

MATERNAL AND INFANT HEALTH PROFILE

Background

The Office of Maternal and Child Health (MCH) Epidemiology in the MCH Bureau (MCHB) at the Maryland Department of Health created these health profiles to examine local maternal and infant health outcomes and risk factors compared to state averages. Local health departments should use these data and maps to identify and target population specific interventions to reduce maternal health risks that contribute to increased fetal-infant mortality rates among minorities in Maryland.

While the statewide infant mortality rate (IMR) has decreased 32% since 1990, racial IMR disparities persist. Infant mortality rates among Black non-Hispanic (NH) births are consistently more than double the rates among White NH births. To eliminate this disparity, the IMR among Black NH births would have to decreased by approximately 60%. The leading cause of infant deaths in Maryland are preterm birth/low birth weight and Sudden Infant Death Syndrome (SIDS) for both Black NH and White NH infants. Congenital anomalies were the leading cause of death for Hispanic infants.

Perinatal periods of risk (PPOR) analysis is a method of examining all fetal and infant death data to identify opportunities to reduce perinatal mortality (Sappenfield, 2010). Results from Phase 1 PPOR analysis suggests that half (49%) of excess, or preventable, fetal-infant mortality rates in Maryland during 2010-2017 was due to factors related to the maternal health and prematurity (MHP) period among Black NH births. Phase 2 analyses revealed that the largest reductions in infant mortality and adverse pregnancy outcomes could be produced by improving the social and economic environment of women which predisposes them to poorer health and birth outcomes. Specifically, factors contributing most to racial disparities in adverse pregnancy outcomes (APO: fetal or neonatal death, or very PTB and very LBW births) include differences in marital status, education, insurance coverage, community socioeconomic disadvantage, hypertension, prior preterm birth or other pregnancy outcomes, pre-pregnancy body mass index (BMI), and participation in the Women, Infants and Children (WIC) program. Lack of prenatal care and tobacco use are also associated with increased risks of APO, however, these factors do not appear to explain the differences in APO rates between Black NH and White NH births in Maryland. Findings suggest that eliminating the prevalence of hypertension could reduce APO's by nearly 12% statewide. Drastic racial differences in marital status highlight the greater need for social support and/or services for minority women to improve pregnancy outcomes (Salihu, 2014). For greater detail about preconception and prenatal risk factors, please visit the Maryland PRAMS website (PRAMS).

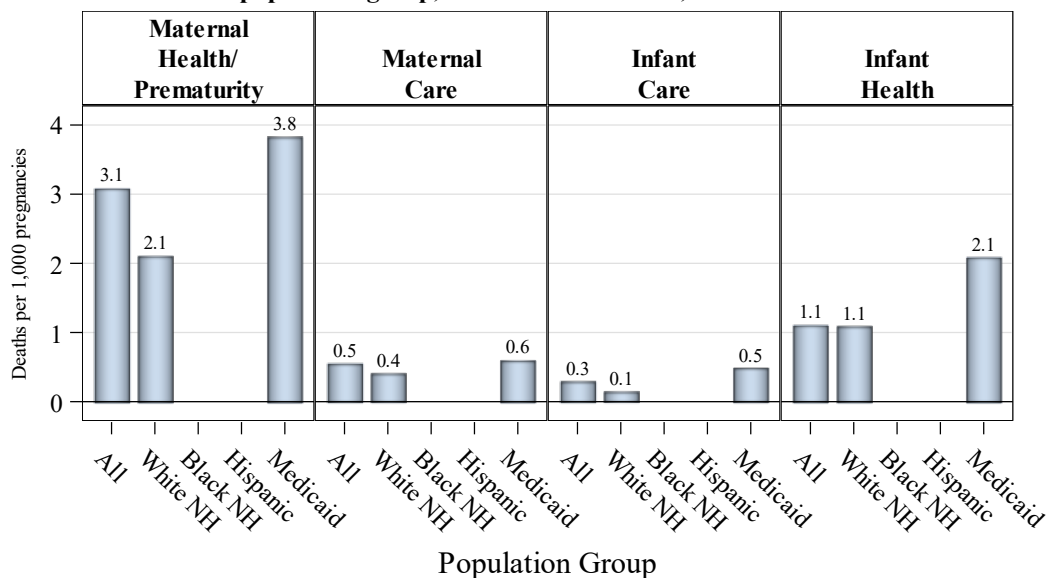
Programs should use these findings to develop evidence-based initiatives to improve the preconception and maternal health of women, and particularly Black NH women, to produce the greatest reductions in fetal and infant mortality in Maryland. For questions or comments, please contact the Maternal and Child Health Bureau at mdh.mchb@maryland.gov or (410) 767-6713.

2017 Jurisdiction Ranks

Indicator	Rank*
Fetal-Infant Mortality Rate (FIMR)	N/a
Preterm Birth (PTB, <37 weeks)	5th
Low Birth Weight (LBW, <2500 grams)	9th
Very PTB & Very LBW	N/a
Unmarried, no father listed	21st
Maternal Education: High School Diploma or Less	24th
Maternal Hypertension (Chronic or Gestational)	20th
Medicaid Coverage	21st
Maternal Obesity	8th
Prior Preterm Birth	10th
Maternal Age Under 20 Years Old	15th
Third Trimester or No Prenatal Care Initiation	14th
Preconception or Prenatal Smoking	18th
Maternal Opioid Use Disorder	15th
Maternal Substance Use Disorder	14th
WIC Participation	6th

*Ranks are relative to the other 24 jurisdictions. Lower is better. N/a: rank not available due to insufficient data.

Perinatal Period of Risk (PPOR): Excess, or preventable, fetal-infant mortality rates by population group, North Eastern Shore, 2010-2017



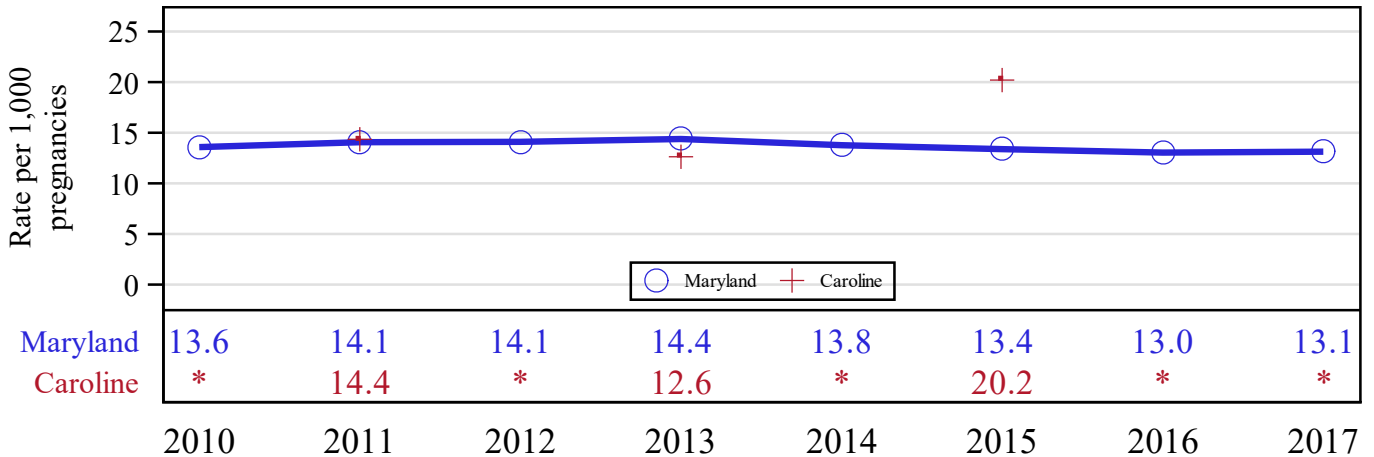
CAROLINE

Fetal-Infant Mortality Rates

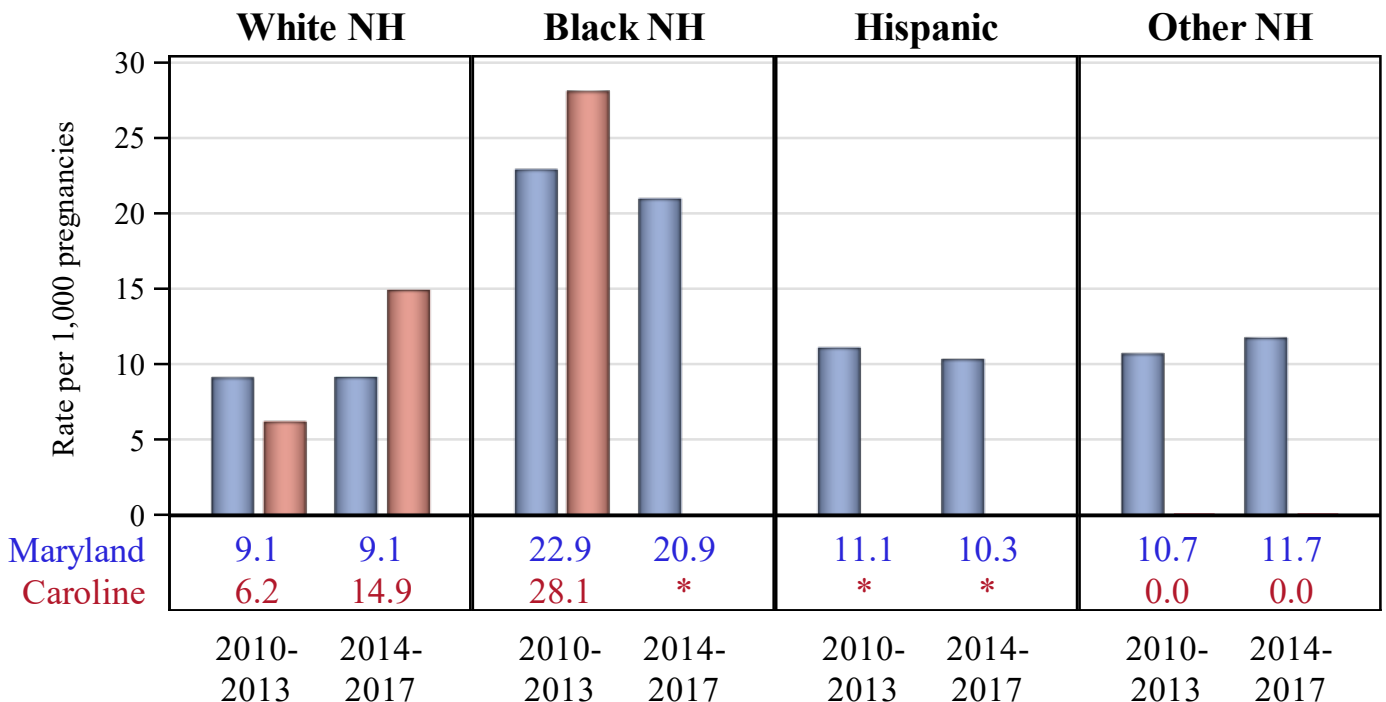
Fetal-infant mortality rates (FIMR) represent the number of fetal (older than 20 weeks gestation) or infant deaths (younger than 365 days old) per 1,000 pregnancies in that year. NOTE: Source is linked infant birth and death certificate records which exclude records not linked due to certificate errors or migration and results in lower FIMRs than those in Maryland VSA reports.

*Of the 378 pregnancies in Caroline in 2017 there were *fetal or infant deaths for every 1,000 pregnancies.*

by Year



by Maternal Race and Year



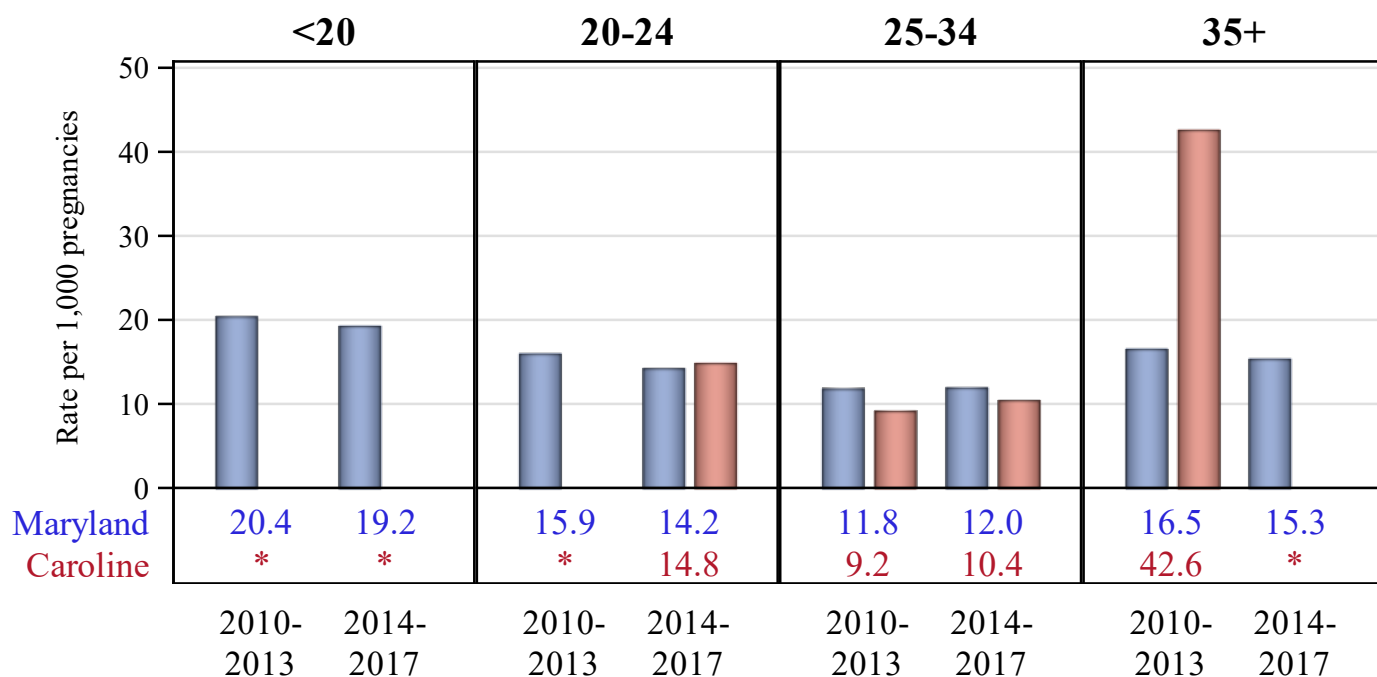
Source: Maryland Vital Statistics Administration Linked Infant Birth-Death Certificate File

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

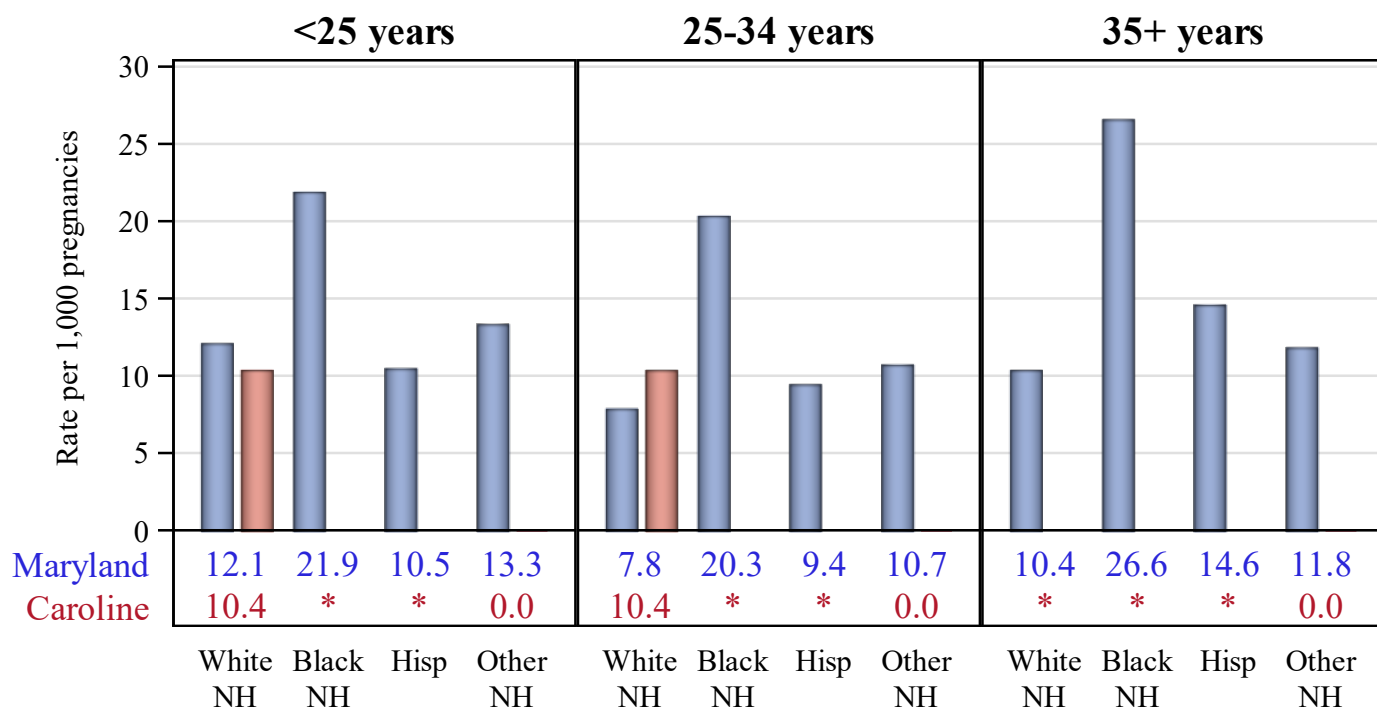
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Fetal-Infant Mortality Rates

by Maternal Age and Year



by Maternal Age and Race, 2010-2017



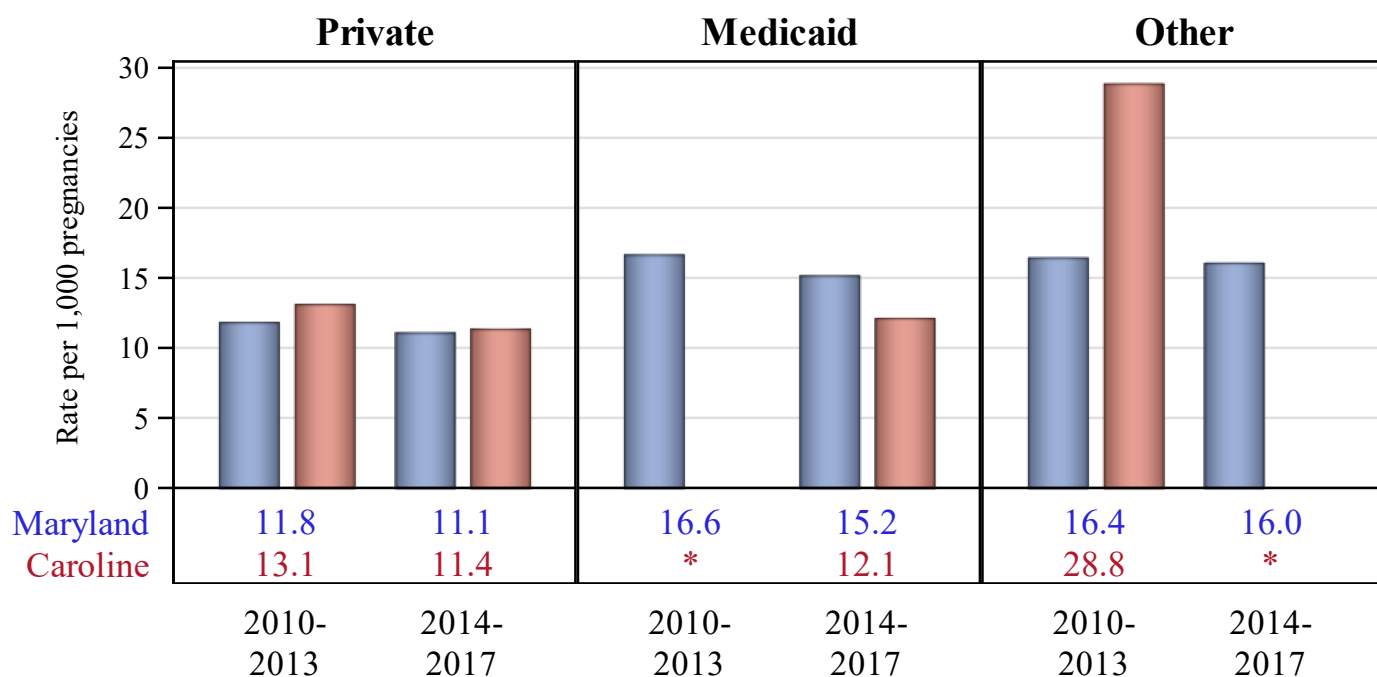
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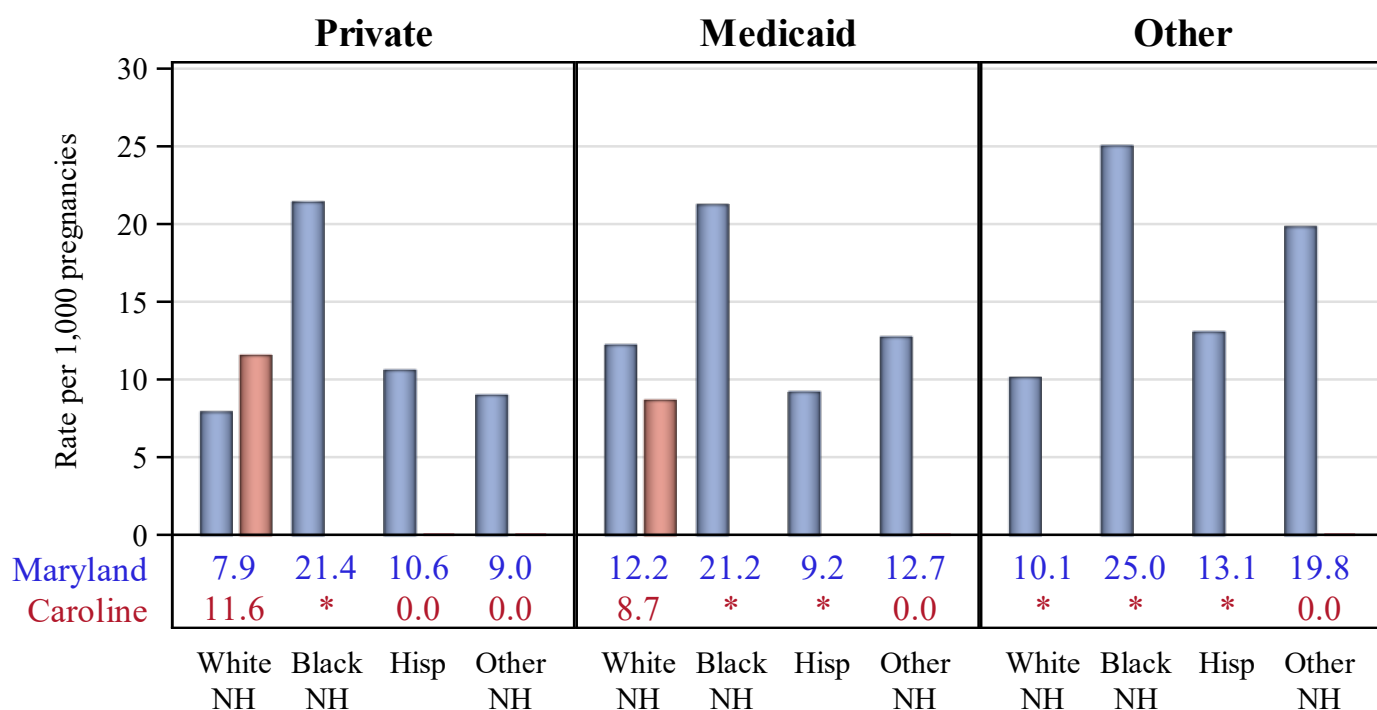
CAROLINE

Fetal-Infant Mortality Rates

by Insurance Coverage and Year



by Insurance Coverage and Race, 2010-2017



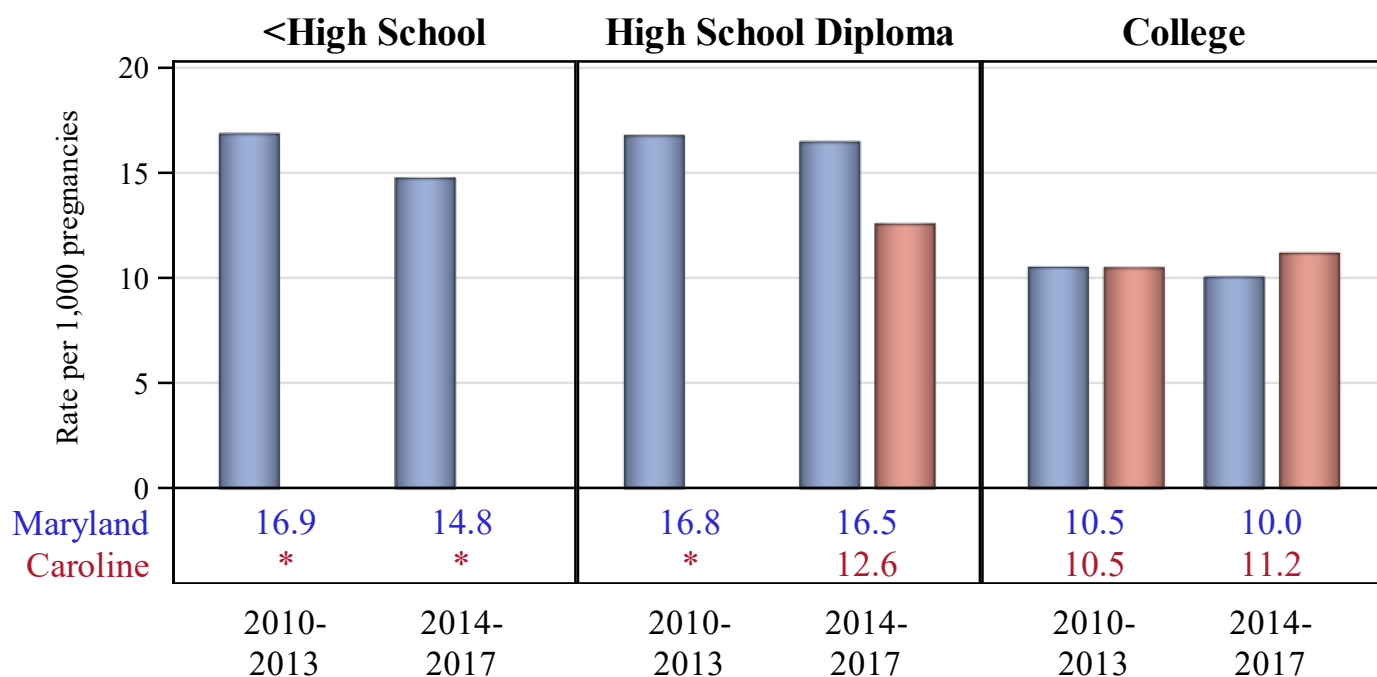
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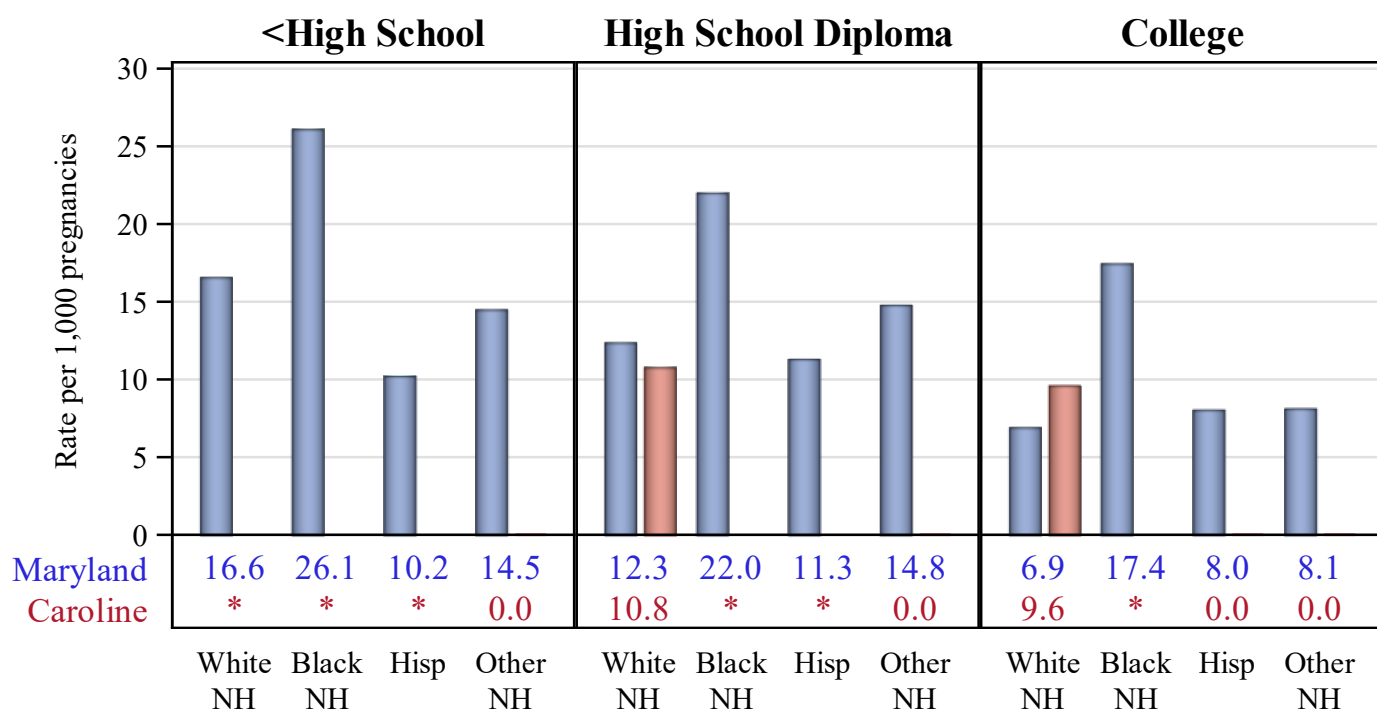
CAROLINE

Fetal-Infant Mortality Rates

by Maternal Educational Attainment and Year



by Maternal Educational Attainment and Race, 2010-2017



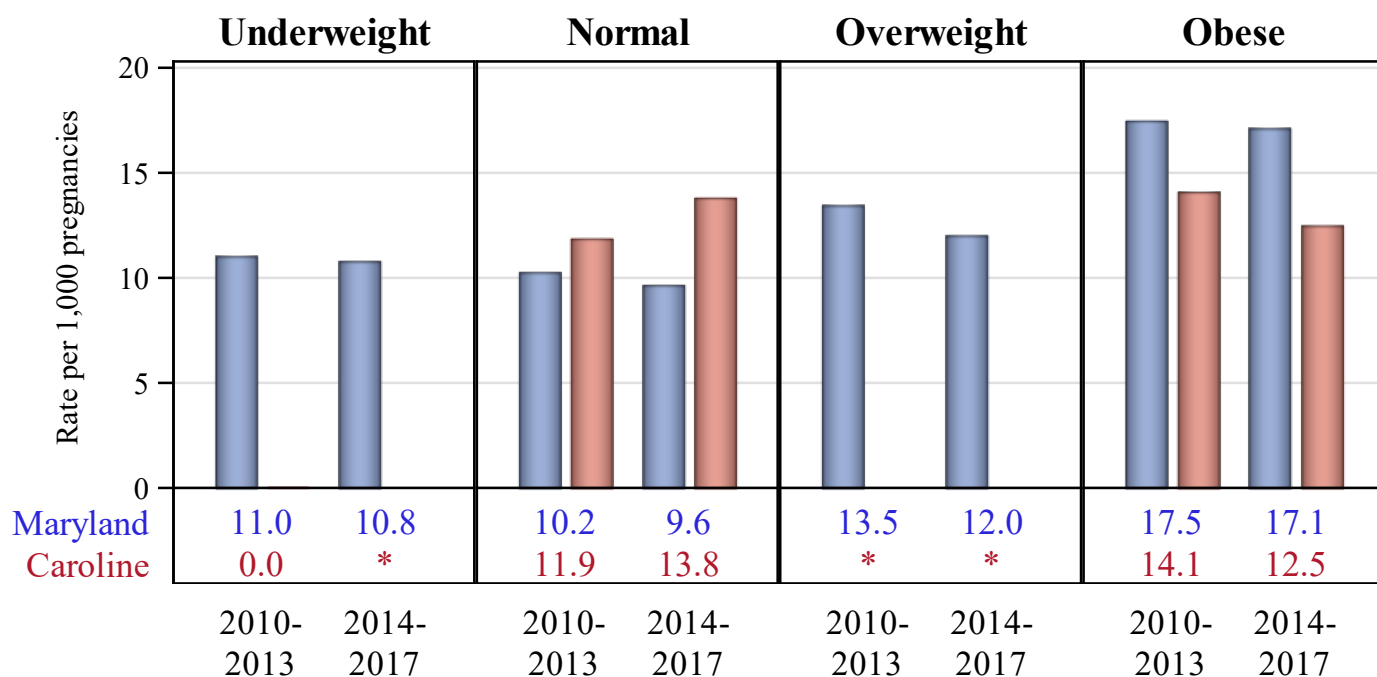
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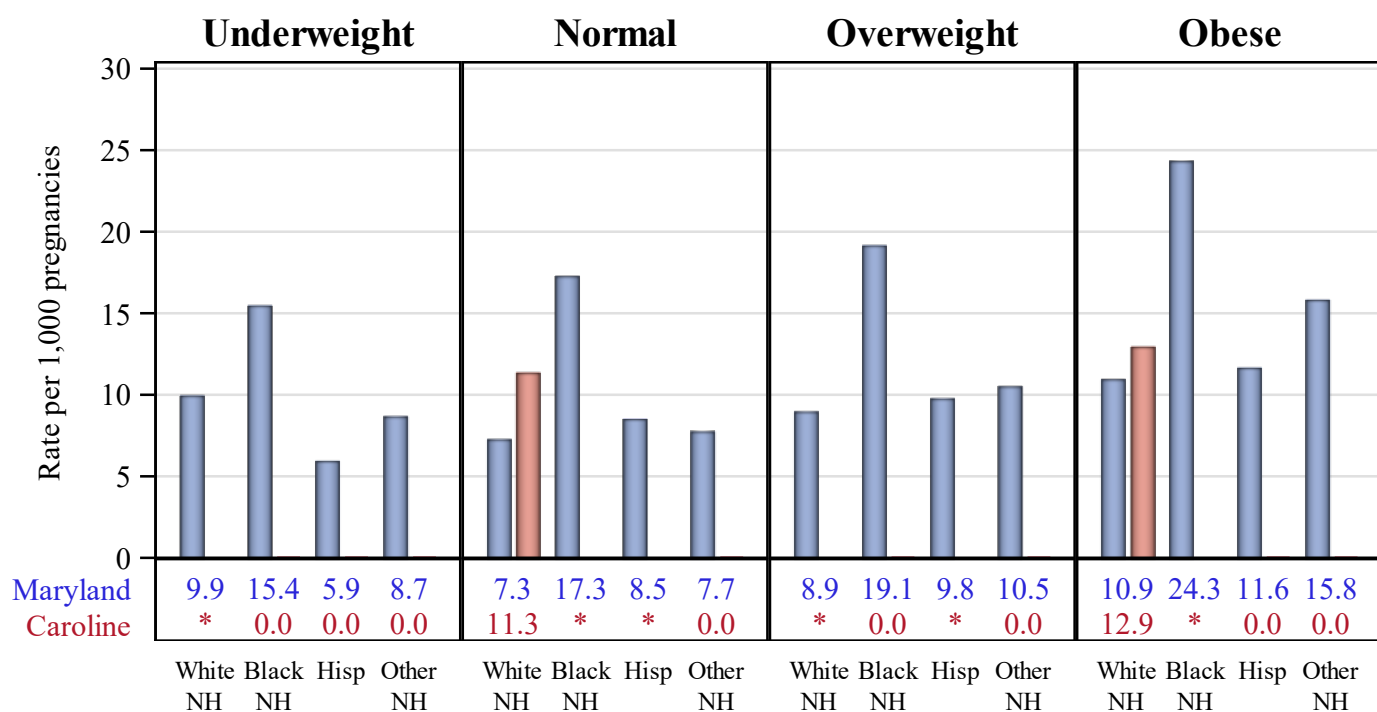
CAROLINE

Fetal-Infant Mortality Rates

by Pre-Pregnancy Body Mass Index (BMI) and Year



by Pre-Pregnancy Body Mass Index (BMI) and Race, 2010-2017



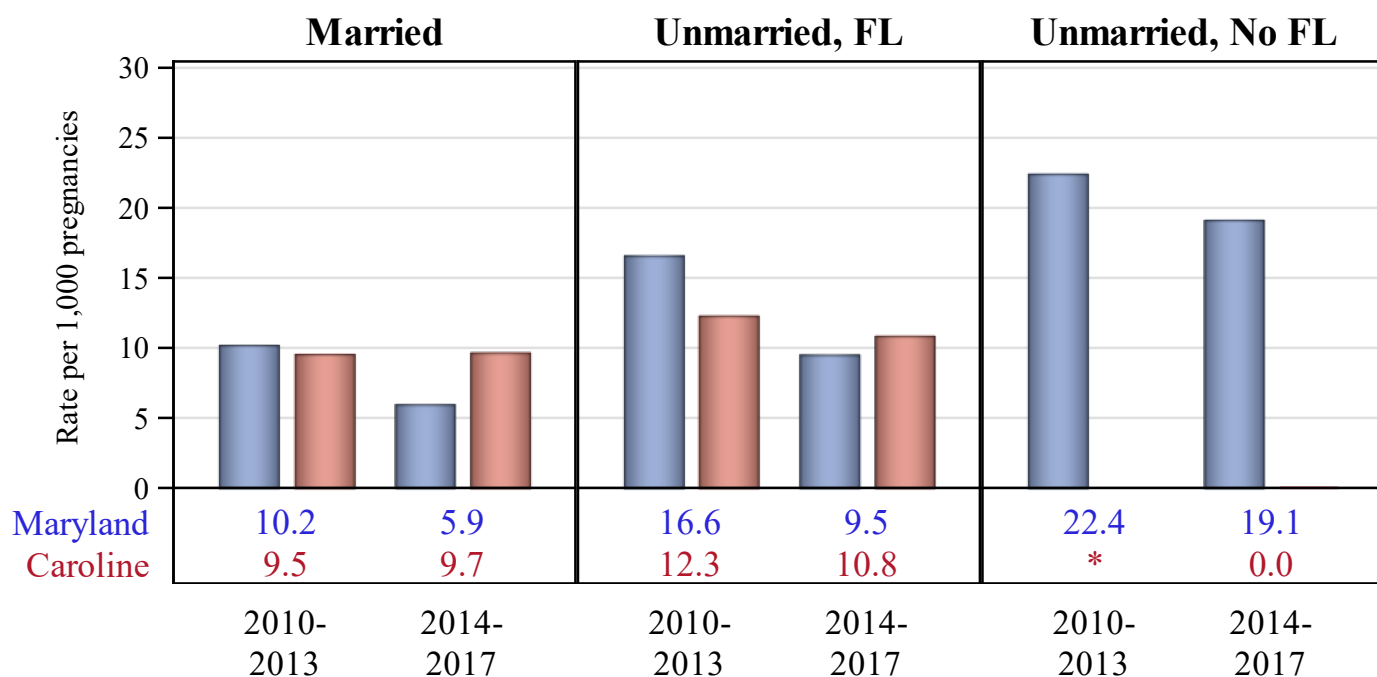
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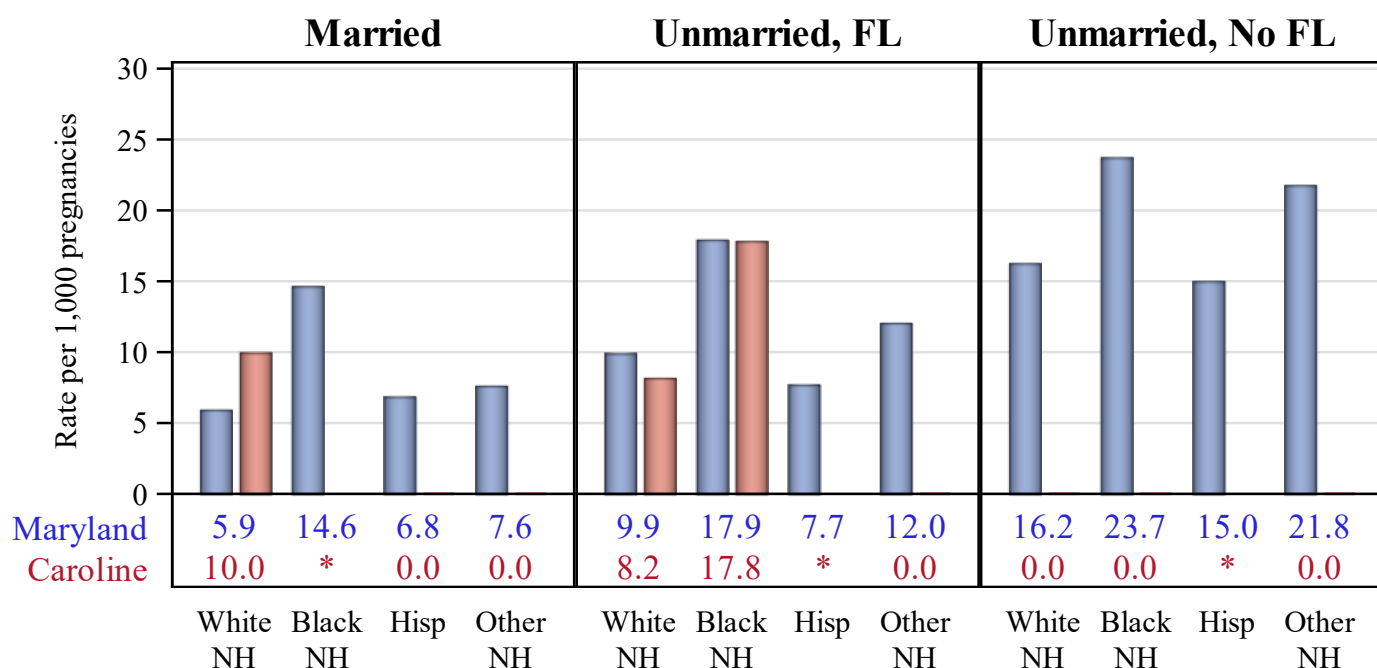
CAROLINE

Fetal-Infant Mortality Rates

by Marital Status and Year



by Marital Status and Race, 2010-2017



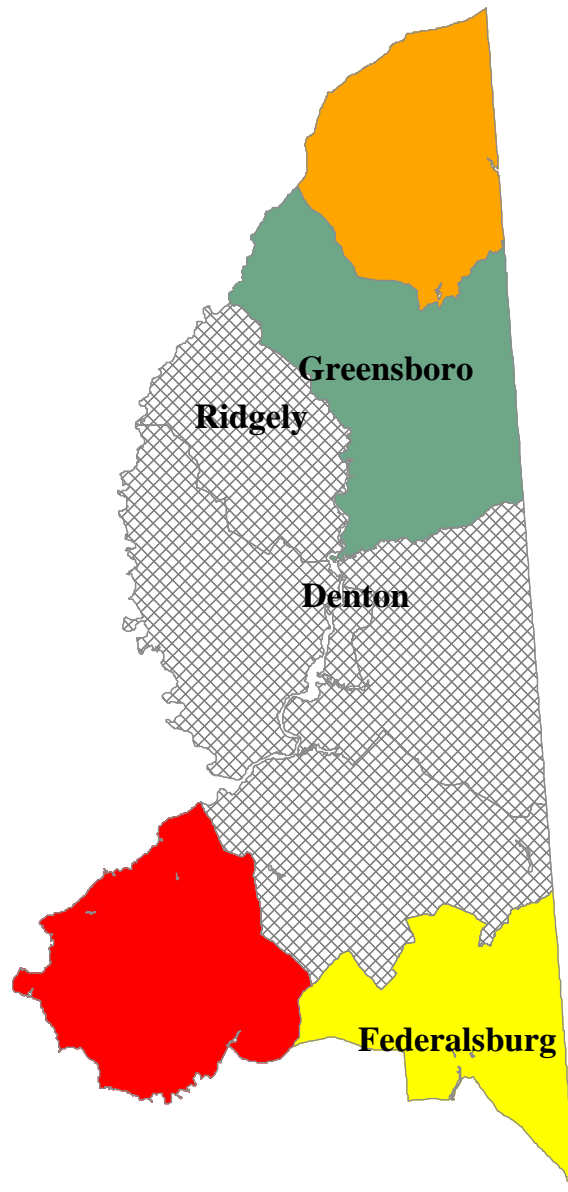
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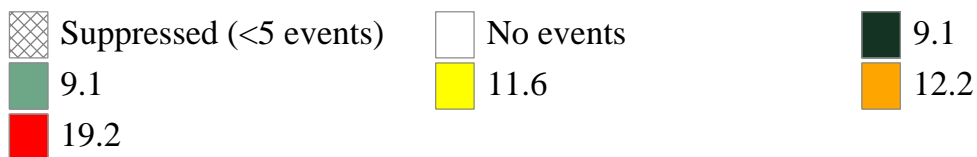
FL: father listed on the birth certificate

CAROLINE

Fetal-Infant Mortality Rates by Maternal Residence Census Tract, 2010-2017



Rate per 1,000 pregnancies

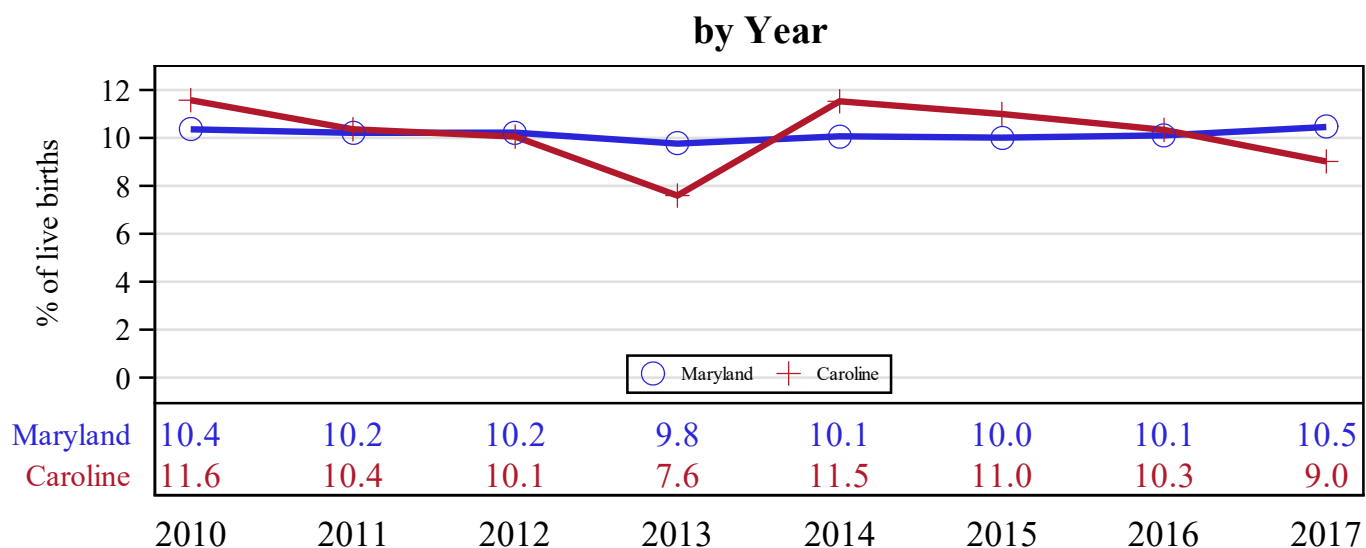


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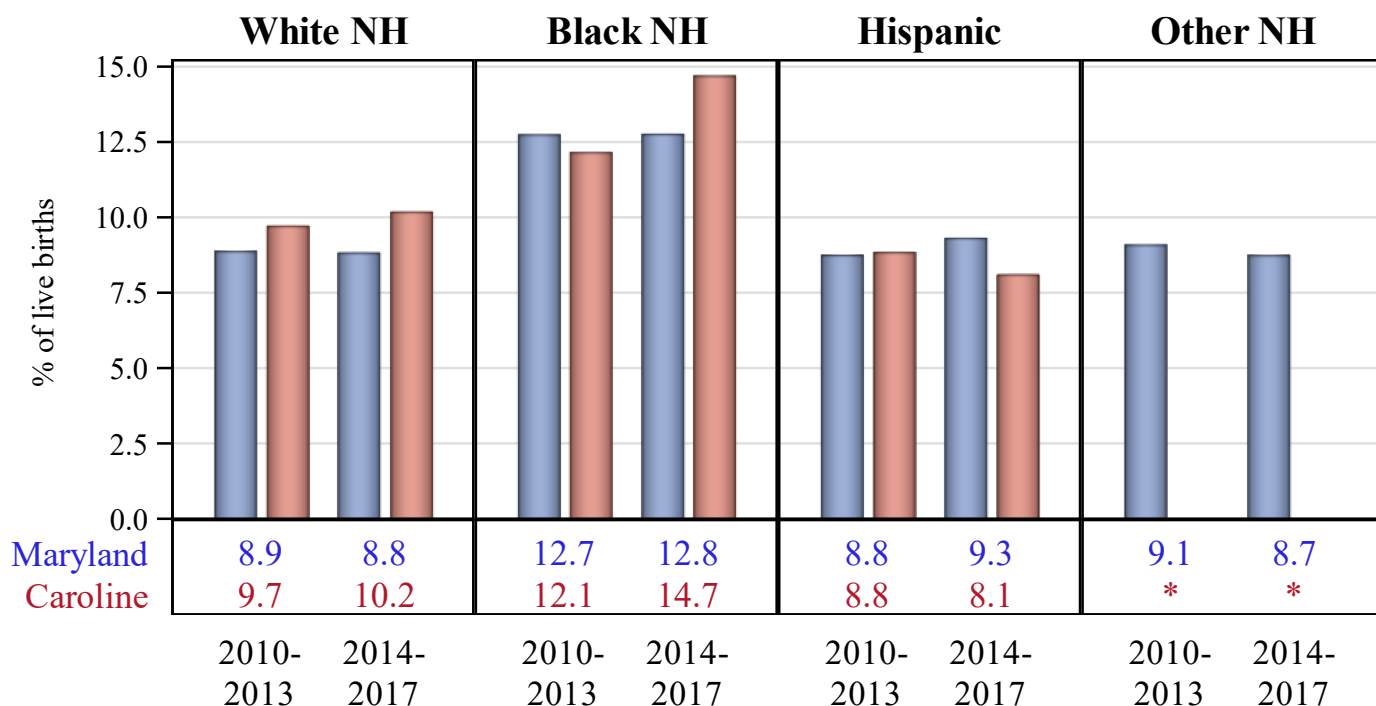
Preterm Birth (PTB, <37 weeks)

Preterm birth describes infants born prior to 37 weeks gestation and is a leading cause of LBW and VLBW, and infant death. Preterm-related causes of death accounted for 35% of all infant deaths in the U.S. in 2010, more than any other single cause.

Of the 377 live births in Caroline in 2017, 9% were born preterm (<37 weeks gestation).



by Maternal Race and Year



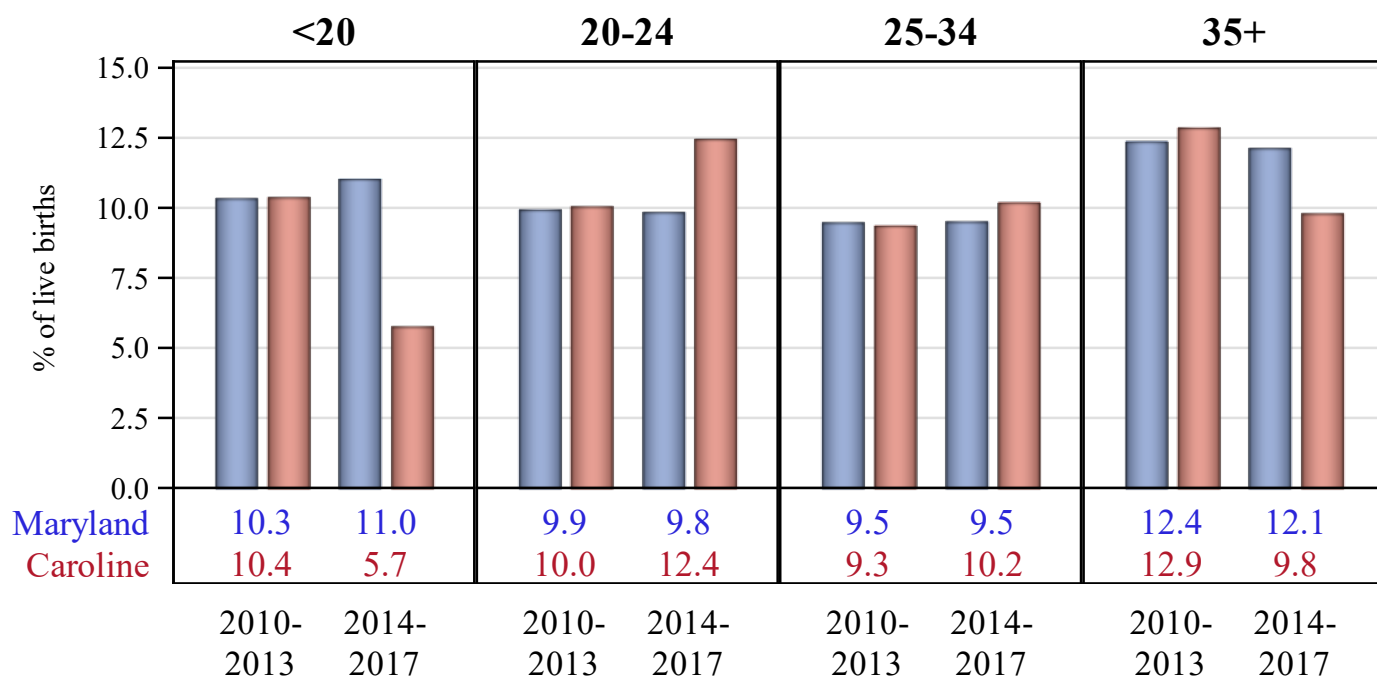
Source: Maryland Vital Statistics Administration

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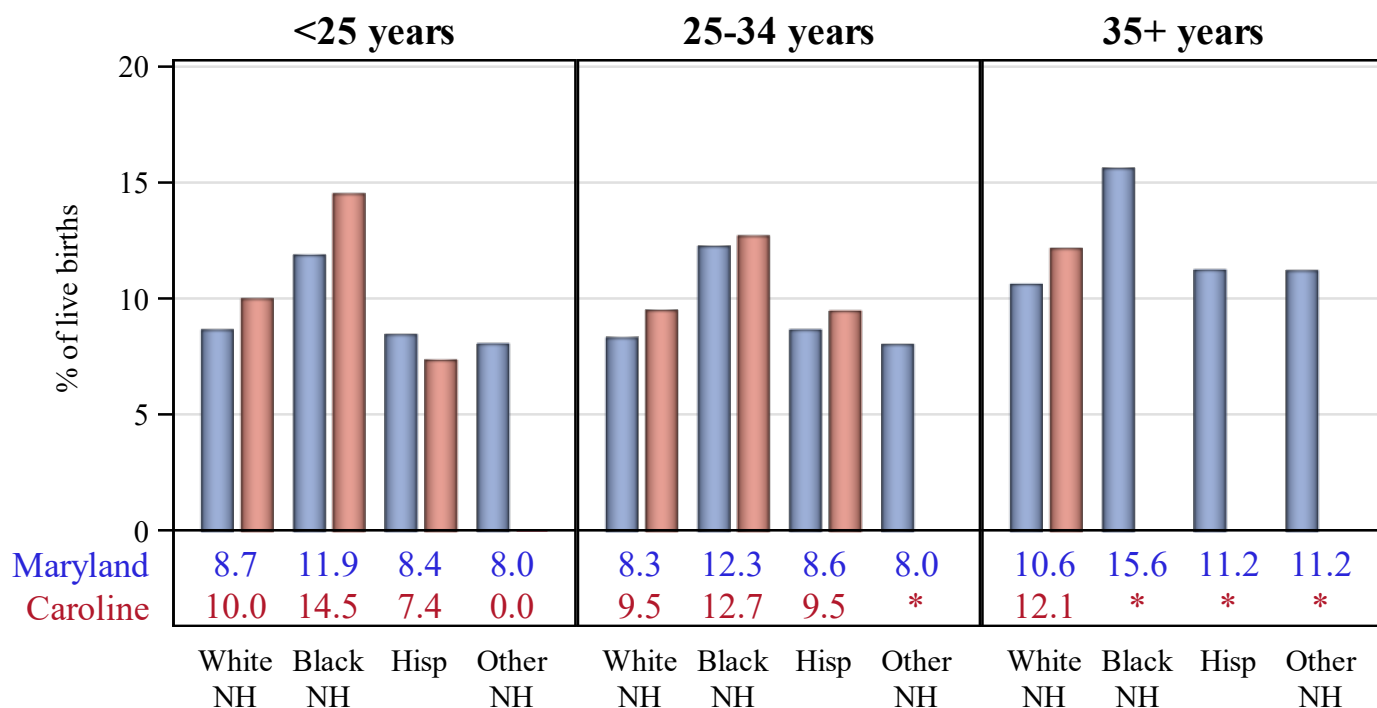
CAROLINE

Preterm Birth (PTB, <37 weeks)

by Maternal Age and Year



by Maternal Age and Race, 2010-2017



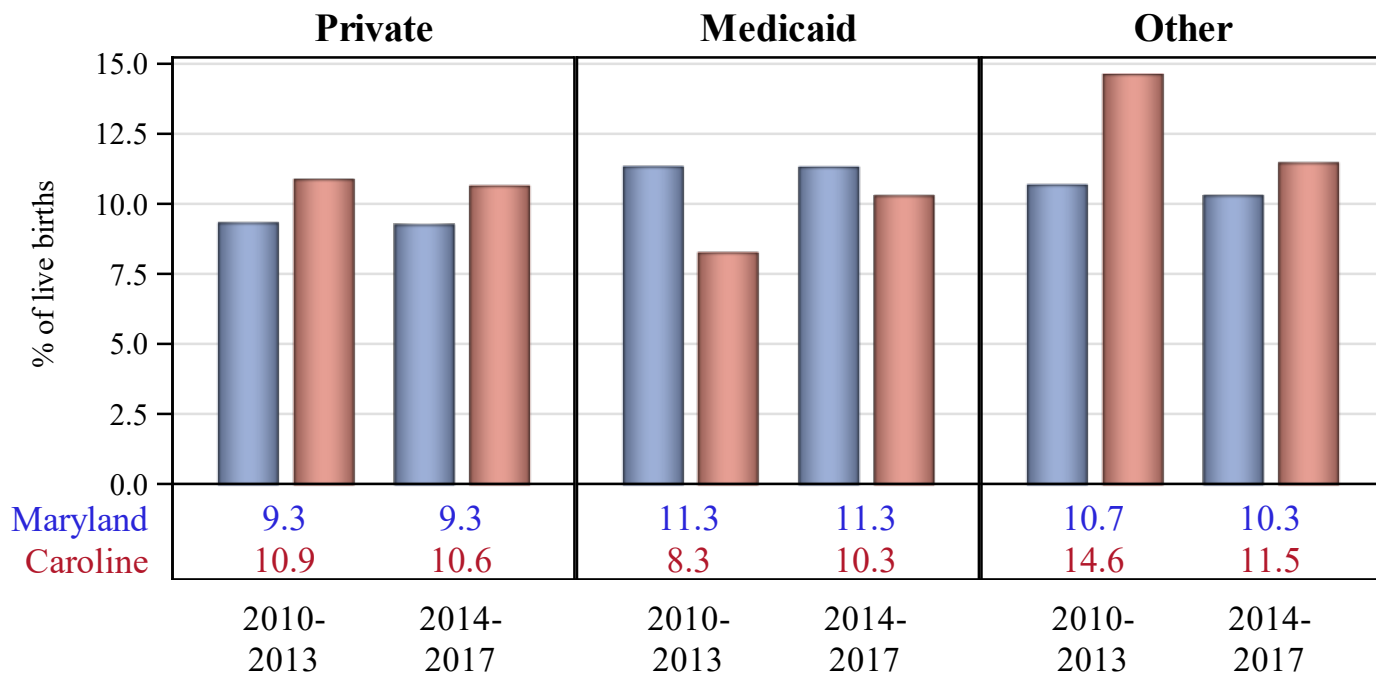
Source: Maryland Vital Statistics Administration

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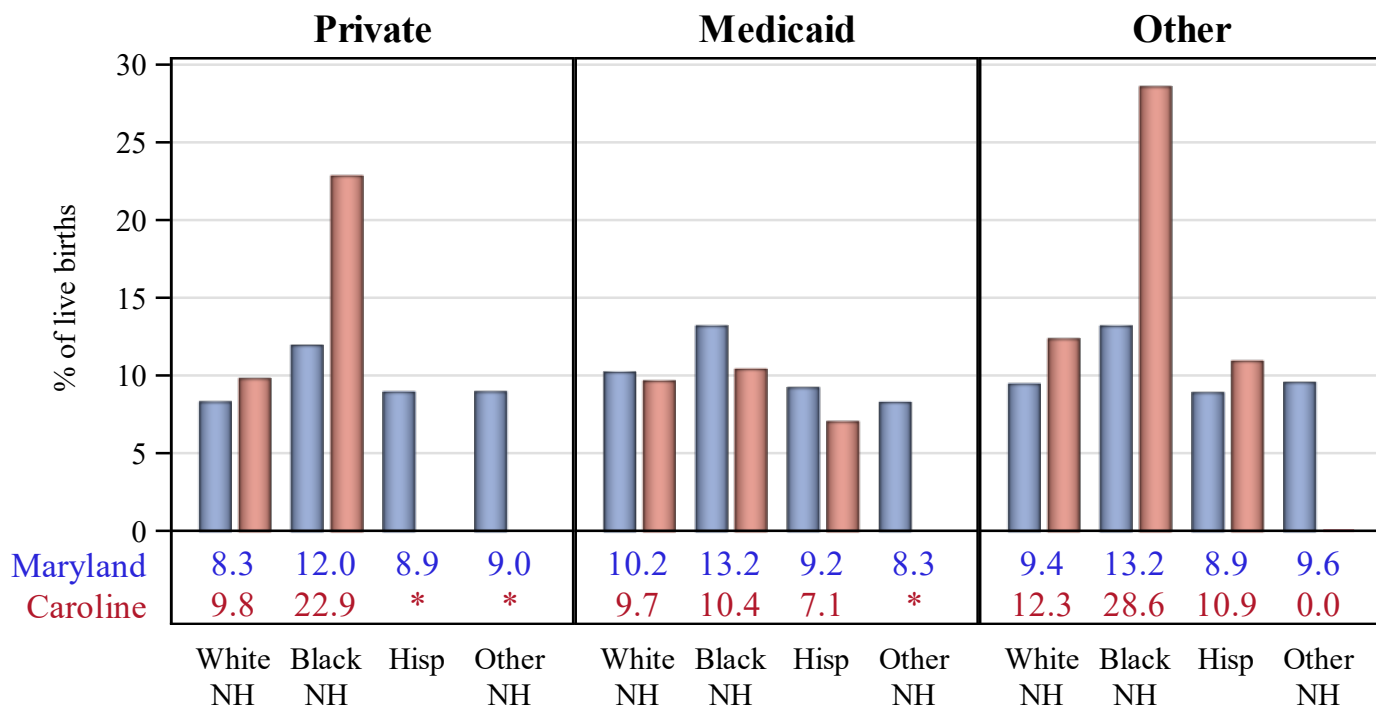
CAROLINE

Preterm Birth (PTB, <37 weeks)

by Insurance Coverage and Year



by Insurance Coverage and Race, 2010-2017



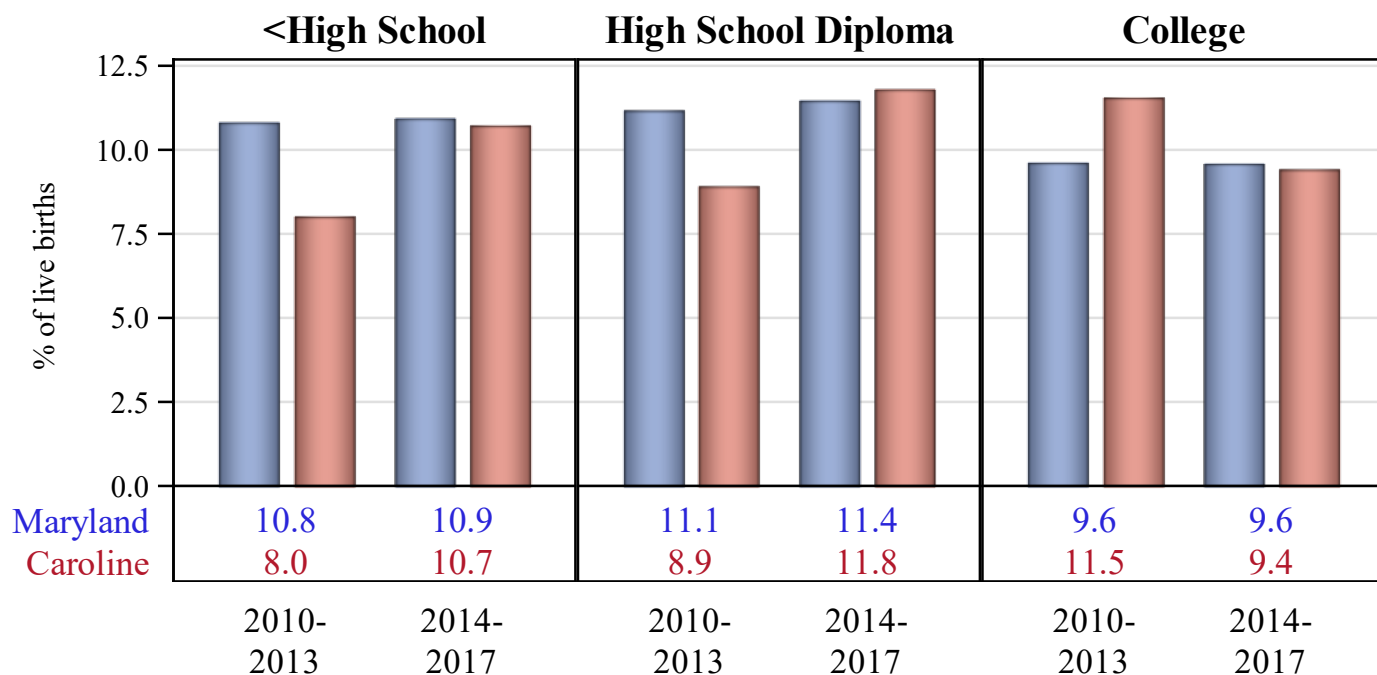
Source: Maryland Vital Statistics Administration

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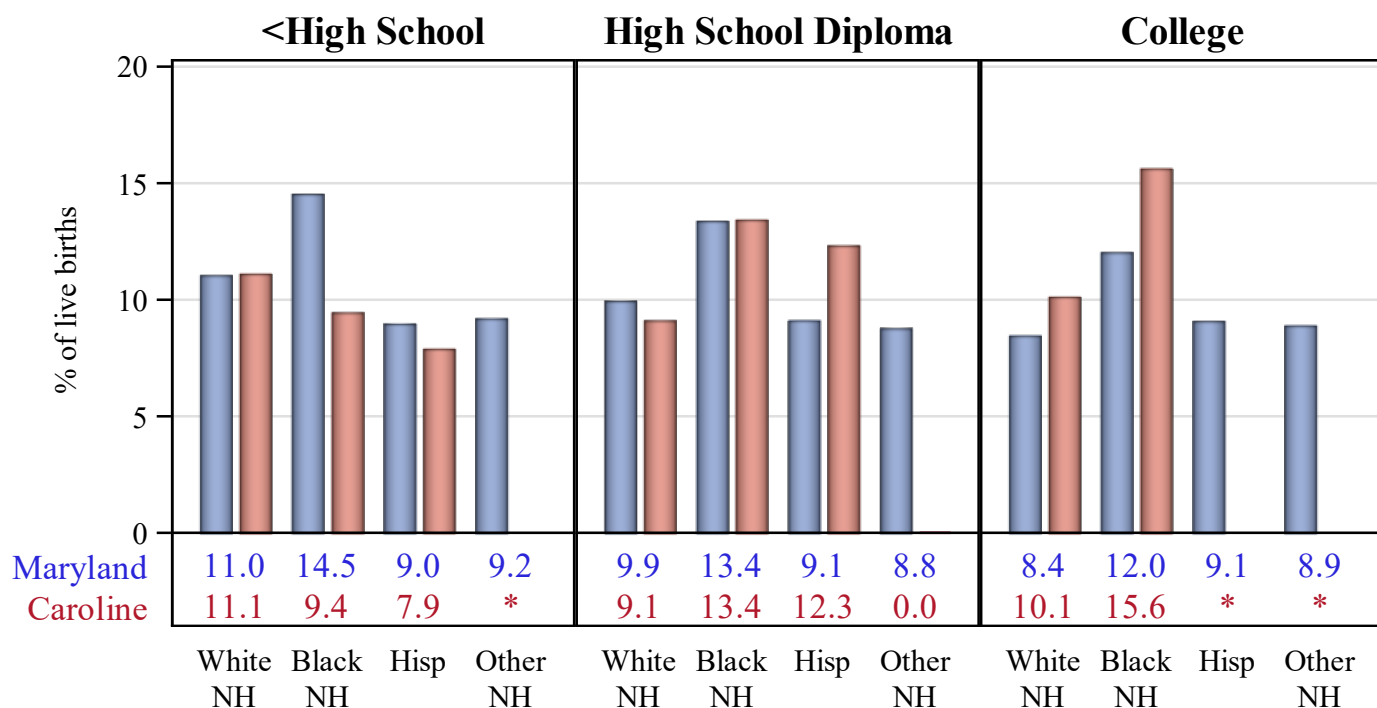
CAROLINE

Preterm Birth (PTB, <37 weeks)

by Maternal Educational Attainment and Year



by Maternal Educational Attainment and Race, 2010-2017



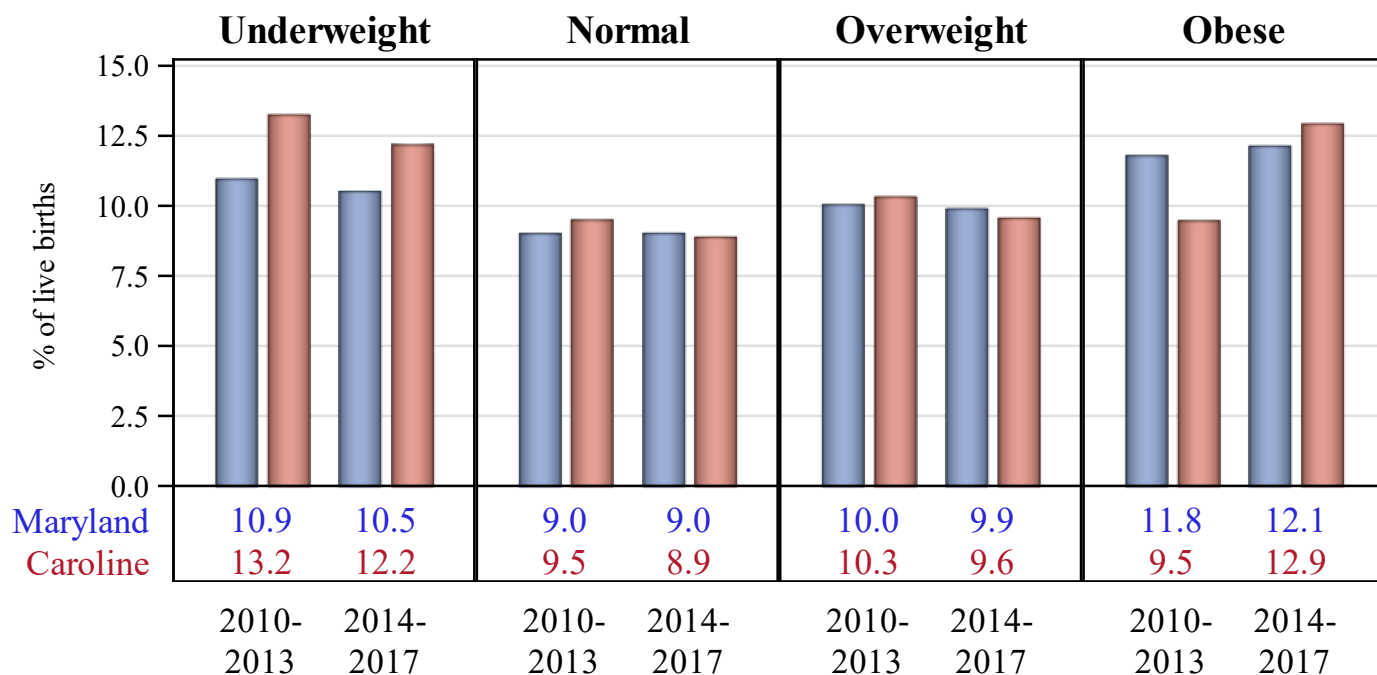
Source: Maryland Vital Statistics Administration

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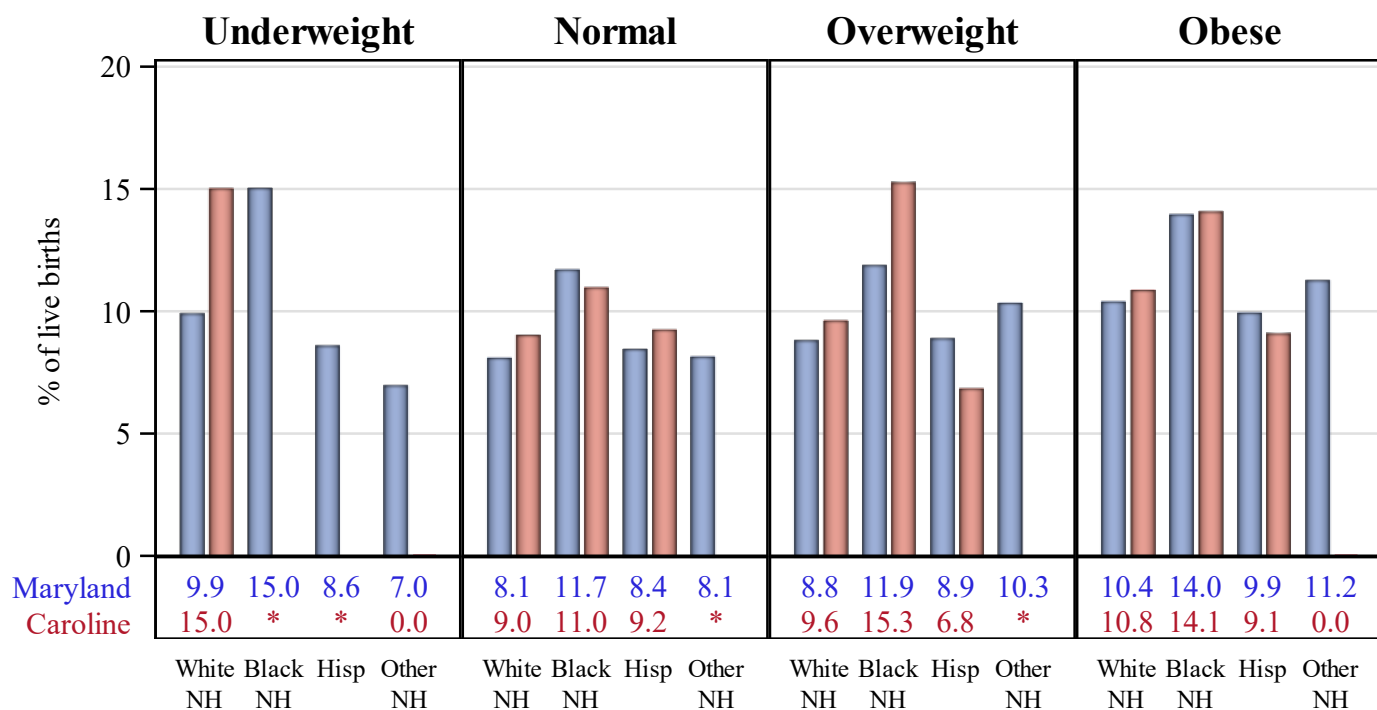
CAROLINE

Preterm Birth (PTB, <37 weeks)

by Pre-Pregnancy Body Mass Index (BMI) and Year



by Pre-Pregnancy Body Mass Index (BMI) and Race, 2010-2017



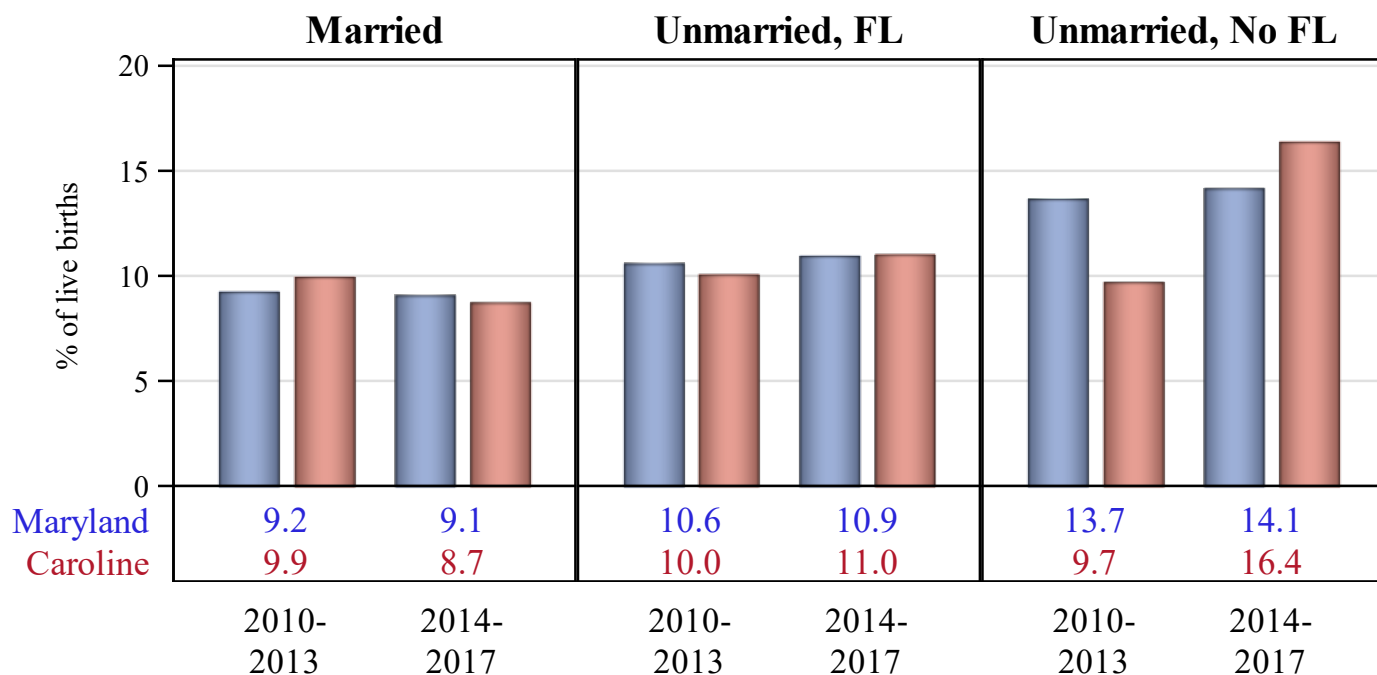
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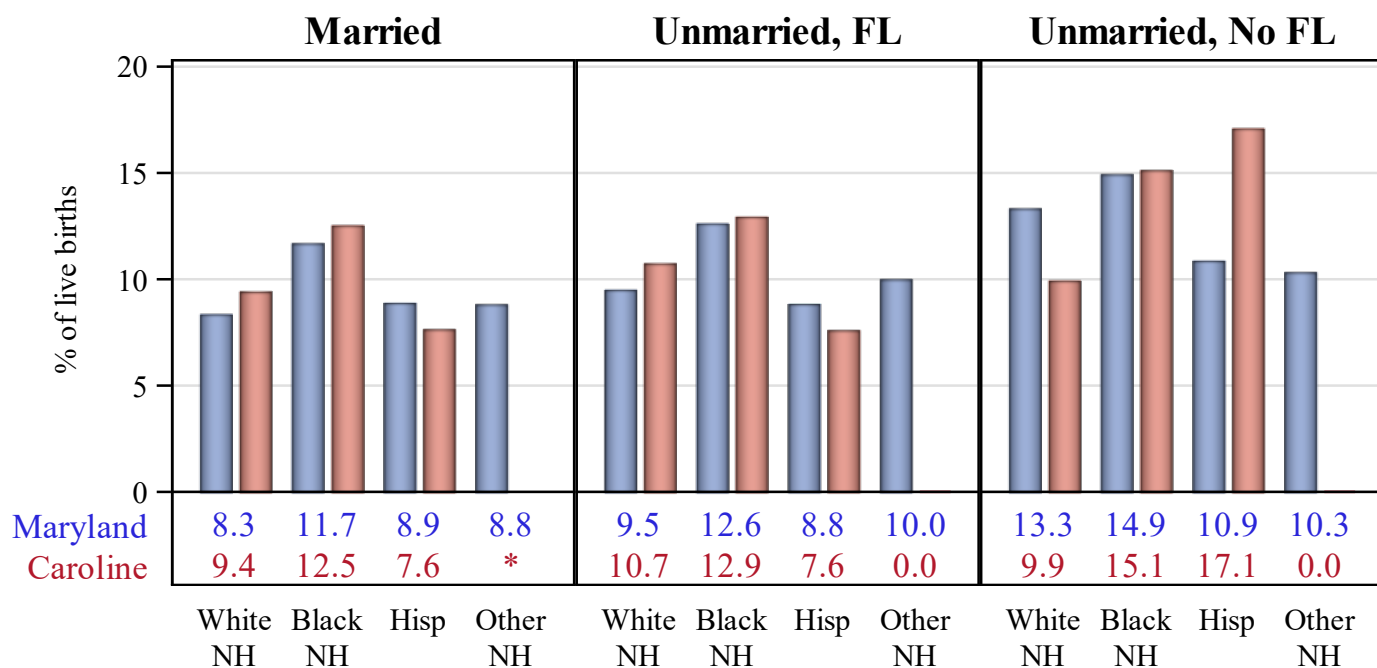
CAROLINE

Preterm Birth (PTB, <37 weeks)

by Marital Status and Year



by Marital Status and Race, 2010-2017

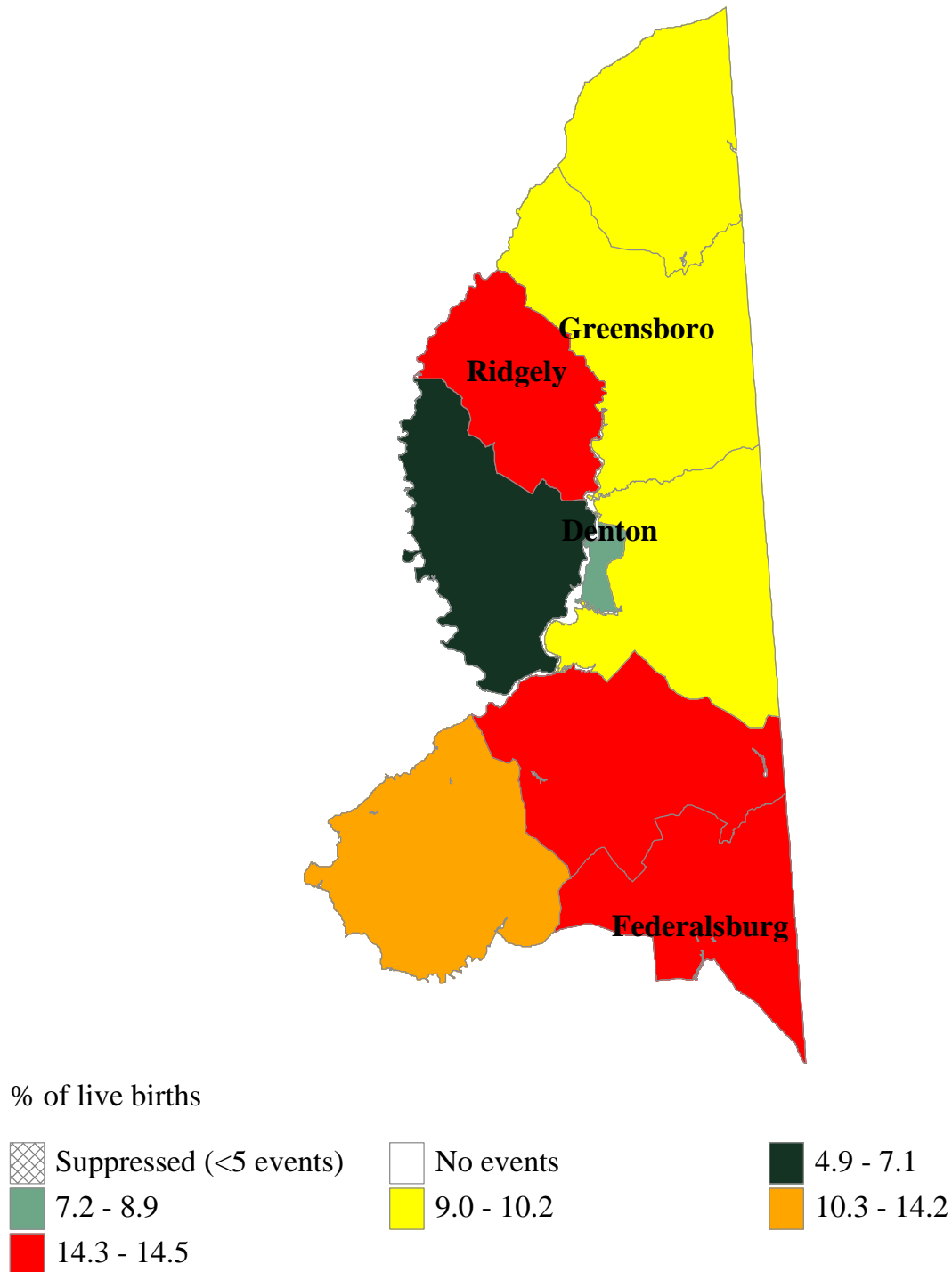


Source: Maryland Vital Statistics Administration

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FL: father listed on the birth certificate

Preterm Birth (PTB, <37 weeks) by Maternal Residence Census Tract, 2010-2017



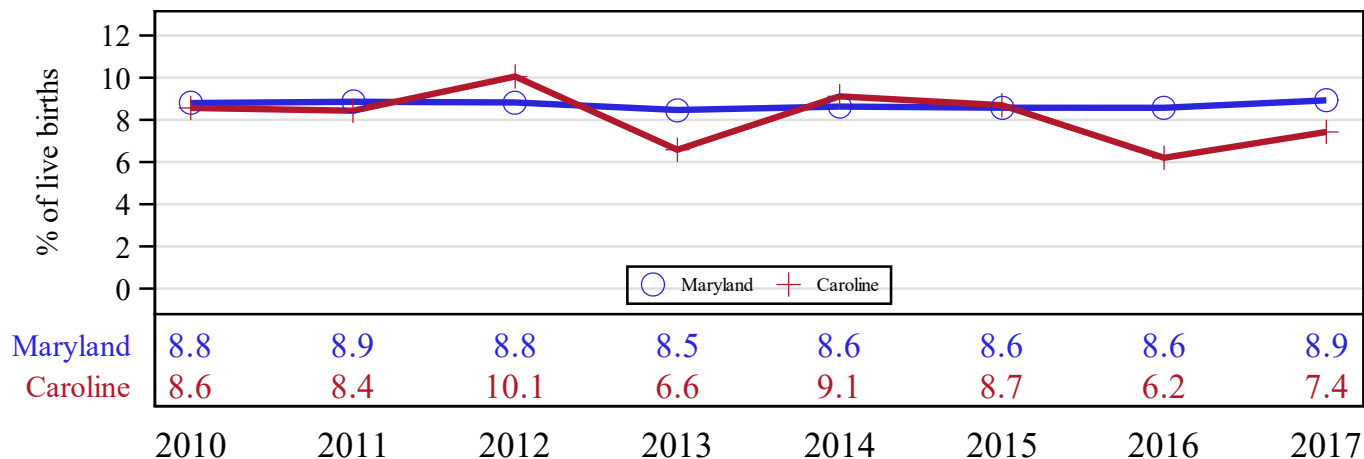
CAROLINE

Low Birth Weight (LBW, <2500 grams)

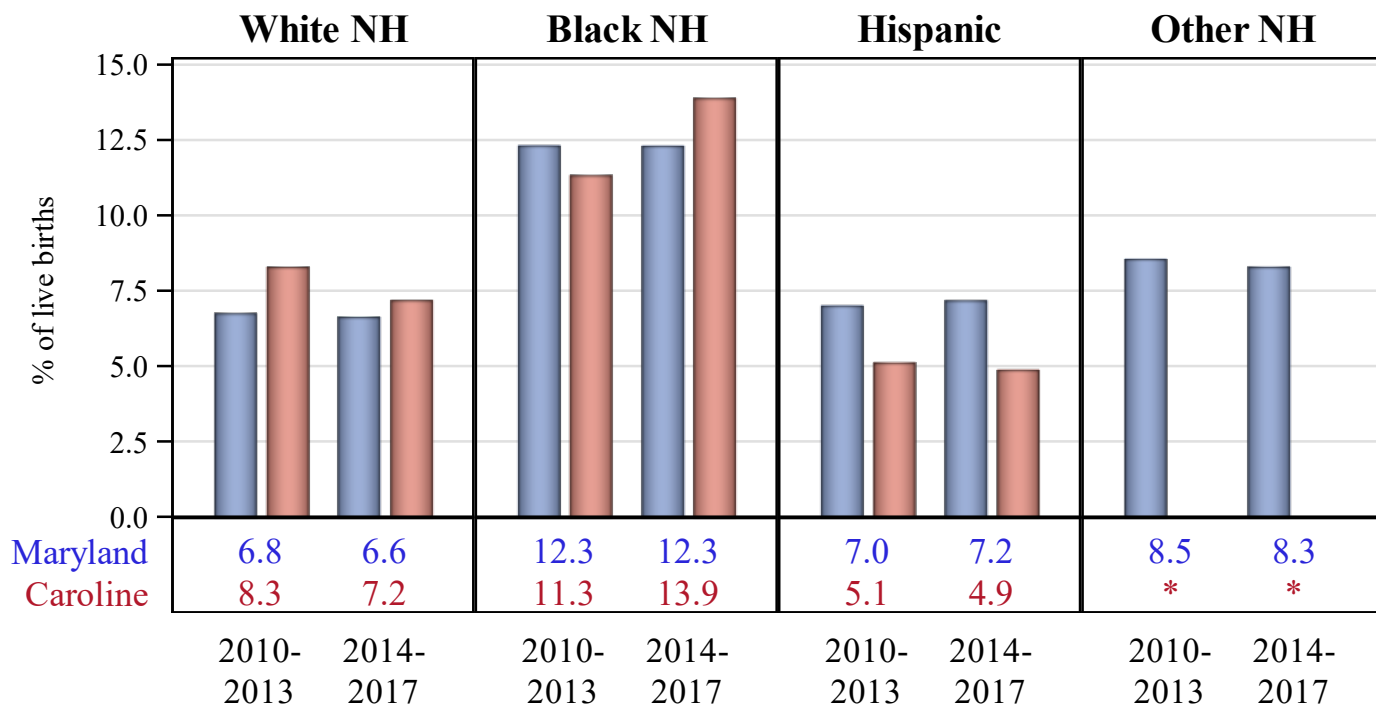
Low birth weight describes infants weighing less than 2500 grams, or 5.5 pounds, at birth and is a leading cause of neonatal mortality. Since low birth weight is typically associated with a preterm birth, many public health interventions focus on ways to reduce the rates of low birth weight, very low birth weight, and preterm birth as strategies to reduce infant mortality.

Of the 377 live births in Caroline in 2017, 7.4% were low birth weight (<2500 grams).

by Year



by Maternal Race and Year



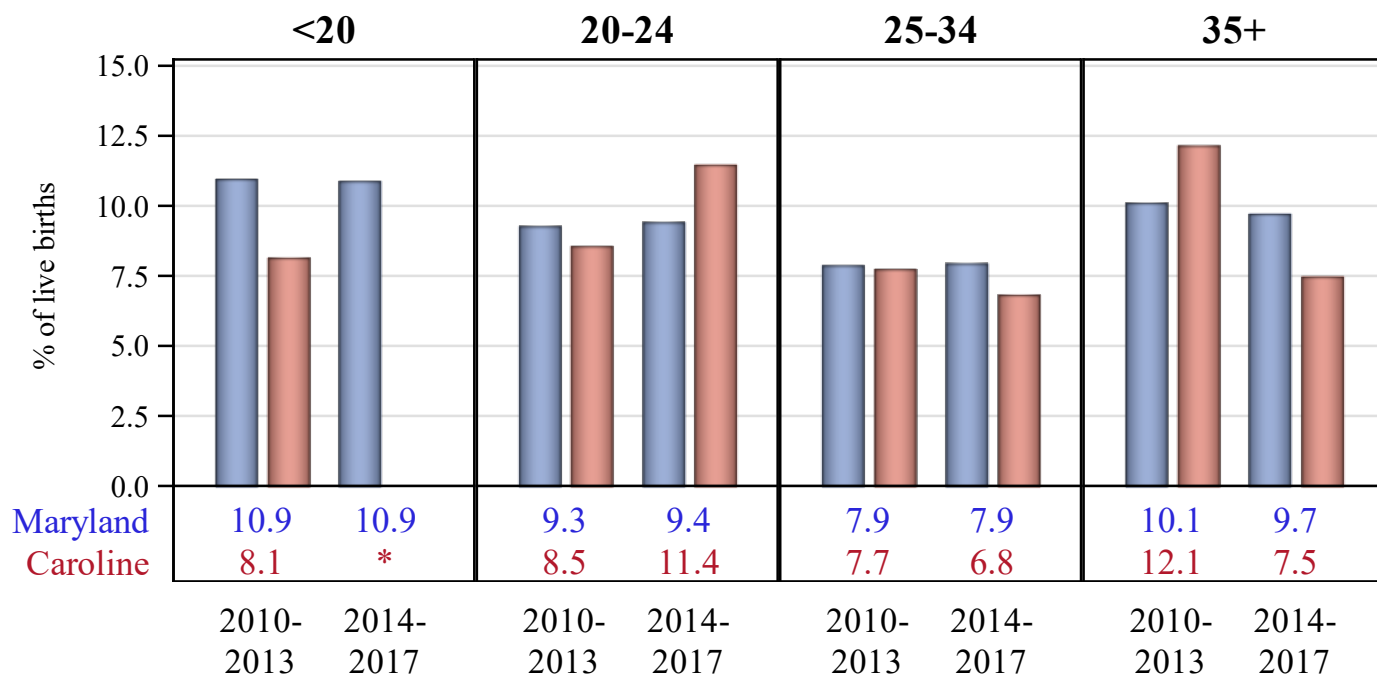
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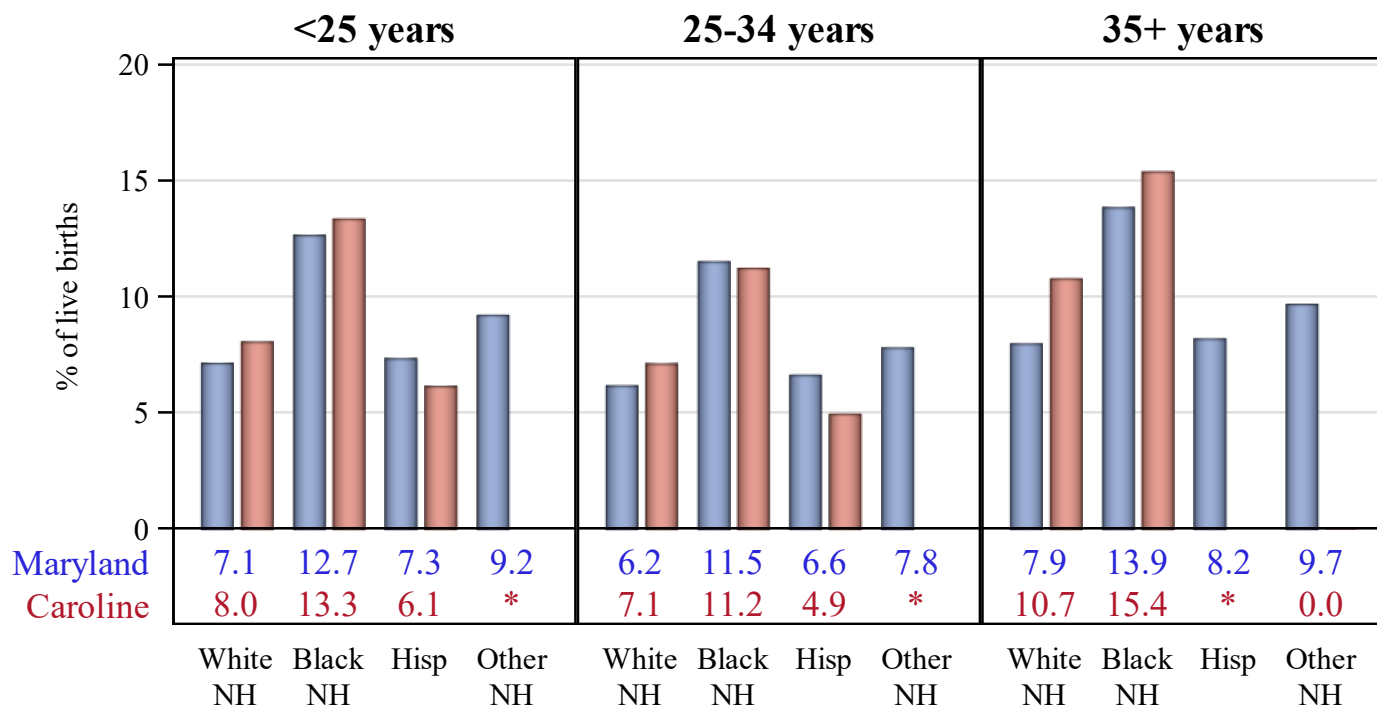
CAROLINE

Low Birth Weight (LBW, <2500 grams)

by Maternal Age and Year



by Maternal Age and Race, 2010-2017



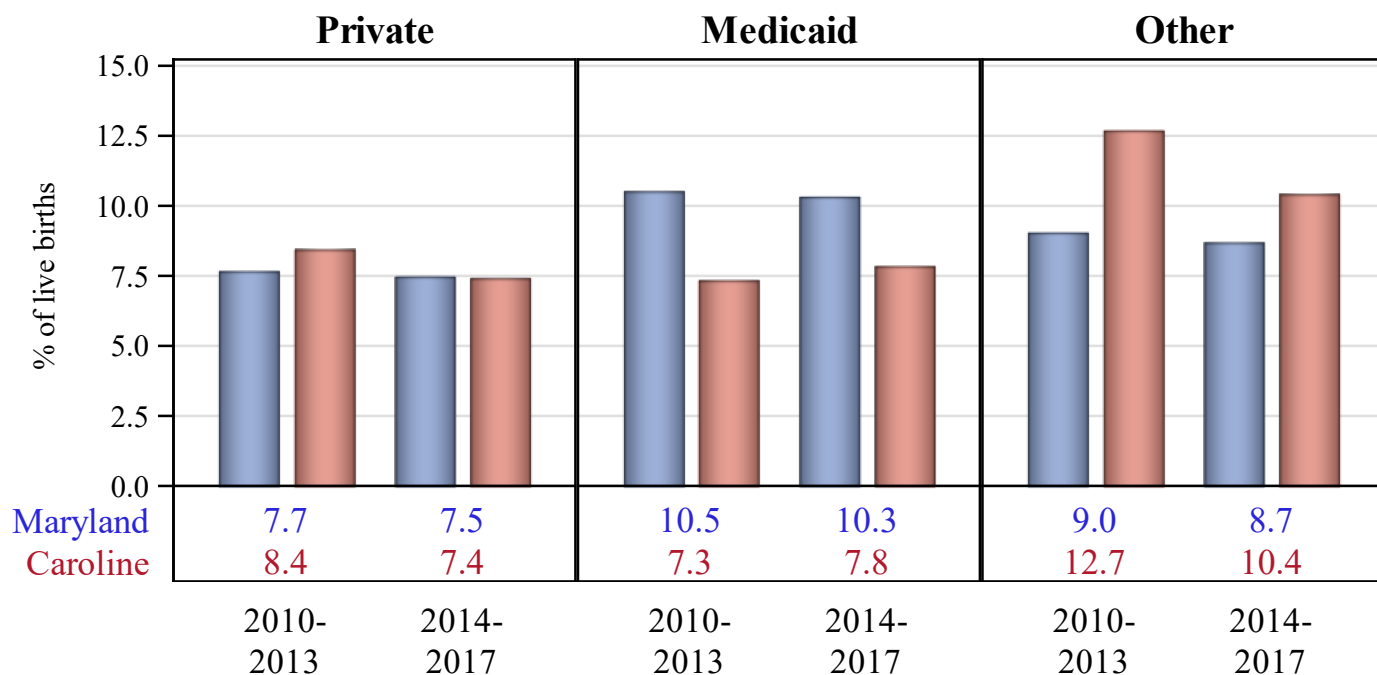
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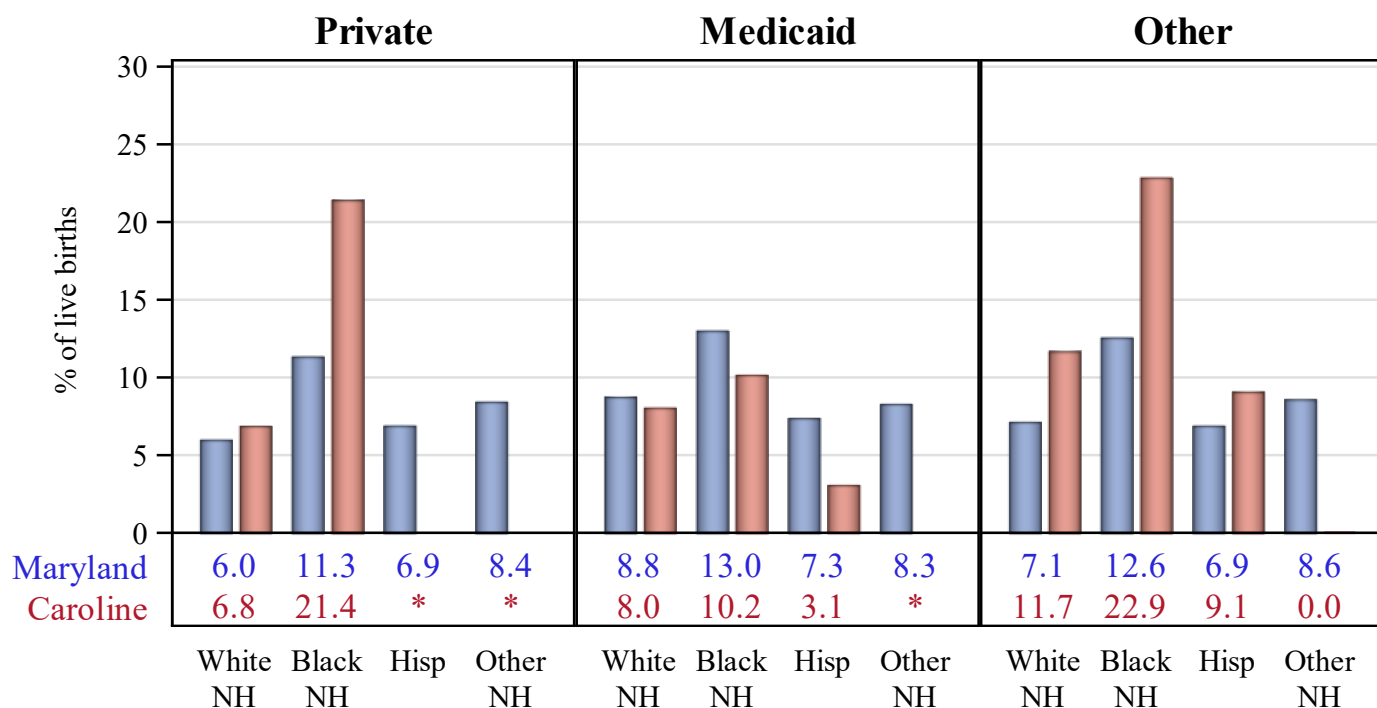
CAROLINE

Low Birth Weight (LBW, <2500 grams)

by Insurance Coverage and Year



by Insurance Coverage and Race, 2010-2017



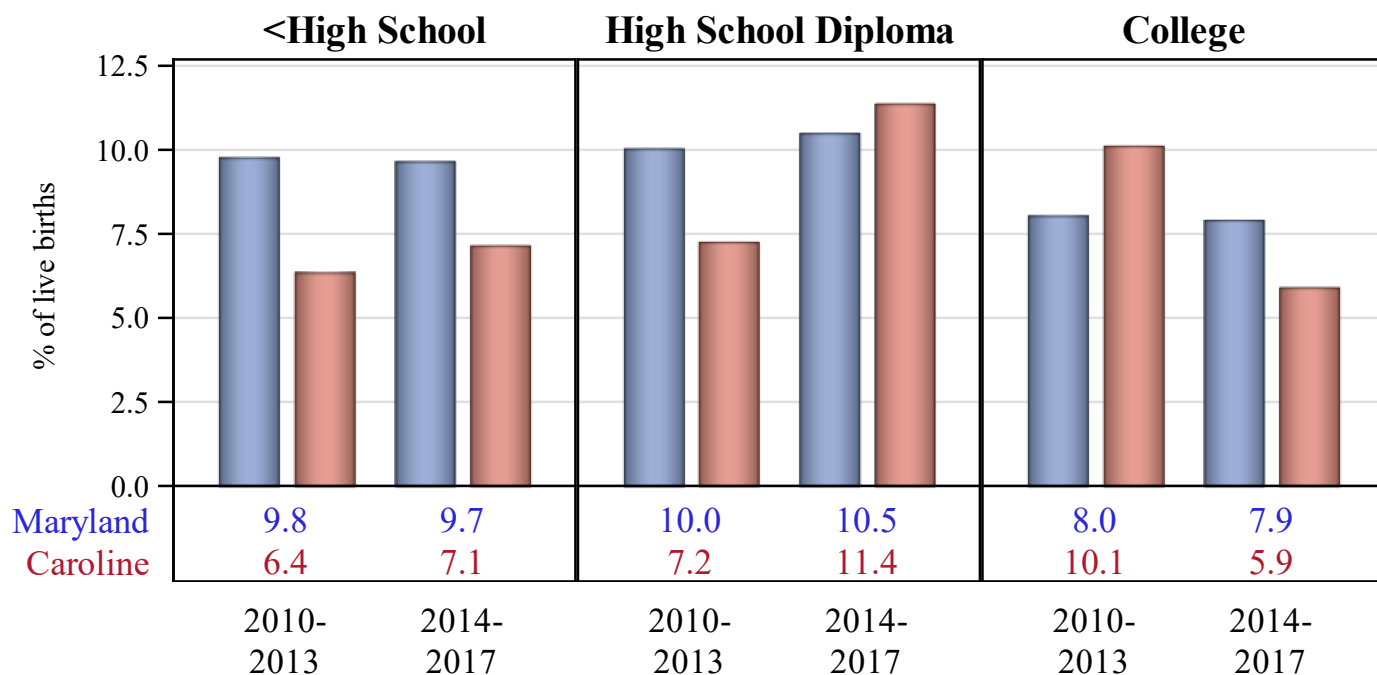
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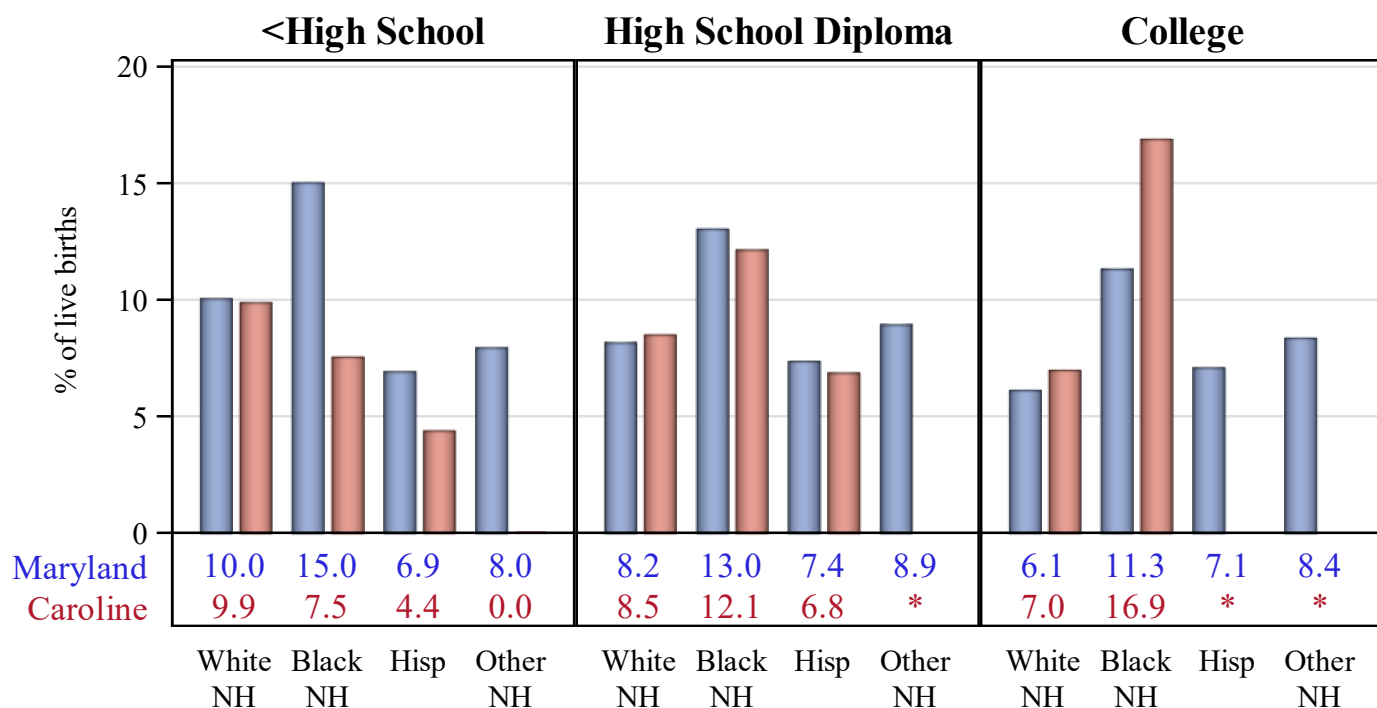
CAROLINE

Low Birth Weight (LBW, <2500 grams)

by Maternal Educational Attainment and Year



by Maternal Educational Attainment and Race, 2010-2017



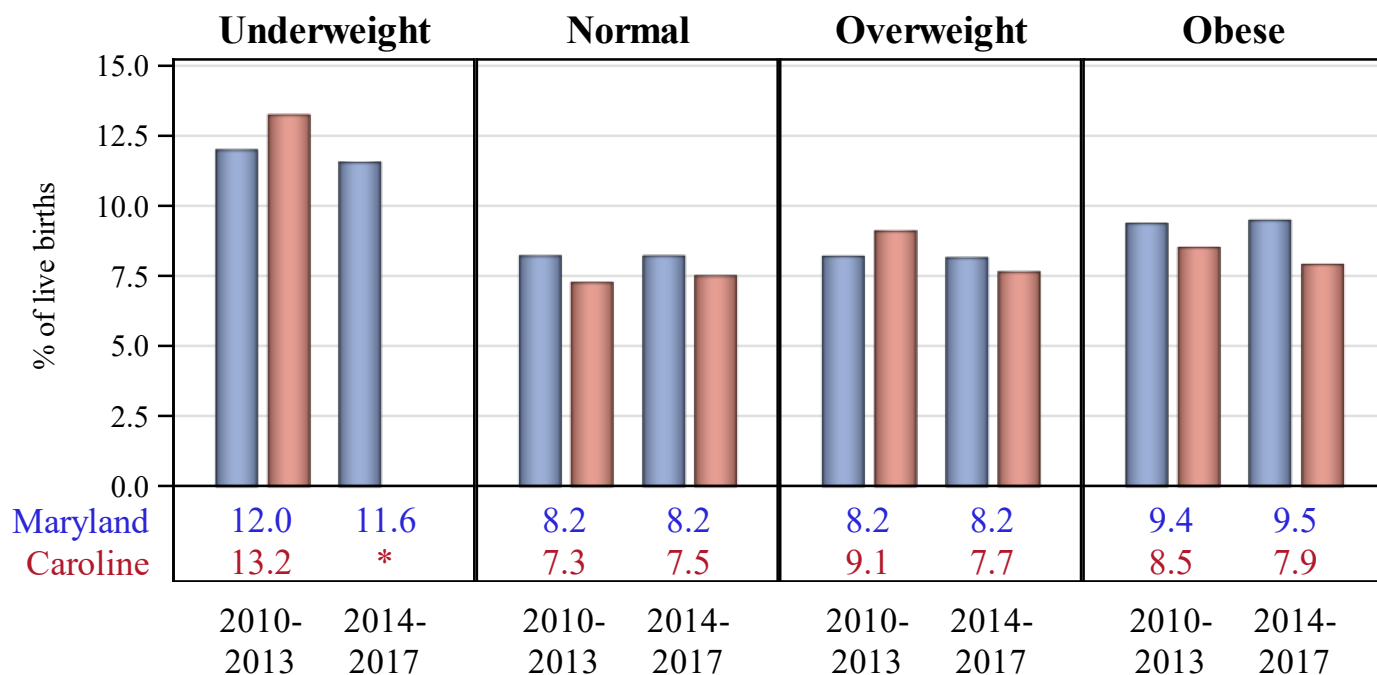
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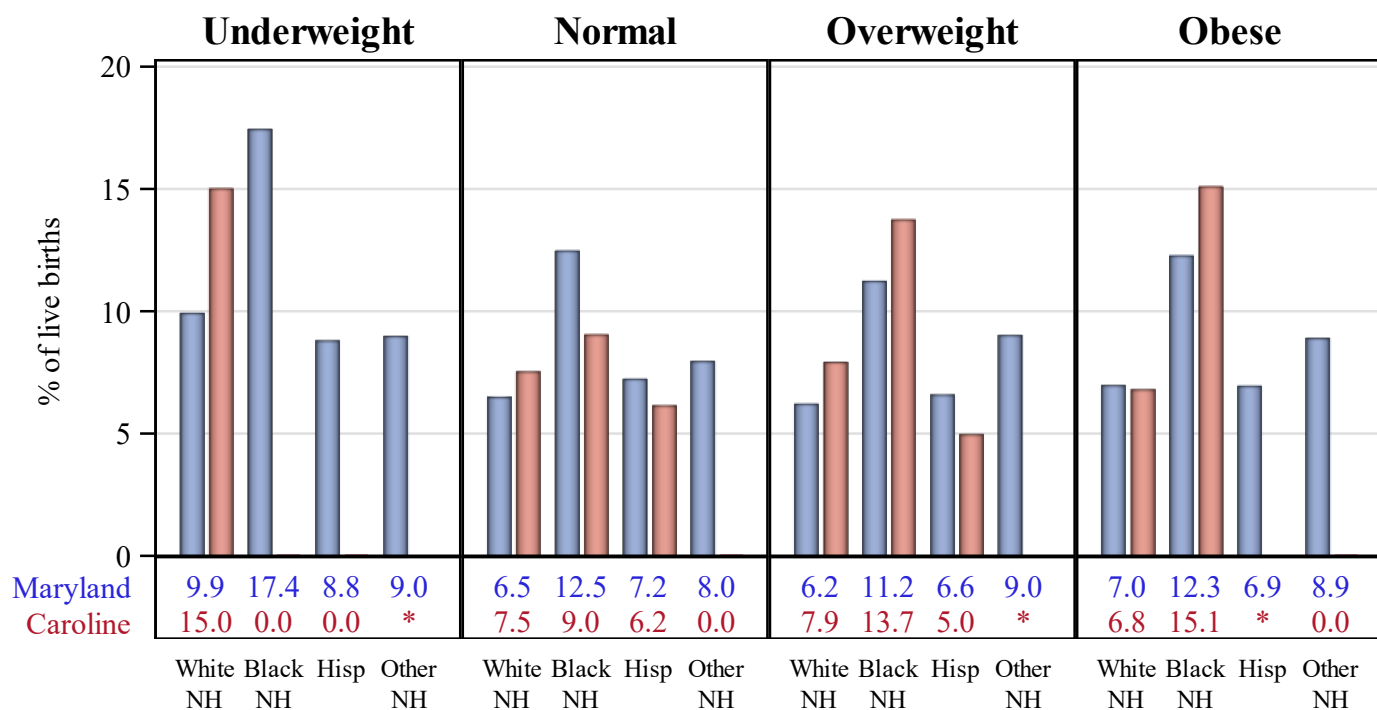
CAROLINE

Low Birth Weight (LBW, <2500 grams)

by Pre-Pregnancy Body Mass Index (BMI) and Year



by Pre-Pregnancy Body Mass Index (BMI) and Race, 2010-2017



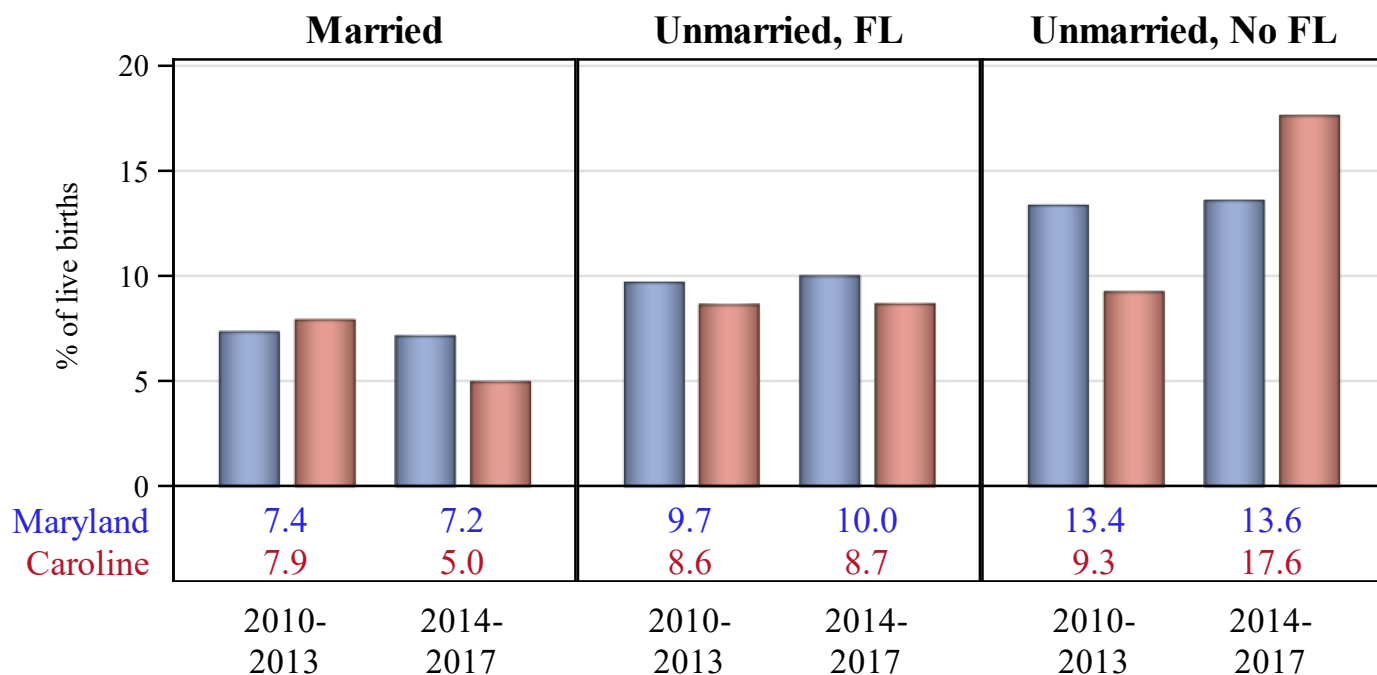
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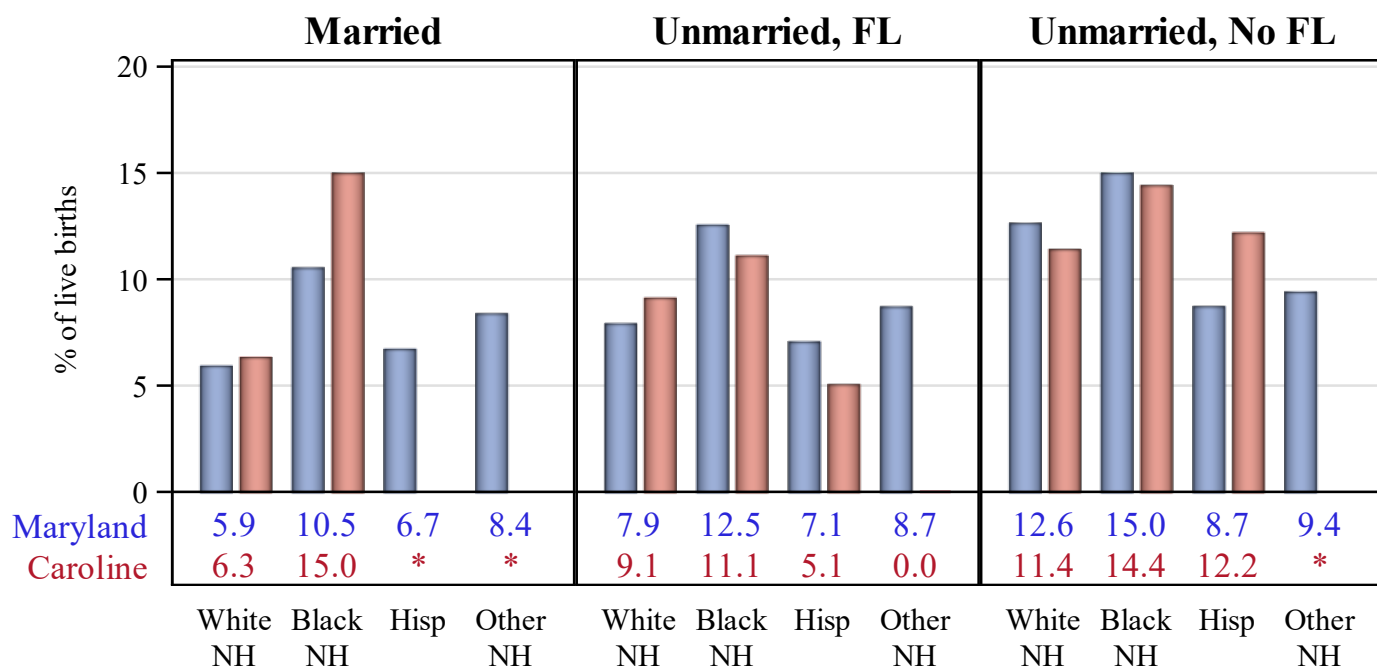
CAROLINE

Low Birth Weight (LBW, <2500 grams)

by Marital Status and Year



by Marital Status and Race, 2010-2017

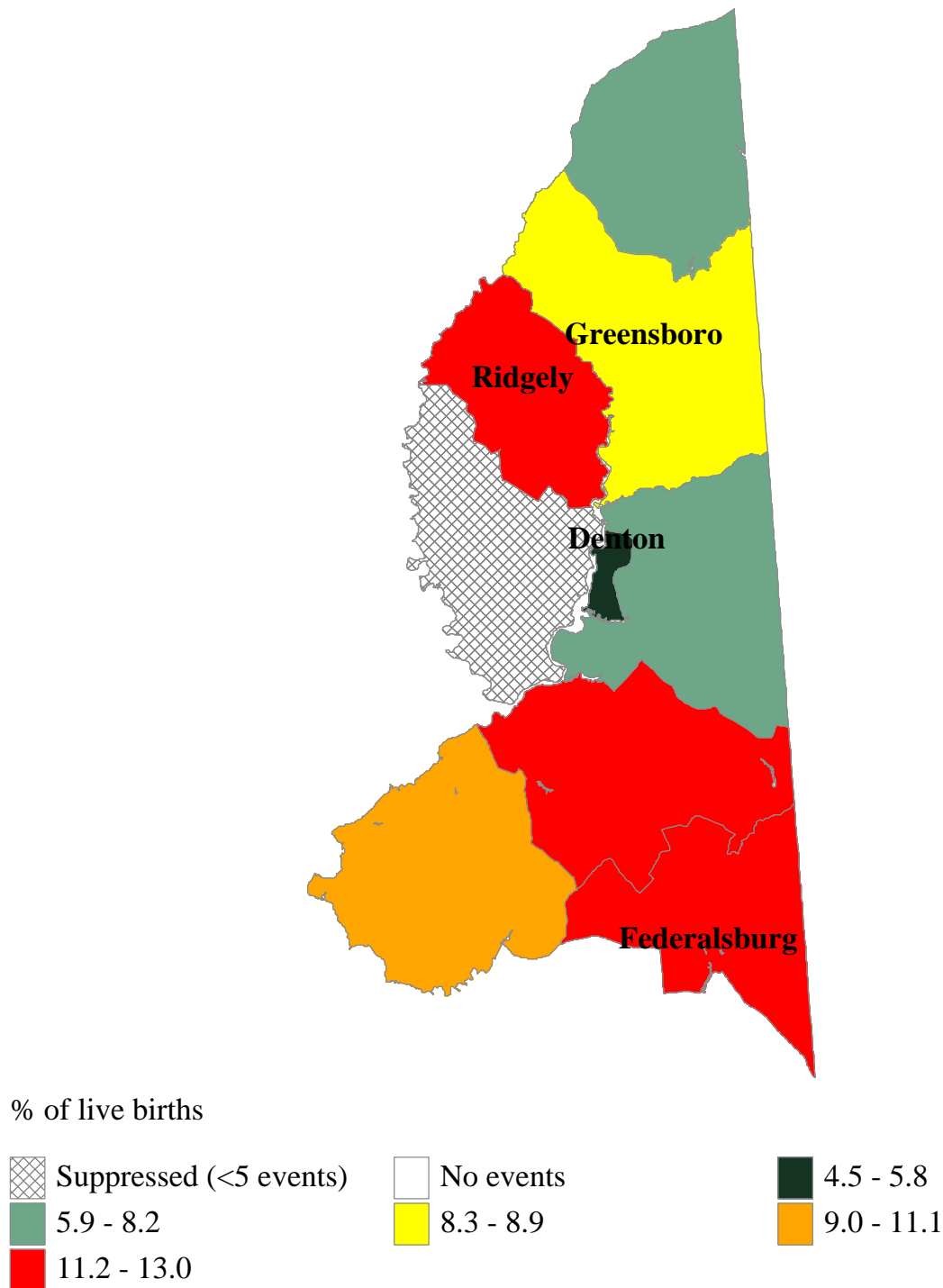


Source: Maryland Vital Statistics Administration

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FL: father listed on the birth certificate

Low Birth Weight (LBW, <2500 grams) by Maternal Residence Census Tract, 2010-2017



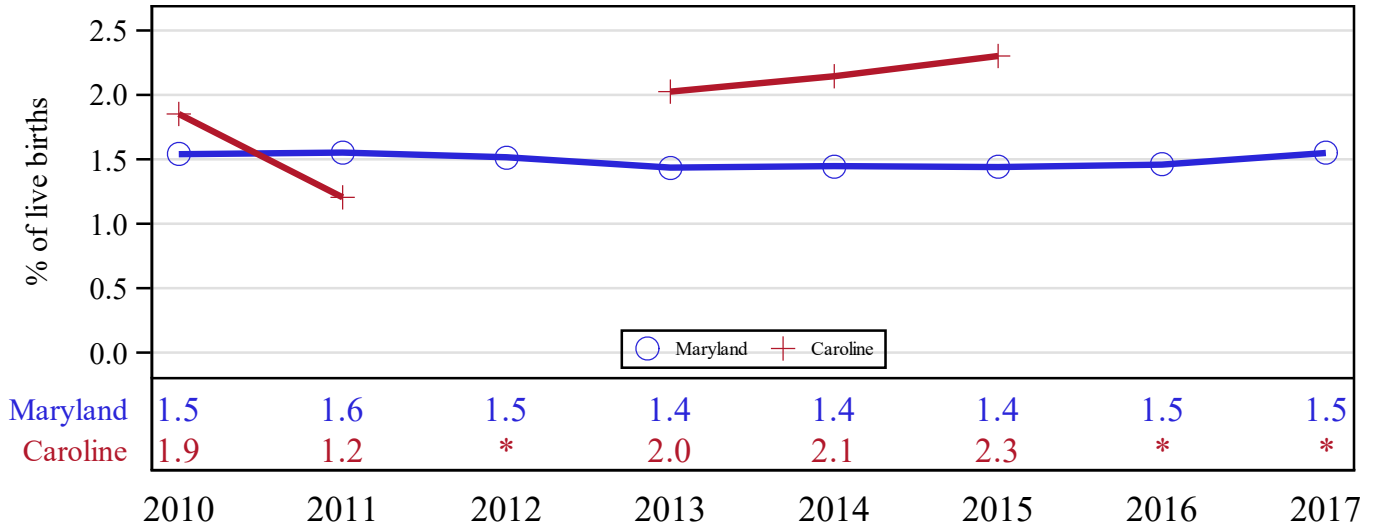
CAROLINE

Very LBW (<1500 grams) & Very PTB (<32 weeks)

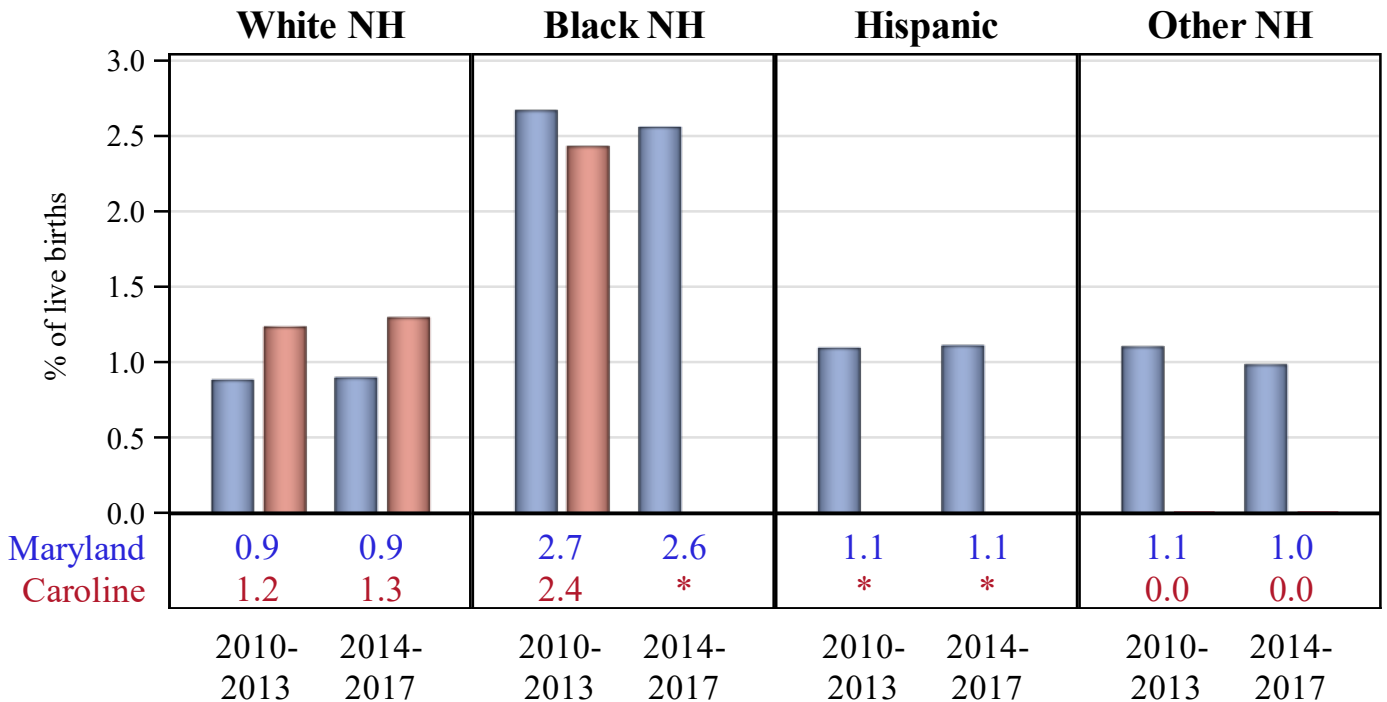
Approximately 1 in 4 infants born very PTB & very LBW die before their first birthday. Very PTB & very LBW infants also have an increased risk of developmental delays.

*Of the 377 live births in Caroline in 2017, *%were born very premature.*

by Year



by Maternal Race and Year



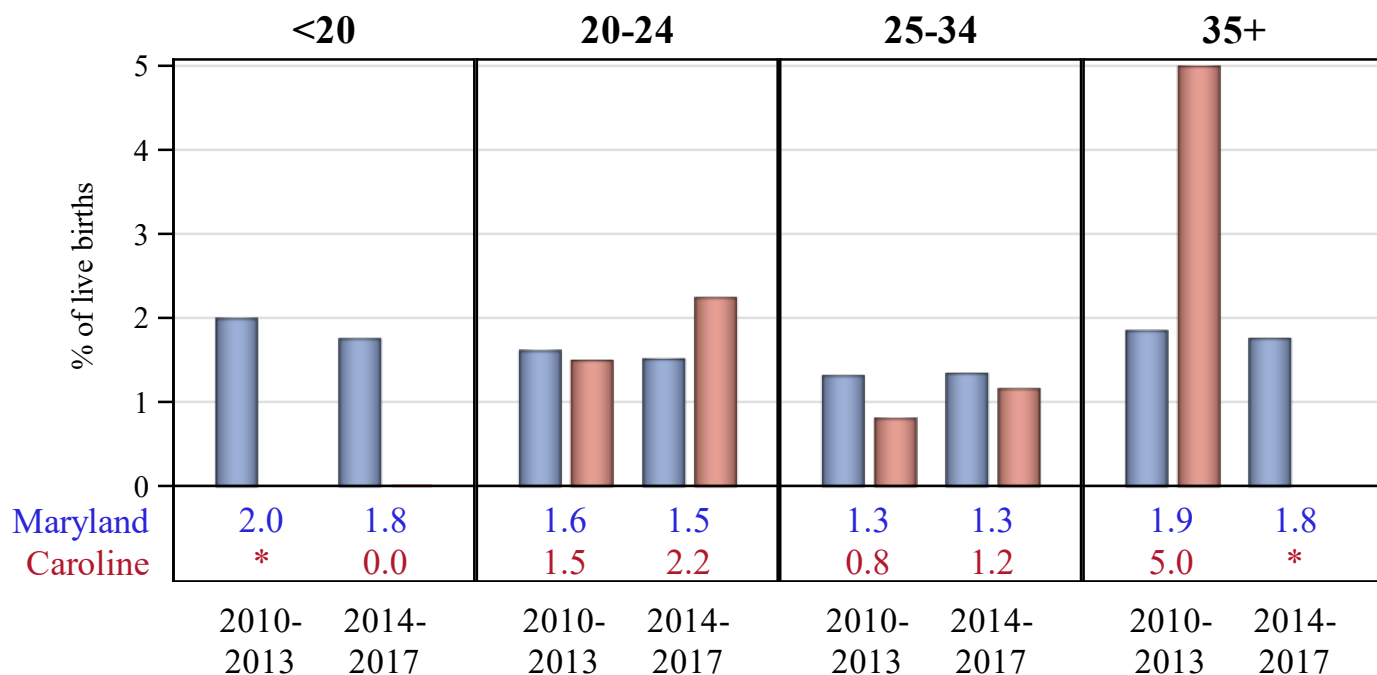
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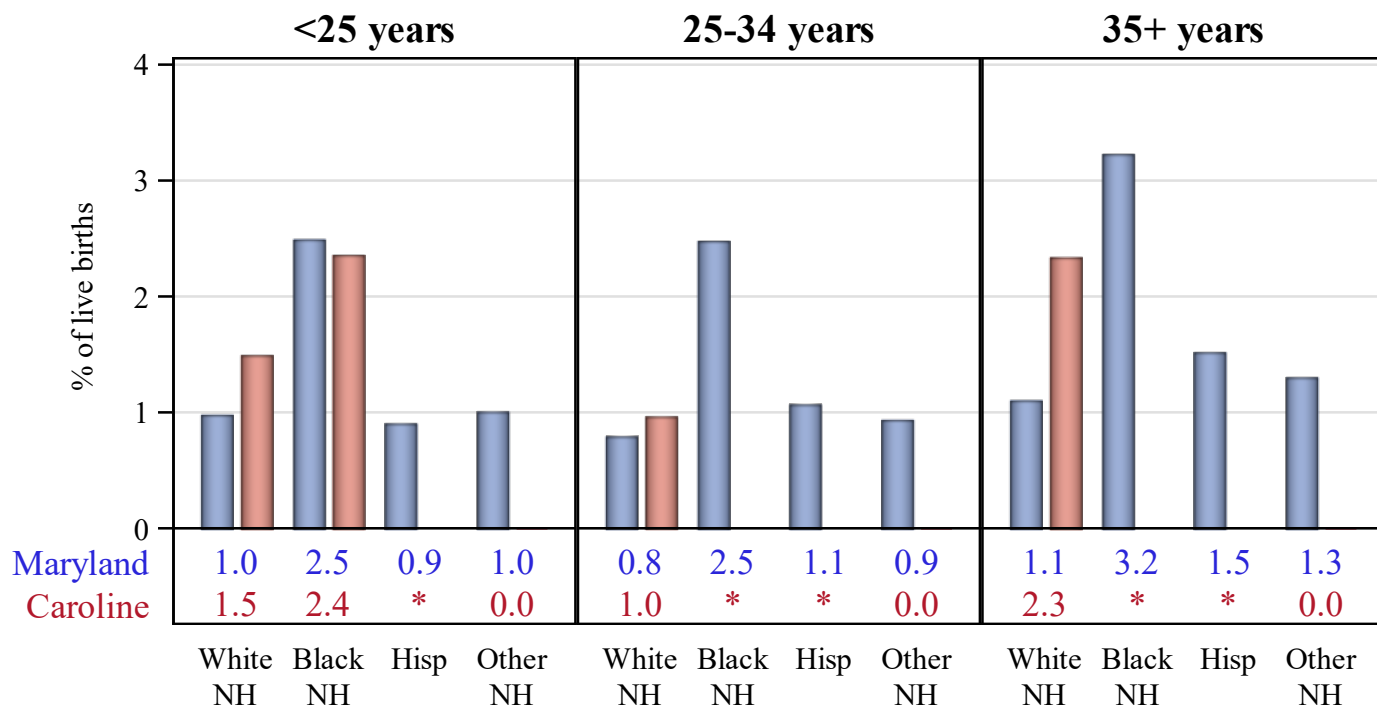
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Very LBW (<1500 grams) & Very PTB (<32 weeks)

by Maternal Age and Year



by Maternal Age and Race, 2010-2017



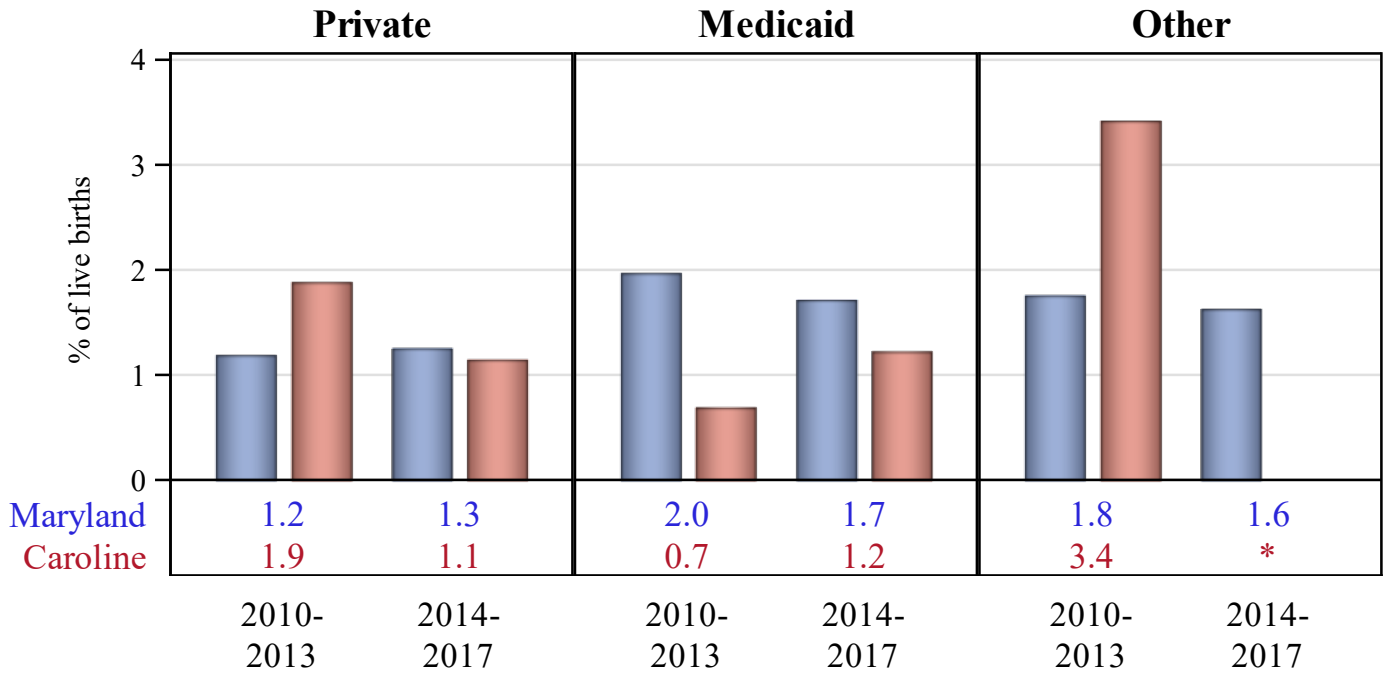
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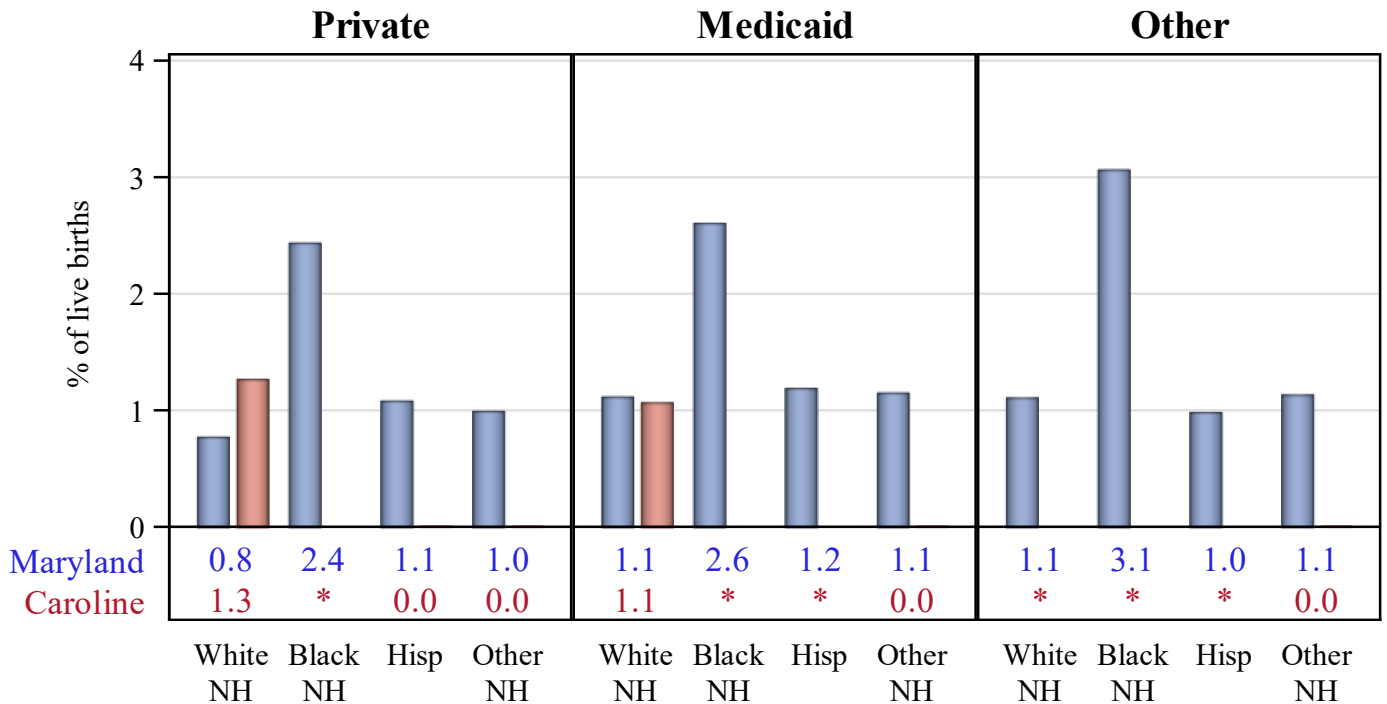
CAROLINE

Very LBW (<1500 grams) & Very PTB (<32 weeks)

by Insurance Coverage and Year



by Insurance Coverage and Race, 2010-2017



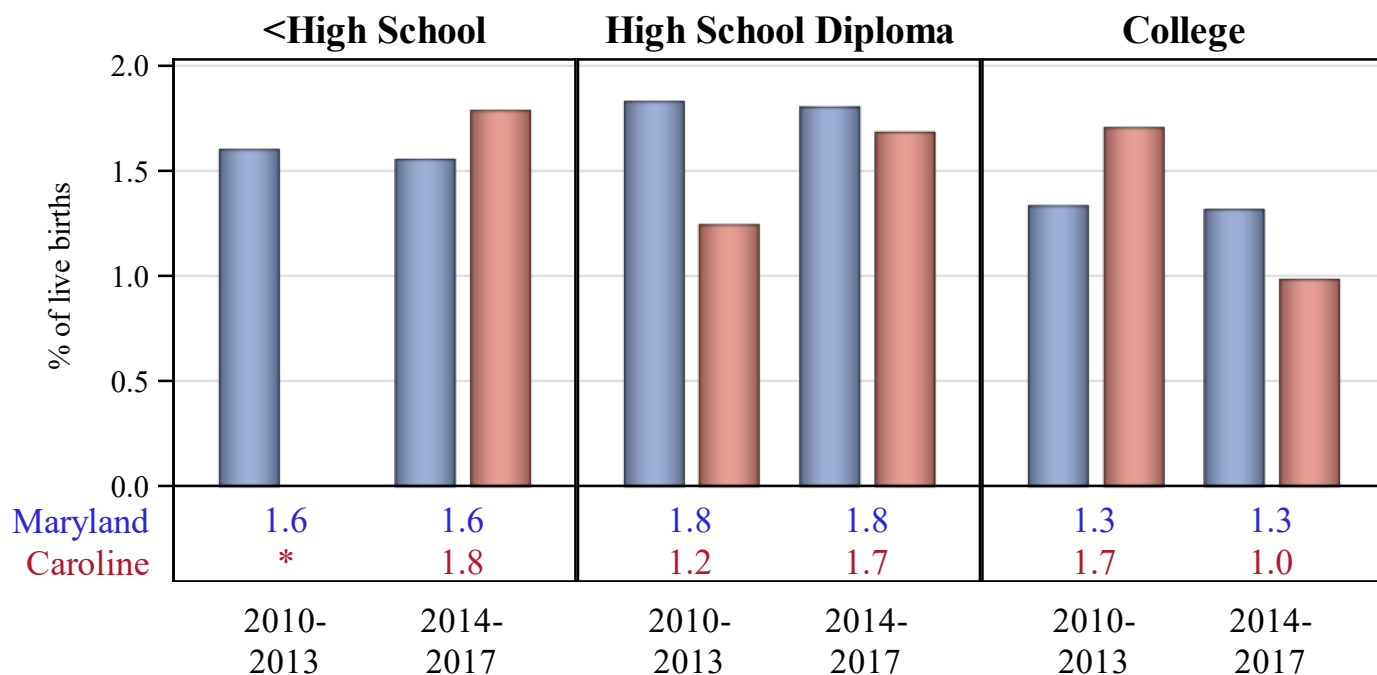
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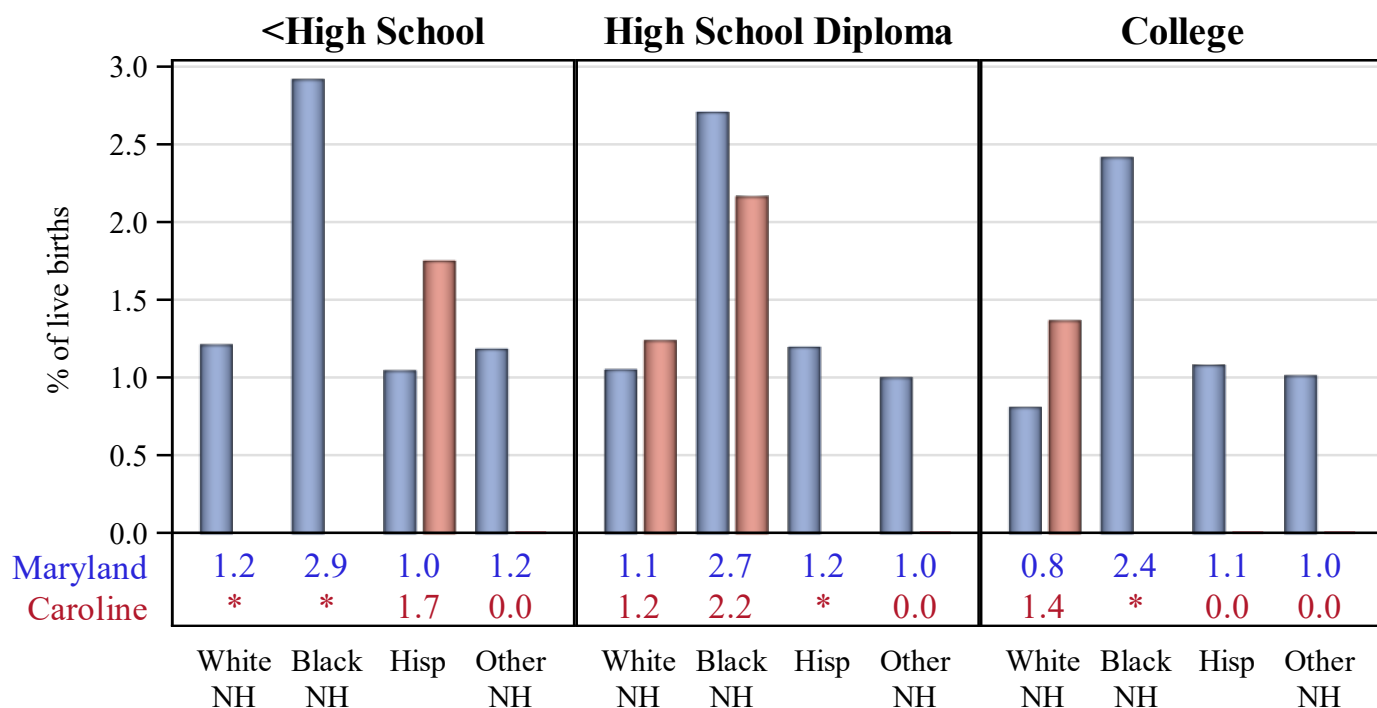
CAROLINE

Very LBW (<1500 grams) & Very PTB (<32 weeks)

by Maternal Educational Attainment and Year



by Maternal Educational Attainment and Race, 2010-2017



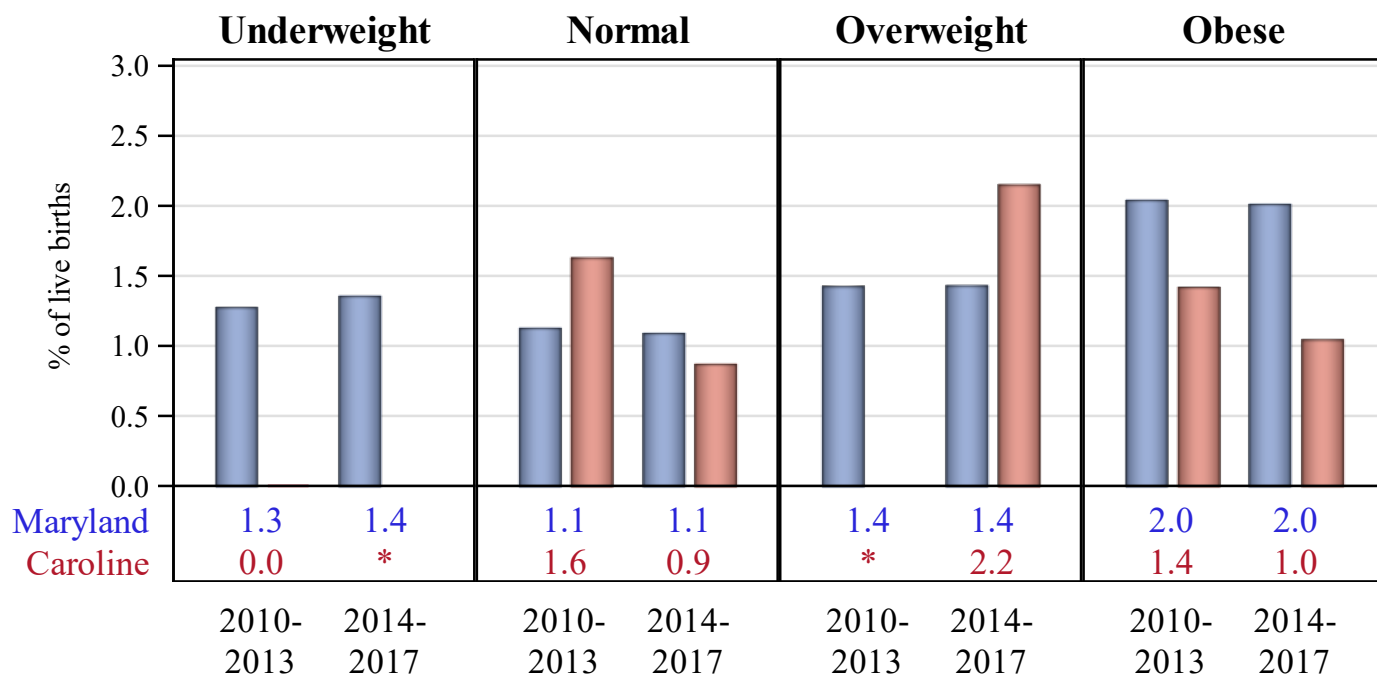
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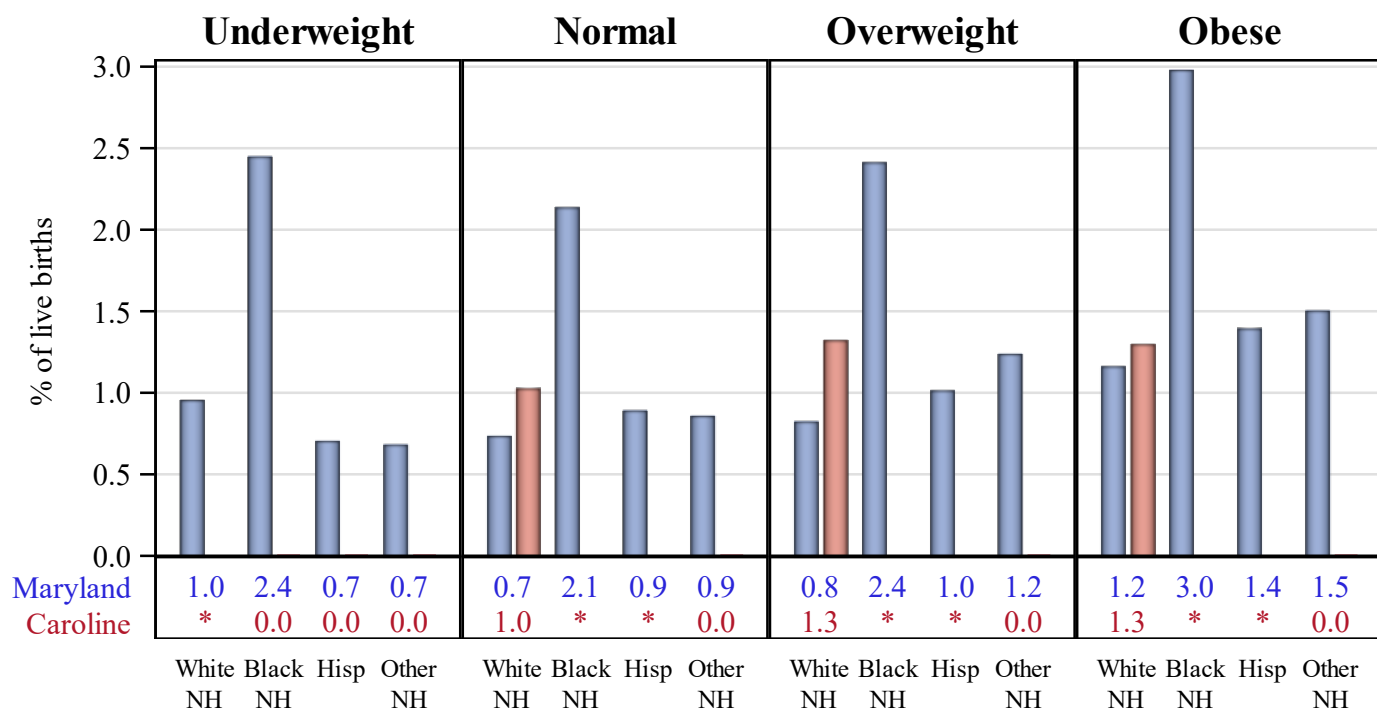
CAROLINE

Very LBW (<1500 grams) & Very PTB (<32 weeks)

by Pre-Pregnancy Body Mass Index (BMI) and Year



by Pre-Pregnancy Body Mass Index (BMI) and Race, 2010-2017



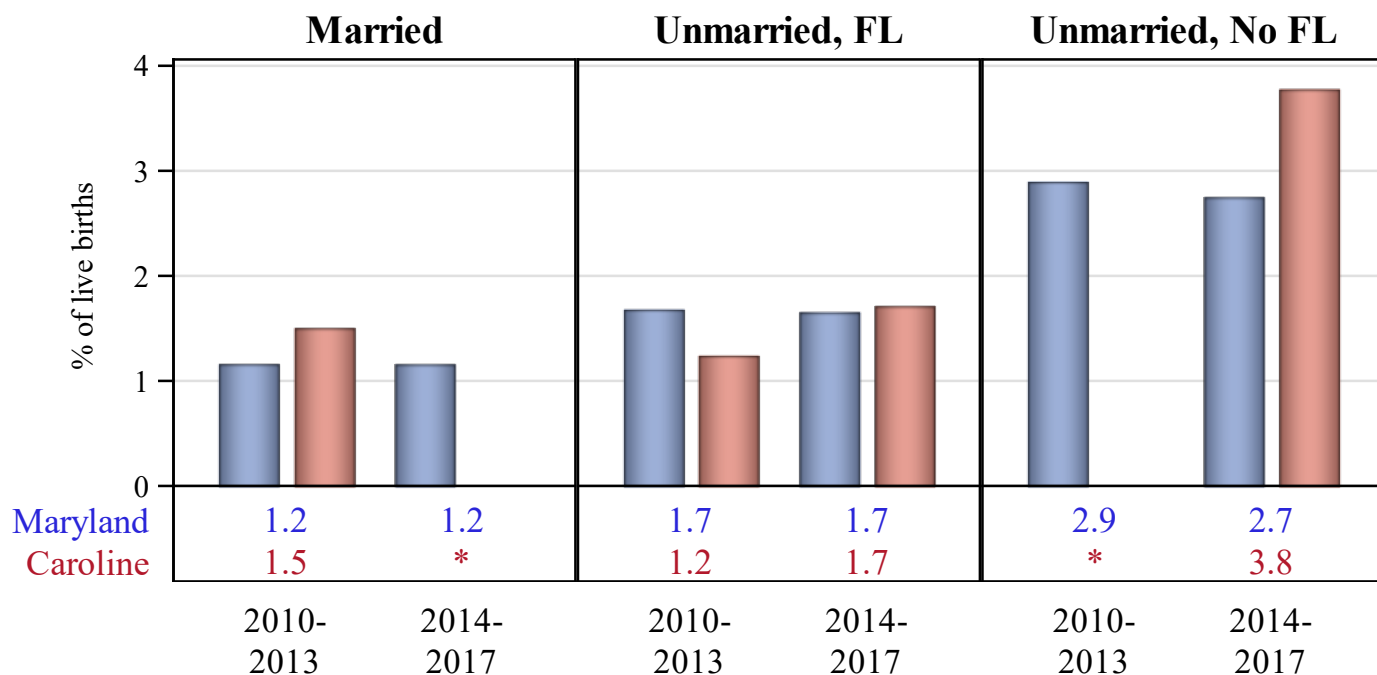
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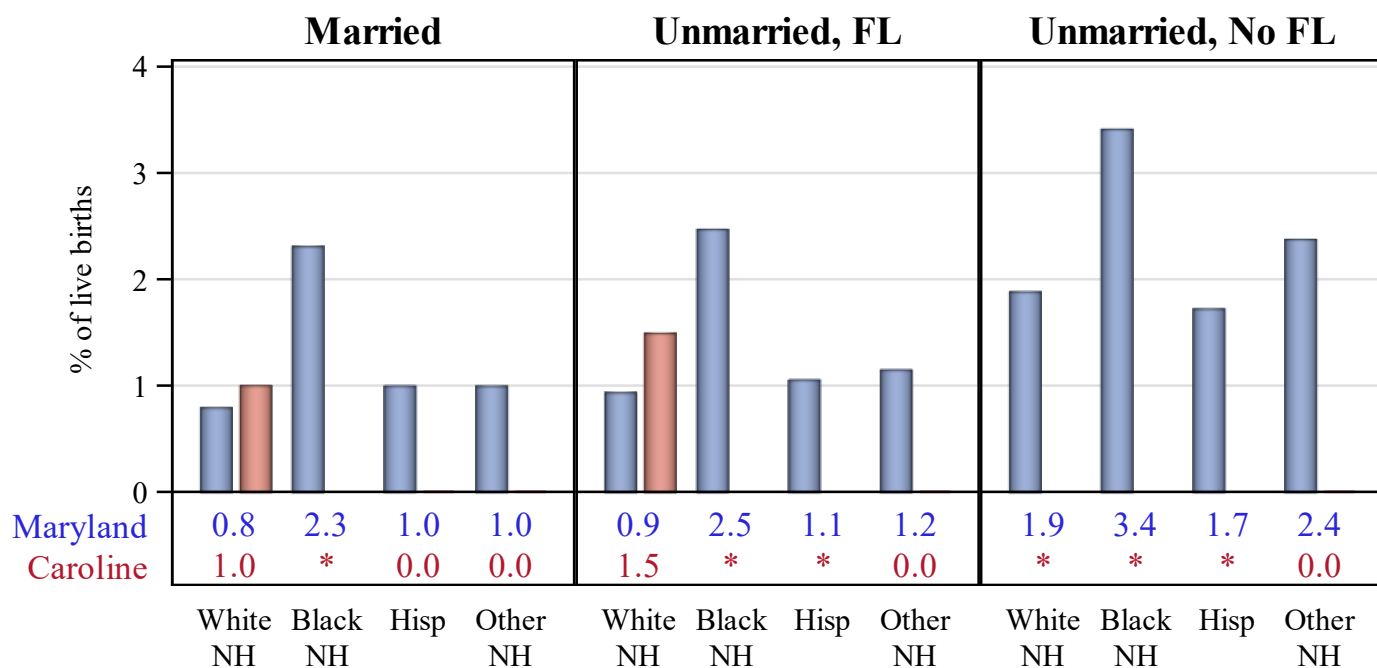
CAROLINE

Very LBW (<1500 grams) & Very PTB (<32 weeks)

by Marital Status and Year



by Marital Status and Race, 2010-2017

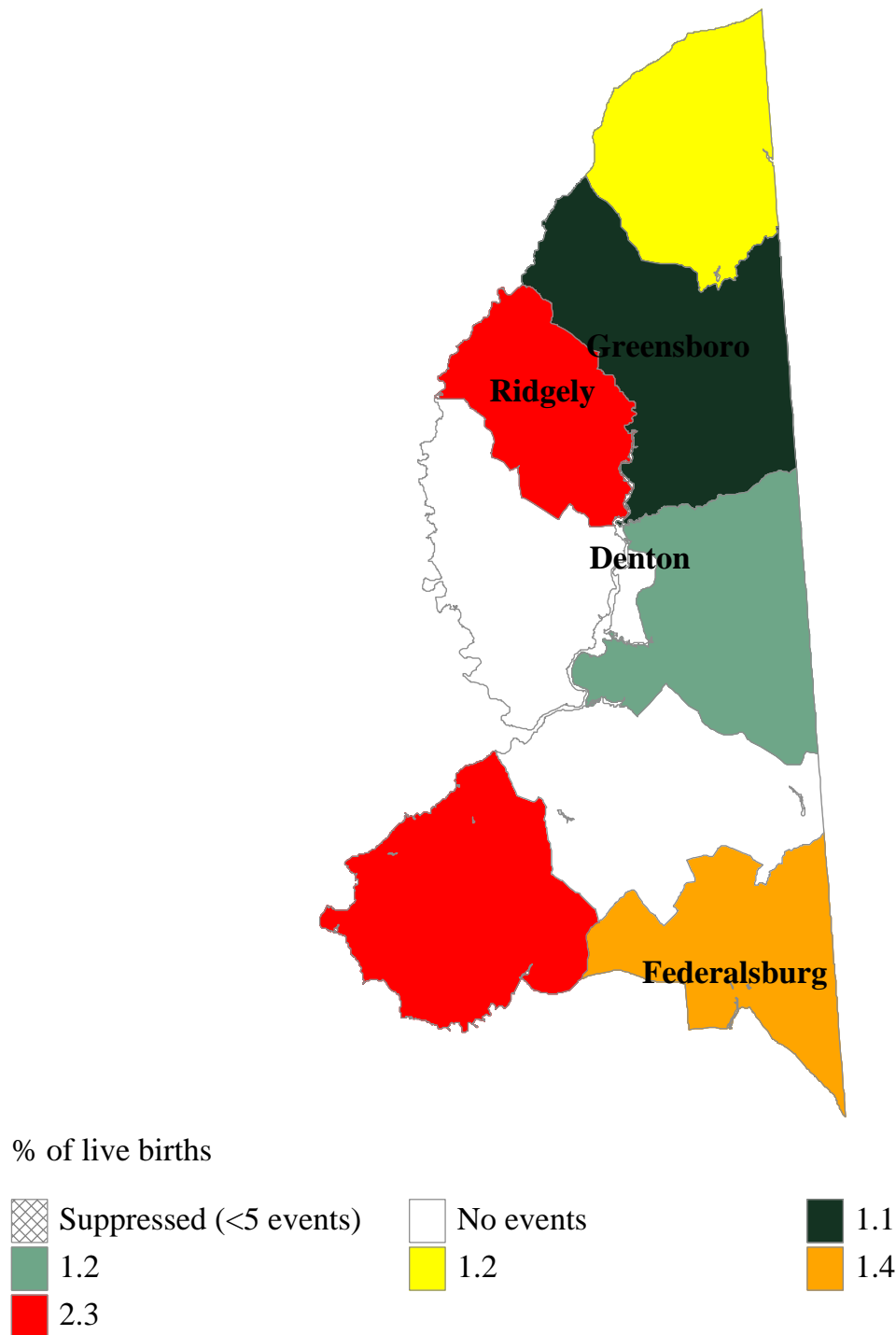


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Very LBW (<1500 grams) & Very PTB (<32 weeks) by Maternal Residence Census Tract, 2010-2017



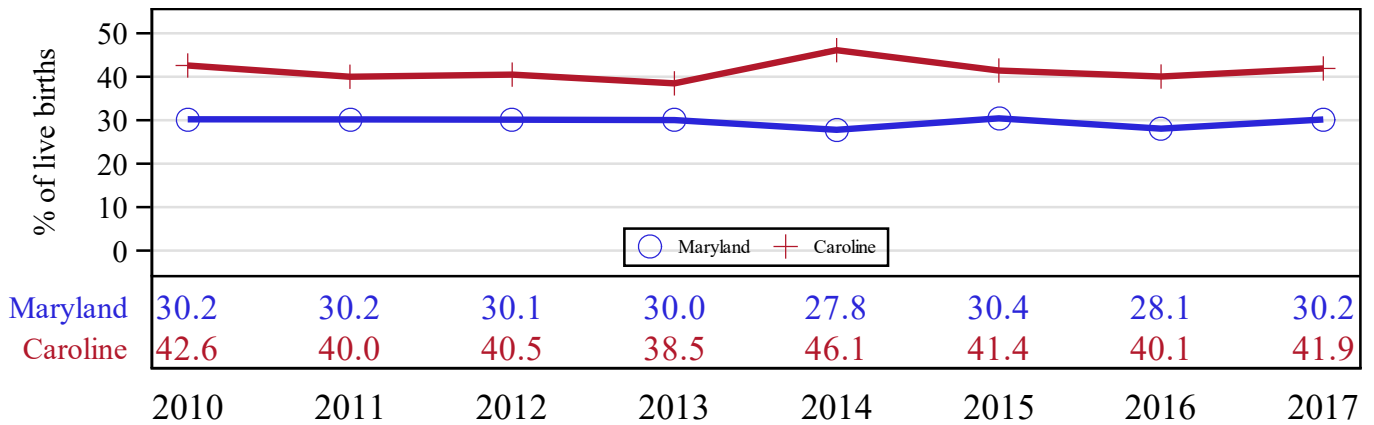
CAROLINE

Risk Factor: Unmarried, No Father Listed

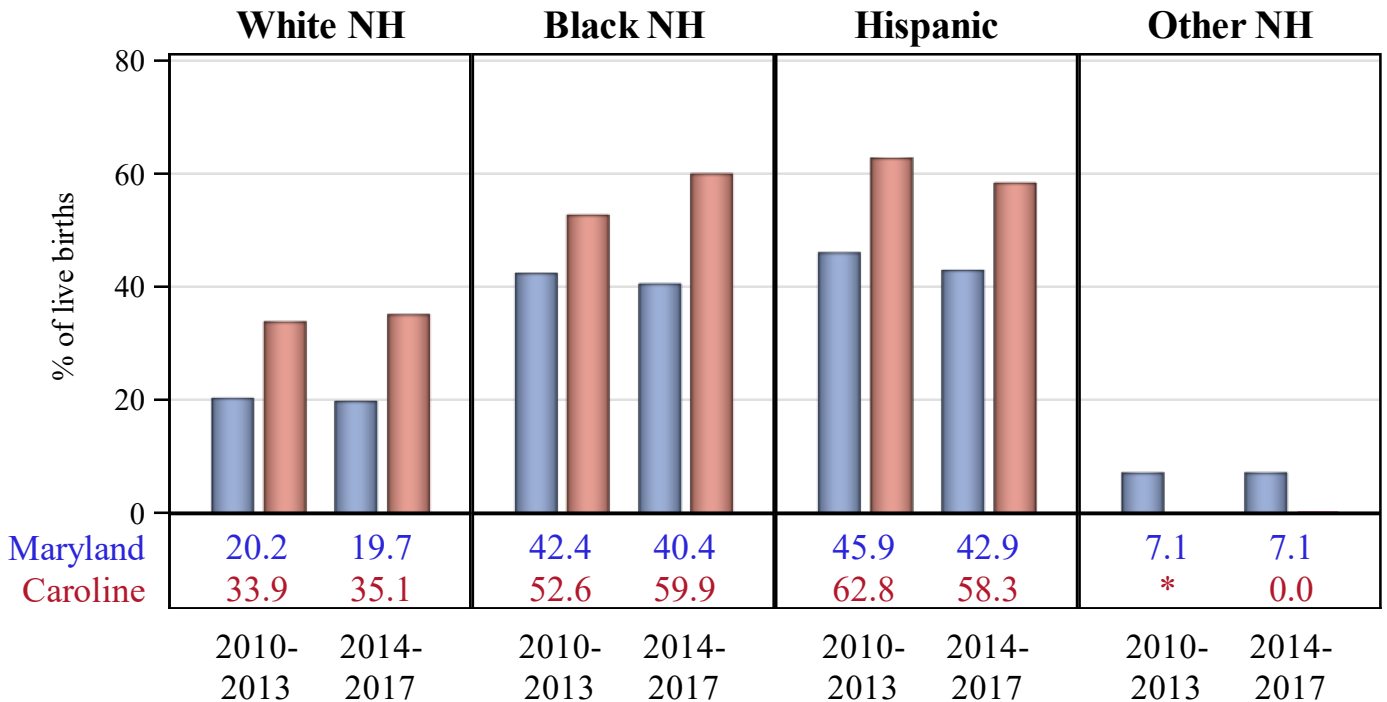
Births to unmarried women with no father listed on the birth certificate have an increased risk of adverse birth outcomes. (Ngui, 2009; Luo, 2004; Alio, 2010). Mothers with a lack of paternal involvement are more likely to experience greater psychosocial stress due to insufficient economic and social support which can lead to poor health behaviors and adverse birth outcomes.

Of the 377 live births in Caroline in 2017, 41.9% were to unmarried women with no father listed on the birth certificate.

by Year



by Maternal Race and Year

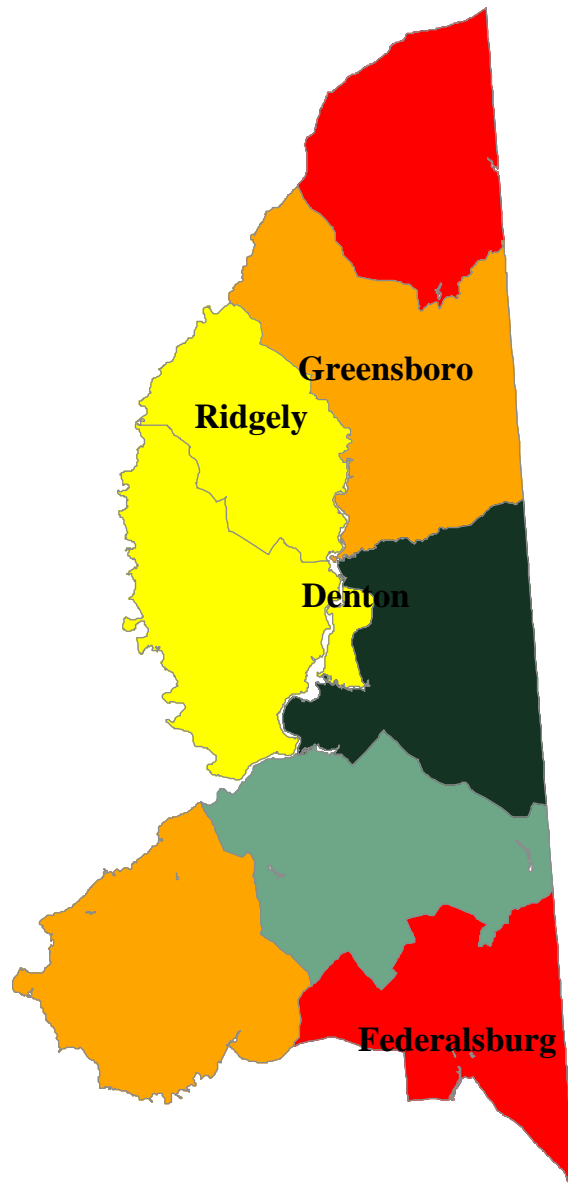


Source: Maryland Vital Statistics Administration

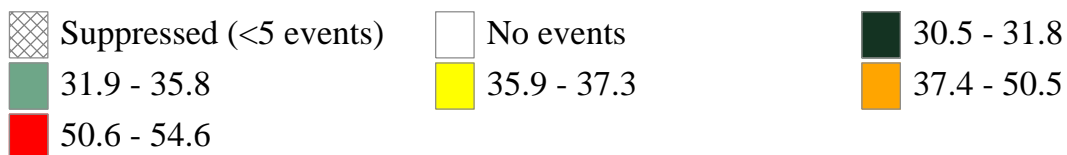
*Rates based on less than 5 events are suppressed. FL: father listed on the birth certificate. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

CAROLINE

Risk Factor: Unmarried, No Father Listed by Maternal Residence Census Tract, 2010-2017



% of live births



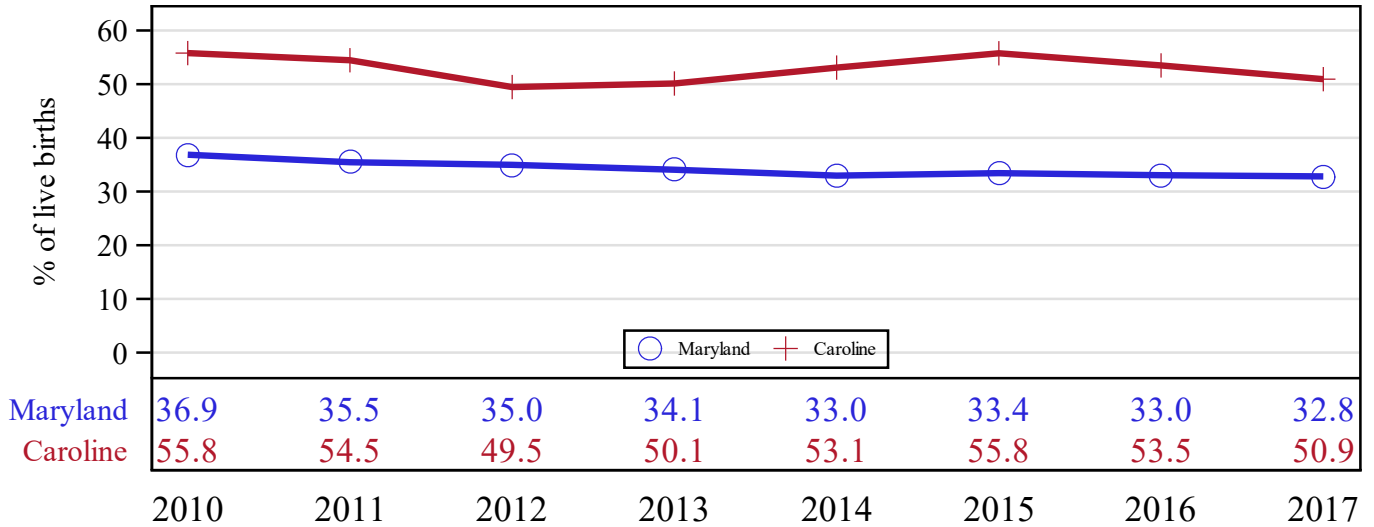
CAROLINE

Risk Factor: Maternal Education: High School Diploma or Less

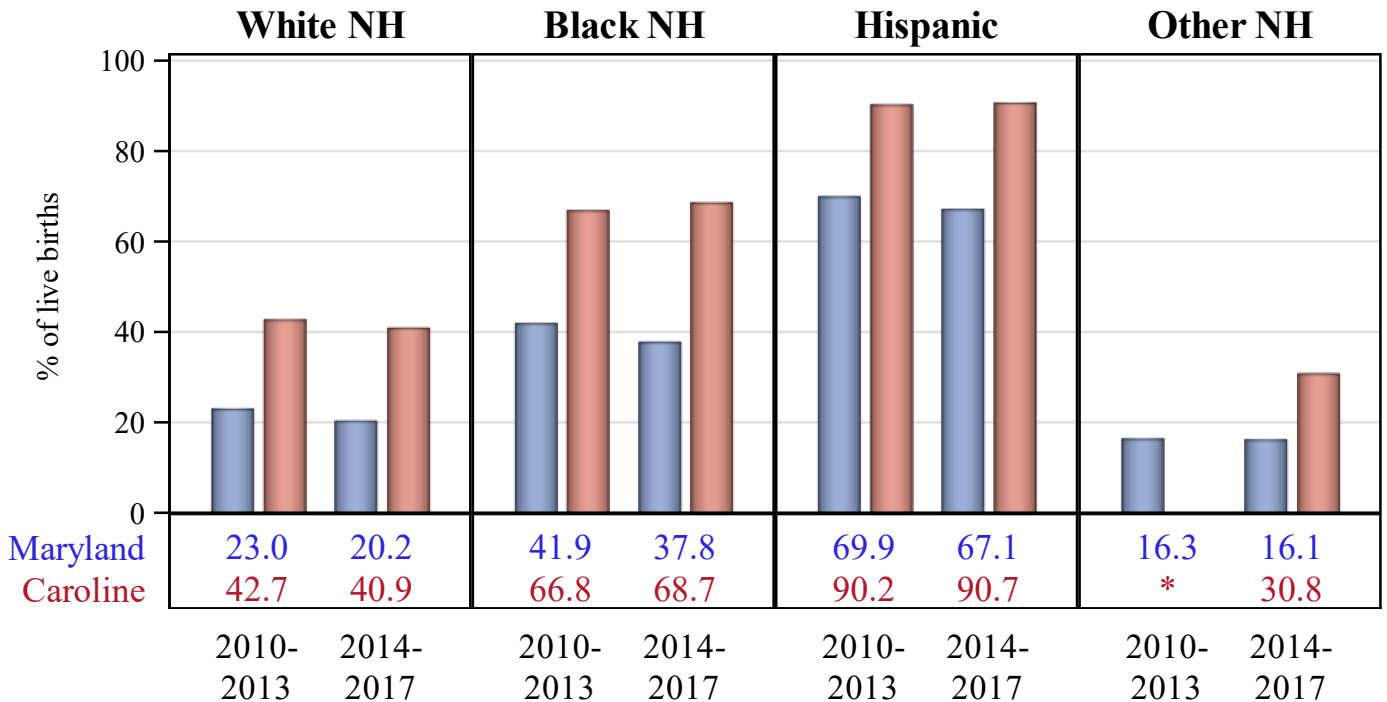
Low educational attainment serves as a proxy for lower socioeconomic status and is associated with increased adverse birth outcome risks.

Of the 377 live births in Caroline in 2017, 50.9% were to women with a high school education or less.

by Year



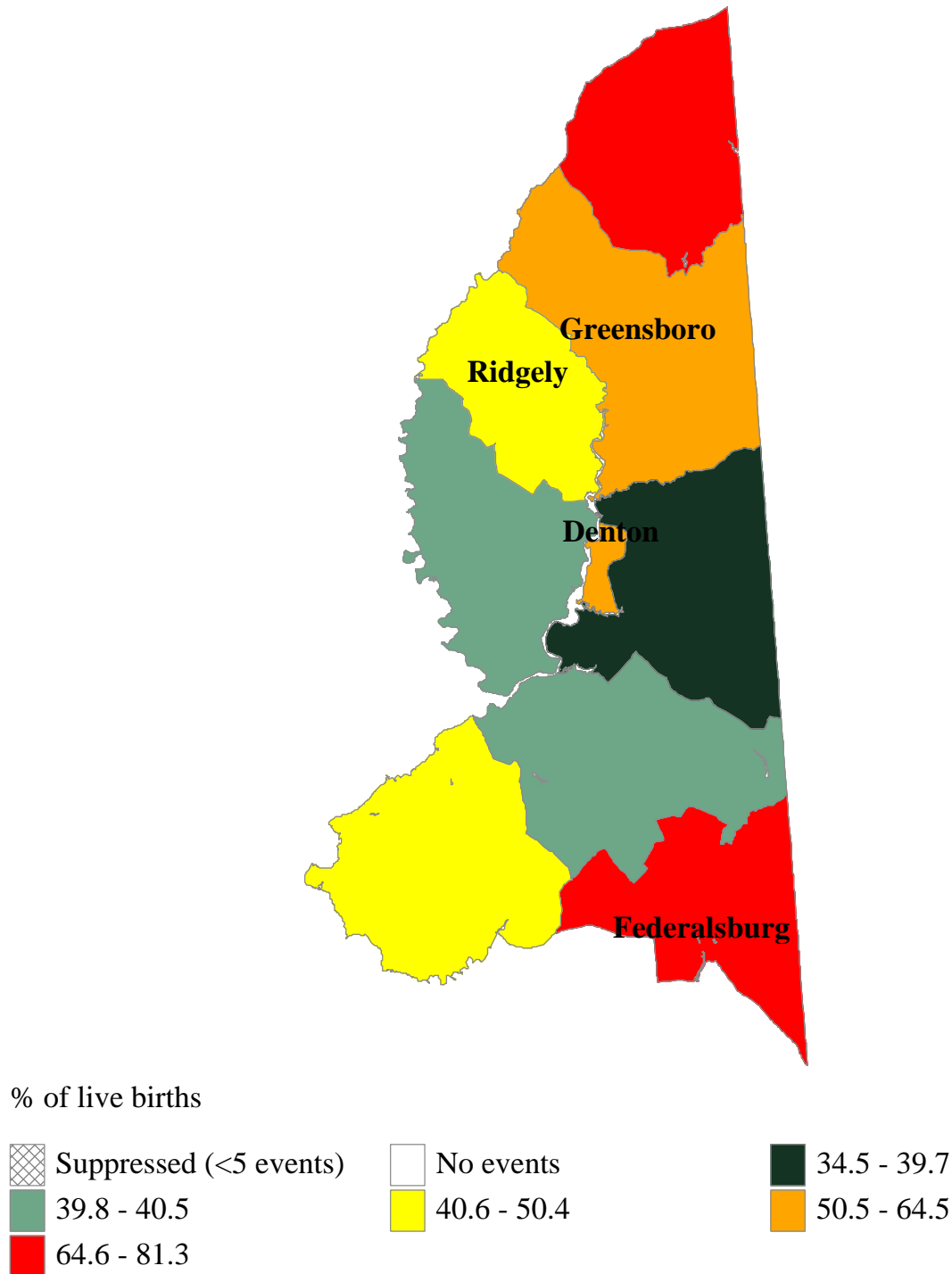
by Maternal Race and Year



Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Maternal Education: High School Diploma or Less by Maternal Residence Census Tract, 2010-2017



% of live births

Suppressed (<5 events)
39.8 - 40.5
64.6 - 81.3

No events
40.6 - 50.4

34.5 - 39.7
50.5 - 64.5

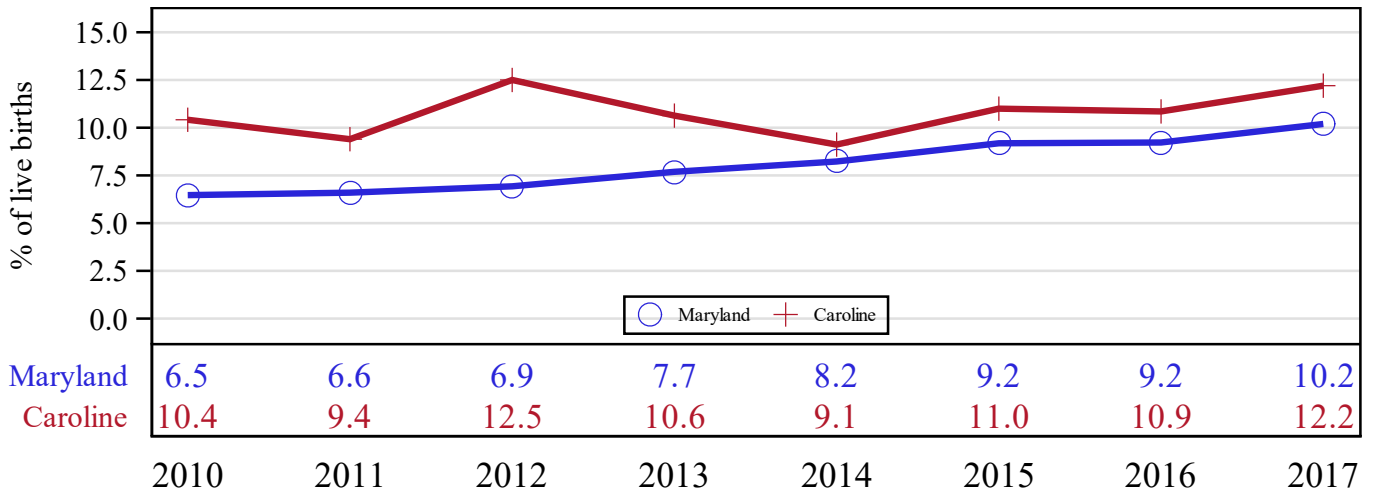
CAROLINE

Risk Factor: Maternal Hypertension (Chronic or Gestational)

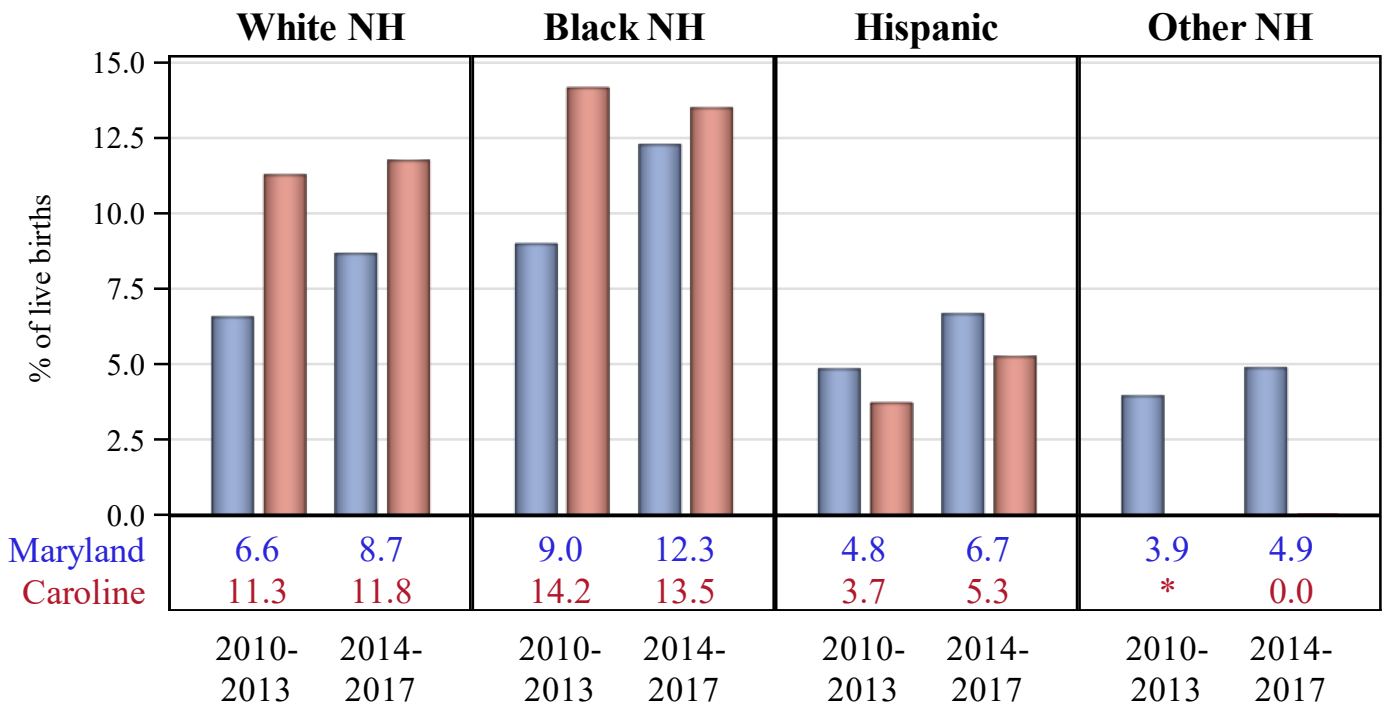
Hypertension before and during pregnancy puts women at higher risk for preeclampsia, cesarean section, preterm birth, and a low birth weight baby.

Of the 377 live births in Caroline in 2017, 12.2% were to women who had chronic or pregnancy-associated hypertension.

by Year



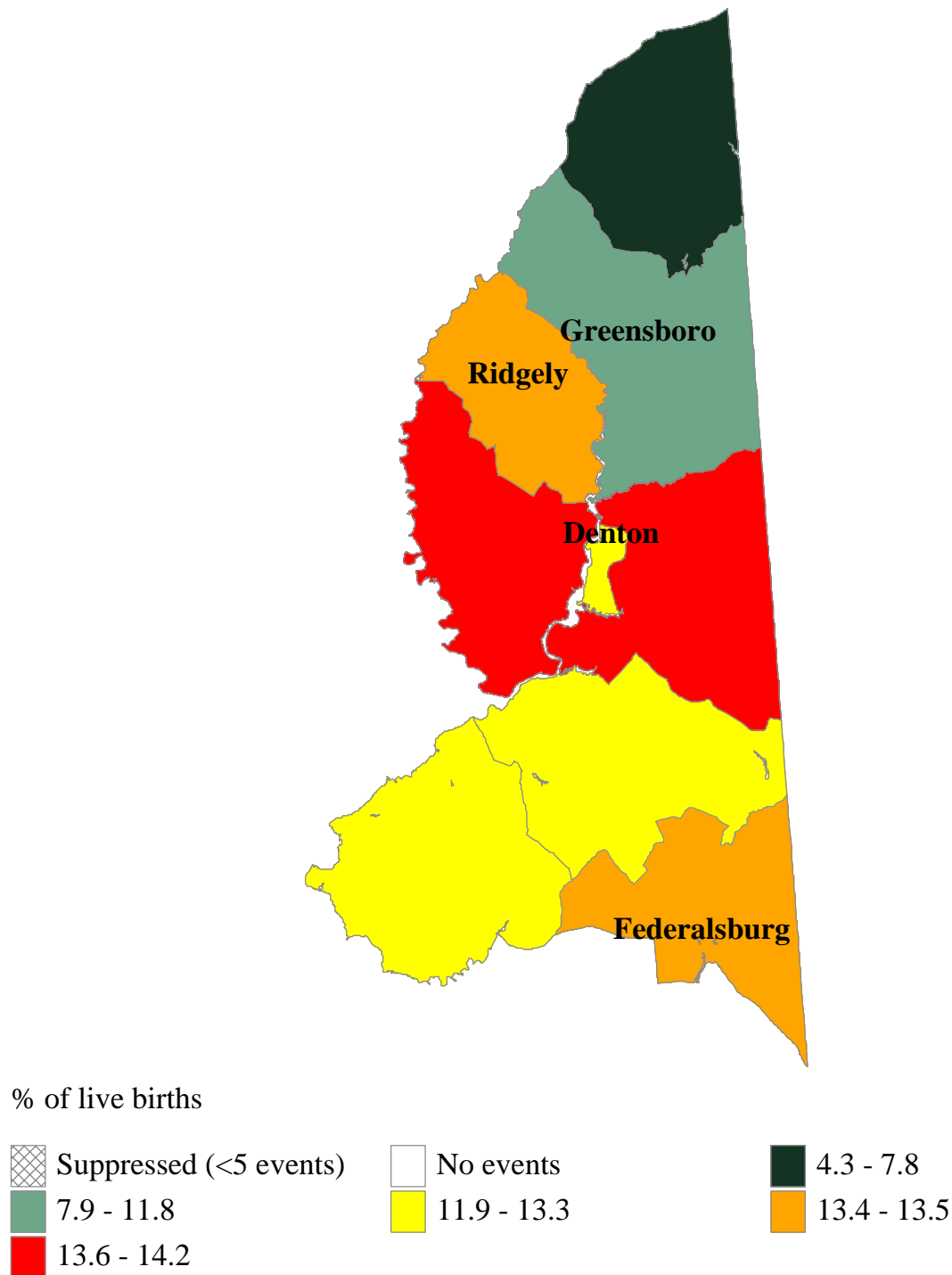
by Maternal Race and Year



Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Maternal Hypertension (Chronic or Gestational) by Maternal Residence Census Tract, 2010-2017



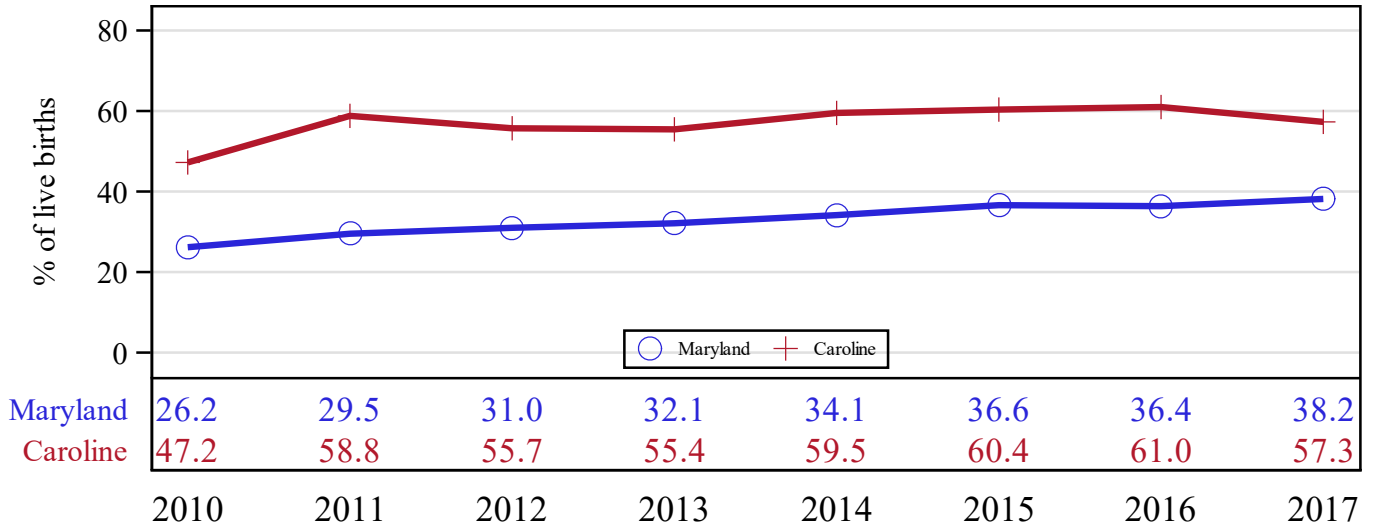
CAROLINE

Risk Factor: Medicaid Coverage

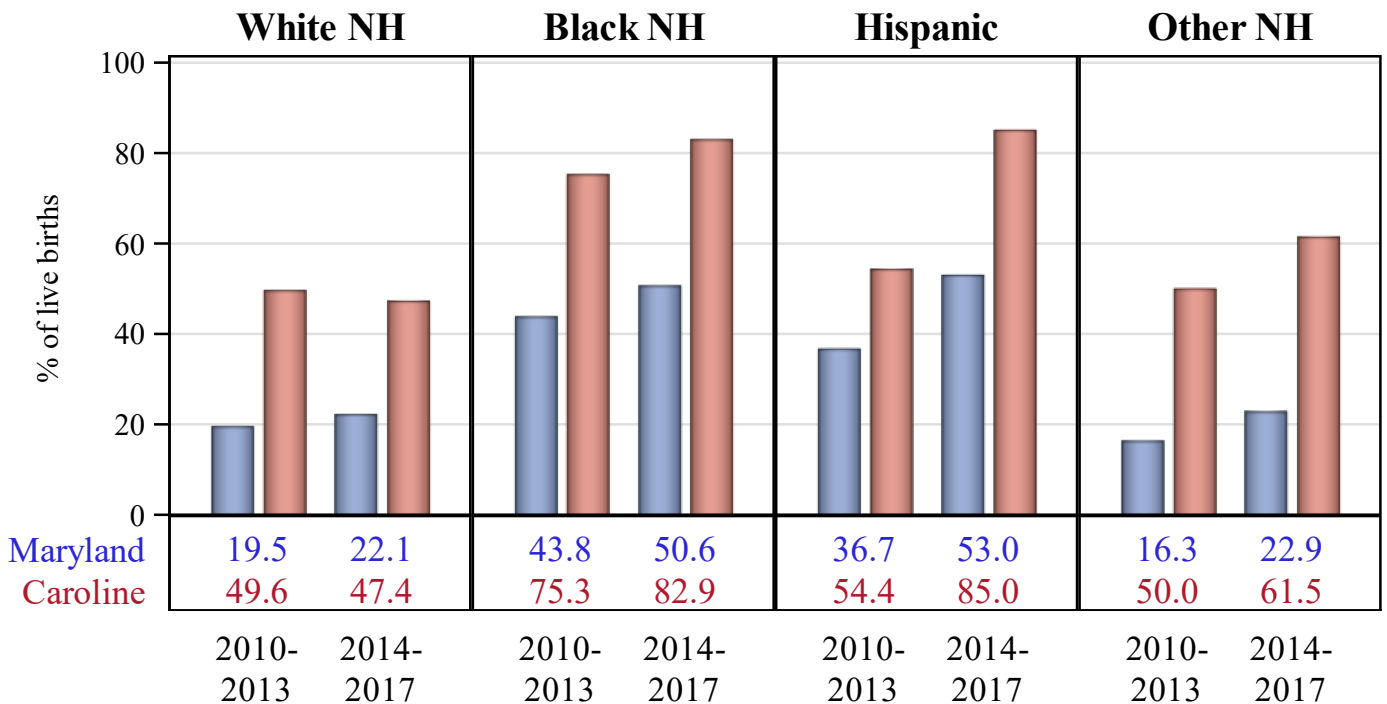
Medicaid paid births serve as a proxy for lower socioeconomic status and is associated with increased adverse birth outcome risks.

Of the 377 live births in Caroline in 2017, 57.3% were Medicaid paid births.

by Year



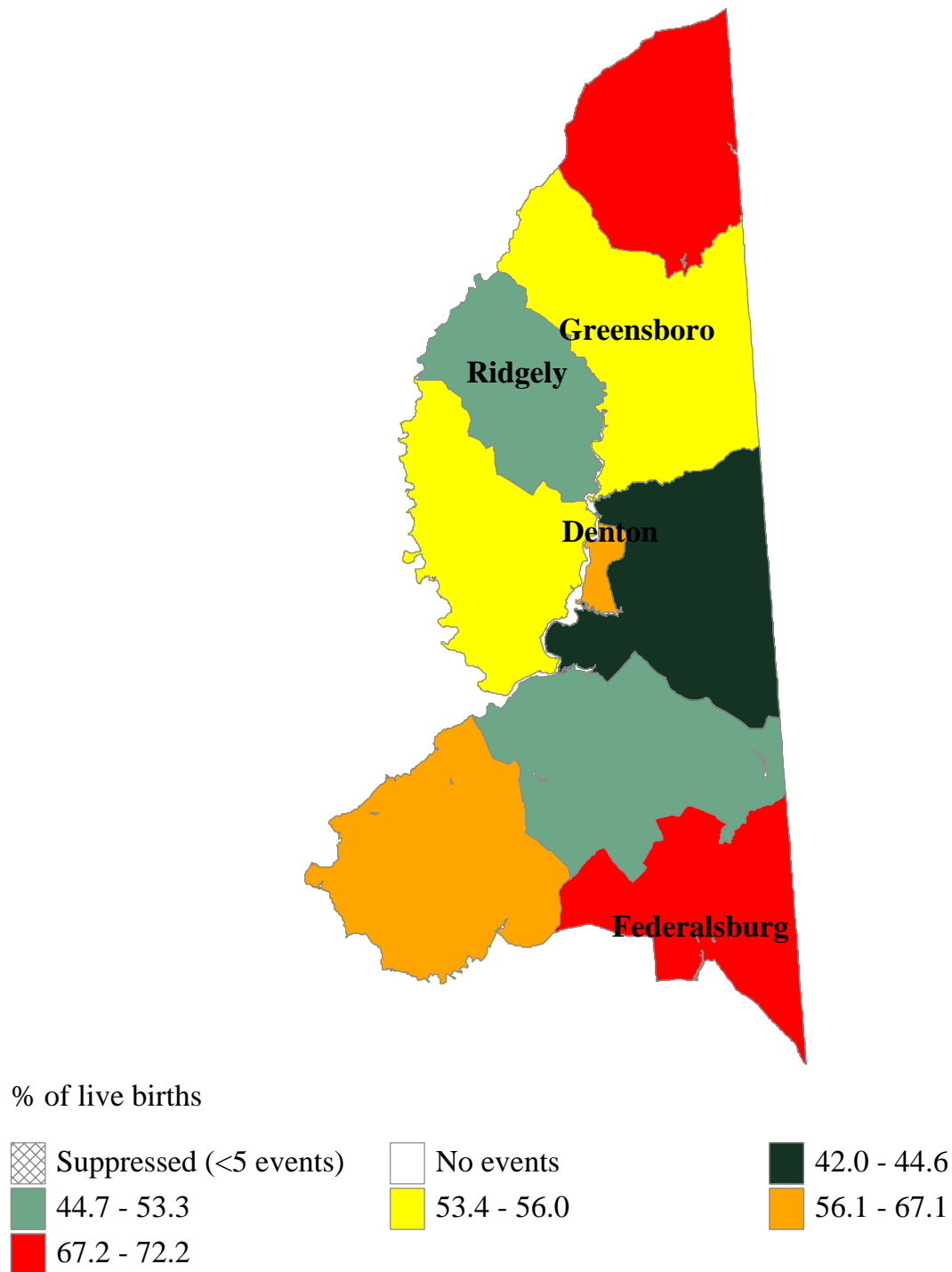
by Maternal Race and Year



Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Medicaid Coverage by Maternal Residence Census Tract, 2010-2017



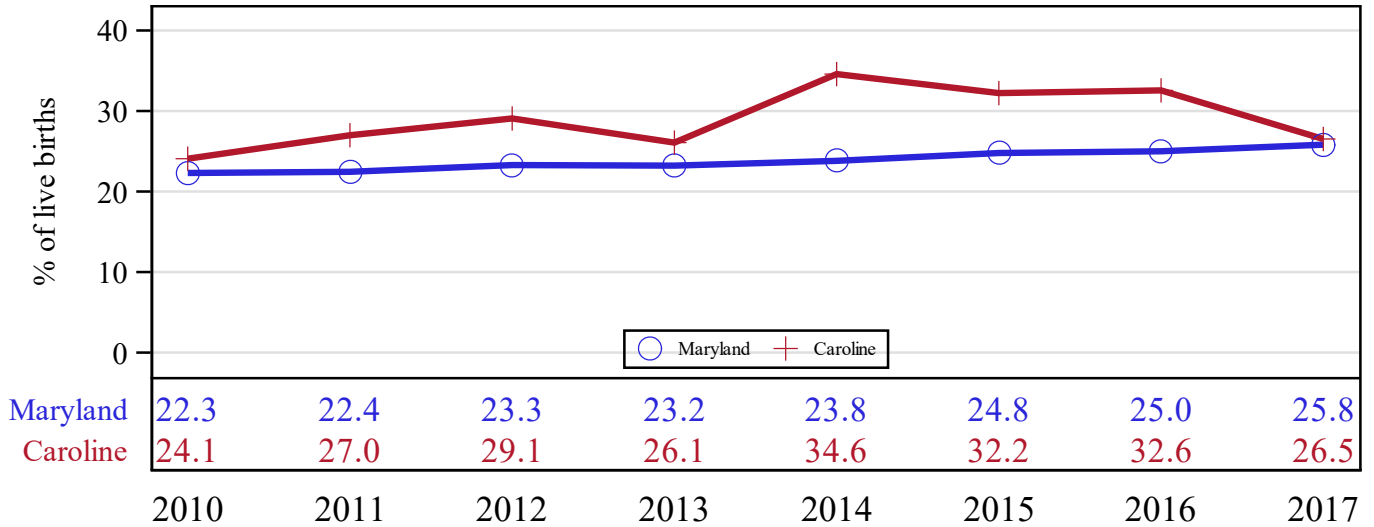
CAROLINE

Risk Factor: Maternal Obesity

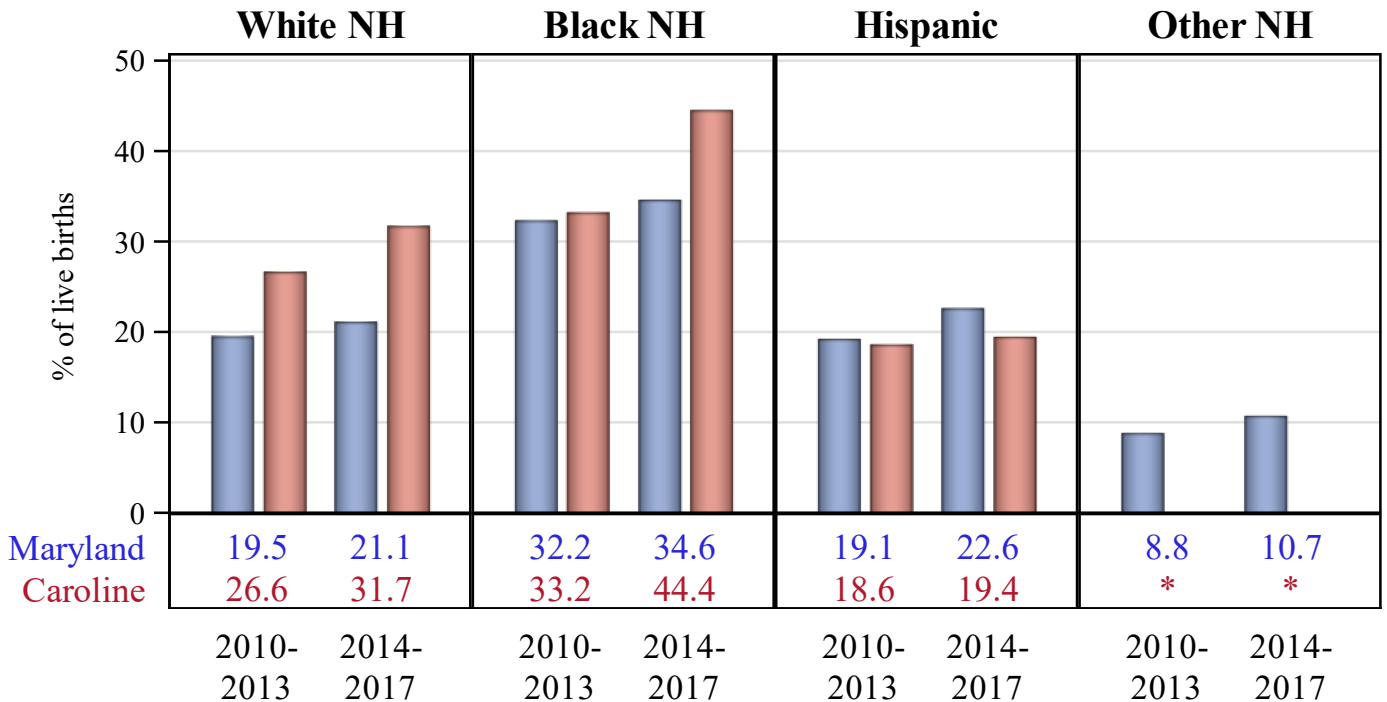
Obesity during pregnancy is associated with maternal risks such as gestational diabetes, preeclampsia, stillbirth and congenital anomalies (Leddy, 2008).

Of the 377 live births in Caroline in 2017, 26.5% were to obese women.

by Year



by Maternal Race and Year

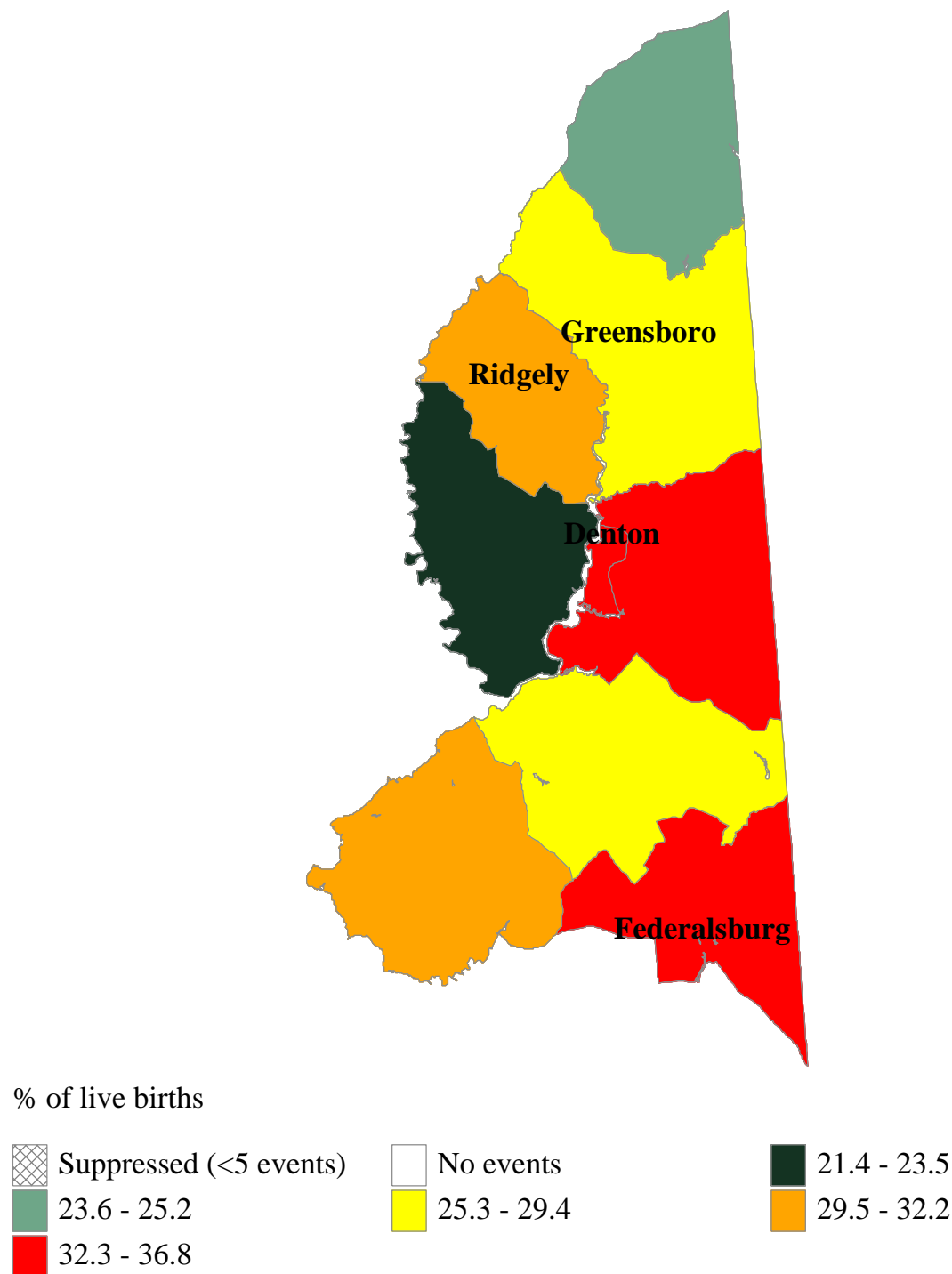


Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. Obesity defined as a pre-pregnancy body mass index (BMI) score of 30 or greater. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

CAROLINE

Risk Factor: Maternal Obesity by Maternal Residence Census Tract, 2010-2017



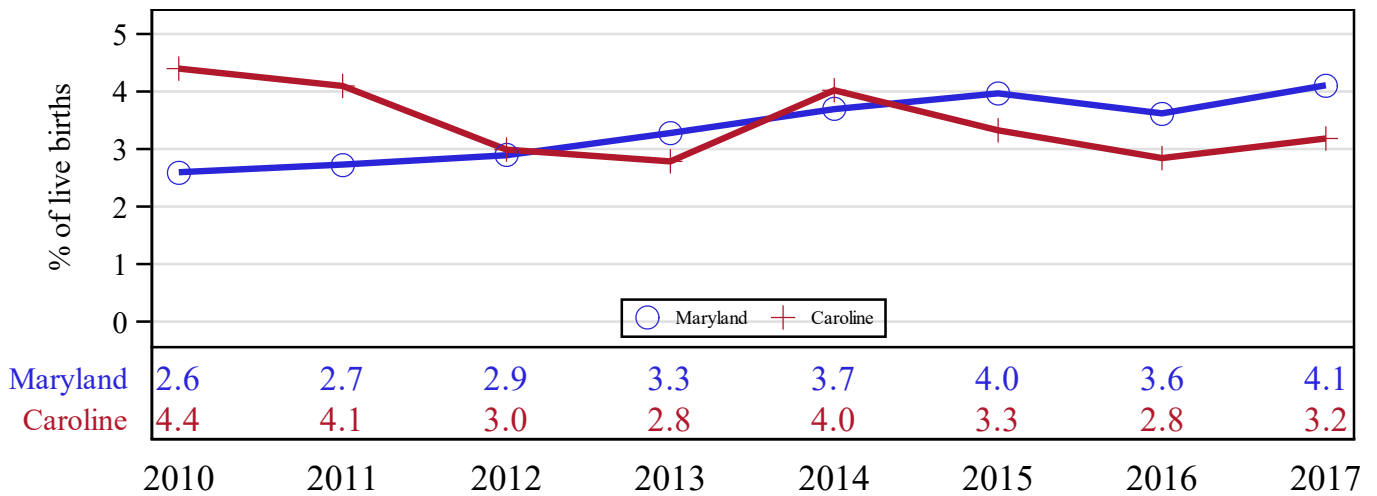
CAROLINE

Risk Factor: Prior Preterm Birth

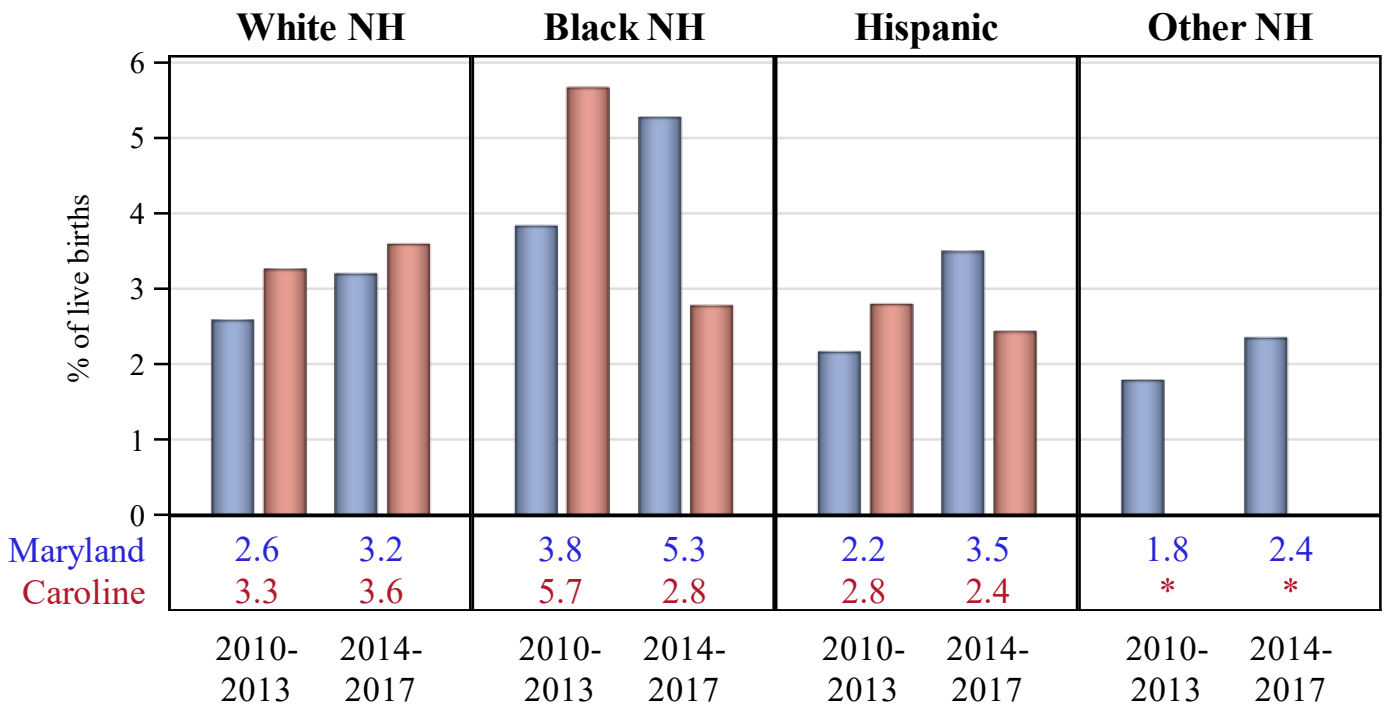
Women with a prior preterm birth are more likely to have a repeat preterm birth (Adams, 2000). Repeat PTB's may also serve as a marker for persistent physiological risks to maternal health and is associated with greater risks to infant survival.

Of the 377 live births in Caroline in 2017, 3.2% were to women with a prior preterm birth.

by Year



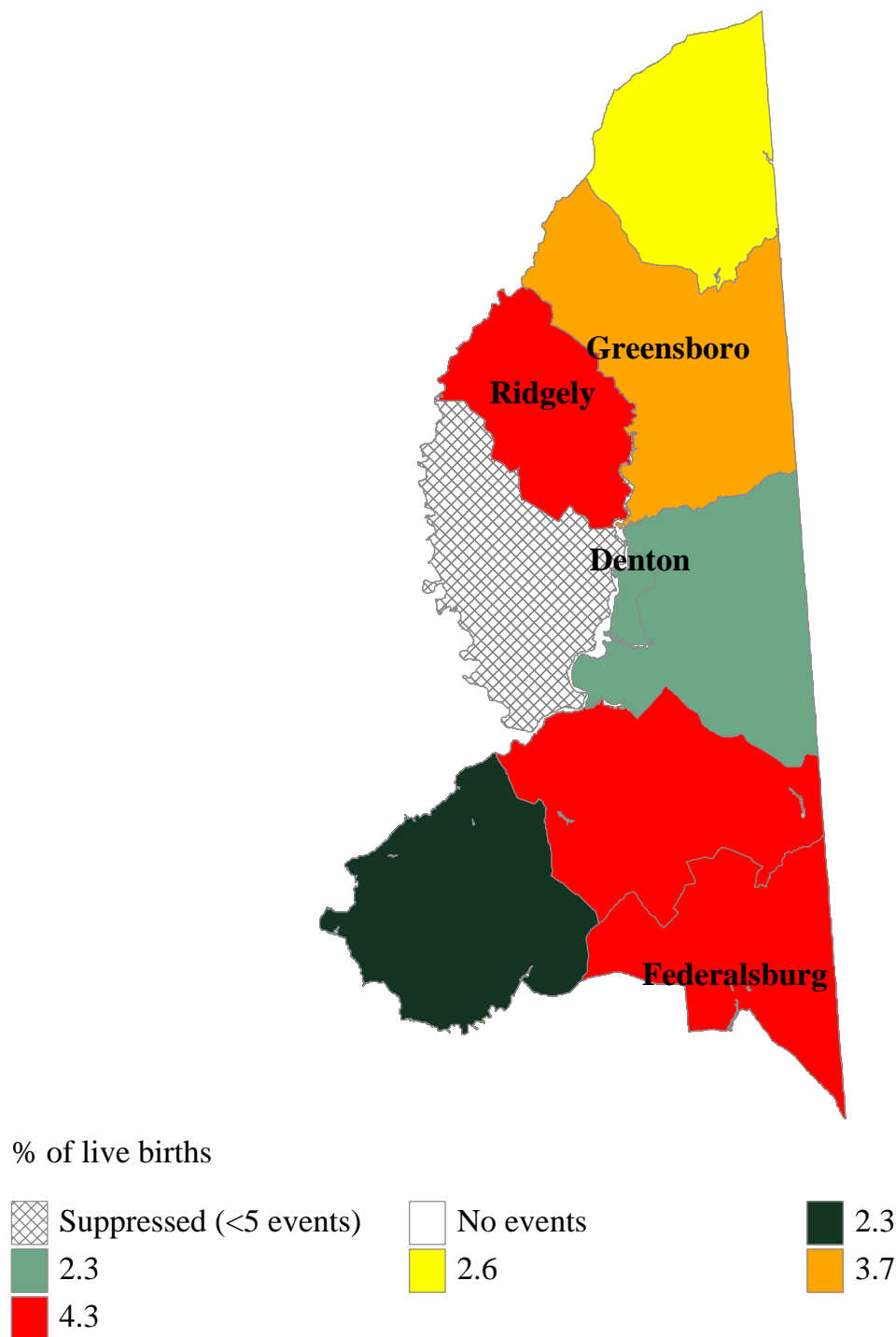
by Maternal Race and Year



Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Prior Preterm Birth by Maternal Residence Census Tract, 2010-2017



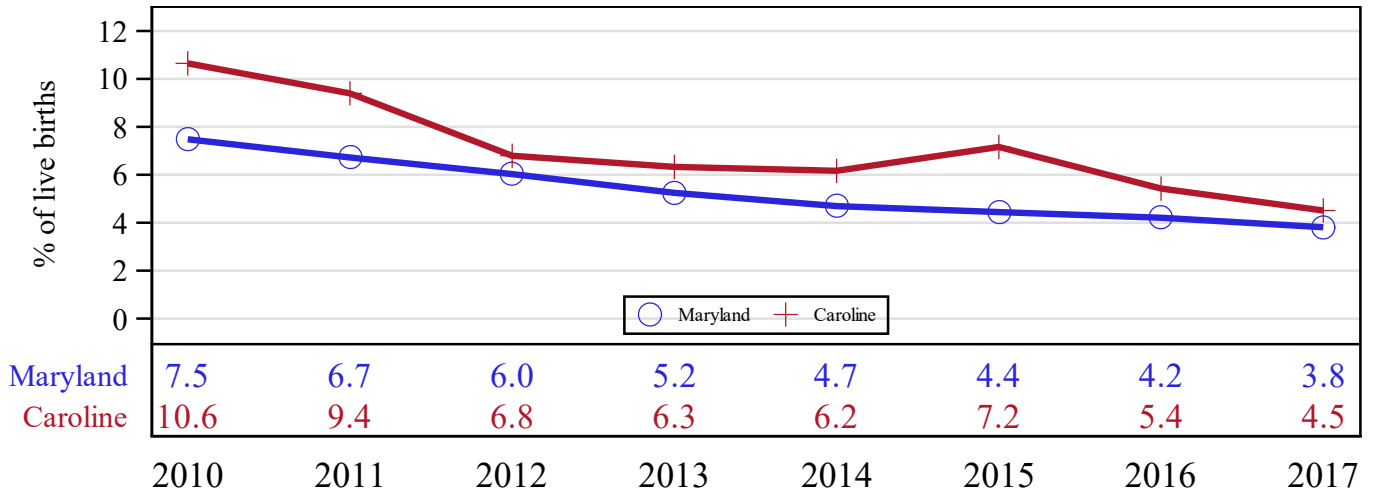
CAROLINE

Risk Factor: Maternal Age Under 20 Years Old

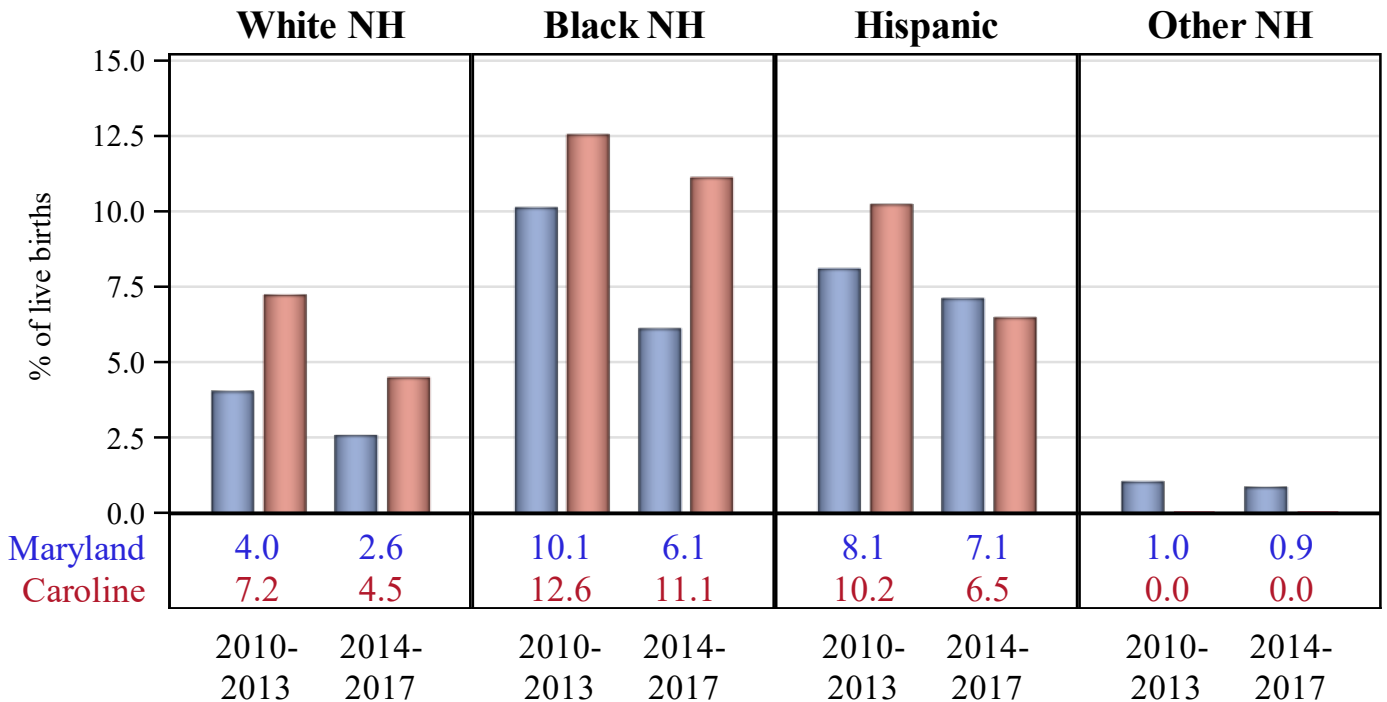
Teen childbearing often limits the educational and economic opportunities for young women and is associated with a greater risk of adverse birth outcomes. (Ventura, 2014) Approximately, 8 in 10 births to women under 20 years old are unintended. (MD PRAMS, 2018)

Of the 377 live births in Caroline in 2017, 4.5% were to women under 20 years old.

by Year



by Maternal Race and Year

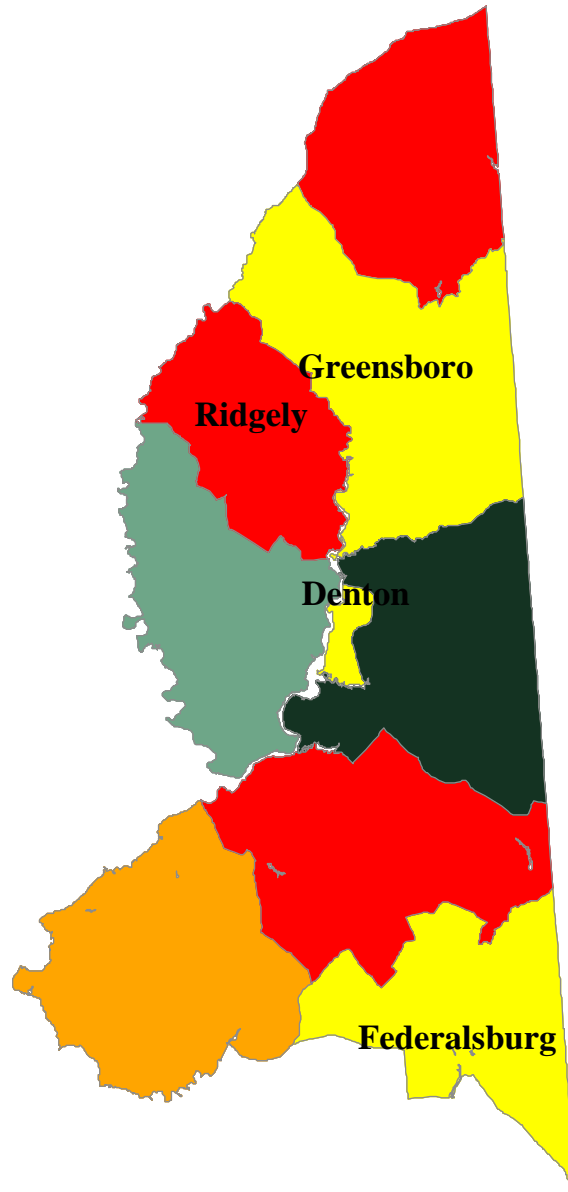


Source: Maryland Vital Statistics Administration

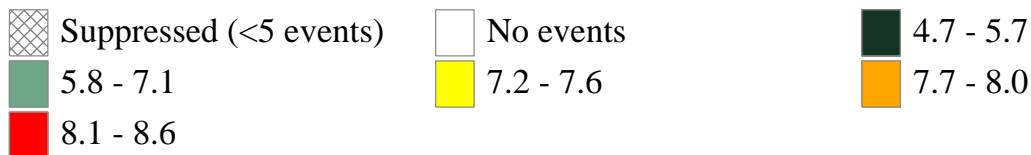
*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

CAROLINE

Risk Factor: Maternal Age Under 20 Years Old by Maternal Residence Census Tract, 2010-2017



% of live births



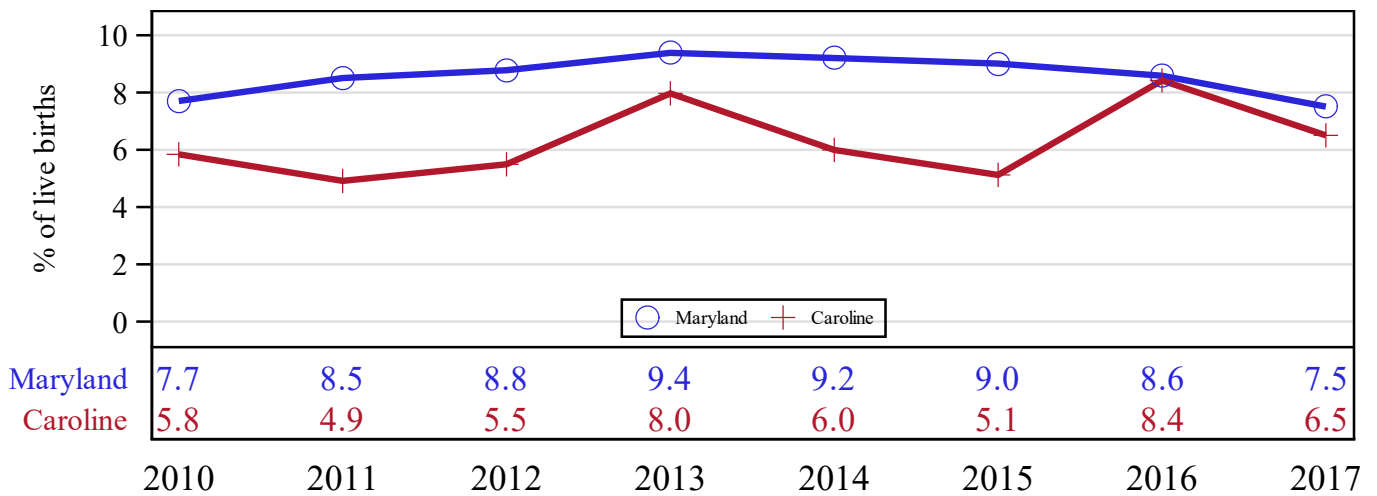
CAROLINE

Risk Factor: Third Trimester or No Prenatal Care Initiation

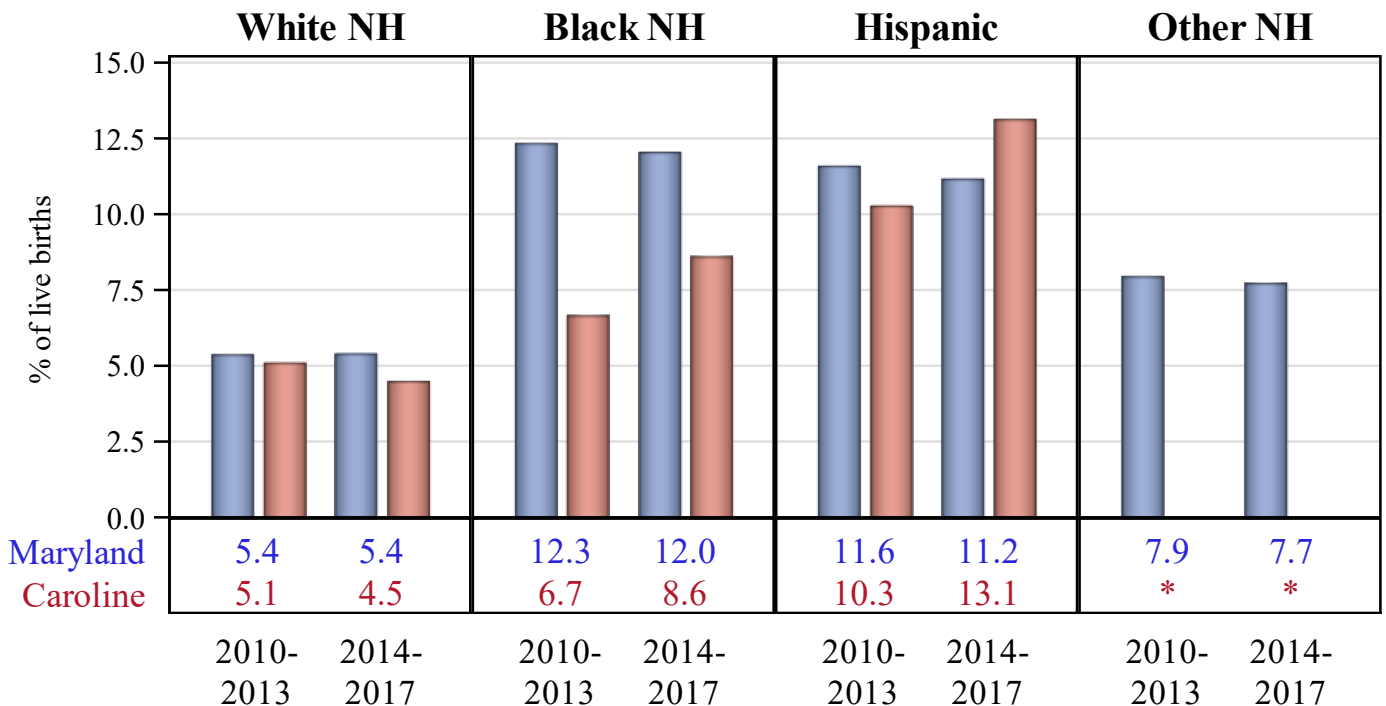
Babies born to women who do not receive prenatal care are three times more likely to be born at a low birth weight and five times more likely to die than babies born to mothers receiving prenatal care.

Of the 377 live births in Caroline in 2017, 6.5% were to women who initiated prenatal care in the third trimester or had no prenatal care.

by Year



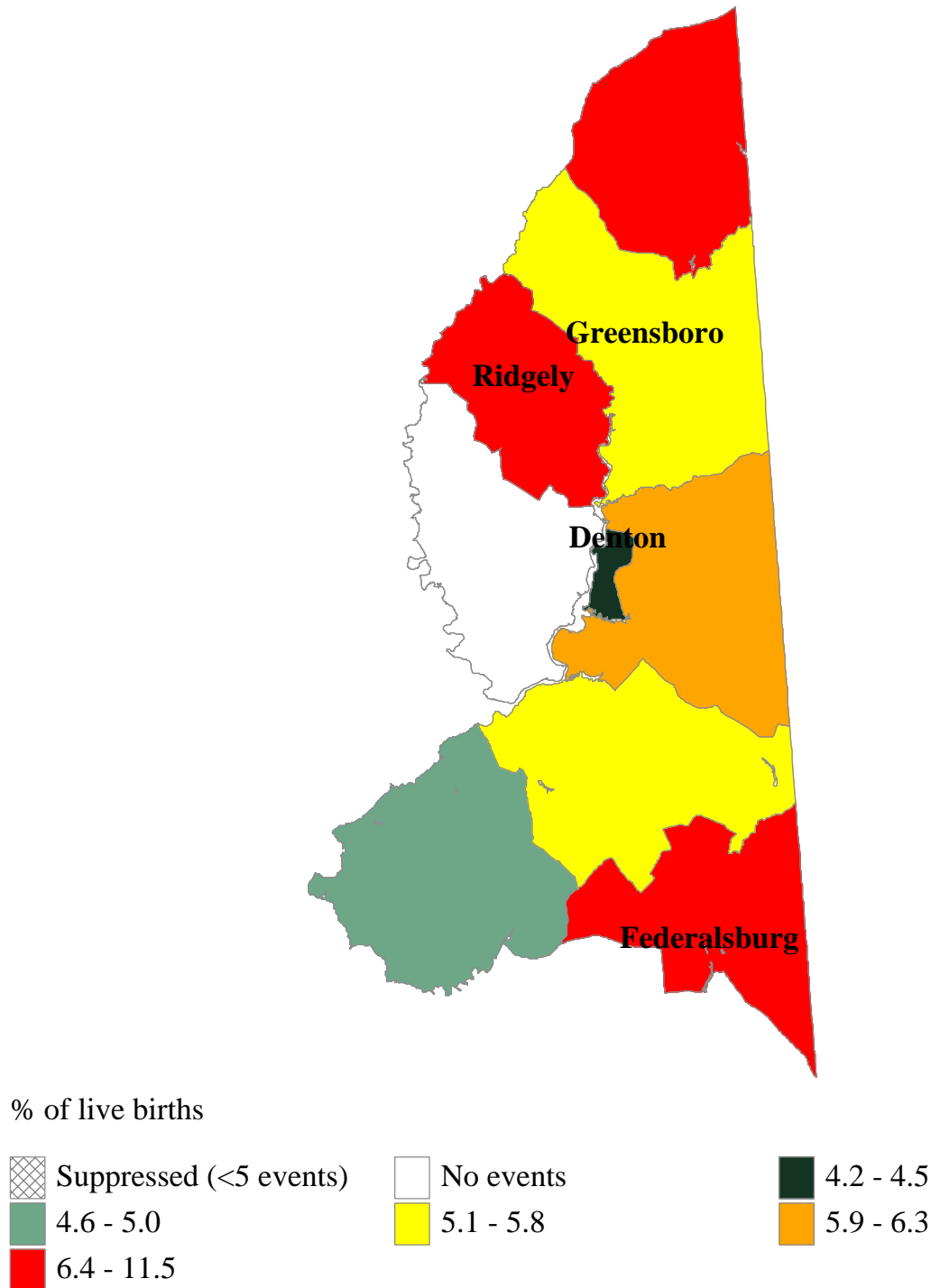
by Maternal Race and Year



Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. Note: percentages are calculated excluding missing or unknown values of PNC initiation. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Third Trimester or No Prenatal Care Initiation by Maternal Residence Census Tract, 2010-2017



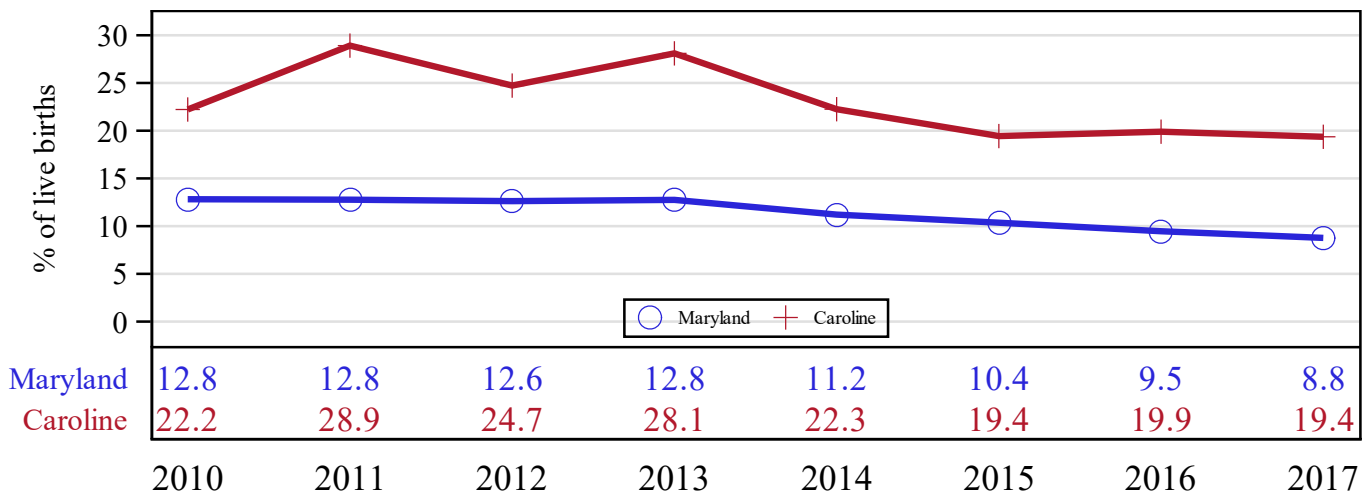
CAROLINE

Risk Factor: Preconception or Prenatal Smoking

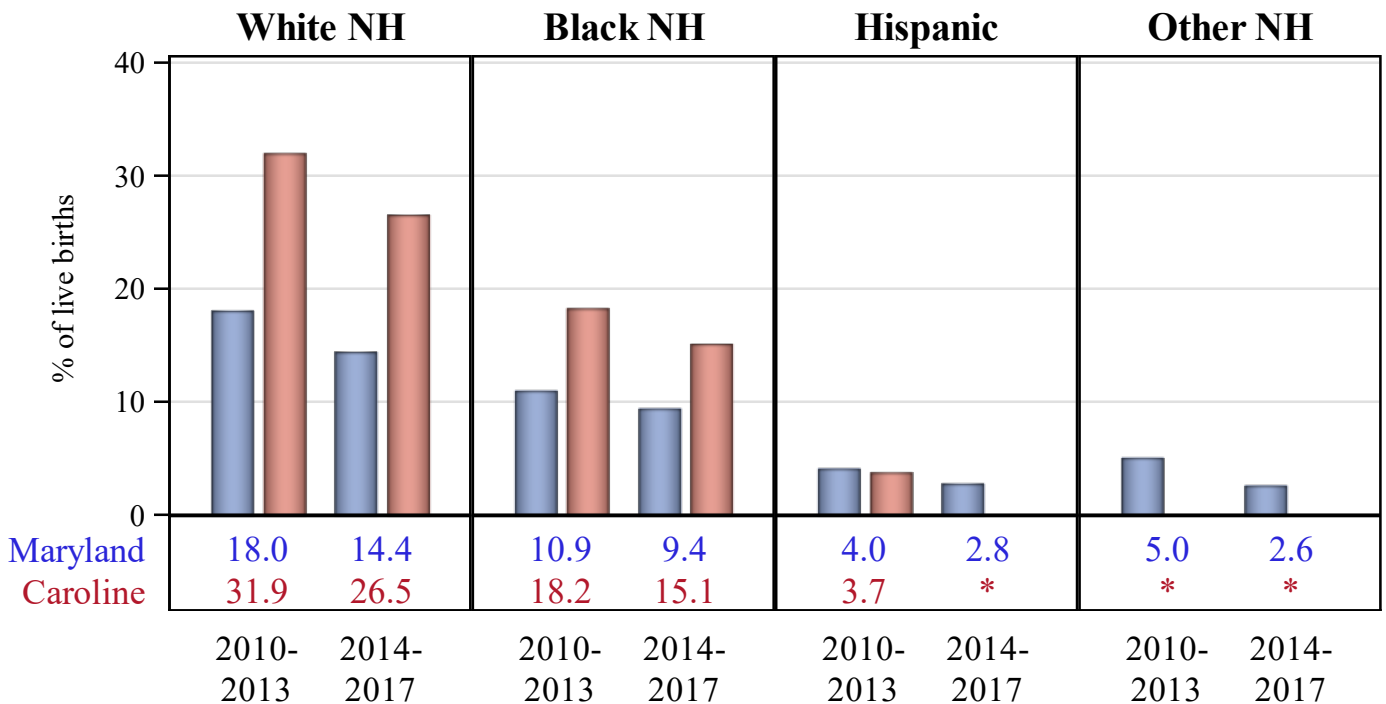
Tobacco is the most commonly used substance during pregnancy and is associated with adverse birth outcomes such as miscarriage, placental abruption, placental insufficiency, and low birth weight.

Of the 377 live births in Caroline in 2017, 19.4% were to women who reported smoking before or during their pregnancy.

by Year



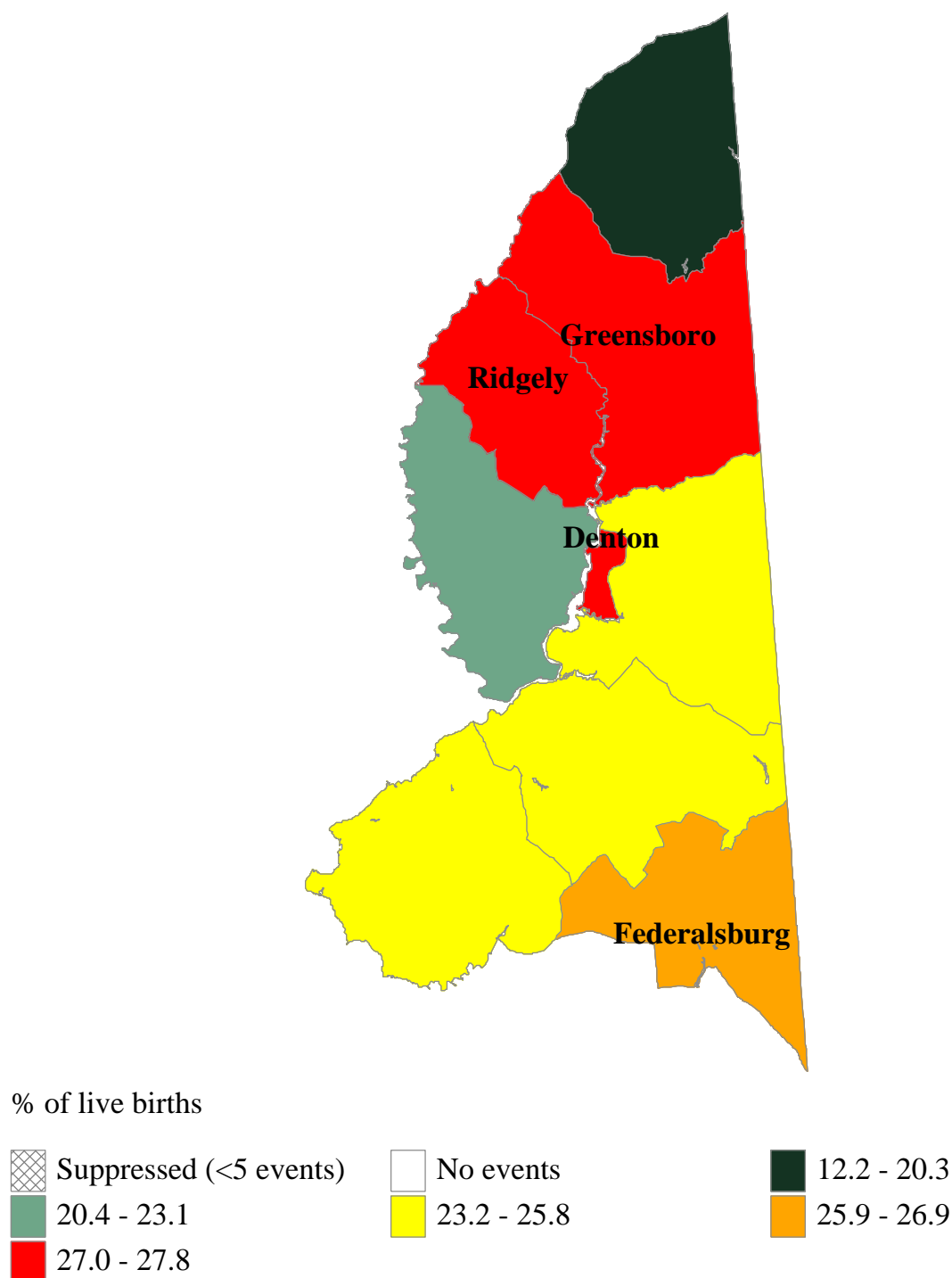
by Maternal Race and Year



Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Preconception or Prenatal Smoking by Maternal Residence Census Tract, 2010-2017



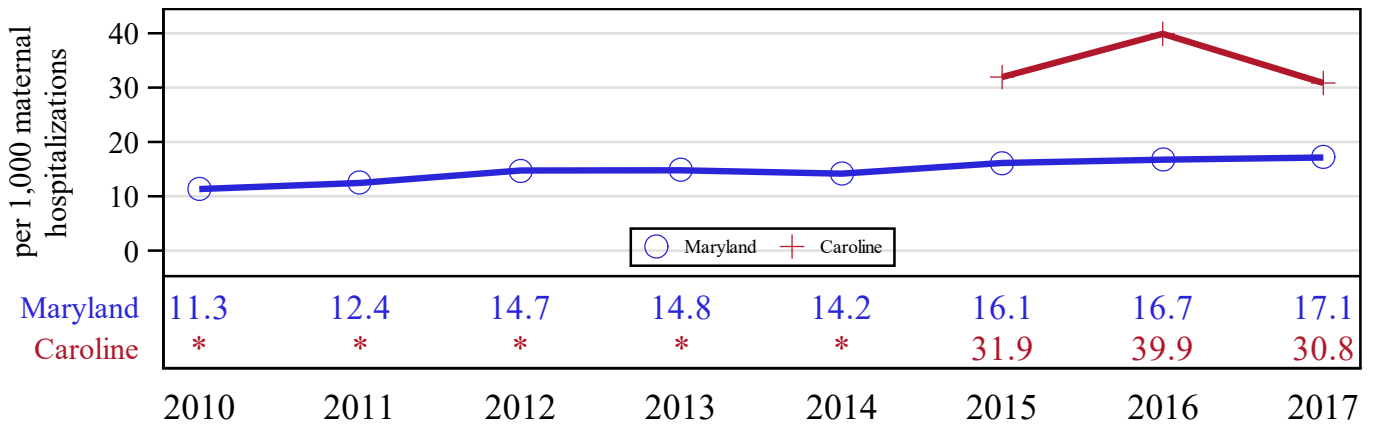
CAROLINE

Risk Factor: Maternal Opioid Use Disorder (OUD)

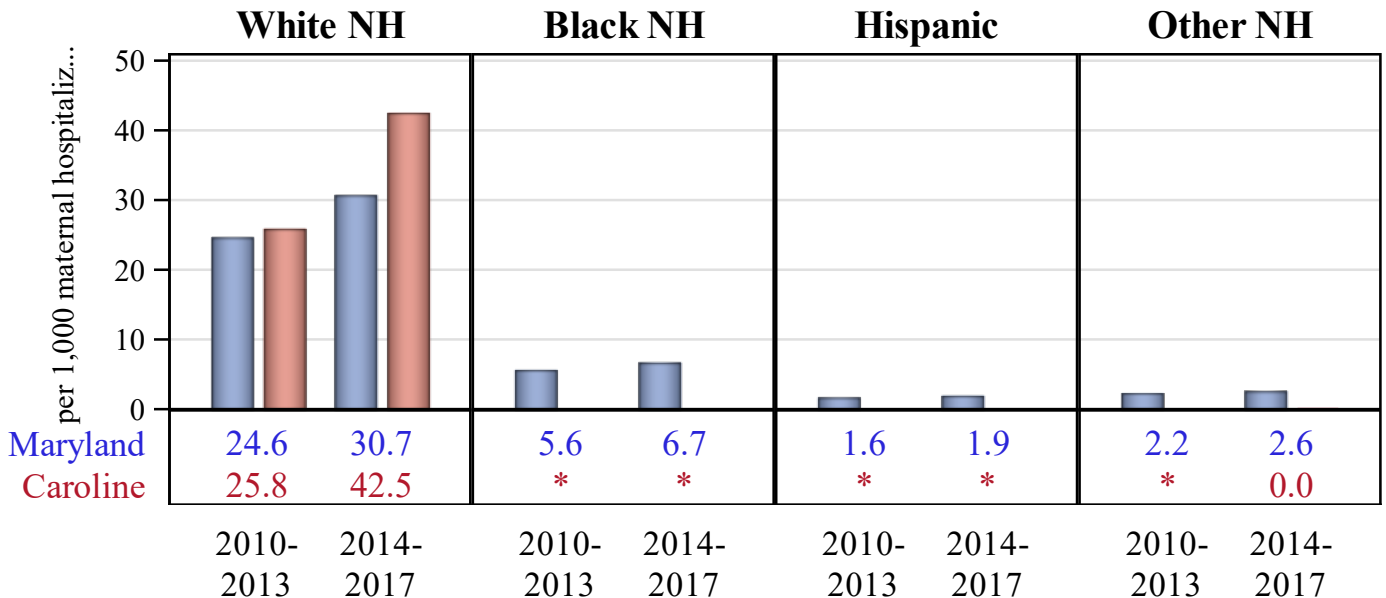
Opioids include heroin, morphine, codeine, oxycodone, hydrocodone, etc. Maternal opioid use disorder has been associated with preterm labor, stillbirth, birth defects, neonatal abstinence syndrome, and maternal mortality (Patrick, 2015; Maeda, 2014). Nationally, the rate of opioid use disorder during delivery hospitalizations increased 67% from 2010-2014 (Haight, 2017).

Of the 389 maternal hospitalizations in Caroline in 2017, there were 30.8 with an OUD diagnosis for every 1,000 maternal hospitalizations.

by Year



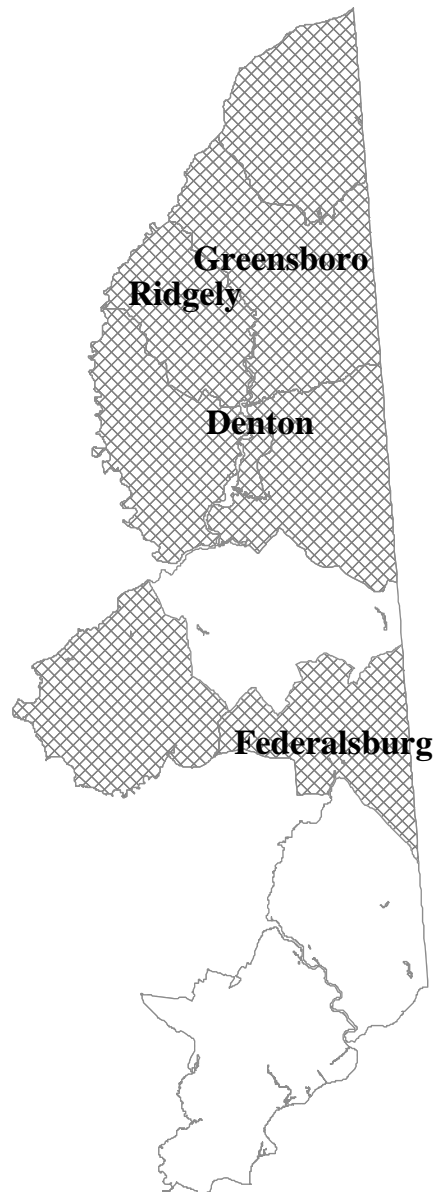
by Maternal Race and Year



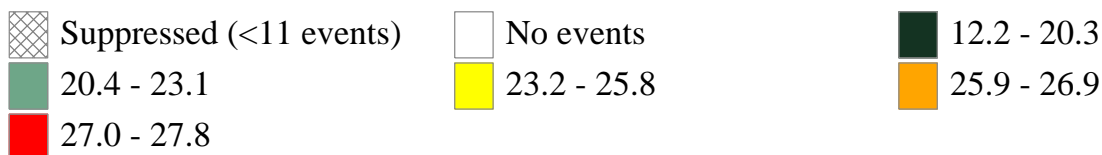
Source: Maryland Health Services Cost Review Commission (HSCRC) Inpatient Files for maternal (prenatal, delivery, or postpartum) hospitalizations. Please note, diagnosis coding transitioned from ICD-9 to ICD-10 beginning October 2015. Note, OUD diagnoses based on AHRQ recommended ICD-9 and ICD-10 codes (Heslin, 2017).

*Rates based on less than 11 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Maternal Opioid Use Disorder (OUD) by Maternal Residence Census Tract, 2013-2016



per 1,000 maternal hospitalizations

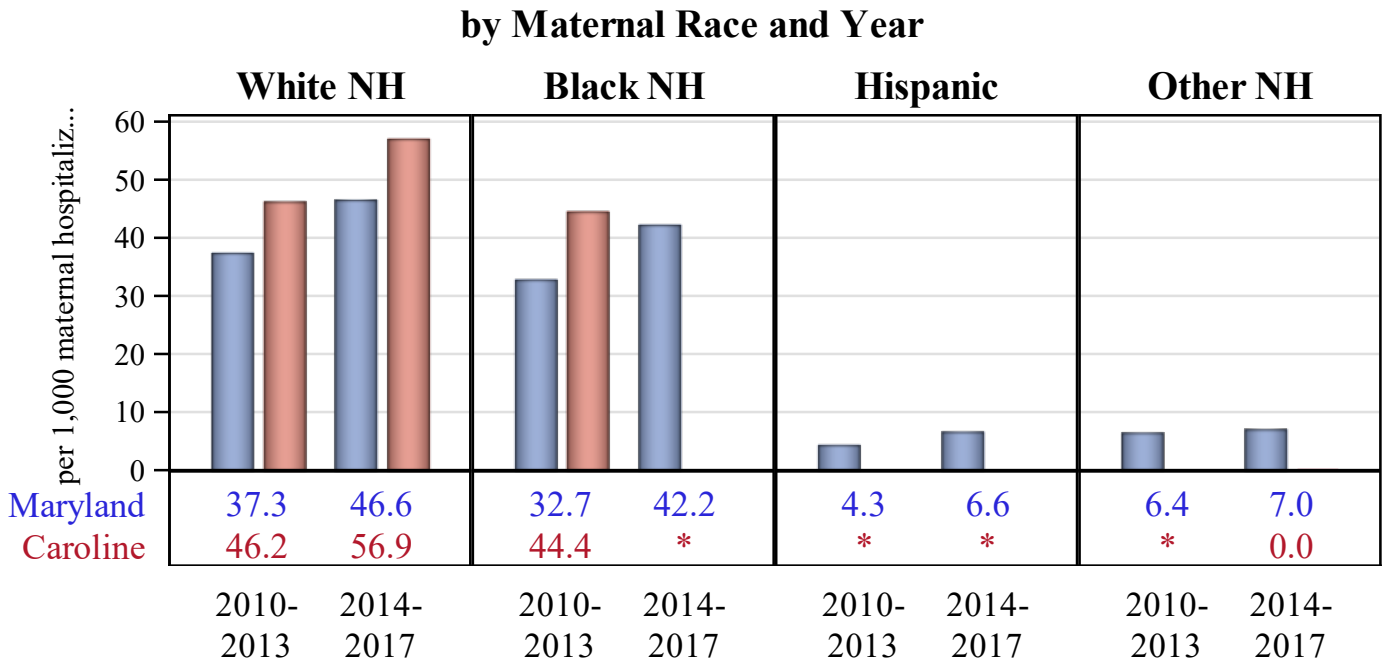
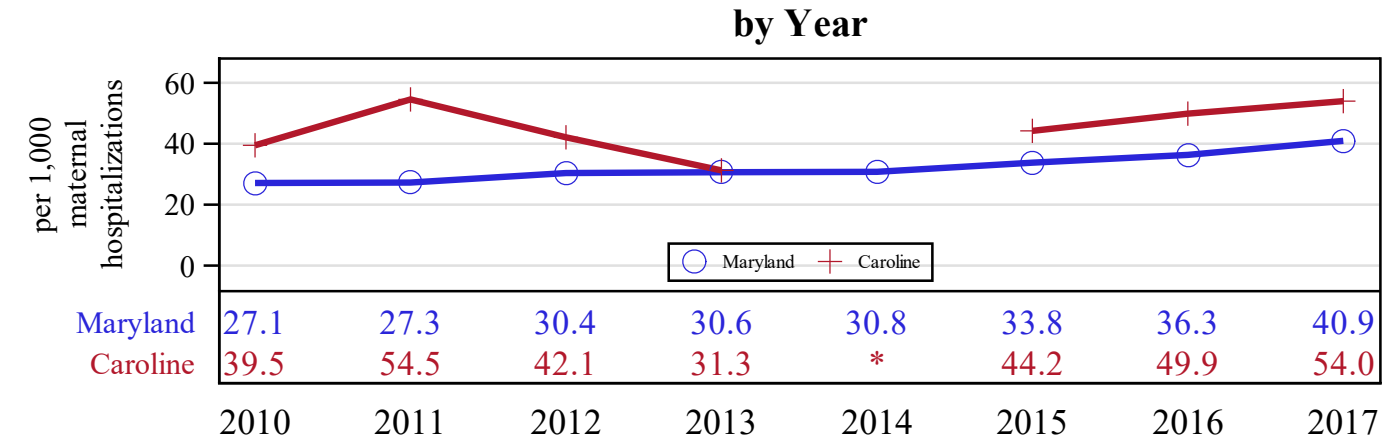


CAROLINE

Risk Factor: Maternal Substance Use Disorder (SUD)

In addition to opioid, other substances can lead to adverse birth outcomes. Cocaine use during pregnancy can lead to spontaneous abortion, preterm births, placental abruption, and congenital anomalies. Alcohol use during pregnancy can lead to spontaneous abortion, growth restriction, birth defects, and mental retardation (Keegan, 2010). This indicator represents a SUD diagnosis during a maternal hospitalization for the following substances: Opioids, Cocaine, Cannabis, Alcohol, Sedatives, and Hallucinogens.

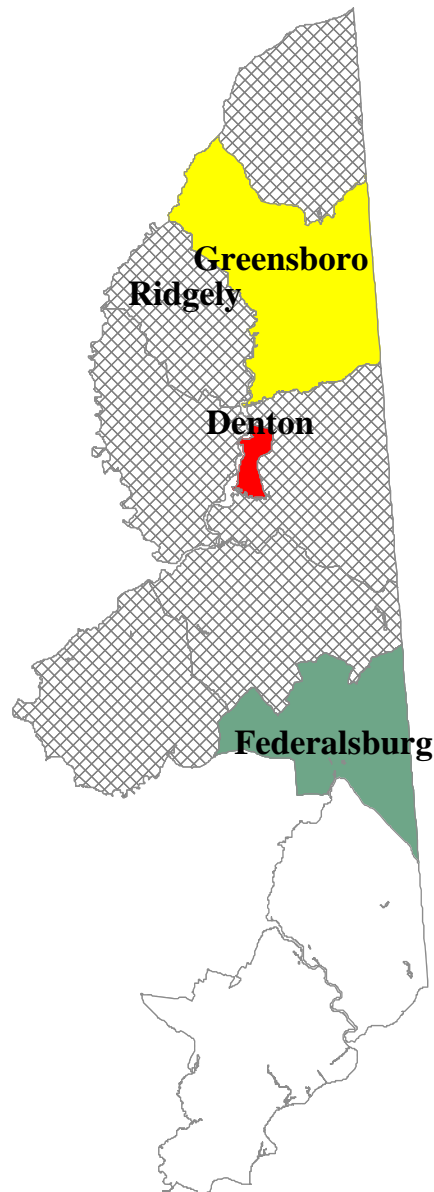
Of the 389 maternal hospitalizations in Caroline in 2017, there were 54 with an SUD diagnosis for every 1,000 maternal hospitalizations.



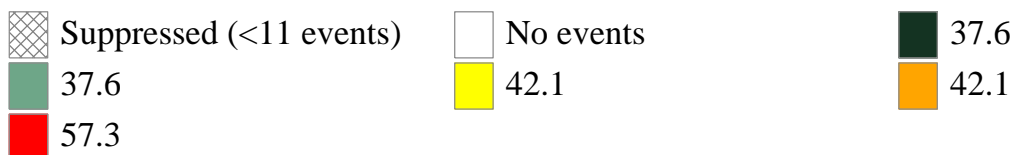
Source: Maryland Health Services Cost Review Commission (HSCRC) Inpatient Files for maternal (prenatal, delivery, or postpartum) hospitalizations. Please note, diagnosis coding transitioned from ICD-9 to ICD-10 beginning October 2015. Note, SUD diagnoses based on AHRQ recommended ICD-9 and ICD-10 codes (Fingar, 2015; Heslin, 2017).

*Rates based on less than 11 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

Risk Factor: Maternal Substance Use Disorder (SUD) by Maternal Residence Census Tract, 2013-2016



per 1,000 maternal hospitalizations



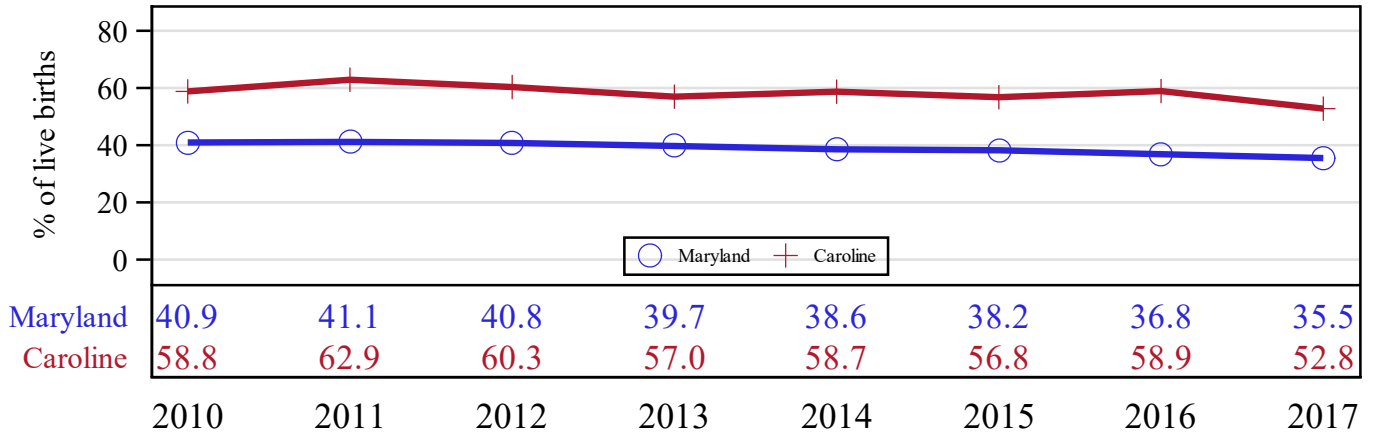
CAROLINE

Characteristic: Women, Infants and Children (WIC) Program Participation

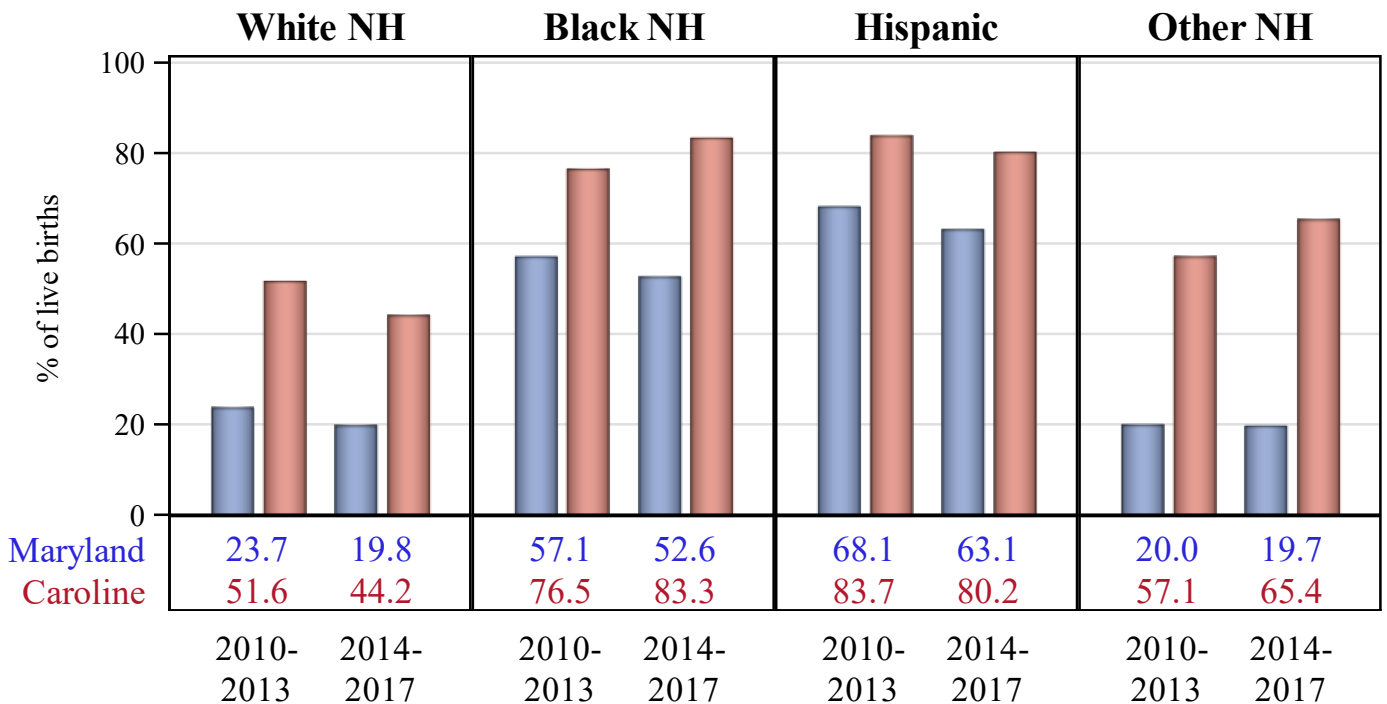
Prenatal WIC participation is associated with lower infant mortality rates. WIC prenatal care benefits reduce the rate of LBW babies by 25% and VLBW babies by 44%. Women participating in WIC have been found to have longer pregnancies and are more likely to receive adequate prenatal care.

Of the 377 live births in Caroline in 2017, 52.8% were to women who were enrolled in WIC.

by Year



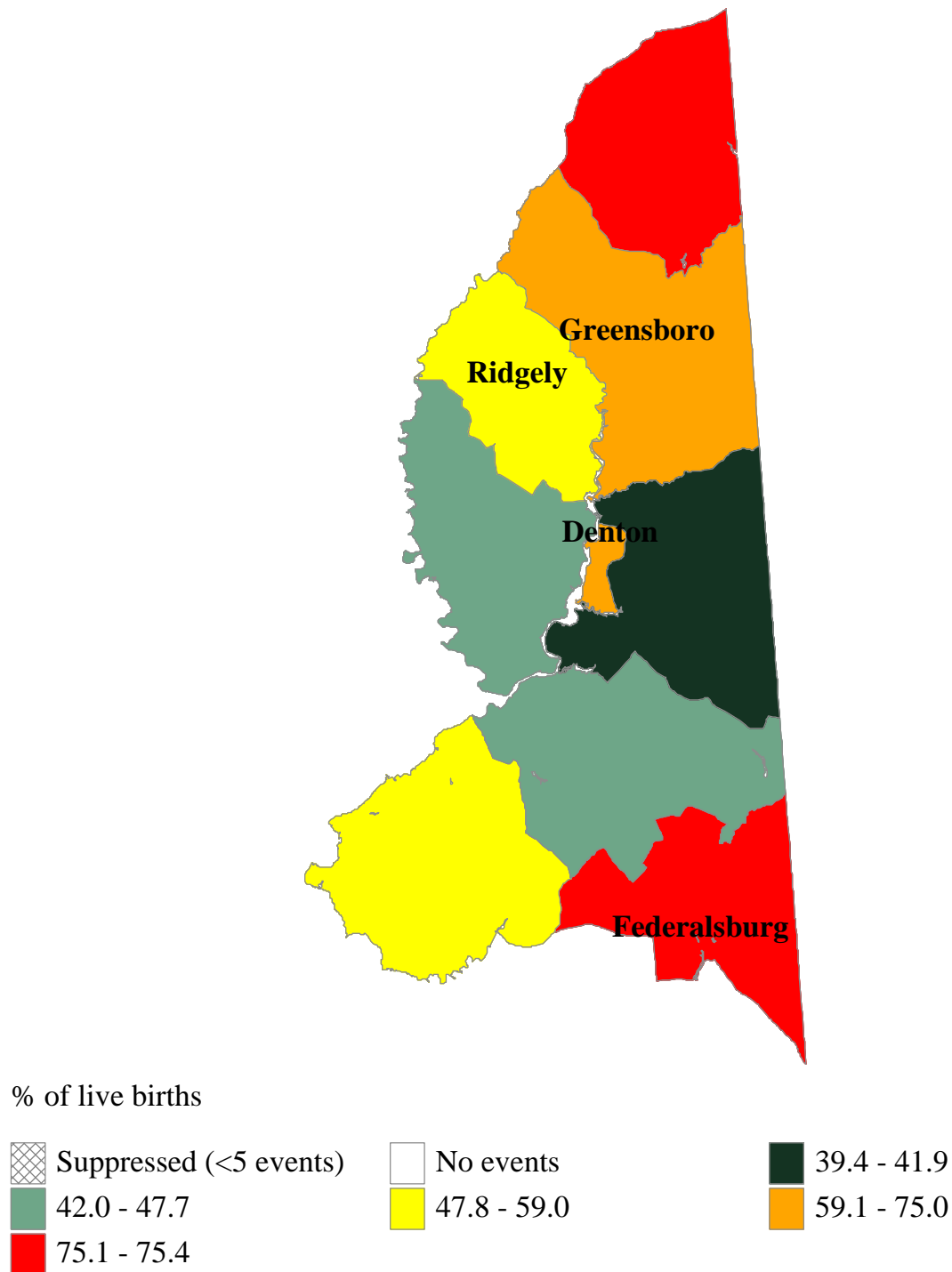
by Maternal Race and Year



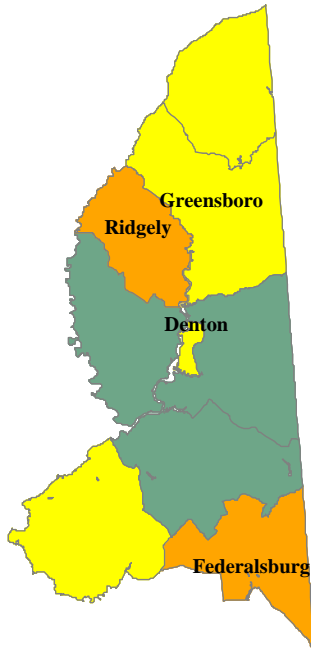
Source: Maryland Vital Statistics Administration

*Rates based on less than 5 events are suppressed. NH: non-Hispanic. Other NH includes American Indian and Asian or Pacific Islander.

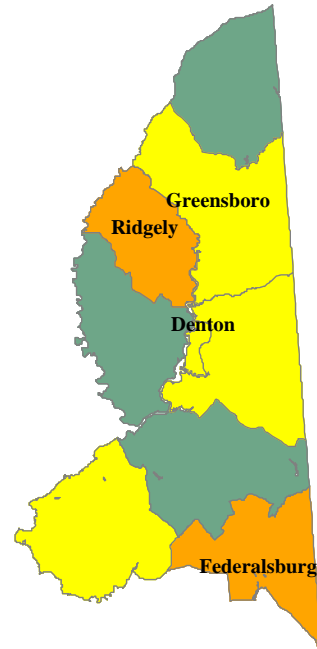
Characteristic: Women, Infants and Children (WIC) Program Participation by Maternal Residence Census Tract, 2010-2017



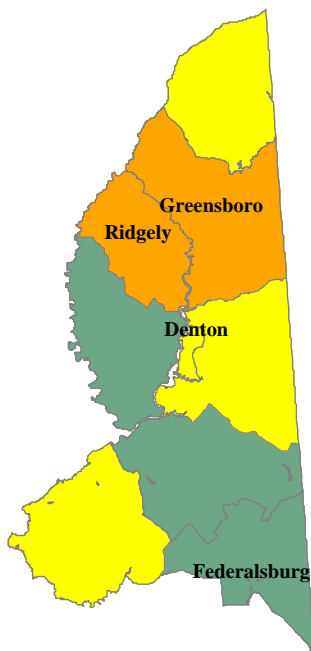
All Races



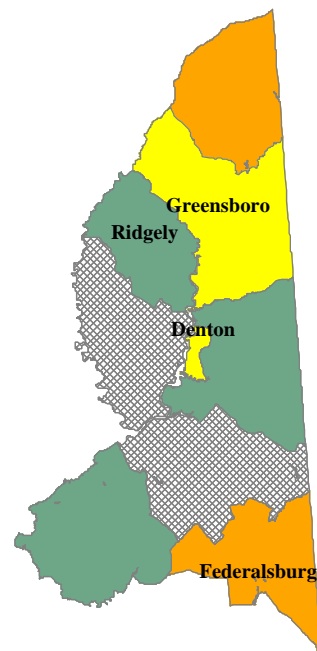
Black non-Hispanic



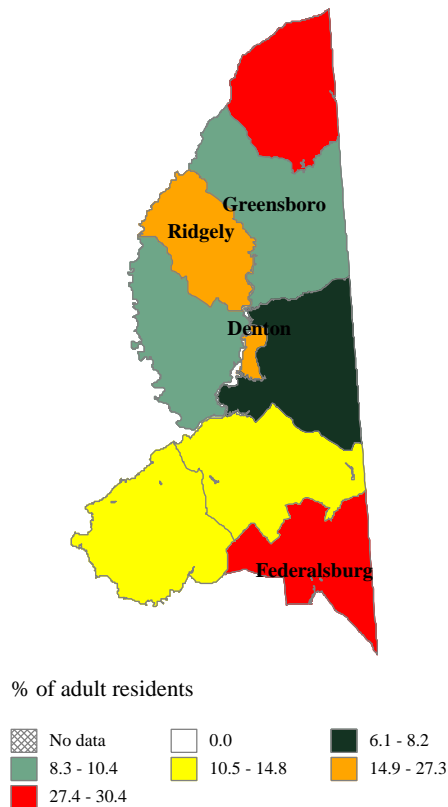
White non-Hispanic



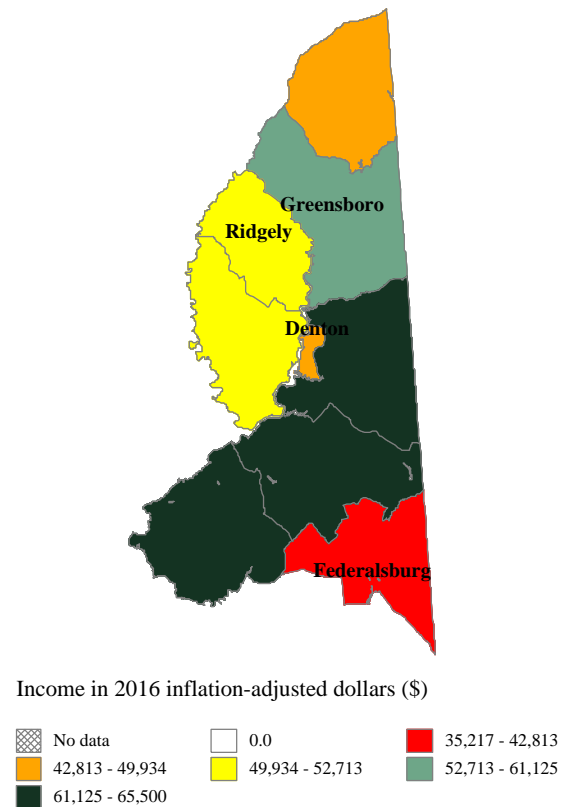
Hispanic



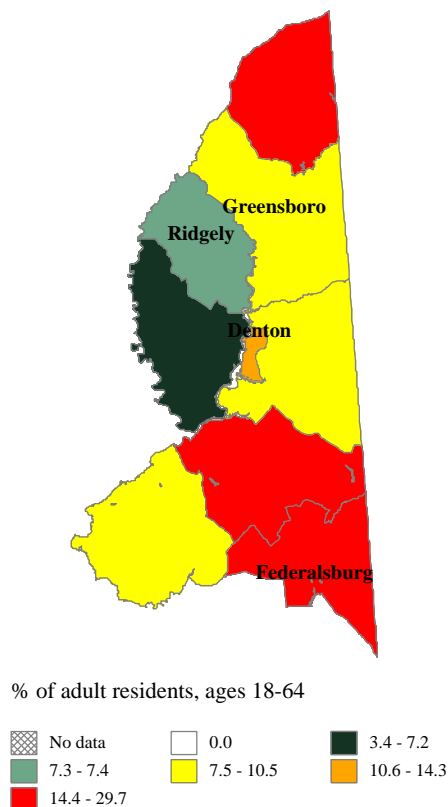
Adult Poverty Rates (ages 18-59)



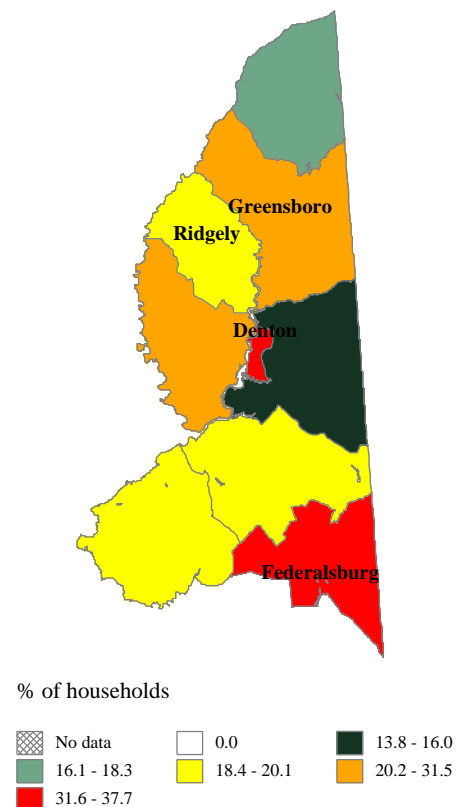
Median Household Income



No Health Insurance Coverage



Houses Built Before 1950



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More information about maternal preconception and prenatal risk factors and trends are available in Maryland Pregnancy Risk Assessment Monitoring System (PRAMS) Reports and Focus Briefs available here: https://phpa.health.maryland.gov/mch/Pages/prams_report.aspx