

---

# Maternal & Infant Health Trends, 2008-2019

Updated March 2021

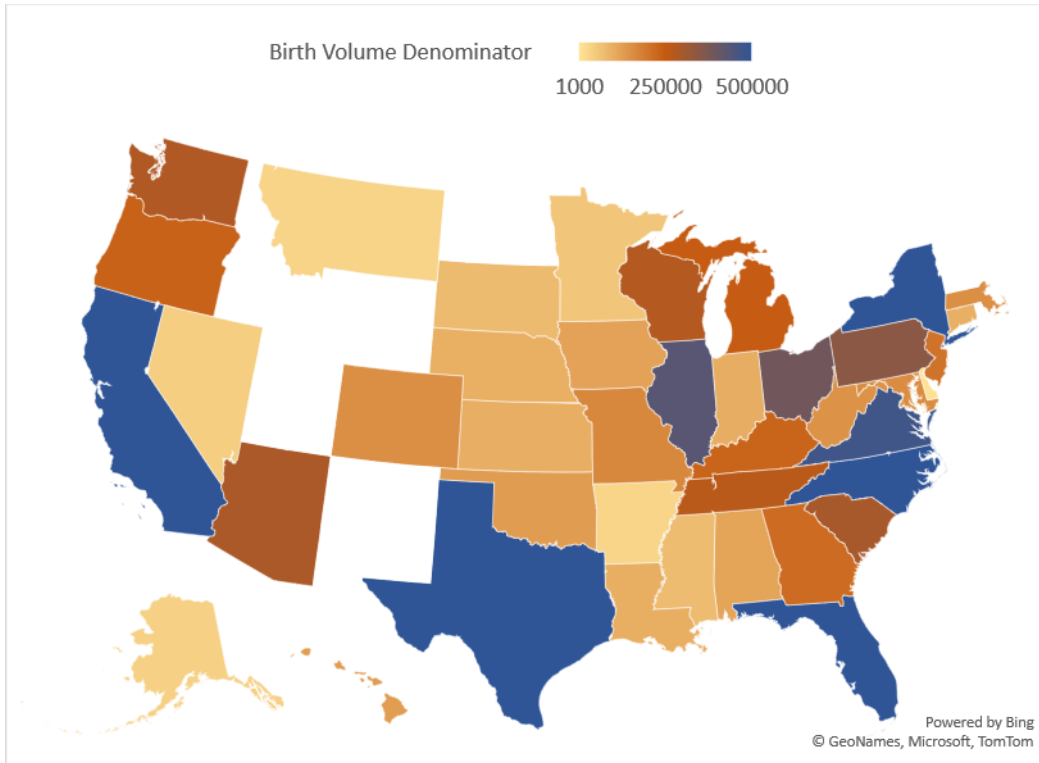
## ***Premier's national trend analysis explores maternal and infant health outcomes at the time of delivery.***

The analysis leveraged the Premier Healthcare Database and included standardized inpatient data from 10.1 million births that occurred in 903 hospitals across 45 states between 2008-2019. It builds on [Premier's first maternal and infant health trends analysis](#) that examined 2008-2018 data.

Measurement of patient demographics and clinical outcomes used the Centers for Disease Control and Prevention's (CDC's) methodology for severe maternal morbidity (SMM), which includes the birth admission definition as the denominator and the numerator, as well as additional standardized national methodologies. Note that as hospitals switched from ICD-9 to ICD-10 in 2015, these changes in documentation and coding may have affected 2015's trending in comparison with previous years.

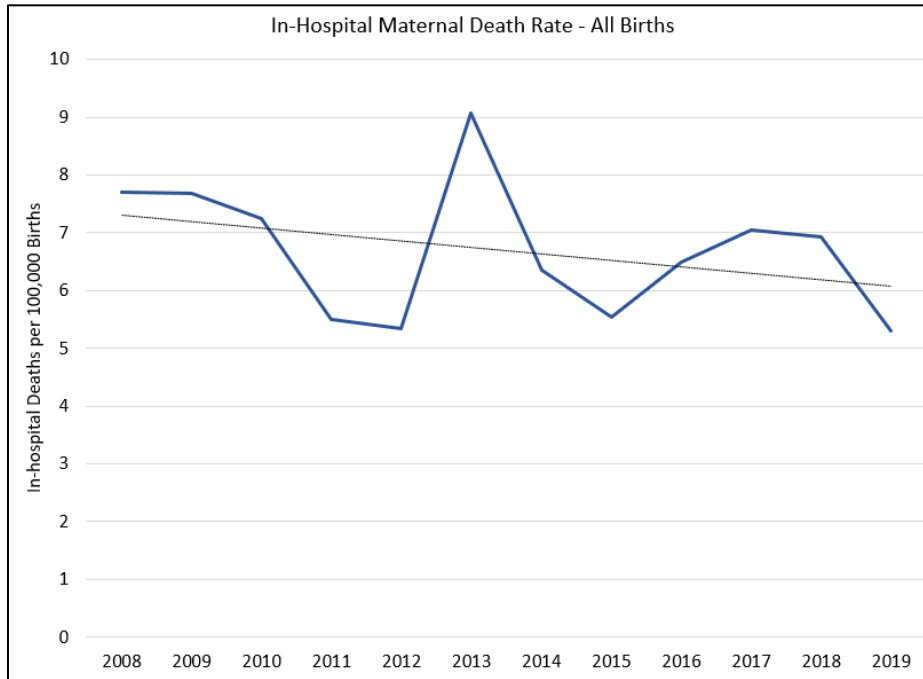
Premier worked closely with the CDC to ensure the methodology used in this analysis is aligned with and complements their data. However, Premier's analysis shows maternal mortality rates through 2019 while the CDC's most recent mortality trends end in 2015. Additionally, Premier's analysis used standardized inpatient data, which allows for greater specificity when exploring trends happening within the hospital, at the time of delivery and beyond. Note that the analysis did not explore maternal deaths occurring outside of delivery in the hospital.

Figure 1: Total Birth Volume by State



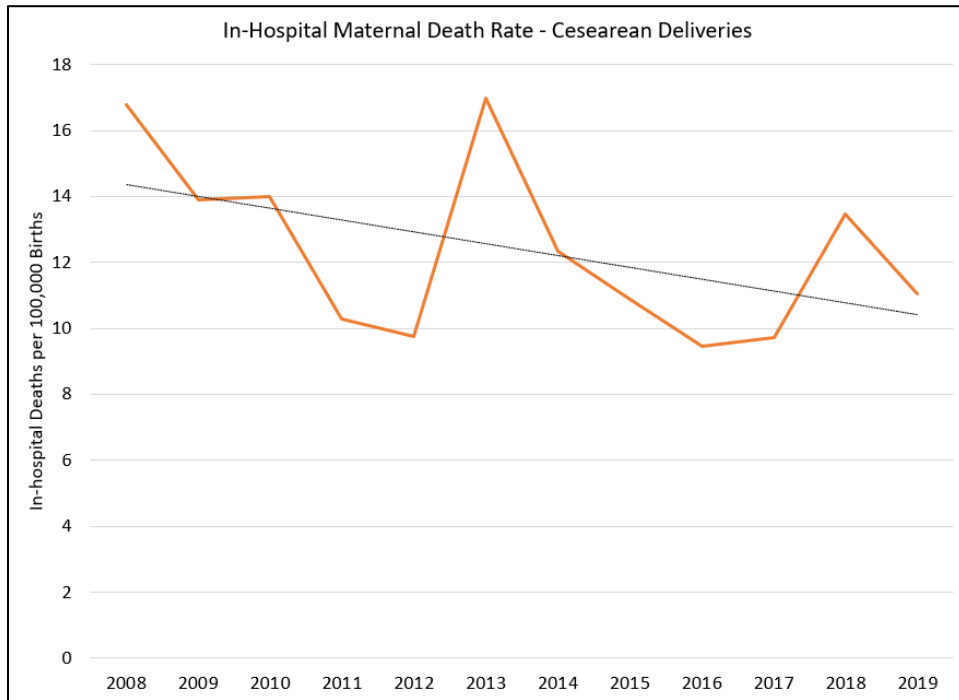
## Trend 1: U.S. hospitals are demonstrating a dramatic decrease in delivery-related maternal deaths.

*Figure 2: In-Hospital, Delivery-Related Death Rate Trend*

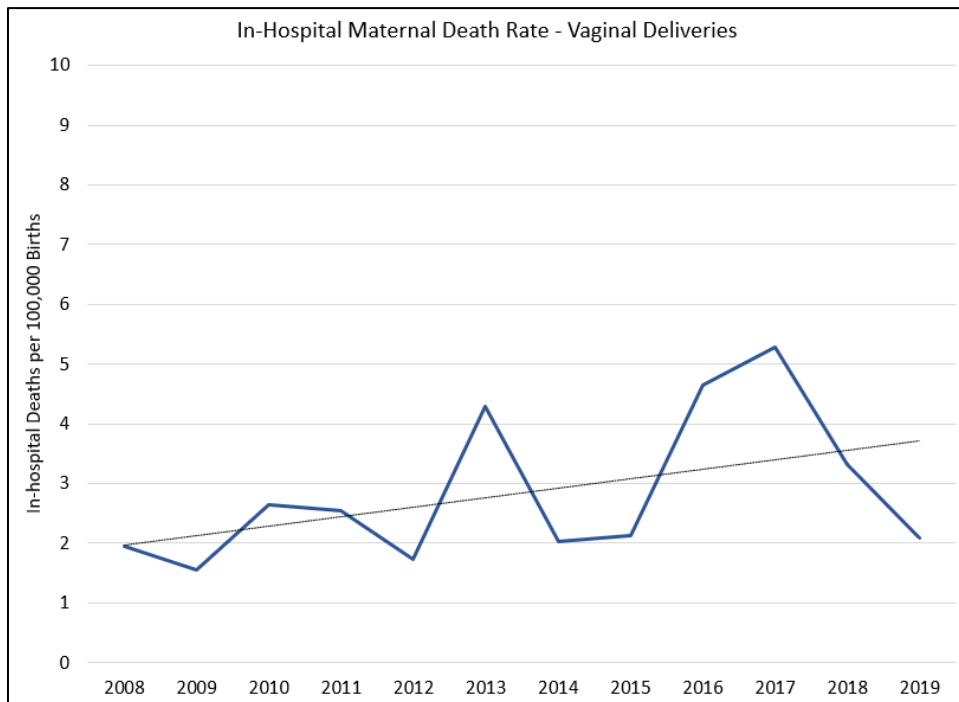


Overall, Premier found that U.S. hospitals showed a 17 percent decrease in delivery-related maternal deaths between 2008-2019. Additionally, Premier’s data showed an average of 60 deaths per year over the past four years across approximately 650 hospitals. This trend suggests that progress is being made in the hospital, at the time of delivery.

**Figure 3: Inpatient Cesarean Delivery Maternal Mortality Rate**

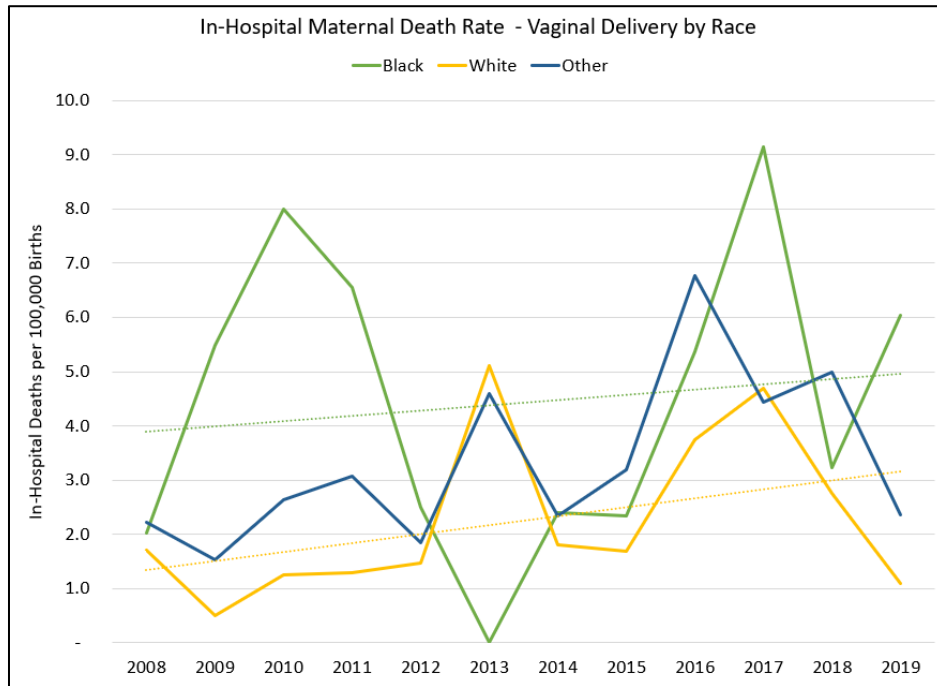


**Figure 4: Inpatient Vaginal Delivery Maternal Mortality Rate**

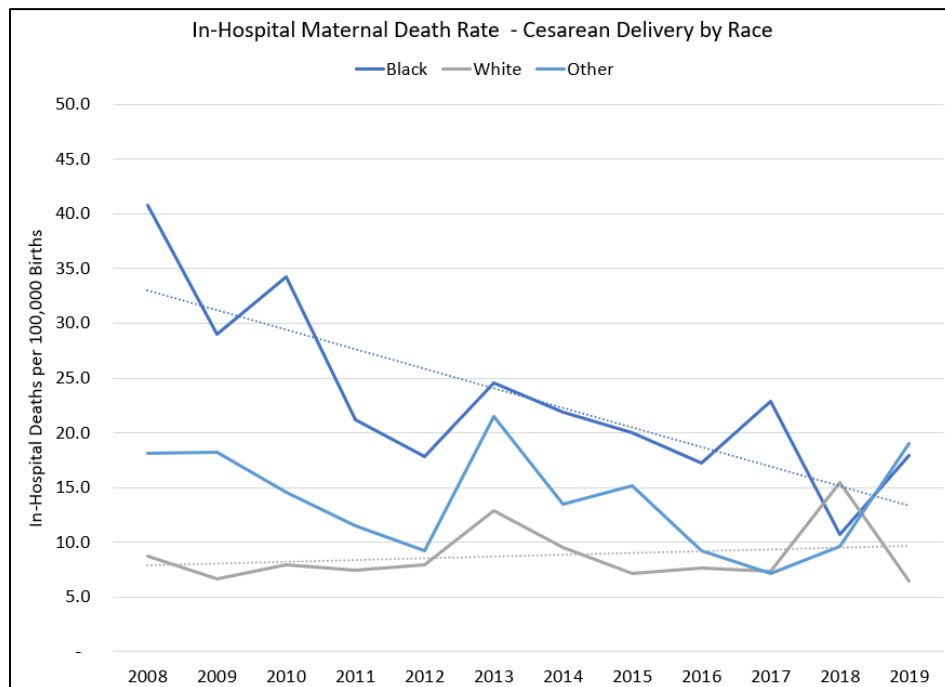


Premier’s data shows a 27 percent drop in the death rate associated with cesarean deliveries (Figure 3). When comparing women who had a cesarean with those who had a vaginal delivery, Premier identified an 88 percent increase in delivery-related maternal mortalities for vaginal deliveries (Figure 4).

**Figure 5: Inpatient Vaginal Delivery Maternal Mortality by Race**



**Figure 6: Inpatient Cesarean Delivery Maternal Mortality Delivery by Race**



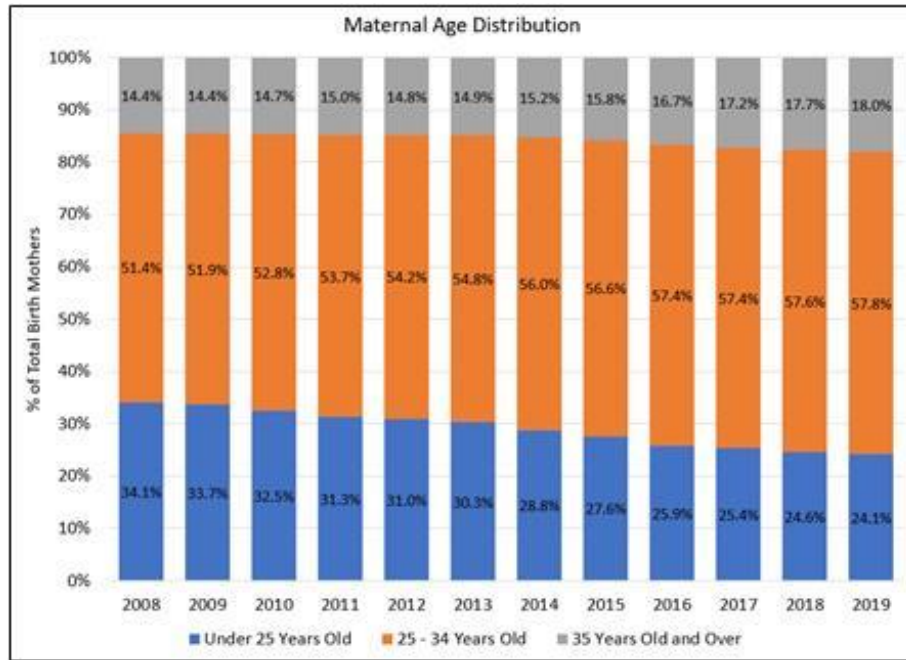
Notably, the disparity gap between black and white women for inpatient delivery-related deaths has substantially narrowed. Premier identified a 59 percent decrease in delivery-related maternal mortality for black women between 2008-2019.

Comparing Premier’s methodology to the CDC’s, note that the CDC uses mortality data from the [National Vital Statistics System](#) (NVSS), death certificates from each state and the [Pregnancy Mortality Surveillance System](#). The CDC defines a [pregnancy-related death](#) as the death of a woman during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

While Premier’s analysis was limited to hospitalization and the CDC can track maternal death outside of the hospital, the [CDC has stated](#) that “errors in reported pregnancy status on death certificates have been described, potentially leading to overestimation of the number of pregnancy-related deaths.” Thus, Premier’s in-hospital measure may provide a better approximation of hospital performance.

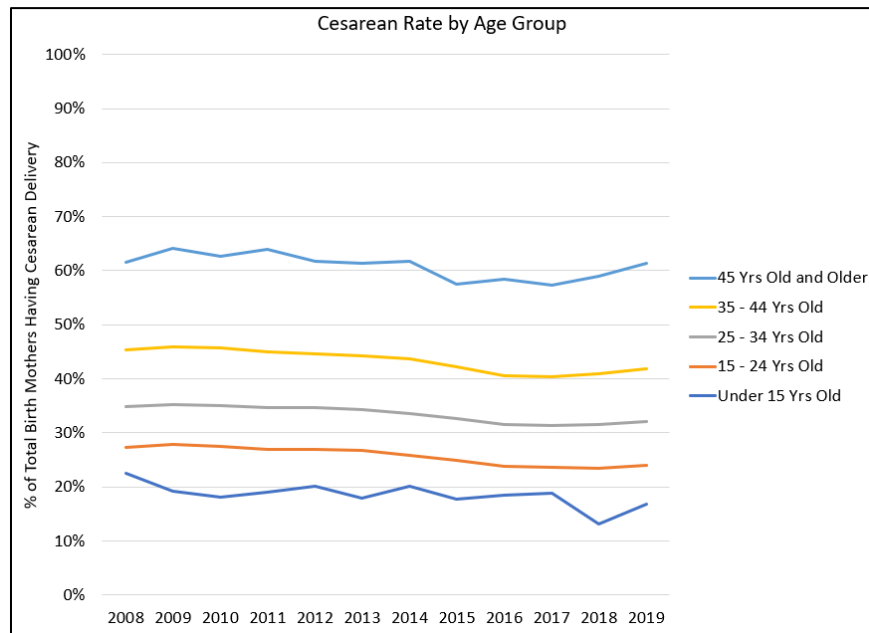
## Trend 2: The maternal population is aging.

Figure 7: Overall Maternal Age Distribution



The percent of women giving birth who are over 35 years of age increased by 28 percent and by 13 percent for mothers 25-35. Women giving birth under 25 decreased by 31 percent (Figure 7).

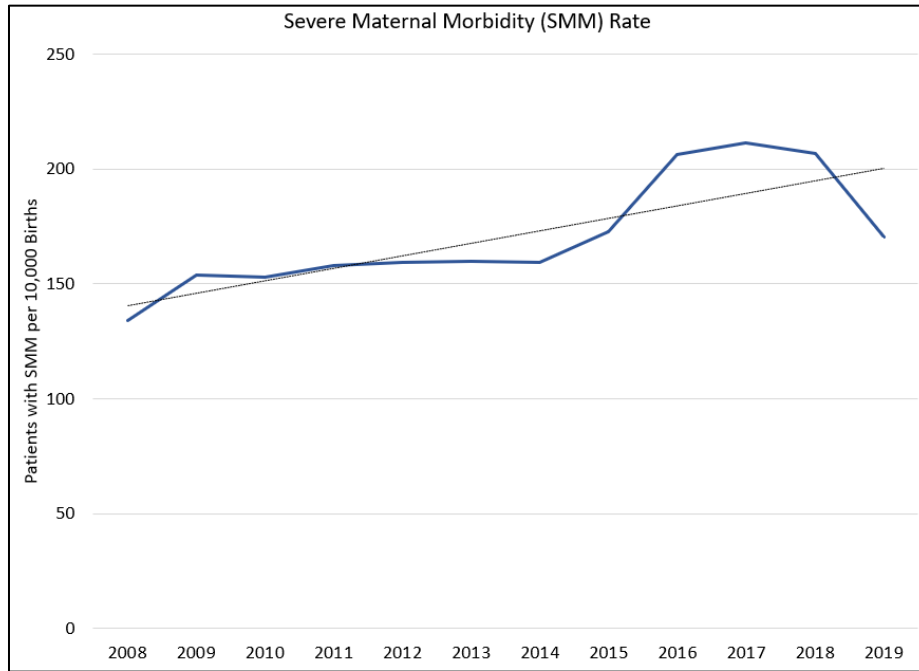
Figure 8: Cesarean Deliveries by Age Group



Mothers over 35 tend to have a higher rate of cesarean sections as illustrated in Figure 8. Cesarean deliveries, which can increase the risk of complications, are 41 percent higher for women over 35 than for women under 35.

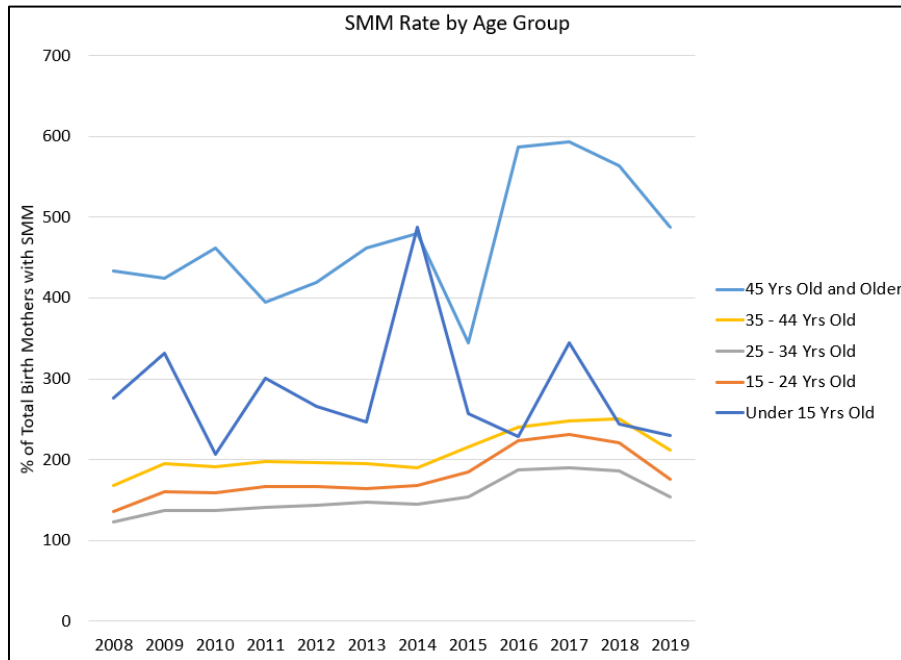
**Trend 3: Severe maternal morbidity has increased significantly.**

**Figure 9: Overall SMM Rate**



While inpatient maternal mortality has decreased, the analysis showed an increase of 43 percent in severe maternal morbidity (SMM) between 2008-2019, with a substantial drop from 2018 to 2019.

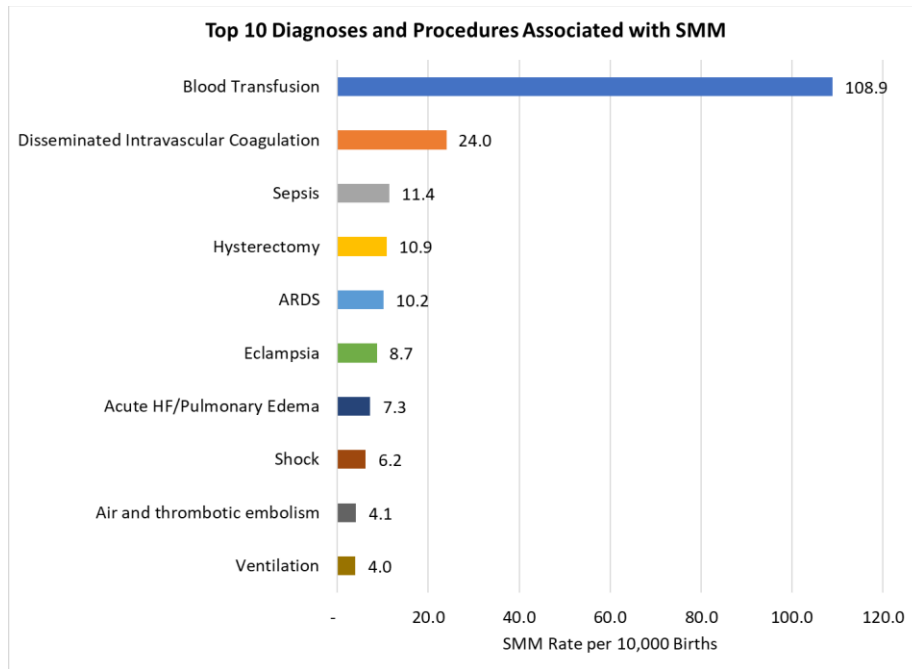
**Figure 10: Overall SMM Rate by Maternal Age Group**



Overall the SMM rate for patients 35 and older is 31 percent higher than those under 35.



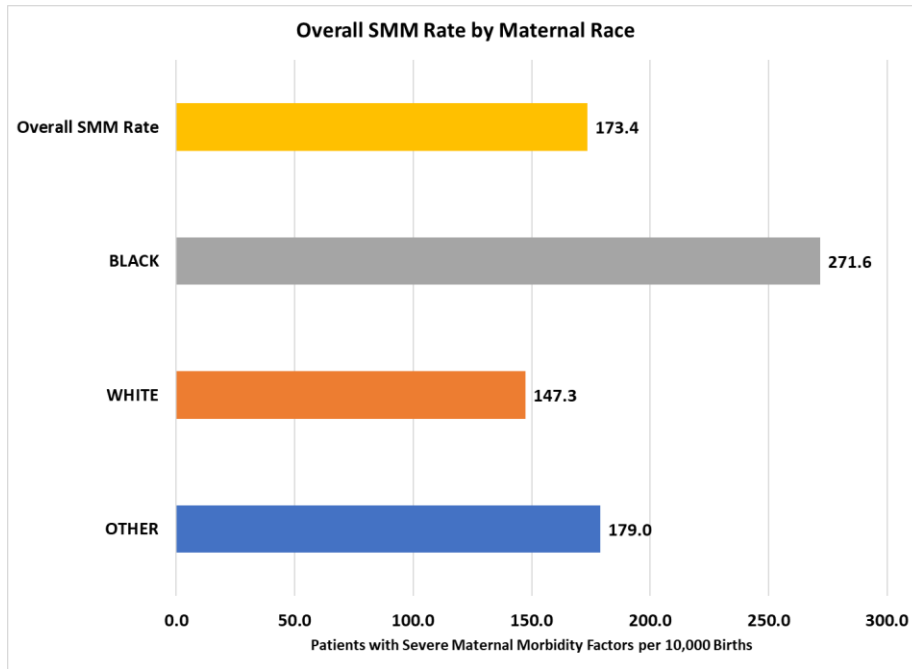
**Figure 11: Top 10 Diagnoses Associated with SMM Procedures**



Blood transfusions, disseminated intravascular coagulation, sepsis, hysterectomy, and acute respiratory distress syndrome (ARDS) were the top diagnoses associated patients who experienced a SMM.

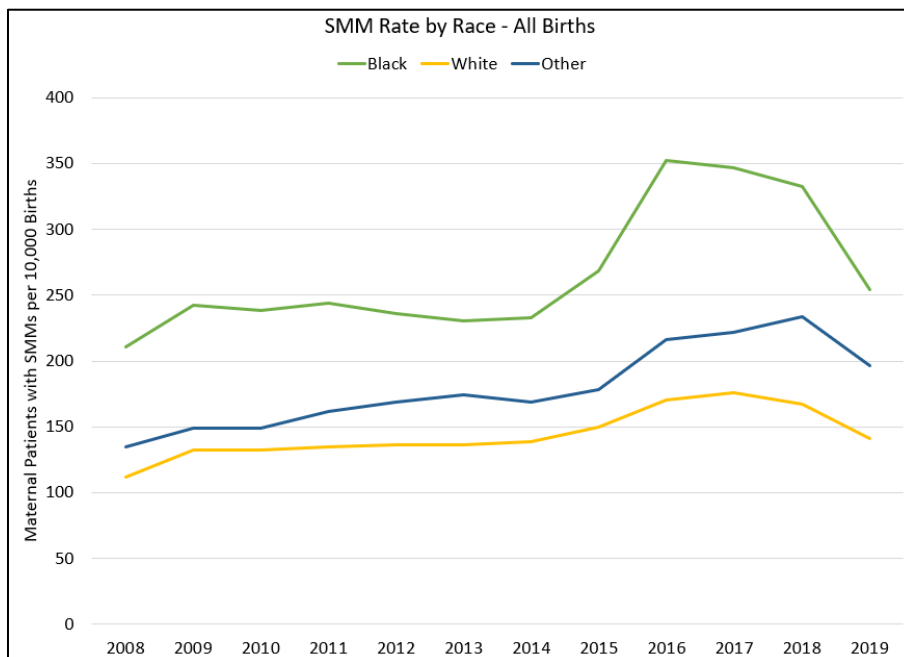
### Trend 4: The race disparity gap remains open for SMM.

Figure 12: Overall SMM Rate by Maternal Race



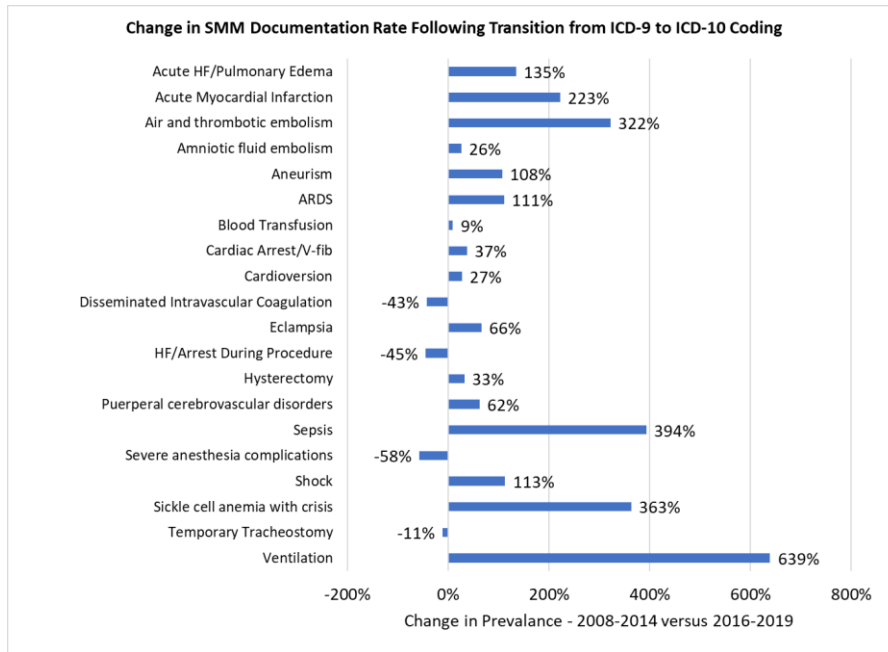
Black women had an 84 percent higher SMM rate than white women (Figure 12). Specifically, black women had higher SMM rates for heart failure, ARDS, eclampsia, acute renal failure and sepsis. Black women also have a 94 percent higher rate of blood transfusions than white women. Women who receive blood transfusions have a [higher risk](#) of SMM and mortality.

Figure 13: Overall SMM Rate by Maternal Race



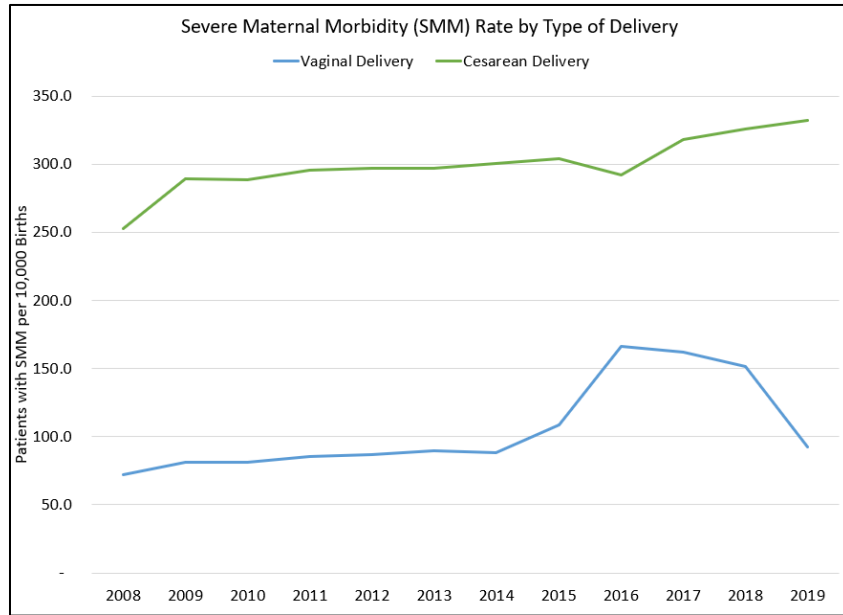
As illustrated in Figure 13, the change from ICD-9 to ICD-10 may have affected the accuracy of SMM rates for 2015. That is, part of the increase may be attributable to coding and documentation changes. However, the Premier analysis shows a higher SMM rate than what was reported by the CDC for the same time period. This suggests that there may have been an increase in SMM rates regardless of the transition to ICD-10.

**Figure 14: Change in SMM Documentation Rate Following Transition from ICD-9 to ICD-10 Coding**



Due to the differences between Premier’s and the CDC’s findings for SMM trends, additional analyses and research are needed to identify how coding changes may contribute to the increasing SMM trend. For example, the changes in coding may demonstrate an enhanced capability to identify complications and SMM at a greater level of accuracy, thus enabling a better understanding of preventable harm and complications.

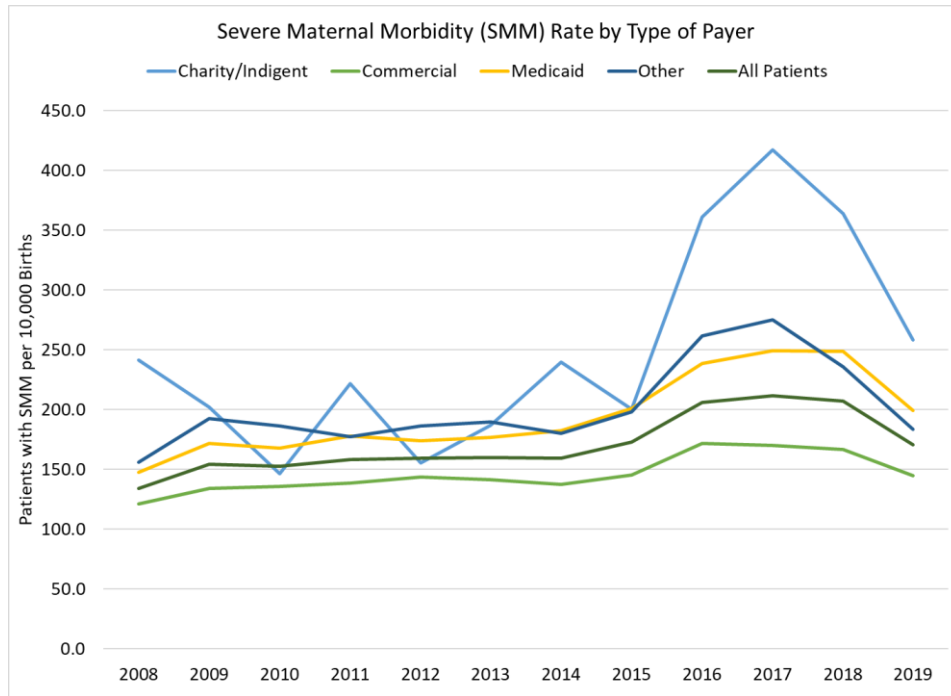
**Figure 15: Overall SMM Rate by Type of Delivery**



Premier’s analysis confirmed that SMM rates for cesarean sections are higher than for vaginal deliveries. For vaginal deliveries, the SMM rate returned to pre-ICD-10 levels in 2019.

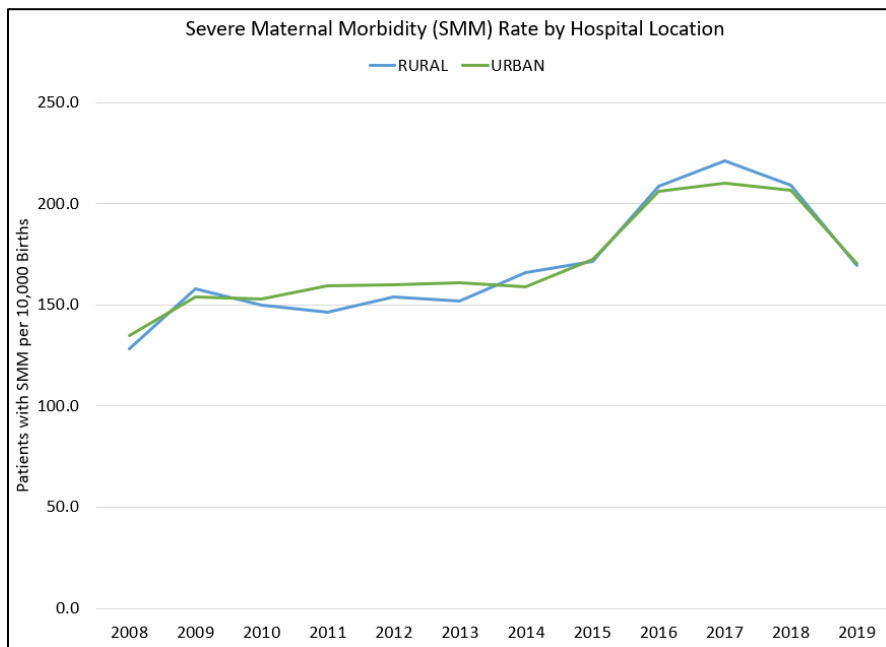
## Trend 5: Commercial insurance carriers have the lowest SMM rates.

Figure 16: Overall SMM Rate by Type of Payer



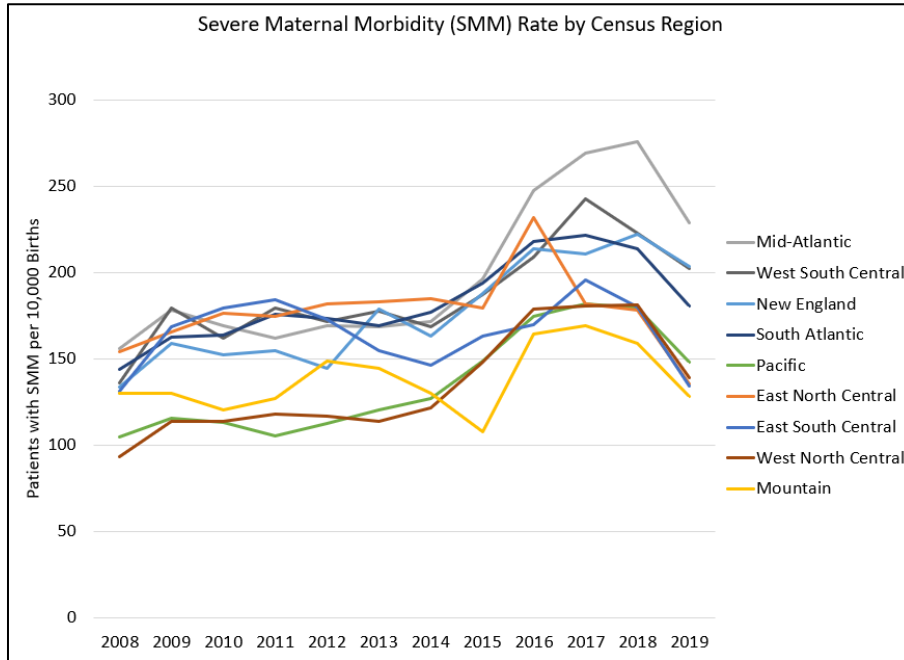
Women with commercial insurance had the lowest SMM rates. Mothers with charity/indigent coverage had the highest SMM rates – a 72 percent higher SMM rate than commercial insurance carriers. Mothers with Medicaid had the second highest SMM rate, 35 percent higher than commercial carriers.

Figure 17: SMM Rates for Rural vs. Urban Hospitals



SMM rates for rural and urban hospitals remained relatively similar to each other. Rural hospitals saw a 51 percent increase in SMM over the timeframe while urban hospitals saw a 42 percent increase.

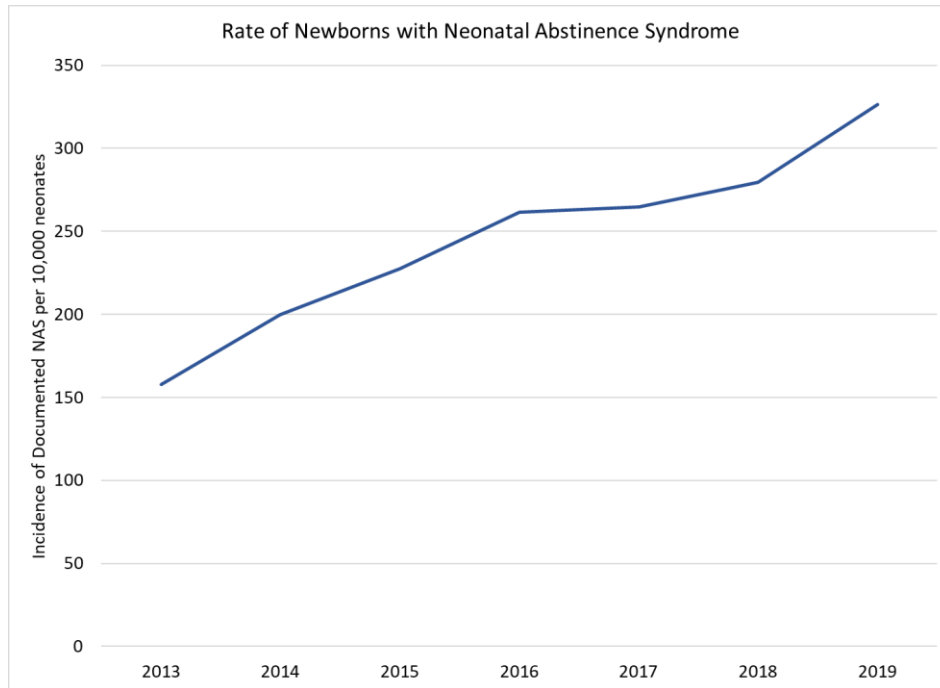
**Figure 18: SMM Rates by Census Region**



Comparing SMM rate by census region, hospitals in the Mid-Atlantic region had the highest SMM rates over the past four years. Hospitals in the Mountain region had the lowest rates over the past four years.

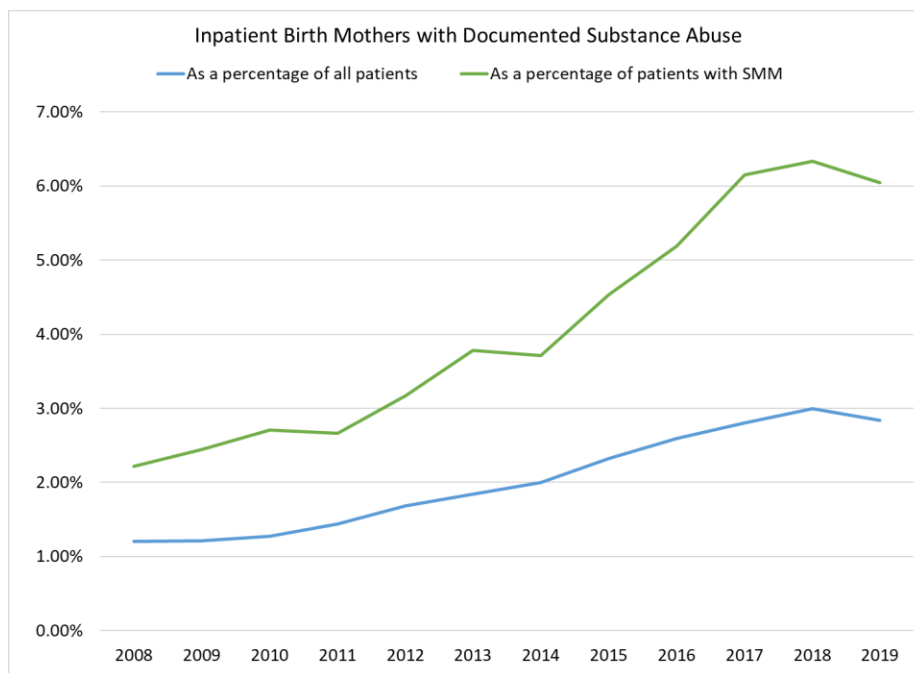
## Trend 6: The levels of substance misuse are rising.

**Figure 19: Rate of Babies born with Neonatal Abstinence Syndrome**



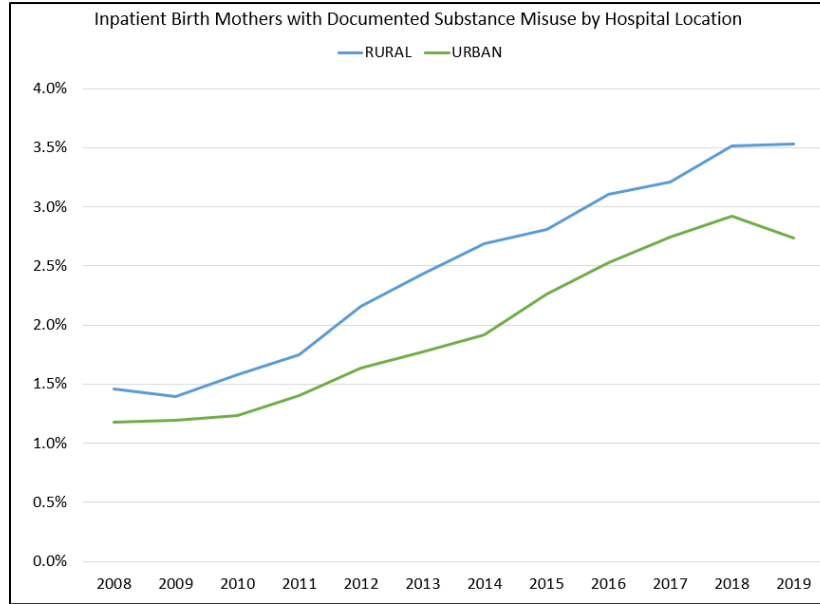
Alarming, the rate of infants born with neonatal abstinence syndrome (NAS) increased 89 percent between 2008 and 2019.

**Figure 20: Birth Mothers with Documented Substance Abuse**



The NAS trend aligns closely with an increased rate of birth mothers with documented substance misuse, which has increased by 201 percent since 2008 overall. Additionally, these mothers are twice as likely to experience an instance of SMM.

**Figure 21: Rate of Substance Use by Hospital Location**



Rural hospitals had a 27 percent higher rate of maternal patients with substance misuse compared to urban hospitals.



## Conclusion

---

Premier's analysis shows that hospitals are making progress in reducing maternal mortalities at the time of delivery. It also appears that the equity gap has been closed between white and black women for maternal mortalities at the time of delivery in the hospital. However, SMM rates have increased, which could be due to multiple factors. Additionally, the maternal population is aging, the disparity gap is wide when comparing SMM rates for black and white women, and the rising rate of NAS and substance use in mothers is concerning.

There are several factors that occur outside of the hospital during pre- and postpartum care that could be influencing overall maternal mortality and morbidity trends. The U.S. healthcare system continues to be fragmented in the way it cares for pregnant women, new mothers and infants. A more integrative approach to the care expectant and new mothers receive before, during and after delivery is needed in order to improve overall maternal and infant health in the U.S.

Premier Inc. (NASDAQ: PINC) is a leading healthcare improvement company, uniting an alliance of more than 4,100 U.S. hospitals and health systems and approximately 200,000 other providers and organizations to transform healthcare. With integrated data and analytics, collaboratives, supply chain solutions, and consulting and other services, Premier enables better care and outcomes at a lower cost. Premier plays a critical role in the rapidly evolving healthcare industry, collaborating with members to co-develop long-term innovations that reinvent and improve the way care is delivered to patients nationwide. Headquartered in Charlotte, NC, Premier is passionate about transforming American healthcare. Please visit Premier's news and investor sites on [www.premierinc.com](http://www.premierinc.com); as well as Twitter, Facebook, LinkedIn, YouTube, Instagram and Premier's blog for more information about the company.