



# The Economic Burden of Perinatal Morbidity

Indiana Perinatal Quality Improvement Collaborative

## **IPQIC The Economic Burden of Perinatal Morbidity 2020 Updates Summary**

**The Economic Burden of Perinatal Morbidity** – updated document presented to IPQIC Governing Council in September 2020. The Economic Burden document originally presented to Governing Council January 2017.

***Please note:** Supporting studies and data points throughout the document were updated with applicable existing current data.*

- **Section: The Financial Costs of Perinatal Morbidity:**
  - Updated section with current data and added additional supporting data when available.
  - Added new subsection **Healthcare Disparities in the Perinatal Period** given the importance of identifying solutions that will help alleviate the negative impacts of such disparities.
  
- **Section: Success Stories: Programs that reduce the costs of perinatal morbidity** added new subsections and as noted, provided data updates and/or added more recent supporting studies in the existing subsections.
  - **Home Visiting Programs** new subsection
  - **Telemedicine** new subsection
  - **Pregnancy Complications** new subsection
  - **Group Prenatal Care** – changed title of subsection, added information on IU Maternal Recovery Group Prenatal Care (GPC)

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# The Economic Burden of Perinatal Morbidity

## Introduction

Perinatal morbidity in Indiana causes enormous negative impacts to both health outcomes and financial expenditures. Human costs are significant, and the financial burden resulting from poor birth outcomes begins at time of delivery and often stretches into adulthood. Yet there are proven actions that can be taken to significantly improve health outcomes and reduce the economic burden for Indiana families.

While past research efforts around the United States have been largely concentrated on infant mortality, the available data clearly highlights the urgent need to address perinatal morbidity. As noted by the UCLA Center for Health Policy Research: “The published data on costs of maternal and neonatal care are sparse and not always current.”<sup>i</sup>

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“...average expenditures for premature/low birthweight infants were **more than 10 times as high** as uncomplicated newborns.”

March of Dimes, 2008

Despite the limited amount of data on the cost of infant and maternal morbidity, this document provides an attempt, based on available research, to estimate the cost of perinatal morbidity in Indiana and savings that could be obtained from implementing various initiatives.

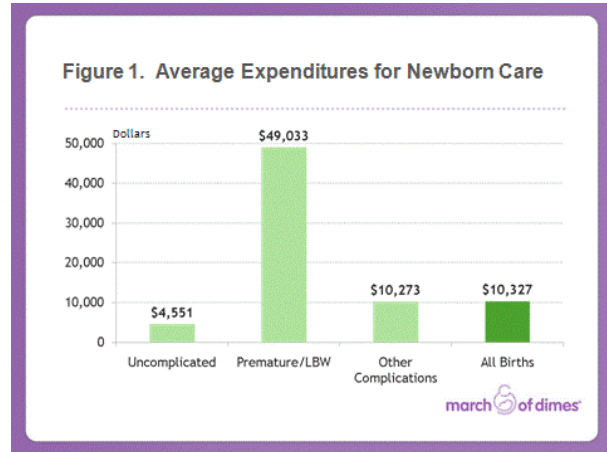
Research, specific to Indiana is needed to arrive at a more accurate cost estimate. Tracking timely performance on infant and maternity care metrics, such as severe infant maternal morbidity, informs clinical practices and drives quality improvement.

## The Financial Costs of Perinatal Morbidity

Preterm birth and low birthweight are associated with long-term disabilities like cerebral palsy, autism, mental retardation, vision and hearing impairments and other developmental disabilities. LBW infants tend to have lower educational attainment, poorer self-reported health status, and reduced employment and earnings as adults, relative to their normal weight counterparts.

Expenditures for care of LBW infants total more than half of the costs incurred for all newborns. Data provided by March of Dimes concluded that average expenditures for premature/low birthweight infants were more than 10 times as high as uncomplicated newborns.<sup>ii</sup> These expenditures include the costs related to medical care for infants from birth through the first year of life.

Utilizing the cost estimates provided by the March of Dimes, this translates into perinatal costs of over **\$496 million yearly** for the state of Indiana. Costs were estimated by first adjusting the *Average Expenditure for Newborn Care* from the March of Dimes to 2019 dollars. The average expenditure of \$62,249 was then multiplied by the number of LBW/VLBW infants. (1,167 VLBW; 6,811 LBW).



The March of Dimes also analyzed linked mom and infant records, to determine the combined cost of maternal and infant care. They found that combined infant and maternity medical costs for an infant with a diagnosis of prematurity/LBW were four times as high as those for an uncomplicated newborn. For infants with a diagnosis of prematurity/LBW, the total expenditures for mothers and babies combined were \$64,713, compared to \$15,047 for uncomplicated infants.

For Indiana, adjusting to 2019 dollars (\$82,155) and using the total number of LBW and VLBW babies born in Indiana in 2017, the yearly combined cost is estimated at **\$655,432,590**. Alternatively, using 2017 preterm births in Indiana (8,143), the annual cost is estimated at **\$668,988,165**.

A study by the UCLA Health Center for Policy Research in 2013 calculated the costs of moderate and severe newborn morbidity (compared to no/mild morbidity) to be<sup>iii</sup>:

- \$70,468 per child with moderate morbidity, and
- \$109,490 per child with severe morbidity

Using this data adjusted to 2019 dollars, and assuming all Hoosier children born with very low birth weight would fall into the classification of ‘severe morbidity’ (1,167), and that most of the children born with low birth weight would fall into the classification of ‘moderate morbidity’ (6,811), the yearly costs for Indiana would be **over \$678 million**.<sup>iv</sup>

### Additional supporting data related to costs

There are several other studies related to the cost of maternal and neonatal morbidity which are included here as reference points to help substantiate the estimate of morbidity cost for Indiana. For example, the U.S. Agency for Healthcare Research and Quality reports that medical costs for the average very-low-birthweight infant are \$79,000, compared with

**Perinatal morbidity financial costs for Indiana are estimated at \$655 to \$678 million annually**

\$1,000 for a normal newborn. Care for infants in neonatal intensive care units (NICUs) accounts for 75 percent of all dollars spent for newborn care. Infants with a moderately low birth weight can cost 46 percent more than infants born at normal birth weight. <sup>v</sup>

In Indiana, lifetime medical and societal costs of preterm birth are estimated at \$62,511 per preterm infant annually (2016 dollars) for a total cost of \$518,025,195. These costs consist of maternal delivery (8%), neonatal medical costs (69%), early intervention services (2%), special education services (3%), and lost household and labor market productivity (18%).<sup>vi</sup>

Another study compared the hospital costs between heavier and lighter infants and singleton and twin births from 1995–2000 using discharge data from New York and New Jersey hospitals. <sup>vii</sup> This study revealed a peak in costs for hospital services of infants weighing nearly 800 grams at birth with a steady and significant decline in costs with increases in birth weight.

For every infant born under 2500 grams the study calculated how much money would be “saved” by raising their weight to 2500 grams. Table 1 shows the hospital costs in excess of the costs associated with 2500 grams for every infant by birth weight category. For example, increasing the weight of a typical baby born in the 800–1000 gram range to the “normal” weight range would save over \$174,857 in hospital charges. These research results reinforce the clear economic value in implementing interventions to move birth weight closer to the normal newborn weight.

**Table 1. Excess Hospital Costs Associated with Low Birth Weight\***

<b>Birth Weight Segment</b>	<b>Excess Hospital Costs</b>
600 – 800 g	\$200,326
800 – 1,000 g	\$193,629
1,000 – 1,500 g	\$113,729
1,500 – 2,000 g	\$38,268

\*Adjusted to 2019 dollars

### **Maternal Morbidity**

Maternal morbidity includes a broad spectrum of severity and can include complications and conditions that are associated with any pregnancy outcome. The most severe pregnancy complications, commonly referred to as severe maternal morbidity (SMM), can result in longer hospital stays, long-term rehabilitation, and higher direct medical costs.

A study of hospital discharges found that SMM is 50 times more common than maternal death. <sup>viii</sup> Researchers found increasing rates of blood transfusion, acute renal failure,

shock, acute myocardial infarction, respiratory distress syndrome, aneurysms, and cardiac surgery during delivery hospitalizations.

According to the CDC, based on the rate per 10,000 deliveries, SMM more than doubled from 1993 to 2014, driven largely by a fivefold rise in blood transfusions. That also includes a nearly 60 percent rise in emergency hysterectomies — removal of the uterus and sometimes other reproductive organs, often to stem massive bleeding or infection. The rate of new mothers requiring breathing tubes increased by 75 percent, as did the rate of

“Determining the best ways to reduce maternal mortality and morbidity should have high priority in research.”

Institute of Medicine, 2010

those treated for sepsis, a life-threatening inflammatory response to infection that can damage tissues and organs.<sup>ix</sup>

A 2018 retrospective study identifying all delivery hospitalizations in the United States between 2011 and 2012 found that hospital costs associated with any SMM was 2.1 times higher than those without any SMM.<sup>x</sup>

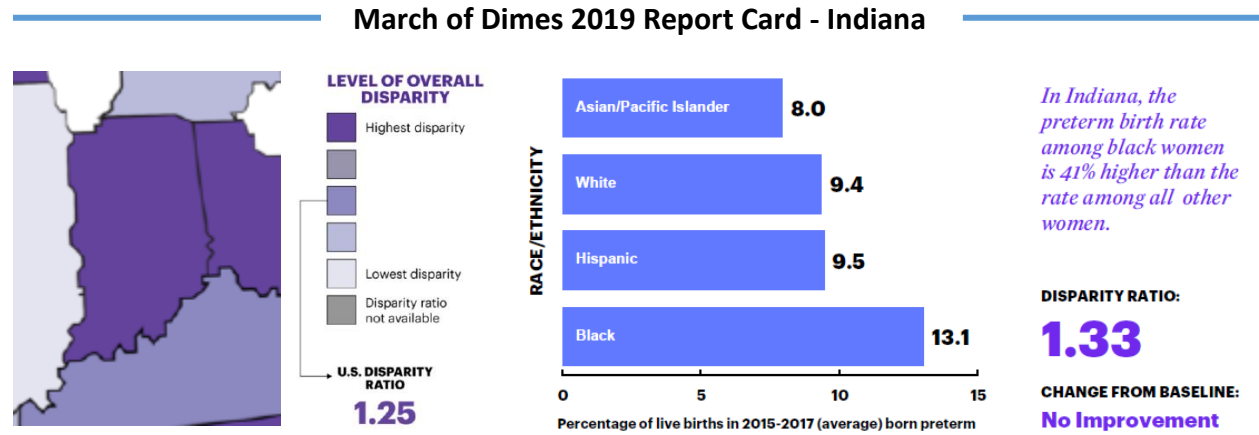
A more recent observational study published in 2020, identified women with a live inpatient birth (2013) in the MarketScan® Commercial and Medicaid health insurance databases. Costs were calculated as total maternity-related costs and categorized as prenatal, delivery, and postpartum costs of which delivery costs were 71-72% of total costs. The occurrence of SMM was associated with an increase in maternity-related costs of 37% in the Commercial and 47% in the Medicaid population.<sup>xi</sup>

### **Healthcare Disparities in the Perinatal Period**

Addressing the healthcare disparities for vulnerable populations in the United States is a public health priority included in Healthy People 2020; and pregnant women represent a key segment of the vulnerable population. While the impact of healthcare disparities in the perinatal period has become increasingly highlighted in literature and research over the last ten years, obstetrical outcomes still show a marked difference by maternal race/ethnicity. According to the March of Dimes 2020 Prematurity Research Centers Update:

- Women of color are up to 50 percent more likely to give birth prematurely and their children can face a 130 percent higher infant death rate.
- In this country black women have maternal death rates over three times higher than women of other ethnicities.
- More than 20 percent of premature babies are born to black women—that’s 1 in 5 babies.

The perinatal health disparity issue extends locally to Indiana as well. The March of Dimes 2019 Report Card rates Indiana at the highest disparity level for preterm births.<sup>xii</sup>



Research, policy making, and the involvement and engagement of this vulnerable population, must be given the highest priority. Collaborative efforts with other stakeholders, states, and federal agencies are needed to identify solutions that will help alleviate the negative impacts of such inequities.

**Success Stories: programs that reduce the costs of perinatal morbidity**

There are programs and projects that have been proven to be successful in other states that could significantly reduce Indiana’s healthcare expenditures. Savings could be dramatically increased over the years as additional perinatal quality improvement activities, specific to Indiana, are studied and implemented.

State Perinatal Collaboratives often take the lead in research and quality improvement initiatives designed to reduce infant morbidity and mortality. Reducing inappropriately scheduled deliveries is one early on initiative that several states tackled and through ongoing data collection has demonstrated significant cost savings. Indiana Medicaid implemented non-payment of early elective deliveries in 2014.

Highlighted below are examples of other initiatives that are proving to positively impact birth outcomes and the costs associated with perinatal morbidity. This is not an exhaustive list and as additional research is conducted new programs are implemented.



### **Increasing the use of progesterone to prevent prematurity**

Preterm births account for 50% of the pregnancy cost as estimated by Medicaid data, largely coming from the costs associated with neonatal admissions<sup>xiii</sup>. While the total number of Indiana births decreased slightly each year from 2015-2017, the total number of preterm births (including prior preterm births, and prior preterm births that had a second preterm birth) are on the rise. In 2017, among Indiana mothers who had a history of a previous preterm birth, 30.5% gave birth to a second preterm birth (ISDH, MCH).

Progesterone administration beginning at 16 to 24 weeks of gestation is an evidence-based intervention that has been shown to significantly reduce subsequent preterm births, from 20-40%. If progesterone could prevent 30% of all the recurrent preterm births in Indiana, 273 preterm births would have been prevented in 2017.<sup>xiv</sup> In Indiana this would lead to a potential savings of **\$17 million annually**.

This does not consider the long-term costs and the emotional toll that is placed on the families and society of infant deaths and of surviving premature infants with ongoing physical and developmental problems.

IPQIC initiated a Progesterone QI Project in 2019 to increase the use of progesterone in pregnant women who have had a prior preterm birth (before 37 weeks of gestation). The project is currently underway with several pilot sites and planned expansion to occur in 2020. A toolkit has been developed and the ISDH maintains the repository for data collection and outcomes reporting.

Indiana's initiative is modeled after Ohio's Perinatal Quality Improvement Collaborative's Progesterone's QI Project which in the first 3 years (2014-2017), reduced repeated early preterm births before 32 weeks by 20%, and all Ohio births before 32 weeks by 6.6%.

### **Reducing the costs of necrotizing enterocolitis (NEC) in premature infants**

Necrotizing enterocolitis (NEC), which typically occurs in the second to third week of life in premature, formula-fed infants, is characterized by variable damage to the intestinal tract, ranging from mucosal injury to full-thickness necrosis and perforation. NEC affects close to 10% of infants who weigh less than 1500 g, with mortality rates of 50% or more depending on severity, but may also occur in term and near-term babies. Necrotizing enterocolitis is a costly disease, accounting for nearly 20% of NICU costs annually. Yet, awareness of NEC risk factors and adopting practices to reduce NEC risk, including human milk feeding, the use of feeding guidelines, and probiotics, have been shown to reduce the incidence of NEC.<sup>xv</sup>

A California based model of health care reimbursement estimated the additional cost per episode of medical NEC was \$74,000 and surgical NEC was \$198,000. An Illinois based model of health care reimbursement estimated the increased cost was \$13,000 (medical NEC) and \$22,000 (surgical NEC).

Multiplied by the number of eliminated cases of NEC through education and guideline interventions, acute health care savings for Indiana in 3 years is estimated at<sup>xvi</sup>:

- **\$1,010,000** (Illinois estimate)
- **\$6,768,000** (California estimate)

### Group Prenatal Care

Group prenatal care is a model for providing prenatal care in a group setting, generally eight to 12 women, which integrates pregnancy health assessments with additional education, skills building and peer support. *CenteringPregnancy*, the most widely adopted model, has demonstrated improved outcomes through multiple studies. This includes a 33-47% decreased risk of preterm birth, lowered incidence of LBW infants, a flattening of health disparities between black and white women, better prenatal visit attendance, greater readiness for birth and infant care, improved breastfeeding rates and higher patient satisfaction scores.<sup>xvii</sup>

The March of Dimes developed their own group prenatal care program, Supportive Pregnancy Care (SPC) and in 2016 implemented SPC in several pilot sites. SPC is like existing group prenatal care programs except that SPC's content and implementation are flexible and may be implemented at lower costs to providers. Pilot site study results published in 2020 suggest SPC has some benefits including fewer ER visits during pregnancy, greater odds of attending the postpartum visit, and greater odds of initiating and continuing breastfeeding.<sup>xviii</sup>

Eskenazi Health has five group prenatal care sites and data from 2015 shows a 31% reduction in preterm births for program participants. Data on program costs and expected cost savings from 2015 are included below, showing a **150%** return on investment for their program.

Total Cost of Program	124 participants	\$89,562
Expected Cost Savings for Reduced preterm/LBW births	4 participants	\$223,936
<b>Expected Return on Investment</b>		<b>150%</b>

**IU Maternal Recovery Group Prenatal Care (GPC)-** The Maternal Recovery Program GPC started in 2017 backed by IU Health Maternal Fetal Medicine. They have been using the *CenteringPregnancy* model for moms with opioid use disorder. Women must be enrolled in the IU maternal recovery program to participate. Program goals include ensuring women continue with medication assisted therapy and decrease the need for treatment for NAS and prolonged hospitalization.

Key findings for the Maternal Recovery Program GPC in 2019 program data included increased breastfeeding, fewer NICU admissions and reduced newborn length of stays. Also 87% had clean urine drug screens at delivery. At the 6-week postpartum visit, data showed 83% reported still smoking, 83% using reliable contraceptive method, and 84% arranged postpartum MAT provider (Medication-Assisted Treatment).

There are currently at least 12 sites in Indiana that either are approved by the Centering Health Institute or are in the process of certification. There are other sites in Indiana with various forms of group prenatal programs, however the total is not known.

### **Reducing bloodstream infections in premature infants**

Newborns are at a greater risk for infections because their immune systems are not fully developed. Nosocomial infections occur in 15-30% of preterm infants and cause increased morbidity, mortality, and hospital costs. The Ohio Perinatal Quality Collaborative has been working to achieve >90% compliance with the reliable use of a catheter care maintenance bundle for all NICU teams and achieving further reductions in blood stream infection rates by increasing the immediate postpartum use of human milk feeding. Initial projects produced a 20% sustained decrease in bloodstream infections in premature infants 22-29 weeks gestation in 24 Neonatal Intensive Care Units (NICUs)<sup>xix</sup>. It is estimated that each neonatal bloodstream infection costs about \$73,700 with a length of stay exceeding on average 22 days more than that for other premature infants. However, if surgical care is required, there is at least an additional cost of \$186,200 and infants stay roughly 60 days longer than other preterm infants.<sup>xx</sup>

The Perinatal Quality Collaborative of North Carolina (PQCNC) led a national initiative to reduce Central line-associated bloodstream infections, (CLABSIs) in NICUs. The project (NCLABSI) was part of a national effort funded by the Agency for Healthcare Research and Quality. PQCNC recruited eight additional state based PQCs to participate in the NCLABSI project. Through the course of the study, an estimated 131 infections were prevented which translates to an estimated 14-41 deaths prevented and \$2,201,776 in excess costs averted. Approximately \$906,000 was invested in the national NCLABSI project resulting in

infections prevented and deaths avoided. With over \$2.2 million in excess costs averted, the return on investment is over 143 percent to date.<sup>xxi</sup>

### **Smoking Cessation Programs**

Smoking is the one of the most important modifiable causes of poor pregnancy outcomes; associated with maternal, fetal, and infant morbidity and mortality. An estimated 5–8% of preterm deliveries, 13–19% of term deliveries of infants with low birth weight, 23–34% cases of sudden infant death syndrome (SIDS), and 5–7% of preterm-related infant deaths can be attributed to prenatal maternal smoking.<sup>xxii</sup> Babies born to smoking mothers may also have further complications including fetal growth restriction, brain and lung development delays, and certain birth defects. Exposure to secondhand smoke is harmful to both mothers and their babies. Babies whose mothers are exposed to secondhand smoke while pregnant are more likely to have lower birth weight, and exposure to secondhand smoke in infancy increases the risk of SIDS. (CDC IN) Additionally, e-cigarettes and other tobacco products containing nicotine are not safe to use during pregnancy.

The CDC reports that direct medical costs of a complicated birth are 66% higher for smokers.<sup>xxiii</sup> Preventing just one smoking-related low birth weight baby can result in the avoidance of more than \$40,000 in health care expenditures.<sup>xxiv</sup>

Indiana has one of the highest smoking rates among pregnant women in the U.S. In 2018, 11.5% of pregnant women in Indiana smoked during pregnancy. Despite a decline from 18.5% in 2007, Indiana's smoking during pregnancy rate is almost double the U.S. smoking during pregnancy rate (6.5%\*). Smoking during pregnancy cost Hoosiers an estimated \$12.7 million in 2018. <sup>xxv</sup>

Birth outcomes are positively impacted when pregnant mothers quit and cost reduction for medical care is achieved. According to an ASTHO report, if maternal mothers quit smoking, it can mean savings up to \$8 million annually in direct neonatal inpatient cost given the cost of an intervention (\$24-\$34) versus the costs saved (\$881) for each woman who quits smoking. Cutting prenatal smoking rates by just one percentage point can prevent 1,300 low birthweight babies and save \$21 million in direct medical costs each year. <sup>xxvi</sup>

Research demonstrates that cost savings can be realized through effective smoking cessation programs. Even a brief cessation counselling session of 5–15 minutes, when delivered by a trained provider with the provision of pregnancy specific, self-help materials, significantly increases rates of cessation among pregnant smokers.<sup>xxvii</sup> Analysis of a comprehensive smoking cessation program for all maternal mothers in Massachusetts showed that for every dollar spent on a smoking cessation programs the state saved \$2 in smoking-related health care costs. In California, the Department of Public Health's tobacco

control program reduced state healthcare costs by more than \$100 million in its first seven years by reducing the number of low birth babies caused by smoking.

Indiana has several smoking cessation initiatives, including the Indiana Tobacco Quitline, which connects smoking pregnant mothers with trained tobacco cessation professionals who set up quitting strategy plans and regular telephonic outreach. The State is also taking part in the national program, of *Baby and Me, Tobacco Free* which reports a high success rate countrywide (near two-thirds of those enrolled successfully quit). The program is currently offered in at least 27 sites across Indiana. Each participant receives at least four prenatal cessation-counseling sessions, support, and carbon monoxide (CO) monitoring, usually during a regular prenatal visit. The participant may qualify for incentives if they remain tobacco-free. Increasing the number of these programs statewide and implementing other proven initiatives can help in getting more smoking maternal women to quit and reduce the overall cost of perinatal morbidity.

### **Teen Pregnancy**

There's been a dramatic decline in teen pregnancies since the peak year of 1991, yet the US rates of teen pregnancy are still the highest among developed countries, with approximately one in four American girls still getting pregnant.<sup>xxviii</sup> In Indiana, teen birth rates have dropped by sixty-one percent since 1991, yet Indiana ranked 20 out of 51 (includes District of Columbia) with 1 representing the highest rate. In 2016, the percent of low birthweight births in this population for Indiana was 10%. It is also the case that 16% of all teen births were to teens who already had a child.<sup>xxix</sup>

Teen birth brings both social and economic costs. According to the CDC, in 2010, teen pregnancy and childbirth accounted for \$9.4 billion to U.S. taxpayers for public assistance payments, increased public health care, foster care, and criminal justice services and lost tax revenue because of lower educational attainment and income among teen mothers. In Indiana, the public cost of teen childbearing in 2010 is estimated at \$227 million.<sup>xxx</sup>

Currently, statistics show that only thirty-eight percent of teen mothers get a high school diploma. In addition, the daughters of teen mothers are three times more likely to become teen mothers and two-thirds of young unmarried mothers are poor, with 25% receiving public assistance within three years of a child's birth.

With the prevention of teen pregnancies, social problems show improvement, including poverty, father-absence, low birth weight, school failure, and poor preparation for the workforce. There is evidence that teen pregnancy programs can delay sexual activity, improve contraceptive use among sexually active teens, and/or prevent teen pregnancy and encourage abstinence. For example, in 2009, the Colorado Family Planning Initiative

was launched, providing funding for 28 Title X Family planning agencies across the state to support the provision of LARC. This initiative reported an unprecedented 29 percent drop in births to low-income teens, and a subsequent decrease in preterm births.<sup>xxxii</sup>

The National Campaign to Prevent Teen and Unplanned Pregnancy indicates that effective programs can be divided into five basic categories<sup>xxxiii</sup>:

- Curriculum-based education, encouraging both contraceptive use and abstinence that is offered in regular school classes or after-school programs on school grounds or community centers.
- Service-learning programs that aim to keep youth constructively engaged in their communities through community service activities and incorporate follow-up exercise such as group discussions or writing about their experiences.
- Youth development programs such as academic assistance, sex education, performing arts and sports opportunities, and employment assistance.
- Parent programs involving both parents and adolescents and attempt to improve parent-child communication.
- Community-wide programs that tend to be much broader in scope and that encourage involvement from the entire community. These programs might include public service announcements, educational activities for the community, or community-wide events such as health fairs.

The Office of Population Affairs (OPA) Teen Pregnancy Prevention Program (TPP) provides competitive grants to a wide range of agencies and organizations across the county to support the implementation of evidence-based teen pregnancy prevention programs as well as the development and evaluation of new and innovative approaches. TPP Program currently funds 91 community-based grants and thus far has funded 41 rigorous evaluation studies. Information on the OAH TPP programs can be found at:

<https://www.hhs.gov/ash/oah/grant-programs/teen-pregnancy-prevention-program-tpp/successful-strategies/index.html>

Also crucial is the role of adolescent males in prevention. According the OAH, an estimated 9% percent of young men between the ages of 12 and 16 will become fathers before their 20th birthday. Research and programs are increasing the focus on the role of males in teenage pregnancy and childrearing.

### **Home Visiting Programs**

Home visiting programs provide structured visits by trained professionals and paraprofessionals to high-risk parents who are pregnant or have young children. These programs support families by providing health check-ups, screenings, referrals, parenting advice, and guidance with navigating other programs and services in their community.

The short- and long-term benefits of home visiting programs largely outweigh the overall costs incurred from implementation. RAND found that home visiting programs for at-risk

families have a \$5.70 return for every tax dollar spent from reduced spending for health care and welfare services.<sup>xxxiii</sup> Another study of a home visiting program in Durham, North Carolina reported saving \$3.00 for every \$1.00 spent on the program during an infant's first six months due to reduced emergency care visits.<sup>xxxiv</sup>

The **Nurse-Family Partnership (NFP)** is a well-established voluntary home visiting program that supports low income, first-time mothers, and their babies. Specially trained registered nurses provide support, advice, and education on diverse topics regarding child and maternal health, development, and care. Visits to families begin during pregnancy and continue until a child's second birthday. Currently, Nurse-Family Partnership (NFP) serves 39 Indiana counties through local agencies. Since inception in Indiana in 2011 the organization has served 4,784 families. Outcome data for Indiana, published in 2019, indicates 90% of babies born to clients are full term, 90% of the mothers-initiated breast feeding, 96% of babies received immunizations by 24 months and 61% of clients were employed at 24 months.<sup>xxxv</sup>

In New York, **Public Health Solutions**, through community-based collaborations offers a Home Visiting Program which provides a variety of evidence-based home-visiting services to pregnant and parenting families. Nurse Home Visitors, Family Support Workers, and Community Health Workers offer education, tools, and support during pregnancy and through early childhood. The risk of delivering a low birth weight baby was reduced by half for mothers involved in the program and the children of these mothers have a 67% reduction in behavioral and intellectual problems and are 2.7 times more likely to be enrolled in a gifted program at school.<sup>xxxvi</sup>

Through a collaboration between the Indiana State Department of Health (ISDH), the Indiana Family and Social Services Administration (FSSA) and the Indiana Department of Child Services (DCS) Indiana established the **OB Navigator** program in 2019. The goal of this program is to identify women early in their pregnancies and connect them with an OB navigator – a home visitor who provides personalized guidance and support to a woman during her pregnancy through at least the first six to 12 months after her baby's birth. To begin that effort, the program is working to connect pregnant women who are covered by Medicaid in Indiana's highest-risk areas to services in their communities. The long-term vision is for every pregnant woman in Indiana to be supported by a navigator. The ISDH has also obtained funding to hire advance practice nurses in OB deserts.<sup>xxxvii</sup>

## **Telemedicine**

Indiana faces access issues to OB care in that counties throughout the state are dealing with hospitals no longer providing inpatient obstetrical services. Pregnant women especially living in rural counties experience issues in accessing OB specialty providers. Telemedicine

services can facilitate access to Maternal Fetal Medicine (MFM) doctors when not available in local health delivery system or access to obstetricians in identified OB desert areas in Indiana.

The Indiana Health Coverage Programs (IHCP), as well as commercial health plans, have implemented coverage and reimbursement policies for telemedicine services to support access.

Data related to the impact of using telemedicine for high-risk patients indicate positive outcomes. The University of Pittsburgh Medical Center provides telemedicine consults with MFMs for patient with high-risk pregnancies in rural PA. This telemedicine group showed lower rates of premature delivery and NICU use compared to in-person consults. The telemedicine group saved \$90.28/consult in travel and work expenses. 56% saved >2 hours/visit driving. 74% said telemedicine allowed family to be present for the visit. 11% would have otherwise forgone MFM care.<sup>xxxviii</sup>

Arkansas runs a similar telehealth program for high-risk obstetric patients, allowing video conferencing with MFMs, and over a nine-month period saw Medicaid deliveries of very low birthweight infants in hospitals without NICUs decrease from 13.1 percent to 7.0 percent and saw a small but statistically significant reduction in infant mortality.<sup>xxxix</sup>

### **Pregnancy Complications.**

Pregnancy complications may be related to health problems, including physical and psychologic that develop during the pregnancy or exacerbated by health problems the woman experienced before became pregnant. Health conditions arising during pregnancy can become long-term chronic health problems such as diabetes and hypertension. The most severe complications are categorized as severe maternal morbidity (SMM) which are trending on the rise.

**Obstetric hemorrhage** is one of the leading causes of SMM and mortality. The California Maternal Quality Care Collaborative (CMQCC) launched a state-wide outreach collaborative to help California hospitals implement best practices to reduce maternal hemorrhage. CMQCC reports SMM was reduced by 20.8% between 2014 – 2016 among the 126 participating hospitals.<sup>xl</sup>

**High blood pressure** during pregnancy can affect the development of the placenta, causing the nutrient and oxygen supply to the baby to be limited. This can lead to an early delivery, low birth weight, placental separation (abruption) and other complications for the baby as well as adverse outcomes to the mother, for example, stroke. Illinois Perinatal Quality Collaborative (ILPQA) implemented an initiative with 100 hospitals to reduce the



severe morbidities through appropriate medical management of severe hypertension. As a result of their efforts, ILPQA reports care for pregnant and postpartum women with severe hypertension improved significantly within 2 years (2016-2018), reducing severe complications by 27%.<sup>xli</sup>

Both CMQCC and ILPQA initiatives described above focused on the implementation of the applicable Alliance for Innovation on Maternal Health (AIM) Patient Safety Bundle. AIM is a national data-driven maternal safety and quality improvement initiative based on proven implementation approaches to improving maternal safety and outcomes. AIM has developed Patient Safety Bundles, best practices, to reduce the most common maternal morbidities and causes of death.

The Indiana State Department of Health (ISDH) joined AIM in 2019. ISDH chose to begin implementation of the Severe Hypertension in Pregnancy and Obstetric Hemorrhage Patient Safety Bundles, in partnership with IN hospitals and IN Perinatal Quality Improvement Collaborative (IPQIC).

### **Additional QI Programs Underway**

Additional programs that are being implemented in a variety of states to reduce the costs of perinatal morbidity:

- Increased access to prenatal/postpartum care
- Increase appropriate use of antenatal steroids
- Enteral feeding improvement
- Placental transfusions
- Neonatal Abstinence Syndrome (NAS) interventions
- C-section reduction initiatives
- Preconception Care

### **Conclusion and Moving Forward**

In summary, the costs of perinatal morbidity are staggering – both financial costs to the State of Indiana, and the human, social, and emotional costs to its Hoosiers. Investments in Indiana specific research and programs to reduce perinatal morbidity will pay dividends far beyond the costs.

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<sup>i</sup> Pourat N, Martinez AE, McCullough, JC, Gregory KD, Korst L, Kominski GF,. Costs of Maternal Hemorrhage in California. Los Angeles (CA): UCLA Center for Health Policy Research; 2013.

<sup>ii</sup> March of Dimes, The Cost of Prematurity to U.S. Employers, 2008.

<sup>iii</sup> Pourat N, Martinez AE,; 2013.

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- <sup>iv</sup> UCLA study costs: \$70,468 adjusts to \$78,637 in 2019 dollars times LBW (6,811) = 535,596,607, \$109,490 adjusts to \$122,182 in 2019 dollars times VLBW (1,167) = 142,586,394 Total = 678,183,001
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