Michigan Feto-Infant Mortality Rate, 2013-2017

Prepared by Yan Tian (TianY@michigan.gov), Maternal and Child Health (MCH) Epidemiology Section, Michigan Department of Health and Human Services (MDHHS)
Data source: Michigan resident live birth files (12/12/2018), infant mortality files (1/23/2019), and fetal death files (11/7/2018), Division for Vital Records and Health Statistics, MDHHS
03/2019

This presentation provides updated 2013-2017 feto-infant mortality rates for the State of Michigan.

This presentation was prepared by Yan Tian, Maternal and Child Health Epidemiology Section, Michigan Department of Health and Human Services (MDHHS)

Data source: Michigan resident live birth files (12/12/2018), infant mortality files (1/23/2019), and fetal death files (11/7/2018), Division for Vital Records and Health Statistics, MDHHS

Revised: March 2019
Perinatal Periods of Risk (PPOR) Phase 1: 
Michigan Feto-Infant Mortality Rate 
2013-2017

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

The following slides contain updated 2013-2017 feto-infant mortality rates for the State of Michigan based on the Perinatal Periods of Risk (PPOR) approach. These slides contain PPOR Phase 1 results.
Perinatal Periods of Risk (PPOR)*

- Analysis is part of a comprehensive evaluation of infant mortality – usually large cities, counties, etc.

- Sorts fetal and infant deaths based on birthweight and age at death into boxes

- Rates are calculated for each period of risk and compared to standard population


Perinatal Periods of Risk (PPOR) is a comprehensive approach to help communities use data to reduce infant mortality. Designed for use in US cities with high infant mortality rates, PPOR brings community stakeholders together to build consensus and partnership based on local data. It provides a framework and steps that help a community analyze their own local vital records data and then move from data to action. It can be used on its own or with existing infant mortality prevention efforts such as Fetal Infant Mortality Review (FIMR), Healthy Start, and home visiting. PPOR is about impact and results. It builds data capacity, promotes evidence-based decisions, strengthens partnerships, helps leverage resources, and enables systems change. There are six stages within the PPOR framework and the results included within this presentation focus on stage one only.

Based on birthweight and gestational age, the fetal and infant deaths are divided into four periods of risk: maternal health/prematurity, maternal care, newborn care, and infant health. PPOR analyses require at least sixty fetal and infant deaths within each population group being studied. A feto-infant mortality rate for each period is calculated and compared to the standard population.
Perinatal Periods of Risk (PPOR)*

- The periods of risk were chosen so deaths in the same ‘box’ had similar problems. So they had similar solutions.

The initial analysis divides fetal and infant deaths into four perinatal periods of risk based on both birth weight and age at death. The periods of risk are useful because causes of death tend to be similar within each, so when a community finds problems in only one or two periods of risk, efforts can be focused on those periods. A feto-infant mortality rate is calculated for each period, to allow the stakeholders to compare populations within their jurisdictions, to examine time trends, and to compare to other cities, or to a reference group.
Perinatal Periods of Risk (PPOR) *

Each period of risk is associated with its own set of risk and prevention factors. The four periods provide a framework that helps communities move from having data to using it, prioritizing limited resources, and using evidence to maximize impact.

Maternal health and prematurity is associated with risk factors such as chronic disease, health behaviors, prenatal care, etc. Maternal care is associated with risk factors such as prenatal care, high risk referral, obstetric care, etc. Newborn care is linked to risk factors such as perinatal management, neonatal care pediatric, surgery, etc. Infant health is related to such risk factors as sleep-related deaths, injuries, infections, etc.


Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS
This slide shows the number of feto-infant deaths and feto-infant mortality rates in Michigan from 2013-2017 and from 2015-2017 for each of the four periods.

From 2013 to 2017, there were 1,582 deaths in the maternal health and prematurity period, 983 deaths in the maternal care period, 725 deaths in the newborn care period, and 1,064 deaths in the infant health period. From 2015 to 2017, in Michigan there were 945 deaths in the maternal health and prematurity period, 592 deaths in the maternal care period, 425 deaths in the newborn care period, and 642 deaths in the infant health period.

From 2013 to 2017, the feto-infant mortality rate was 2.8 per 1,000 live births in the maternal health and prematurity period, 1.7 per 1,000 live births in the maternal care period, 1.3 per 1,000 live births in the newborn care period, and 1.9 per 1,000 live births in the infant health period. From 2015 to 2017, in Michigan the feto-infant mortality rate was 2.8 per 1,000 live births in the maternal health and prematurity period, 1.8 per 1,000 live births in the maternal care period, 1.3 per 1,000 live births in the newborn care period, and 1.9 per 1,000 live births in the infant health period.
The PPOR reference group is a real population of mothers with near optimal birth outcomes. Here the reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery. It provides a realistic benchmark or target toward which the community can strive. Assuming those outcomes are attainable, the reference group allows estimation of preventable or excess mortality for each period of risk. Periods of risk with the largest excess mortality become the community’s focus for further study, to determine which of the known causes are likely to be most influential in that community.

This slide shows the excess feto-infant mortality rate in Michigan from 2013 to 2017 and from 2015 to 2017 for each of the four periods. From 2013 to 2017, the excess feto-infant mortality rate was 0.96 per 1,000 live births in the maternal health and prematurity period, 0.25 per 1,000 live births in the maternal care period, 0.29 per 1,000 live births in the newborn care period, and 0.83 per 1,000 live births in the infant health period. From 2015 to 2017, the excess feto-infant mortality rate was 1.02 per 1,000 live births in the maternal health and prematurity period, 0.18 per 1,000 live births in the maternal care period, 0.24 per 1,000 live births in the newborn care period, and 0.86 per 1,000 live births in the infant health period.
PPOR by Maternal Race/Ethnicity

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

The next several slides contain updated PPOR results by maternal race/ethnicity for the State of Michigan.
This slide shows the feto-infant mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, the feto-infant mortality rate was highest among those Black non-Hispanic women in the maternal health and prematurity period, multiracial women in the maternal care period, other non-Hispanic women in the newborn care period, and Black non-Hispanic women in the infant health period.
This slide shows the feto-infant mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2015 to 2017.

From 2015 to 2017, the feto-infant mortality rate was highest among Black non-Hispanic women in the maternal health and prematurity period, multiracial women in the maternal care period, multiracial women in the newborn care period, and American Indian women in the infant health period.
Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2013-2017 (rate per 1,000 live births)

Excess mortality = mortality rate (population) – mortality rate (reference group).

Using Michigan reference: White non-Hispanic, 20-<40 years old and (>13 years education or intending to use private insurance at delivery).

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant excess mortality rate was highest among Black non-Hispanic women in the maternal health and prematurity period, multiracial women in the maternal care period, other non-Hispanic women in the newborn care period, and Black non-Hispanic women in the infant health period.
Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2015-2017 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Maternal Race/Ethnicity, Michigan, 2015-2017

- White non-Hispanic
- Black non-Hispanic
- Hispanic
- American Indian
- Asian/Pacific Islander
- Other non-Hispanic
- Multiracial

<table>
<thead>
<tr>
<th></th>
<th>Infant Health</th>
<th>Newborn Care</th>
<th>Maternal Care</th>
<th>Maternal/Prematurity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate per 1,000 live births</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>White non-Hispanic</td>
<td>0.40</td>
<td>2.62</td>
<td>0.91</td>
<td>3.75</td>
</tr>
<tr>
<td>Black non-Hispanic</td>
<td>2.62</td>
<td>0.67</td>
<td>0.33</td>
<td>-0.22</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.91</td>
<td>-0.19</td>
<td>-0.77</td>
<td>-0.37</td>
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<tr>
<td>American Indian</td>
<td>3.75</td>
<td>-0.22</td>
<td>-0.77</td>
<td>-0.37</td>
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<tr>
<td>Asian/Pacific Islander</td>
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<td>-0.05</td>
<td>0.46</td>
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<tr>
<td>Other non-Hispanic</td>
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<td>0.40</td>
<td>0.31</td>
<td>0.88</td>
</tr>
<tr>
<td>Multiracial</td>
<td>1.11</td>
<td>0.98</td>
<td>0.88</td>
<td>2.50</td>
</tr>
</tbody>
</table>

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant excess mortality rate was highest among Black non-Hispanic women in the maternal health and prematurity period, multiracial women in the maternal care period, multiracial women in the newborn care period, and American Indian women in the infant health period.
This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, among White non-Hispanic women, the infant health period accounted for 43 percent of the feto-infant excess mortality; the maternal health and prematurity period accounted for 30 percent; the newborn care period accounted for 17 percent; and the maternal care period accounted for 10 percent.

From 2013 to 2017, among Black non-Hispanic women, the maternal health and prematurity period accounted for 48 percent of the feto-infant excess mortality; the infant health period accounted for 33 percent; the newborn care period accounted for 9 percent; and the maternal care period accounted for 10 percent.
Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2015-2017 (rate per 1,000 live births)

White non-Hispanic

- Infant Health: 44%
- Maternal/Prematurity: 36%
- Newborn Care: 12%

Black non-Hispanic

- Infant Health: 34%
- Maternal/Prematurity: 48%
- Newborn Care: 9%

* Using Michigan reference: White non-Hispanic, 20-<40 years old and (>13 years education or intending to use private insurance at delivery).

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, among White non-Hispanic women, the infant health period accounted for 44 percent of the feto-infant excess mortality; the maternal health and prematurity period accounted for 36 percent; the newborn care period accounted for 12 percent; and the maternal care period accounted for 8 percent.

From 2015 to 2017, among Black non-Hispanic women, the maternal health and prematurity period accounted for 48 percent of the feto-infant excess mortality; the infant health period accounted for 34 percent; the newborn care period accounted for 9 percent; and the maternal care period accounted for 9 percent.

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS.
This slide shows the feto-infant mortality rate trend by maternal race/ethnicity in Michigan from 2013 to 2017.

From 2013 to 2017, the feto-infant mortality rate among Black non-Hispanic women was higher than that among other racial/ethnic groups. The feto-infant mortality rate among White non-Hispanic women was stable. The rate among Hispanic women went up from 2013 to 2014, and then declined from 2014 to 2017.
This slide shows the feto-infant mortality rate trend by PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, the feto-infant mortality rate in the maternal health and prematurity period was higher than the other periods. The feto-infant mortality rate in the newborn care period has been on a slow decrease over time. The feto-infant mortality rate in the infant health period has been on a slow increase over time. The rate in the maternal care period declined from 2013 to 2015, however, it went up from 2015 to 2016, and then decreased in 2017.
Michigan Feto-Infant Excess Mortality Rate* Trend by PPOR Period: 2013-2017 (rate per 1,000 live births)

This slide shows the feto-infant mortality rate trend by PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant excess mortality rate in the maternal health and prematurity period went up from 2013 to 2014, then decreased from 2014 to 2016, and then increased from 2016 to 2017. The excess rate in the newborn care period has been on a slow decrease over time. The excess rate in the infant health period has been on a slow increase over time. The rate in the maternal care period increased from 2013 to 2016, and declined from 2016 to 2017.
This slide shows the feto-infant mortality rate trend by PPOR period and maternal race/ethnicity in Michigan from 2013 to 2017.

From 2013 to 2017, among White non-Hispanic women, the feto-infant mortality rate in the maternal health and prematurity period was higher than in the other periods. The feto-infant mortality rate in the newborn care period decreased from 2013 to 2014 and then had a slow increase. The feto-infant mortality rate in the infant health period has been on a slow decrease. The rate in the maternal care period declined from 2013 to 2014, then went up from 2014 to 2016, and then decreased in 2017.

From 2013 to 2017, among Black non-Hispanic women, the feto-infant mortality rate in the maternal health and prematurity period was higher than that among other periods. The rate in the newborn care period has been stable from 2013 to 2016 and then decreased in 2017. The rate in the infant health period went up from 2013 to 2015, then declined from 2015 to 2016, and then increased in 2017. The rate in the maternal care period declined from 2013 to 2014, then went up from 2014 to 2016, and then decreased in 2017.
Michigan Feto-Infant Excess Mortality Rate* Trend by PPOR Period and Race/Ethnicity: 2013-2017 (rate per 1,000 live births)

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

Using Michigan reference: White non-Hispanic, 20-<40 years old and (>13 years education or intending to use private insurance at delivery).
Excess mortality rates less than 0 mean mortality rates are lower in the population compared to the reference group.

This slide shows the feto-infant excess mortality rate trend by PPOR period and maternal race/ethnicity in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, among White non-Hispanic women, the feto-infant excess mortality rate in the maternal health and prematurity period has been stable. The excess rate in the newborn care period decreased from 2013 to 2014 and then increased from 2014 to 2017. The excess rate in the infant health period has been on a slow decrease. The excess rate in the maternal care period declined from 2013 to 2014, then went up from 2014 to 2016 and then decreased in 2017.

From 2013 to 2017, among Black non-Hispanic women, the feto-infant mortality excess rate in the maternal health and prematurity period was higher than that among other periods. The excess rate in the newborn care period has been increased from 2013 to 2016 and then decreased in 2017. The excess rate in the infant health period went up from 2013 to 2017. The rate in the maternal care period declined from 2013 to 2014, then went up from 2014 to 2016 and then decreased in 2017.
The next several slides contain updated PPOR by prosperity regions of residence at birth for the State of Michigan.
This slide shows the feto-infant mortality rate by prosperity region of residence in Michigan from 2013 to 2017.

The feto-infant mortality rate in the east central Michigan prosperity region was higher than that in other regions and it was 8.32 per 1,000 live births, followed by the East Michigan prosperity region (8.16 per 1,000 live births) and the Detroit metro prosperity region (7.99 per 1,000 live births). The rate in the upper peninsula prosperity alliance was the lowest (6.82 per 1,000 live births).
This slide shows the feto-infant mortality rate by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, the feto-infant mortality rate was highest in the Detroit metro prosperity region for the maternal health and prematurity period, in the southwest prosperity region for the maternal care period, in the northwest prosperity region for the newborn care period, and in the east Michigan prosperity region for the infant health period.
Michigan Feto-Infant Mortality Rate by Prosperity Region: 2015-2017 (rate per 1,000 live births)

<table>
<thead>
<tr>
<th>Prosperity Region</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Peninsula Prosperity Alliance</td>
<td>2.78</td>
<td>1.73</td>
<td>2.78</td>
</tr>
<tr>
<td>Northwest Prosperity Region</td>
<td>2.08</td>
<td>2.08</td>
<td>2.08</td>
</tr>
<tr>
<td>Northeast Prosperity Region</td>
<td>1.59</td>
<td>1.59</td>
<td>1.59</td>
</tr>
<tr>
<td>West Michigan Prosperity Alliance</td>
<td>3.20</td>
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<td>East Central Michigan Prosperity Region</td>
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<td>East Michigan Prosperity Region</td>
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<td>1.37</td>
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<tr>
<td>Southwest Prosperity Region</td>
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<td>1.81</td>
<td>1.75</td>
</tr>
<tr>
<td>Southeast Michigan Prosperity Region</td>
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<tr>
<td>Detroit Metro Prosperity Region</td>
<td>1.27</td>
<td>1.90</td>
<td>1.56</td>
</tr>
</tbody>
</table>

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant mortality rate by prosperity region of residence and PPOR period in Michigan from 2015 to 2017.

From 2015 to 2017, the feto-infant mortality rate was highest in the east Michigan prosperity region for the maternal health and prematurity period, in the upper peninsula prosperity alliance for the maternal care period, in the west Michigan prosperity region for the newborn care period, and in the east Michigan prosperity region for the infant health period.
This slide shows the feto-infant mortality excess rate by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant excess mortality rate was highest in the Detroit metro prosperity region for the maternal health and prematurity period, in the southwest prosperity region for the maternal care period, in the northwest prosperity region for the newborn care period, and in the east Michigan prosperity region for the infant health period.
Michigan Feto-Infant Excess Mortality Rate* by Prosperity Region: 2015-2017 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Prosperity Region and PPOR Period, Michigan, 2015-2017

This slide shows the feto-infant mortality excess rate by prosperity region of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant mortality rate was highest in the east Michigan prosperity region for the maternal health and prematurity period, in the upper peninsula prosperity alliance for the maternal care period, in the west Michigan prosperity region for the newborn care period, and in the east Michigan prosperity region for the infant health period.

* Using Michigan reference: White non-Hispanic, 20–40 years old and (>13 years education or intending to use private insurance at delivery).

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS.

This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, in the upper peninsula prosperity alliance region, the feto-infant mortality rate in the maternal health and prematurity period went up from 2013 to 2016, and then declined in 2017. The rate in the newborn care period has been decreased from 2013 to 2014, and went up from 2014 to 2017. The rate in the infant health period has been increased over time from 2013 to 2016, and then declined in 2017. The rate in the maternal care period declined from 2013 to 2015 and then increased from 2015 to 2017.

From 2013 to 2017, in the northwest prosperity region, the feto-infant mortality rate in the maternal health and prematurity period went up from 2013 to 2014, decreased in 2015, and then increased from 2015 to 2017. The rate in the newborn care period went down in from 2013 to 2014, and went up from 2014 to 2017. The rate in the infant health period went up from 2013 to 2014, decreased in 2015, and then increased from 2015 to 2017. The rate in the maternal care period went down from 2013 to 2014, increased in 2015, decreased in 2016 and then increased again in 2017.
This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, in the northeast prosperity region, the feto-infant mortality rate in the maternal health and prematurity period went up from 2013 to 2015, then declined in 2016, and then increased in 2017. The rate in the newborn care period increased from 2013 to 2014, went down in 2015, and then went up from 2015 to 2017. The rate in the infant health period went up in 2014, declined from 2014 to 2016, and then increased in 2017. The rate in the maternal care period went down in 2014, went up in 2015, then decreased in 2016, and went up again in 2017.

From 2013 to 2017, in the west Michigan prosperity alliance, the feto-infant mortality rate in the maternal health and prematurity period increased from 2013 to 2014, and declined from 2014 to 2017. The rate in the newborn care period has been on a slow increase from 2013 to 2016, and then decreased in 2017. The rate in the infant health period has been on a slow increase from 2013 to 2015, declined in 2016, and then increased in 2017. The rate in the maternal care period decreased from 2013 to 2015, then went up in 2016, and then decreased in 2017.
This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, in the east central Michigan prosperity region, the feto-infant mortality rate in the maternal health and prematurity period decreased from 2013 to 2015, then went up in 2016, and then decreased again in 2017. The rate in the newborn care period went up from 2013 to 2014, decreased in 2015, went up in 2016, and then went down in 2017. The rate in the infant health period went up from 2013 to 2014, and then declined from 2014 to 2017. The rate in the maternal care period went up from 2013 to 2014, declined in 2015, and increased again from 2015 to 2017.

From 2013 to 2017, in the east Michigan prosperity alliance, the feto-infant mortality rate in the maternal health and prematurity period increased from 2013 to 2016, and then decreased in 2017. The rate in the newborn care period has been on a slow increase from 2013 to 2016, and then decreased in 2017. The rate in the infant health period increased from 2013 to 2014, then decreased from 2014 to 2016, and then went up in 2017. The rate in the maternal care period increased from 2013 to 2014, decreased in 2015, then went up in 2016, and then went down in 2017.
This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, in the south central Michigan prosperity region, the feto-infant mortality rate in the maternal health and prematurity period decreased from 2013 to 2014, went up in 2015, and then decreased from 2015 to 2017. The rate in the newborn care period has been on a decline from 2013 to 2014, went up in 2015, decreased in 2016, and then increased in 2017. The rate in the infant health period went down from 2013 to 2014, went up from 2014 to 2016, and then decreased again in 2017. The rate in the maternal care period went down from 2013 to 2014, went up from 2014 to 2016, and then decreased in 2017.

From 2013 to 2017, in the southwest Michigan prosperity alliance, the feto-infant mortality rate in the maternal health and prematurity period increased from 2013 to 2015, went down in 2016, and then went up again in 2017. The rate in the newborn care period declined from 2013 to 2015, went up in 2016, and then went down in 2017. The rate in the infant health period decreased from 2013 to 2014, went up in 2015, went down in 2016 and then increased again in 2017. The rate in the maternal care period went down from 2013 to 2015, increased in 2016, and then decreased again in 2017.
This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, in the southeast prosperity region, the feto-infant mortality rate in the maternal health and prematurity period was higher than in the other periods and decreased from 2013 to 2014, increased in 2015, and then decreased again from 2015 to 2017. The rate in the newborn care period went down from 2013 to 2015, then increased in 2016, and then declined in 2017. The rate in the infant health period went down from 2013 to 2014, increased from 2014 to 2016, and then decreased in 2017. The rate in the maternal care period increased from 2013 to 2014, went down in 2015, went up in 2016, and then decreased again in 2017.

From 2013 to 2017, in the Detroit metro prosperity region, the feto-infant mortality rate in the maternal health and prematurity period was higher than the other periods and increased from 2013 to 2014, declined from 2014 to 2016, and then increased in 2017. The rate in the newborn care period went down from 2013 to 2014, then increased in 2015, and then declined from 2015 to 2017. The rate in the infant health period has been on a slow increase from 2013 to 2017. The rate in the maternal care period declined from 2013 to 2014 and then increased from 2014 to 2017.
Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 2013-2017 (rate per 1,000 live births)

- Using Michigan reference: White non-Hispanic, 20–40 years old and (>13 years education or intending to use private insurance at delivery).
- Excess mortality rates less than 0 mean mortality rates are lower in the population compared to the reference group.

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant mortality excess rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in the upper peninsula prosperity alliance region, the feto-infant excess mortality rate in the maternal health and prematurity period went up from 2013 to 2016, and then declined in 2017. The rate in the newborn care period has been decreased from 2013 to 2014, and went up from 2014 to 2017. The rate in the infant health period has been increased over time from 2013 to 2016, and then declined in 2017. The rate in the maternal care period declined from 2013 to 2015 and then increased from 2015 to 2017.

From 2013 to 2017, in the northwest prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period went up from 2013 to 2014, decreased in 2015, and then increased from 2015 to 2017. The rate in the newborn care period went down in from 2013 to 2014, and went up from 2014 to 2017. The rate in the infant health period went up from 2013 to 2014, decreased in 2015, and then increased from 2015 to 2017. The rate in the maternal care period went down from 2013 to 2014, increased in 2015, decreased in 2016 and then increased again in 2017.
This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in the northeast prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period went up from 2013 to 2015, then declined in 2016, and then increased in 2017. The rate in the newborn care period increased from 2013 to 2014, went down in 2015, and then went up from 2015 to 2017. The rate in the infant health period went up in 2014, declined from 2014 to 2016, and then increased in 2017. The rate in the maternal care period went down in 2014, went up in 2015, then decreased in 2016, and went up again in 2017.

From 2013 to 2017, in the west Michigan prosperity alliance, the feto-infant mortality excess rate in the maternal health and prematurity period increased from 2013 to 2014, and declined from 2014 to 2017. The rate in the newborn care period has been on a slow increase from 2013 to 2016, and then decreased in 2017. The rate in the infant health period has been on a slow increase from 2013 to 2015, declined in 2016, and then increased in 2017. The rate in the maternal care period decreased from 2013 to 2015, then went up in 2016, and then decreased in 2017.
This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in the east central Michigan prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2013 to 2015, then went up in 2016, and then decreased again in 2017. The rate in the newborn care period went up from 2013 to 2014, decreased in 2015, went up in 2016, and then went down in 2017. The rate in the infant health period went up from 2013 to 2014, and then declined from 2014 to 2016, and then went up in 2017. The rate in the maternal care period went up from 2013 to 2014, declined in 2015, and increased again from 2015 to 2017.

From 2013 to 2017, in the east Michigan prosperity alliance, the feto-infant mortality excess rate in the maternal health and prematurity period increased from 2013 to 2016, and then decreased in 2017. The rate in the newborn care period has been on a slow increase from 2013 to 2016, and then decreased in 2017. The rate in the infant health period has been on a slow increase from 2013 to 2016, then decreased from 2014 to 2016, and then went up in 2017. The rate in the maternal care period increased from 2013 to 2014, decreased in 2015, then went up in 2016, and then went down in 2017.
This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in the south central Michigan prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2013 to 2014, went up in 2015, and then decreased from 2015 to 2017. The rate in the newborn care period has been on a decline from 2013 to 2014, went up in 2015, decreased in 2016, and then increased in 2017. The rate in the infant health period went down from 2013 to 2014, went up from 2014 to 2016, and then decreased again in 2017. The rate in the maternal care period went down from 2013 to 2015, increased in 2016, and then decreased again in 2017.

From 2013 to 2017, in the southwest Michigan prosperity alliance, the feto-infant mortality excess rate in the maternal health and prematurity period increased from 2013 to 2015, went down in 2016, and went up again in 2017. The rate in the newborn care period declined from 2013 to 2015, went up in 2016, and then went down in 2017. The rate in the infant health period decreased from 2013 to 2014, went up in 2015, went down in 2016 and then increased again in 2017. The rate in the maternal care period went down from 2013 to 2015, increased in 2016, and then decreased again in 2017.
This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in the southeast prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2013 to 2014, increased in 2015, and then decreased again from 2015 to 2017. The rate in the newborn care period went down from 2013 to 2015, then increased in 2016, and then declined in 2017. The rate in the infant health period went down from 2013 to 2015, increased in 2016, and then decreased in 2017. The rate in the maternal care period increased from 2013 to 2014, went down in 2015, went up in 2016, and then decreased again in 2017.

From 2013 to 2017, in the Detroit metro prosperity region, the feto-infant mortality excess rate in the maternal health and prematurity period was higher than the other periods and increased from 2013 to 2014, went down from 2014 to 2016, and then increased in 2017. The rate in the newborn care period went down from 2013 to 2014, then increased in 2015, and then declined from 2015 to 2017. The rate in the infant health period has been on a slow increase from 2013 to 2017. The rate in the maternal care period declined from 2013 to 2014 and then increased from 2014 to 2017.
This slide shows the feto-infant mortality rate and excess rate by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

The feto-infant mortality rate in the east central Michigan prosperity region was higher than that in other regions and it was 8.32 per 1,000 live births, followed by the East Michigan prosperity region (8.16 per 1,000 live births) and the Detroit metro prosperity region (7.99 per 1,000 live births). The rate in the upper peninsula prosperity alliance was the lowest (6.82 per 1,000 live births).

From 2013 to 2017, the feto-infant excess mortality rate in the east central Michigan prosperity region was higher than that in other regions and it was 2.96 per 1,000 live births, followed by the east Michigan prosperity region (2.81 per 1,000 live births) and the Detroit metro prosperity region (2.63 per 1,000 live births). The rate in the upper peninsula prosperity alliance was the lowest (1.46 per 1,000 live births).
This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by prosperity region of residence in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in the northeast prosperity region, 52.5 percent of excess infant deaths were attributed to the maternal health and prematurity period. In the upper peninsula prosperity alliance, 22.4 percent of excess infant deaths were attributed to the maternal care period. In the northwest prosperity region, 32.3 percent of excess infant deaths were attributed to the neonatal care period. In the south central prosperity region, 57.7 percent of excess infant deaths were attributed to the infant health period.
Michigan Feto-Infant Mortality Rate by Prosperity Region: 2015-2017 (rate per 1,000 live births)

This slide shows the feto-infant mortality rate and excess rate by prosperity region of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant mortality rate in the east Michigan prosperity region was higher than that in other regions at 8.45 per 1,000 live births, followed by the southwest prosperity region (8.11 per 1,000 live births) and the Detroit metro prosperity region (8.04 per 1,000 live births). The rate in the southeast Michigan prosperity region was the lowest (6.72 per 1,000 live births).

From 2015 to 2017, the feto-infant excess mortality rate in the east Michigan prosperity region was higher than that in other regions at 3.05 per 1,000 live births, followed by the southwest prosperity region (2.71 per 1,000 live births) and the Detroit metro prosperity region (2.64 per 1,000 live births). The rate in the southeast Michigan prosperity region was the lowest (1.32 per 1,000 live births).
This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by prosperity region of residence in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, in the northeast prosperity region, 72.9 percent of excess infant deaths were attributed to the maternal health and prematurity period. In the upper peninsula prosperity alliance, 26.3 percent of excess infant deaths were attributed to the maternal care period. In the west Michigan prosperity region, 25.3 percent of excess infant deaths were attributed to the neonatal care period. In the northeast prosperity region, 62.8 percent of excess infant deaths were attributed to the infant health period.
The next several slides contain updated PPOR results by city of residence at birth for the State of Michigan.
This slide shows the feto-infant mortality rate by selected city of residence in Michigan from 2013 to 2017.

The feto-infant mortality rate in Saginaw was higher than that in other cities at 15.76 per 1,000 live births, followed by Pontiac (13.74 per 1,000 live births), Detroit (13.17 per 1,000 live births) and Flint (12.81 per 1,000 live births). The rate in Wyoming was lower than other cities (6.00 per 1,000 live births).
This slide shows the feto-infant mortality rate by selected city of residence at birth and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, the feto-infant mortality rate was highest in Pontiac for the maternal health and prematurity period, highest in Portage for the maternal care period, highest in Saginaw for the newborn care period and the infant health period.
Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2015-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate by City of Residence and PPOR Period, Michigan, 2015-2017

This slide shows the feto-infant mortality rate by selected city of residence at birth and PPOR period in Michigan from 2015 to 2017.

From 2015 to 2017, the feto-infant mortality rate was highest in Pontiac for the maternal health and prematurity period, in Benton Harbor for the maternal care period, in Saginaw for the newborn care period, and in Flint for the infant health period.
This slide shows the feto-infant mortality excess rate by selected city of residence at birth and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant excess mortality rate was highest in Pontiac for the maternal health and prematurity period, in Portage for the maternal care period, in Saginaw for the newborn care period and the infant health period.
Michigan Feto-Infant Excess Mortality Rate* by City of Residence at Birth: 2015-2017 (rate per 1,000 live births)

<table>
<thead>
<tr>
<th>City</th>
<th>Infant Health</th>
<th>Newborn Care</th>
<th>Maternal Care</th>
<th>Maternal Health/Prematurity</th>
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<tr>
<td>Michigan</td>
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<td>0.24</td>
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<td>Flint</td>
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<td>-0.20</td>
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* Using Michigan reference: White non-Hispanic, 20-<40 years old and (>13 years education or intending to use private insurance at delivery).

This slide shows the feto-infant mortality excess rate by selected city of residence at birth and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant excess mortality rate was highest in Pontiac for the maternal health and prematurity period, in Benton Harbor for the maternal care period, in Saginaw for the newborn care period, and in Flint for the infant health period.

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS
Michigan Feto-Infant Mortality Rate Trend by City of Residence at Birth: 2013-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate Trend in Detroit, 2013-2017

This slide shows the feto-infant mortality rate trend by selected city of residence and PPOR period in Michigan from 2013 to 2017. Data for some cities, except Detroit and Grand Rapids, is not stable enough for annual estimate.

From 2013 to 2017, in Detroit, the feto-infant mortality rate in the maternal health and prematurity period declined from 2013 to 2016 and then increased in 2017. The rate in the newborn care period has a slow decline from 2013 to 2017. The rate in the infant health period has been on an increase from 2013 to 2015, then went down in 2016, and then went up in 2017. The rate in the maternal care period decreased from 2013 to 2014, and then had a slow increase from 2014 to 2017.
This slide shows the feto-infant excess mortality rate trend by selected city of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery. Data for some cities, except Detroit and Grand Rapids, is not stable enough for annual estimate.

From 2013 to 2017, in Detroit, the feto-infant excess mortality rate in the maternal health and prematurity period declined from 2013 to 2016 and then increased in 2017. The rate in the newborn care period has a slow decline from 2013 to 2017. The rate in the infant health period has been on an increase from 2013 to 2015, then went down in 2016, and then went up in 2017. The rate in the maternal care period decreased from 2013 to 2014, and then had a slow increase from 2014 to 2017.
This slide shows the feto-infant mortality rate and excess rate by selected city of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant mortality rate in Saginaw was higher than that in other cities at 15.76 per 1,000 live births, followed by Pontiac (13.74 per 1,000 live births) and Detroit (13.71 per 1,000 live births). The rate in Grand Rapids was lower than other selected cities (8.34 per 1,000 live births).

From 2013 to 2017, the feto-infant excess mortality rate in Saginaw was higher than that in other selected cities at 10.40 per 1,000 live births, followed by Pontiac (8.38 per 1,000 live births) and Detroit (7.81 per 1,000 live births). The excess rate in Grand Rapids was lower than other selected cities (2.99 per 1,000 live births).
This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected city of residence in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in Pontiac, 47.2 percent of excess infant deaths were attributed to the maternal health and prematurity period. In Grand Rapids, 19.6 percent of excess infant deaths were attributed to the maternal care period. In Saginaw, 20.8 percent of excess infant deaths were attributed to the neonatal care period. In Lansing, 54.1 percent were attributed to the infant health period.
This slide shows the feto-infant mortality rate and excess rate by selected city of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant mortality rate was 13.23 per 1,000 live births in Detroit, 14.42 per 1,000 live births in Flint, and 8.37 per 1,000 live births in Grand Rapids.

From 2015 to 2017, the feto-infant excess mortality rate was 7.83 per 1,000 live births in Detroit, 9.02 per 1,000 live births in Flint, and 2.99 per 1,000 live births in Grand Rapids.
This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected city of residence in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, in Detroit, 46.5 percent of excess infant deaths were attributed to the maternal health and prematurity period. In Flint, 13.6 percent of excess infant deaths were attributed to the maternal care period. In Grand Rapids, 21.2 percent of excess infant deaths were attributed to the neonatal care period. In Grand Rapids, 49.0 percent of excess infant deaths were attributed to the infant health period.
The next several slides contain updated PPOR by county of residence at birth for the State of Michigan.
This slide shows the feto-infant mortality rate by selected county of residence in Michigan from 2013 to 2017.

The feto-infant mortality rate in Saginaw County was higher than that in other counties at 10.50 per 1,000 live births, followed by Wayne County (9.65 per 1,000 live births) and Genesee County (9.44 per 1,000 live births). The rate in Macomb County was lower than other selected counties (6.24 per 1,000 live births).
This slide shows the feto-infant mortality rate by selected county of residence at birth and PPOR period in Michigan from 2013 to 2017.

From 2013 to 2017, the feto-infant mortality rate was highest in Genesee County for the maternal health and prematurity period, in Calhoun County for the maternal care period, and in Saginaw County for both the newborn care and infant health periods.
Michigan Feto-Infant Mortality Rate by County of Residence: 2015-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate by Selected County of Residence and PPOR Period, Michigan, 2015-2017

This slide shows the feto-infant mortality rate by selected county of residence at birth and PPOR period in Michigan from 2015 to 2017.

From 2015 to 2017, the feto-infant mortality rate was highest in Genesee County for the maternal health and prematurity period, in Kalamazoo County for the maternal care period, in Saginaw County for the newborn care period, and in Ingham County for the infant health period.
This slide shows the feto-infant excess mortality rate by selected county of residence at birth and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant excess mortality rate was highest in Genesee County for the maternal health and prematurity period, in Calhoun County for the maternal care period, and in Saginaw County for both the newborn care and infant health periods.
This slide shows the feto-infant excess mortality rate by selected county of residence at birth and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant excess mortality rate was highest in Genesee County for the maternal health and prematurity period, in Kalamazoo County for the maternal care period, in Saginaw County for the newborn care period, and in Ingham County for the infant health period.
This slide shows the feto-infant mortality rate trend by selected county of residence and PPOR period in Michigan from 2013 to 2017. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

From 2013 to 2017, in Kent County, the feto-infant mortality rate in the maternal health and prematurity period increased from 2013 to 2014, went down in 2015, and went up again from 2015 to 2017. The rate in the newborn care period increased from 2013 to 2016 and declined in 2017. The rate in the infant health period increased from 2013 to 2015, decreased in 2016, and then increased again in 2017. The rate in the maternal care period increased from 2013 to 2014, declined in 2015, then went up again in 2016, and decreased in 2017.

From 2013 to 2017, in Macomb County, the feto-infant mortality rate in the maternal health and prematurity period increased from 2013 to 2017. The rate in the newborn care period decreased from 2013 to 2014, went up in 2015, went down in 2016, and increased again in 2017. The rate in the infant health period has been on a slow increase over time. The rate in the maternal care period increased from 2013 to 2014, went down in 2015, and then increased again in 2016 and 2017.
This slide shows the feto-infant mortality rate trend by selected county of residence and PPOR period in Michigan from 2013 to 2017. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

From 2013 to 2017, in Oakland County, the feto-infant mortality rate in the maternal health and prematurity period was higher than that in other periods and increased from 2013 to 2014, declined in 2015, went up in 2016 and then declined again in 2017. The rate in the newborn care period decreased from 2013 to 2015, and then went up from 2015 to 2017. The rate in the infant health period decreased from 2013 to 2014, then went up from 2014 to 2016, and then decreased in 2017. The rate in the maternal care period increased from 2013 to 2015 and then declined from 2015 to 2017.

From 2013 to 2017, in Wayne County, the feto-infant mortality rate in the maternal health and prematurity period was higher than that in other periods and decreased from 2013 to 2016 and then increased in 2017. The rate in the newborn care period increased slowly from 2013 to 2015, and then decreased from 2015 to 2017. The rate in the infant health period increased from 2013 to 2017. The rate in the maternal care period decreased from 2013 to 2014, and then went up from 2014 to 2017.
This slide shows the feto-infant excess mortality rate trend by selected county of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

From 2013 to 2017, in Kent County, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2013 to 2014, went down in 2015, and went up again from 2015 to 2017. The rate in the newborn care period increased from 2013 to 2016 and declined in 2017. The rate in the infant health period increased from 2013 to 2015, decreased in 2016, and then increased again in 2017. The rate in the maternal care period increased from 2013 to 2014, declined in 2015, then went up again in 2016, and decreased in 2017.

From 2013 to 2017, in Macomb County, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2013 to 2017. The rate in the newborn care period decreased from 2013 to 2014, went up in 2015, went down in 2016, and increased again in 2017. The rate in the infant health period has been on a slow increase over time. The rate in the maternal care period increased from 2013 to 2014, went down in 2015, and then increased again in 2016 and 2017.
This slide shows the feto-infant excess mortality rate trend by selected county of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

From 2013 to 2017, in Oakland County, the feto-infant excess mortality rate in the maternal health and prematurity period was higher than that in other periods and increased from 2013 to 2014, declined in 2015, went up in 2016 and then declined again in 2017. The rate in the newborn care period decreased from 2013 to 2015, and then went up from 2015 to 2017. The rate in the infant health period decreased from 2013 to 2014, then went up from 2014 to 2016, and then decreased in 2017. The rate in the maternal care period increased from 2013 to 2015 and then declined from 2015 to 2017.

From 2013 to 2017, in Wayne County, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2013 to 2016 and then increased in 2017. The rate in the newborn care period increased slowly from 2013 to 2015, and then decreased from 2015 to 2017. The rate in the infant health period increased from 2013 to 2017. The rate in the maternal care period decreased from 2013 to 2014, and then went up from 2014 to 2017.
This slide shows the feto-infant mortality rate and excess rate by selected county of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, the feto-infant mortality rate in Saginaw County was higher than that in other counties and it was 10.50 per 1,000 live births, followed by Wayne County (9.65 per 1,000 live births), Genesee County (9.44 per 1,000 live births), and Calhoun County (9.38 per 1,000 live births). The rate in Ottawa County was lower than other selected counties (5.64 per 1,000 live births).

From 2013 to 2017, the feto-infant excess mortality rate in Saginaw County was higher than that in other selected counties at 5.15 per 1,000 live births, followed by Wayne County (4.29 per 1,000 live births), Genesee County (4.09 per 1,000 live births), and Calhoun County (4.02 per 1,000 live births). The excess rate in Ottawa County was lower than other selected counties (0.28 per 1,000 live births).
This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected county of residence in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2013 to 2017, in Oakland County, 85.5 percent of excess infant deaths were attributed to the maternal health and prematurity period. In Calhoun County, 32.7 percent of excess infant deaths were attributed to the maternal care period. In Muskegon County, 17.7 percent of excess infant deaths were attributed to the neonatal care period. In Berrien County, 89.0 percent of excess infant deaths were attributed to the infant health period.
Michigan Feto-Infant Mortality Rate by County of Residence: 2015-2017 (rate per 1,000 live births)

This slide shows the feto-infant mortality rate and excess rate by selected county of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, the feto-infant mortality rate in Saginaw County was higher than that in other counties at 10.30 per 1,000 live births, followed by Wayne County (9.65 per 1,000 live births) and the Genesee County (9.40 per 1,000 live births). The rate in Washtenaw County was lower than other selected counties (5.75 per 1,000 live births).

From 2015 to 2017, the feto-infant excess mortality rate in Saginaw County was higher than that in other selected counties at 4.91 per 1,000 live births, followed by Wayne County (4.25 per 1,000 live births) and Genesee County (4.00 per 1,000 live births). The excess rate in Washtenaw County was lower than other selected counties (0.35 per 1,000 live births).

Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS
This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected county of residence in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White non-Hispanic Michigan women, over 20 years and less than 40 years old, and at least 13 years education or intending to use private insurance at delivery.

From 2015 to 2017, in Oakland County, 75.2 percent of excess infant deaths were attributed to the maternal health and prematurity period. In Kalamazoo County, 14.0 percent of excess infant deaths were attributed to the maternal care period. In Kent County, 27.5 percent of excess infant deaths were attributed to the neonatal care period. In Ingham County, 64.8 percent of excess infant deaths were attributed to the infant health period.