiation time and neonatal mortality in India, where breastfeeding initiation varies</p>	<p>Sampling method: Randomized placebo, infants in the community Setting: Tamil India</p>	<p>Design: Randomized placebo-controlled trial Level:</p>	<p>Findings: The results from this study provide evidence that initiation of breast-feeding after 24 h among</p>	<p>Nurses can teach first time mothers about safe breastfeeding techniques. Can talk to patients about</p>	<p>This study takes place in India, but data can still be looked at for our population, because low SES and being a first time mother can attribute to late breastfeeding practice.</p>

<p>India. <i>Journal of Perinatology</i>, 31(6), 397-403. doi:10.1038/jp.2010.138</p>	<p>widely from region to region. Research Question: Does initiation of breastfeeding before 24 hours reduce neonatal mortality rate?</p>	<p>Sample size: 10,464 infants</p>		<p>newborns in Tamil Nadu, India was associated with a higher risk of neonatal mortality. first-time mothers are more likely to delay breast-feeding</p>	<p>initiating breast feeding before 24 hours to decrease mortality in infants (fewer diseases).</p>	
<p>Hauck, F. R., Mcmurry, T., Moon, R. Y., & Tanabe, K. O. (2014). Evaluation of Bedtime Basics for Babies: A National Crib Distribution Program to Reduce the Risk of Sleep-Related Sudden Infant Deaths. <i>Journal of Community Health J Community Health</i>, 40(3), 457-463.</p>	<p>Purpose statement: Evaluating if education and crib distribution program affects parental knowledge and practices of infant sleep position, bed sharing, pacifier use, and feeding practices. Research question: Do education and crib distribution programs affect parental knowledge on how to use pacifiers, feed their infant, implement safe sleeping positions, and bed sharing practices?</p>	<p>Setting: Washington State, Indiana, and Washington, DC. Sampling method: Families were identified in the prenatal, perinatal, or postpartum periods by WIC programs, health care workers, and social workers. Sample size: 3,303 for prenatal data, 1,483 postnatal, and 1,729 follow-up data</p>	<p>Design: quasi experimental design. Level of evidence: level 5</p>	<p>Findings: bed sharing decreased post intervention Women stated the right sleep positions after interventions. Pacifier use did not change much after the intervention.</p>	<p>Patients should seek prenatal care with a doctor or nurse before they give birth so they know the safe practices to take care of their baby.</p>	<p>Since the surveys were anonymous they couldn't link before and after results, or organize results by race This study helped increase infant safety with the interventions but there was no controlled group, randomization of participants in groups.</p>
<p>Auld, G., Baker, S. S., & Weddig, J. (2011). Perspectives of Hospital-Based Nurses</p>	<p>Purpose: The purpose of this study was to assess the variation in breastfeeding</p>	<p>Setting: eight state hospitals differing in SES and location.</p>	<p>Design: Experimental Level of evidence: evidence from</p>	<p>Findings: the only substantial differences were noted between</p>	<p>Nurses should always use best</p>	<p>Hospital and nurses sampled were all from the same state. this article isn't</p>

<p>on Breastfeeding Initiation Best Practices. <i>Journal of Obstetric, Gynecologic & Neonatal Nursing</i>, 40(2), 166-178.</p>	<p>knowledge and practices of registered nurses in hospital women. Research question: Do nurses' knowledge on breast feeding differ from certain hospitals?</p>	<p>Sample size: Forty female registered nurses from labor and delivery, postpartum, NICU, and LDRP. Sampling method: Participants were recruited by posting flyers in each hospital, and emailing the nurses.</p>	<p>qualitative studies.</p>	<p>BF/BFI and nonBF/BFI hospitals. Nurses in BF/BFI hospitals reported practicing behaviors that are consistent with evidence-based practice. Some nurses don't think it's their job to provide education to patients about breastfeeding.</p>	<p>evidenced based practice in providing care to mothers that are breast feeding. Nurses can do discharge teaching, show mother how to do skin to skin contact with baby, and things like avoiding pacifier use in the first few weeks.</p>	<p>directly related to IMR, but can be talked about in study of how to improve breastfeeding education or outcomes in new mothers, because breastfeeding/feeding in general is related to IMR.</p>
<p>Collie-Akers, V., Colvin, J. D., Moon, R. Y., & Schunn, C. (2014). Sleep Environment Risks for Younger and Older Infants. <i>Pediatrics</i>, 134(2).</p>	<p>Purpose: determine any associations between risk factors for sleep-related deaths at different ages. Research question: What are the risk factors associated with sleep related deaths at different ages.</p>	<p>Setting: 43 states in US. Sampling method: Inclusion criteria were all deaths recorded in the NCRPCD database that occurred during sleep, all infants no older than 1 year. Sample size: 9073 infant</p>	<p>Design: cross sectional study and non-experimental design. Level of evidence: level 2</p>	<p>Findings: Different ages lead to different causes of death during sleep. Younger aged babies' mortalities were related to sleeping on the same bed as parents, and older babies cause was that they were in</p>	<p>Nurses can teach patients safe sleeping patterns for infants. Nurses can warn parents about sharing beds with their infants, especially from ages 0-3 months.</p>	<p>Some states because of when they began participating in the NCRPCD, did not provide data for all study years.</p>

		deaths.		prone position with objects. Latino and African-American infants were more likely to be placed in a nonsupine position		
Paul, D. A., Mackley, A., Locke, R. G., Stefano, J. L., & Kroelinger, C. (2008). State Infant Mortality: An Ecologic Study to Determine Modifiable Risks and Adjusted Infant Mortality Rates. <i>Maternal and Child Health Journal, 13</i> (3), 343-348.	<p>Purpose: To determine factors contributing to infant mortality rates and develops an adjusted infant mortality rate for The United States for 2001 and 2002.</p> <p>Research Question: What factors contributed to state infant mortality rates in 2001 and 2002 in The United States?</p>	<p>Setting: Birth and death certificates for 2001 and 2002 from the National Center for Health Statistics and National Census Bureau in all 50 states and Washington D.C.</p> <p>Sampling Method: Birth and death certificates in all 50 states and Washington D.C. in 2001 and 2002.</p> <p>Sample Size:</p>	<p>Design: exploratory ecologic investigation</p> <p>Level of Evidence: primary research study</p>	<p>Findings: Smoking during pregnancy and adolescent birth rates were associated with increasing infant mortality in 2001 and 2002.</p>	<p>Influencing the smoking rate in pregnant women will bring down the infant mortality rate.</p>	<p>The data was collected from multiple different government organizations and used together to form this data.</p>
Chao, S. M., Donatoni, G., Bemis, C., Donovan, K., Harding, C., Davenport, D., . . . Peck, M. G. (2010). Integrated Approaches to Improve Birth Outcomes: Perinatal Periods of Risk, Infant Mortality Review, and the	<p>Purpose: Perinatal periods of risk can provide a framework and offer analytic methods that move communities to productive action to address infant mortality.</p>	<p>Setting: Los Angeles area</p> <p>Sampling Method: mothers participating in the Los Angeles Mommy and Baby Project</p>	<p>Design: Longitudinal</p> <p>Level of Evidence: primary research</p>	<p>Findings: The LAMB project was integrated into the Antelope Valley community and over a 2-3 year period the infant mortality rate</p>	<p>This shows that educating populations can help to decrease the infant mortality rates. More</p>	<p>The limit of the findings is that the sample size was very small so it might not be a good representation of a whole population.</p>

<p>Los Angeles Mommy and Baby Project. <i>Maternal and Child Health Journal</i>, 14(6), 827-837.</p>	<p>Research Question: How can perinatal periods of risk, infant mortality review, and the Los Angeles Mommy and Baby project (LAMB) be integrated to improve birth outcomes in the Antelope Valley area.</p>	<p>Sample Size: 87 participants</p>		<p>decreased from 14.3 per 1,000 to 9.5 per 1000. Conclusion: Educating populations who have higher infant mortality rates on the factors that increase infant deaths helps to decrease the infant mortality rate.</p>	<p>research should be conducted about the best way to educate the populations.</p>	
<p>Dietz, P. M., England, L. J., Shapiro-Mendoza, C. K., Tong, V. T., Farr, S. L., & Callaghan, W. M. (2010). Infant Morbidity and Mortality Attributable to Prenatal Smoking in the United States. <i>Obstetrical & Gynecological Survey</i>, 65(10), 601-602.</p>	<p>Purpose: To estimate the proportion of preterm deliveries, term low birth weight deliveries, and infant deaths attributable to prenatal smoking. Research Question: What is the proportion of preterm deliveries, term low birth weight deliveries, and infant deaths attributable to prenatal smoking.</p>	<p>Setting: Births in the US in 2002 excluding California Sampling Method: U.S. Linked Birth/Infant Death (LBID) data set Sample Size: 3,352,756</p>	<p>Design: observational Level of Evidence: primary research</p>	<p>Findings: Smoking was linked to an increase in IMR but is still affecting infants today.</p>	<p>Practice: Using more statistics in patient education could help deter mothers from smoking during pregnancy.</p>	<p>The limit of the findings is that the study did not include California.</p>
<p>Kennedy, M. G., Genderson, M. W., Sepulveda, A. L., Garland, S. L., Wilson, D. B., Stith-Singleton, R., & Dubuque, S. (2013). Increasing</p>	<p>Purpose: To encourage pregnant smokers to call a toll-free number for telephone smoking cessation counseling.</p>	<p>Setting: African Americans who were smoking while pregnant in Richmond, Virginia.</p>	<p>Design: longitudinal Level of Evidence: primary research study</p>	<p>Findings: The more publicity and campaigning that were done, the higher the number of</p>	<p>This shows that the more information is put out there, the better chance</p>	<p>The study only considered the women who called into the hot line, not all the women in the area.</p>

<p>Tobacco Quitline Calls from Pregnant African American Women: The “One Tiny Reason to Quit” Social Marketing Campaign. <i>Journal of Women's Health</i>, 22(5), 432-438.</p>	<p>Research Question: Does providing information about a toll free hot line to African American women who are pregnant influence the number of people who call in?</p>	<p>Sampling Method: Obtaining information from individuals who called the hot line. Sample size: 42 women</p>		<p>African American women that called in were.</p>	<p>of reaching the population is.</p>	
<p>Batech, M., Tonstad, S., Job, J. S., Chinnock, R., Oshiro, B., Merritt, T. A., . . . Singh, P. N. (2013). Estimating the Impact of Smoking Cessation During Pregnancy: The San Bernardino County Experience. <i>Journal of Community Health J Community Health</i>, 38(5), 838-846.</p>	<p>Purpose: To estimate the impact of smoking cessation during pregnancy. Research Question: How does infant mortality rates differ between women who smoke during their pregnancy and women who don't?</p>	<p>Setting: San Bernadino Sampling Method: Sample size: 60 women</p>	<p>Design: longitudinal Level of Evidence: primary research study</p>	<p>Findings? This study found that 1 out of every 35 mothers who smoked could have improved their baby's birth rate by stopping smoking. This study found a strong connection between maternal smoking and adverse infant outcomes.</p>	<p>This study indicates that we should provide smoking cessation information to all women who are pregnant in hopes that they stop smoking.</p>	<p>The study was only conducted among 60 women so the sample size was very small for such a large county.</p>
<p>Shaw, R. J., Pickett, K. E., & Wilkinson, R. G. (2010). Ethnic Density Effects on Birth Outcomes and Maternal Smoking During Pregnancy in the US Linked Birth and Infant Death Data Set. <i>Am J Public Health American Journal of Public Health</i>, 100(4), 707-713.</p>	<p>Purpose: To test whether same-ethnic density was associated with maternal smoking in pregnancy, low birth weight, preterm delivery, and infant mortality Research question: Is same-ethnic</p>	<p>Setting: US Census 2000 summary file 3 Sampling Method: 2000 US Linked Birth and Infant Death Data Set Sample size: 1,344,352</p>	<p>Design: multilevel logistic regression analysis Level of Evidence: Controlled trials without randomization</p>	<p>Findings: Higher levels of same-ethnic density were associated with reduced odds of infant mortality among Hispanic mothers, and reduced odds of smoking during pregnancy for</p>	<p>Implications: For Hispanic mothers, in contrast to Black mothers, the advantages of shared culture, social networks, and social</p>	<p>Data available from vital records and the census are limited in scope and they were unable to control for a full range of individual-level and county-level factors that might confound or mediate the effect of ethnic density on maternal and infant</p>

	<p>density associated with maternal smoking in pregnancy, low birthweight, preterm delivery, and infant mortality?</p>			<p>US-born Hispanic and Black mothers. For Black mothers, moderate levels of same-ethnic density were associated with increased risk of low birth weight and preterm delivery; high levels of same ethnic density had no additional effect.</p>	<p>capital protect maternal and infant health.</p>	<p>health. They were also unable to examine ethnic density at a lower geographic scale than counties. Whereas some smaller counties may feel and operate like a genuine community or neighborhood for residents, larger counties include numerous different communities.</p>
<p>Hirai, A. H., Hayes, D. K., Taulii, M. M., Singh, G. K., & Fuddy, A. L. (2013). Excess Infant Mortality Among Native Hawaiians: Identifying Determinants for Preventive Action. <i>Am J Public Health American Journal of Public Health</i>, 103(11).</p>	<p>Purpose: To identify potential determinants and cause-specific sources of excess infant mortality among Native Hawaiians.</p> <p>Research Question: What are potential determinants and cause-specific sources of excess infant mortality among Native Hawaiians?</p>	<p>Setting: Hawaii</p> <p>Sampling Method: 2002 to 2009 Hawai'i State Linked Birth/Infant Death Cohort File</p> <p>Sample Size: 3,352,756</p>	<p>Design: multivariable analyses</p> <p>Level of Evidence: controlled trials without randomization</p>	<p>Findings: The Native Hawaiian infant mortality rate was more than twice that for Whites (7.9 vs 3.5/1000 live births). Excess Native Hawaiian infant mortality was equally apportioned to neonatal and post neonatal deaths. Preterm-related causes of death accounted for 43.9% of the infant mortality disparity, followed by sudden unexpected</p>	<p>Implications: Addressing educational inequalities, promoting safe sleep practices, and reducing smoking among Native Hawaiian mothers would help to eliminate excess infant mortality.</p>	<p>The impact of chronic conditions on infant mortality was likely underestimated and consequently their contribution to disparities as well</p>

				<p>infant death (21.6%) and injury (5.6%). In multivariable models, maternal educational inequality accounted for the largest portion of the neonatal mortality disparity (20.9%); younger maternal age (12.2%) and smoking (9.5%) were the only significant contributors to the post neonatal mortality disparity.</p>		
<p>Hogan, C. (2013). Socioeconomic Factors Affecting Infant Sleep-Related Deaths in St. Louis. <i>Public Health Nursing Public Health Nursing, 31</i>(1), 10-18.</p>	<p>Purpose: To determine how racial disparities may be reduced to lower infant mortality rates. Research Question: Is there a relationship between socioeconomic factors pertaining to the mother and infant sleep-related deaths.</p>	<p>Setting: St. Louis</p> <p>Sampling method: information on 26,211 individuals and represented all births recorded in St. Louis, MO</p> <p>Sample size: 26,111</p>	<p>Design: quasi-experimental</p> <p>Level of evidence: level 2</p>	<p>Findings: African Americans have 1.9 times the SIDS mortality rate of Caucasians.</p>	<p>Implications: Public health officials should know about the disparities and health trends in lower SES status populations.</p> <p>policies to reinforce safe sleep strategies in hospitals, especially in</p>	<p>primarily African American population.</p> <p>small sample size.</p>

					lower income areas.	
<p>Cotten, C.M.,Gantz, M.G., Goldstein, R. F., Poole, W.K. & Shankaran, S.(2012). Influence of gestational age on death and neurodevelopmental outcome in premature infants with severe intracranial hemorrhage. <i>Journal of Perinatology</i>, 33(1), 25-32. doi:10.1038/jp.2012.91</p>	<p>Purpose statement: To determine whether death and/or neurodevelopmental impairment after severe intracranial hemorrhage differs by gestational age in extremely low birth weight (ELBW) infants. Research question: Does gestational age affect outcomes in ELBW infants after severe intracranial hemorrhage?</p>	<p>Setting: Demographic, perinatal and neonatal morbidity variables were obtained from the NRN Registry of Morbidity and Mortality (GDB (Generic Data Base)) Sampling method: NRN Registry sample size: 5456 infants</p>	<p>Level of evidence: This is a retrospective cohort analysis level: 4</p>	<p>findings: Several reports from Network centers demonstrate that late onset infection and NEC contribute to later death and higher risk for NDI in all groups of premature infants. lower GA is important in predicting early death in premature infants poorer outcome, include male gender and the need for a VP shunt</p>	<p>implications. Important factors that contribute to death and/or NDI that are potentially preventable with further advances in neonatal care are late onset infection, severe NEC, BPD and the use of PNS.</p>	<p>Authors declare no conflict of interest</p>
<p>Partridge, S., Balayla, J., Holcroft, C. A., & Abenheim, H. A. (2012). Inadequate Prenatal Care Utilization and Risks of Infant Mortality and Poor Birth Outcome: A Retrospective Analysis of 28,729,765 U.S. Deliveries over 8 Years. <i>American Journal Of</i></p>	<p>Purpose Statement: The purpose if this study is to discover the correlation between of use of adequate prenatal care and fetal, neonatal, and infant mortality. Research Question: What is the</p>	<p>Setting: United States Sampling method: Purposive Sampling Sample size: 28,729,765</p>	<p>Design: retrospective population-based cohort study Level of Evidence: 4</p>	<p>The use of effective prenatal care is an “important predictor of maternal and fetal health”. “Inadequate PNC utilization was associated with an increased risk of poor birth outcomes There is a presented linear relationship between the decrease</p>	<p>Proposals in public health should be directed towards the development of programs to make sure there is timely and effective access to</p>	<p>Reporting bias with the use of birth and death certificate. Evidence that some persons already present with a higher risk for bad pregnancy outcomes.</p>

<p><i>Perinatology</i>, 29(10), 787-793 7p. doi:10.1055/s-0032-1316439</p>	<p>relationship between inadequate prenatal care fetal, neonatal and infant mortality rates?</p>			<p>in prenatal care and “stillbirth, early neonatal death, late neonatal death and infant death. With a reduction in prenatal care enhances the chances of prematurity, still birth, early neonatal mortality, neonatal mortality, and infant mortality.</p>	<p>prenatal care, mainly for women that are at risk.</p>	
<p>Sullivan, M. C., Msall, M. E., & Miller, R. J. (2012). 17-year outcome of preterm infants with diverse neonatal morbidities: Part 1-Impact on physical, neurological, and psychological health status. <i>Journal For Specialists In Pediatric Nursing</i>, 17(3), 226-241 16p. doi:10.1111/j.1744-6155.2012.00337.x</p>	<p>Purpose Statement: The purpose of this study was to examine physical, neurological, psychological health at age 17 in a sample of preterm infants grouped by diverse neonatal morbidity and full term infant group Research question: What are the long term health developmental, behavioral, and vocational consequences for premature infants?</p>	<p>Setting: Northeast U.S. Sampling Method: Stratified sampling method Sample size: 213</p>	<p>Design: Prospective, longitudinal study Level of Evidence: 4</p>	<p>“Today one in eight babies or more than 500,000 per year are premature”. “U.S. cohort at school-age reports 64% of formerly preterm children had functional limits.” “18 adolescents who were born preterm has severe impairments that precluded complete participation” In all three areas of study, the outcomes were poorer for adolescents born premature babies</p>	<p>Health care professionals as well as authority figures in a child’s life should be able to inquire about prematurity, illnesses in the neonatal period, hospitalization after birth since it has a significant effect on their functional abilities.</p>	<p>Difficulty keeping research nurse fully blinded to teens full-term/Pre-term states Health assessment and interview have inherent weaknesses because of clinical interpretation.</p>
<p>King, J., Gazmararian, J., & Shapiro-Mendoza, C. (2014). Disparities in</p>	<p>The purpose of this study was to identify disparities in neonatal, postnatal and overall infant mortality</p>	<p>Setting: United States Sampling Method:</p>	<p>Design: Descriptive study Level of Evidence: 6</p>	<p>“Infant mortality rates among infants born late preterm</p>	<p>There should be an increase in knowledge,</p>	<p>Exclusion of infants born in California because clinical or</p>

<p>Mortality Rates Among US Infants Born Late Preterm or Early Term, 2003-2005. <i>Maternal & Child Health Journal, 18(1), 233-241</i> 9p. doi:10.1007/s10995-013-1259-0</p>	<p>rates among infants born late preterm(34-36 weeks) and early term (37-38 weeks) gestation RQ: What are the disparities between race/ethnicity, maternal age, and plurality in neonatal, post-neonatal, and overall infant mortality</p>	<p>convenience, Randomized sampling Sample size: 874,532 (late preterm), 3,164, 484 (early preterm)</p>		<p>or early term varied substantially by maternal race/ethnicity, maternal age, and plurality” Among infants born late preterm the infant mortality rate was higher among Native Americans and non-Hispanic black mothers. Only postnatal mortality among Hispanic mothers was lower than white mothers. Early term infants Native American and black infant mortality rates were high</p>	<p>an encouragement of preconception care, and effective health care during pregnancy towards infants at high risks.</p>	<p>obstetric estimates of infant’s gestational age at birth were not reported on California birth certificates during study period.</p>
<p>Davis, R., & Hofferth, S. (2012). The Association Between Inadequate Gestational Weight Gain and Infant Mortality Among U.S. Infants Born in 2002. <i>Maternal & Child Health Journal, 16(1), 119-124</i> 6p. doi:10.1007/s10995-010-0713-5</p>	<p>Purpose statement: Determine the relative importance of inadequate gestational weight gain on infant mortality rate. QR: How does inadequate gestational weight affect the infant mortality rate?</p>	<p>Setting: United States Sampling Method: convenience sampling Sample size: 80,224</p>	<p>Design: Descriptive design and proportional hazards regression analysis Level of Evidence: 6</p>	<p>Poor gestational weight gain is connected with negative outcomes for the infant. “Infants born to moms with poor gestational weight has 2.23 higher chance of dying than infants that were born to moms of a normal weight” “0.64% of infants</p>	<p>More pre-conception counseling HCPs should put more emphasis on patterns of weight gain rather the amount of weight gained More education about diet and physical</p>	<p>No maternal birth weight or height to determine BMI. Weight gain could be misreported or misreported</p>

				with inadequate gestational weight died compared with .042% that dies who had normal gestational weight” “5.48% of babies with low birth weight dies compared to .23% of normal weight.	activity and the importance of continued monitoring during pregnancy.	
Johnson, A., Wesley, B., El-Khorazaty, M., Utter, J., Bhaskar, B., Hatcher, B., & ... Laryea, H. (2011). African American and Latino Patient Versus Provider Perceptions of Determinants of Prenatal Care Initiation. <i>Maternal & Child Health Journal, 15</i> (S1), 27-34 8p. doi:10.1007/s10995-011-0864-z	Purpose Statement: To add to scarce information about patient and provider perceptions of barriers, motivators, and facilitators of prenatal care? Research question: What are the motivator, facilitators, and barriers on prenatal care initiation among minority populations such as African American and Latino American?	Setting: United States, Washington D.C., inner city population Sampling Method: stratified sampling Sample size: 331 African American and Latino patients 61 health care providers	Design: Correlational design Level of evidence: 6	Both providers and patients placed high importance on unplanned pregnancy, considering abortion, going to the emergency room when problems occur, and having no health insurance or money to pay for care as barriers to care. Also, both providers and patients did not perceive the clinic environment(i.e. Unavailability of appointments, waiting too long to get an appointment, cancellation of the appointment by the clinic, inconvenience of clinic hours, dislike of staff attitudes, and inability to communicate with staff) as a barrier. Providers were more likely to state what the barriers are in prenatal care and patients were more likely to state motivators.	Health care providers should be more equipped to overcome barriers of African American Latino women starting prenatal care. They should also pay more attention to their needs and concerns in proving prenatal care	The possibility of over reporting by health care providers. Under-reporting from patients who did not want to admit to something bad about them. Pregnant women who never started prenatal care were not included.

				Most mothers were concerned about their health during their pregnancy.		
<p>Medoff Cooper, B., Holditch-Davis, D., Verklan, M. T., Fraser-Askin, D., Lamp, J., Santa-Donato, A., & ... Bingham, D. (2012). Newborn Clinical Outcomes of the AWHONN Late Preterm Infant Research-Based Practice Project. <i>JOGNN: Journal Of Obstetric, Gynecologic & Neonatal Nursing</i>, 41(6), 774-785 12p. doi:10.1111/j.1552-6909.2012.01401.x</p>	<p>Purpose Statement: The purpose statement is to describe the health risk during the neonatal period and how late preterm infants were affected by these risks Research question: How does gestational age at birth influence neonatal health risks?</p>	<p>Sample Setting: Hospitals in Canada and the United States Sampling Method: purposive sampling Sample: 802</p>	<p>Design: Descriptive analysis of prospective data Level of evidence: 6</p>	<p>36% of late preterm infants received neonatal care and 18% were transferred to receive non-special care for newborns. 10% or the 64% of newborns treated regularly were ultimately transferred to receive more extensive and focused care. 50% of the sample experienced hypoglycemia, hypothermia, sepsis work-up, feeding issues, respiratory distress, and hyperbilirubinemia . The risks were higher with infants with lower gestational ages which puts them at higher risk of health complications</p>	<p>Nurses and healthcare providers should be aware of the risks that late preterm infants face. The perinatal nurse should know how to assess behaviors that may suggest that an infant is less mature</p>	<p>Data analyzed was only the data that was obtained during the hospitalization. A follow-up should be done. Date was not obtained on the infants that were transferred out of the non-intensive nursery.</p>