

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

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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

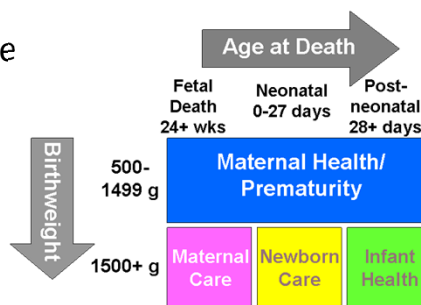
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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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



* CityMatCH, available at <https://www.citymatch.org/perinatal-periods-of-risk-approach/>

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

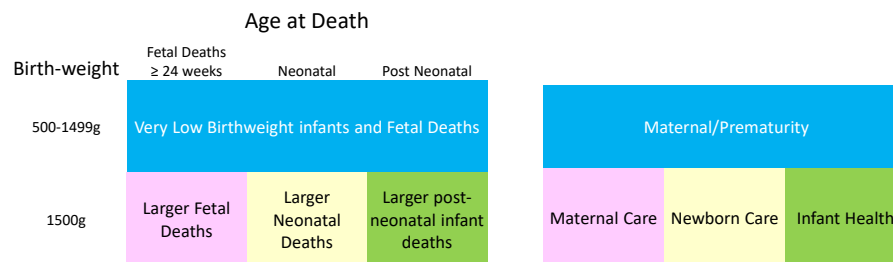
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Perinatal Periods of Risk (PPOR) is a comprehensive approach to help communities use data to reduce infant mortality. Designed for use in US cities with high infant mortality rates, PPOR brings community stakeholders together to build consensus and 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.



* CityMatCH, available at <https://www.citymatch.org/perinatal-periods-of-risk-approach/>

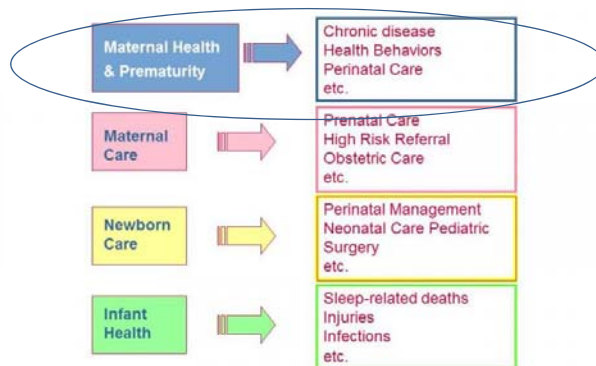
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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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 fetoinfant 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)*

PPOR helps communities move from data to action



* CityMatCH, available at <https://www.citymatch.org/perinatal-periods-of-risk-approach/>

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

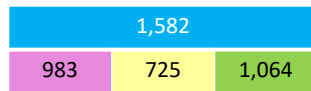
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Each period of risk is associated with its own set of risk and prevention factors. The four periods provide a framework that helps communities move from having data to using it, prioritizing limited resources, and using evidence to maximize impact.

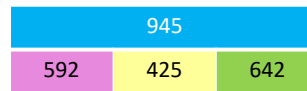
Maternal health and prematurity is associated with risk factors such as chronic disease, health behaviors, prenatal care, etc. Maternal care is associated with risk factors such as prenatal care, high risk referral, obstetric care, etc. Newborn care is linked to risk factors such as perinatal management,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

PPOR

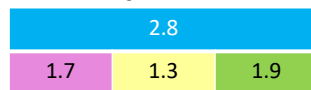
Number of Deaths: Michigan 2013-2017



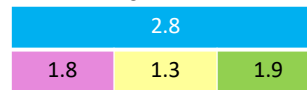
Number of Deaths : Michigan 2015-2017



Feto-Infant Mortality Rate
(per 1,000 live births):
Michigan 2013-2017



Feto-Infant Mortality Rate
(per 1,000 live births):
Michigan 2015-2017



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

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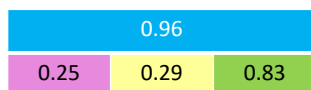
This slide shows the number of feto-infant deaths and feto-infant mortality rates in Michigan from 2013-2017 and from 2015-2017 for each of the four periods.

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.

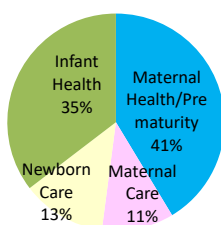
From 2013 to 2017, the feto-infant mortality rate was 2.8 per 1,000 live births in the maternal health and prematurity period, 1.7 per 1,000 live births in the maternal care period, 1.3 per 1,000 live births in the newborn care period, and 1.9 per 1,000 live births in the infant health period. From 2015 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.

PPOR

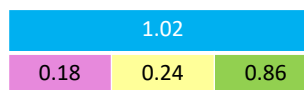
Excess Feto-Infant Mortality Rate*:
Michigan 2013-2017



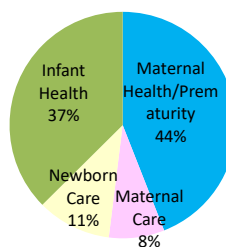
Year 2013-2017



Excess Feto-Infant Mortality Rate*:
Michigan 2015-2017



Year 2015-2017



* 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

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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

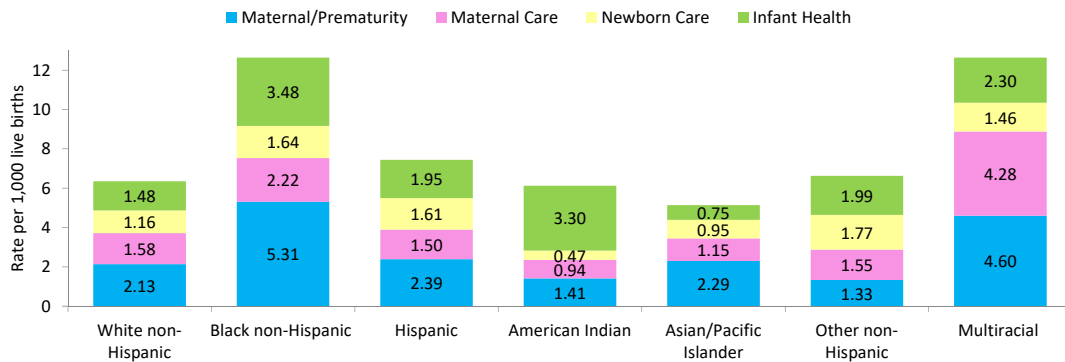
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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The next several slides contain updated PPOR results by maternal race/ethnicity for the State of Michigan.

Michigan Feto-Infant Mortality Rate by Maternal Race/Ethnicity (rate per 1,000 live births)

Feto-Infant Mortality Rate by Maternal Race/Ethnicity, Michigan, 2013-2017



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

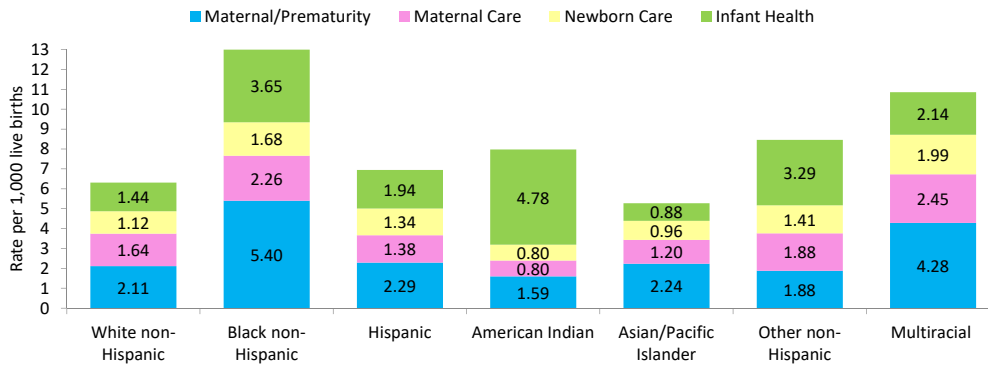
9

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.

Michigan Feto-Infant Mortality Rate by Maternal Race/Ethnicity (rate per 1,000 live births)

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



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

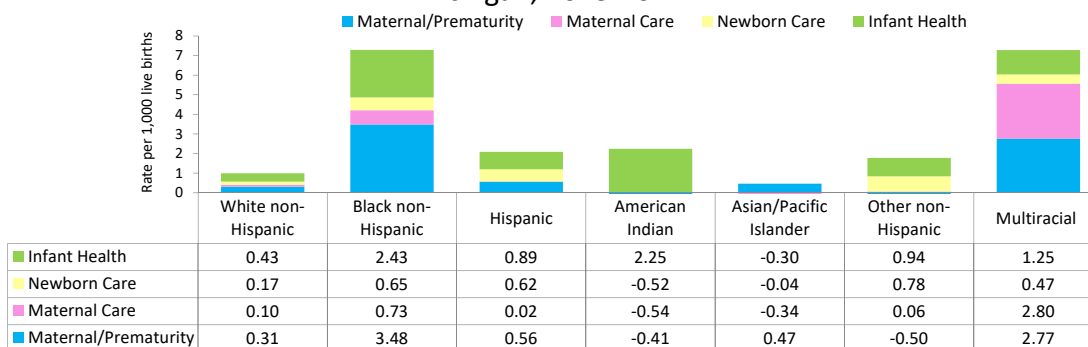
10

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)

Feto-Infant Excess Mortality Rate by Maternal Race/Ethnicity, Michigan, 2013-2017



- 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

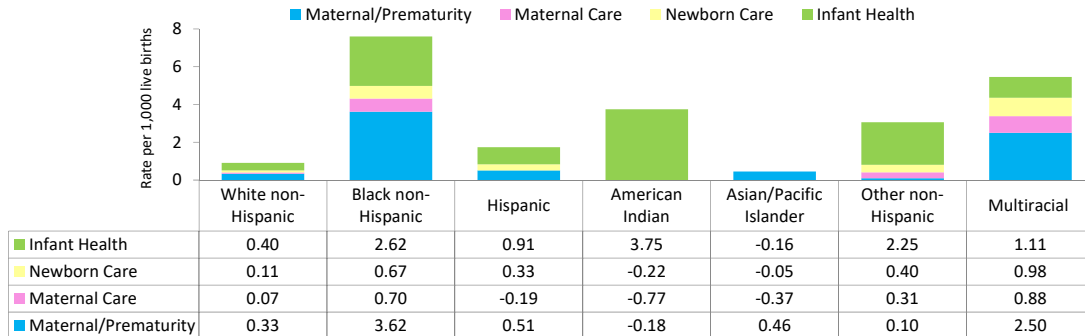
11

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



- 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

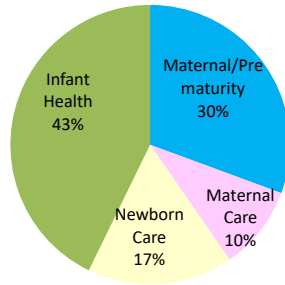
12

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.

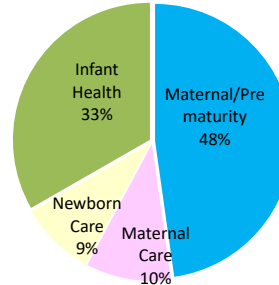
From 2015 to 2017, the feto-infant excess mortality rate was highest among Black non-Hispanic women in the maternal health and prematurity period, multiracial women in the maternal care period, multiracial women in the newborn care period, and American Indian women in the infant health period.

Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2013-2017 (rate per 1,000 live births)

White non-Hispanic



Black non-Hispanic



* 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

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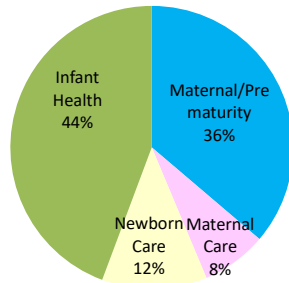
This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group is White 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.

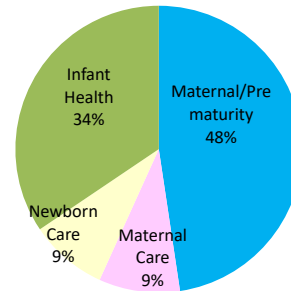
From 2013 to 2017, among Black non-Hispanic women, the maternal health and prematurity period accounted for 48 percent of the feto-infant excess mortality; the infant health period accounted for 33 percent; the newborn care period accounted for 9 percent; and the maternal care period accounted for 10 percent.

Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2015-2017 (rate per 1,000 live births)

White non-Hispanic



Black non-Hispanic



* 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

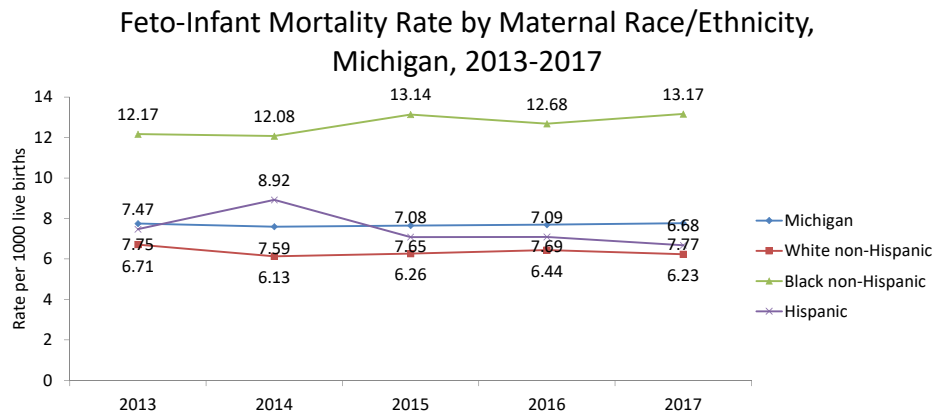
14

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.

Michigan Feto-Infant Mortality Rate Trend by Maternal Race/Ethnicity: 2013-2017 (rate per 1,000 live births)



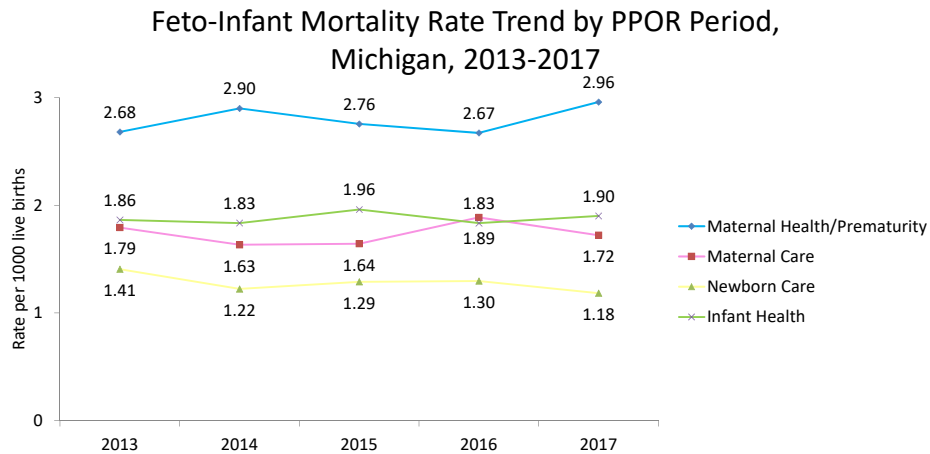
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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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.

Michigan Feto-Infant Mortality Rate Trend by PPOR Period: 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

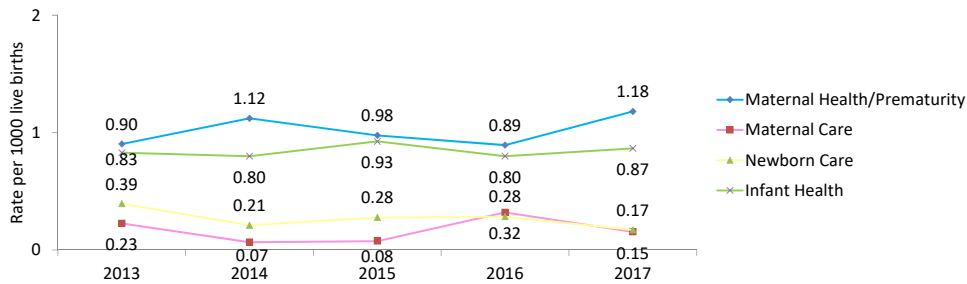
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This slide shows the feto-infant mortality rate trend by PPOR period in Michigan from 2013 to 2017.

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)

Feto-Infant Excess Mortality Rate Trend by PPOR Period, Michigan, 2013-2017



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

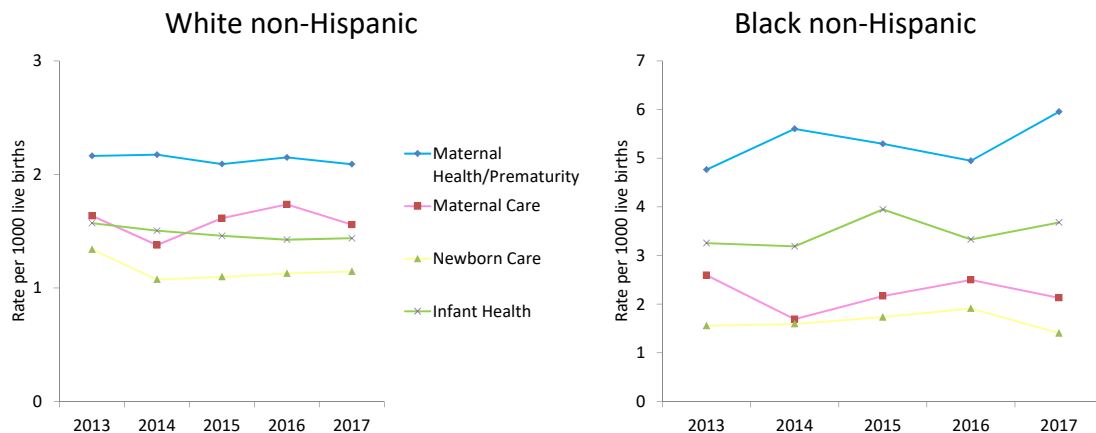
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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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.

Michigan Feto-Infant Mortality Rate Trend by PPOR Period and Maternal 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

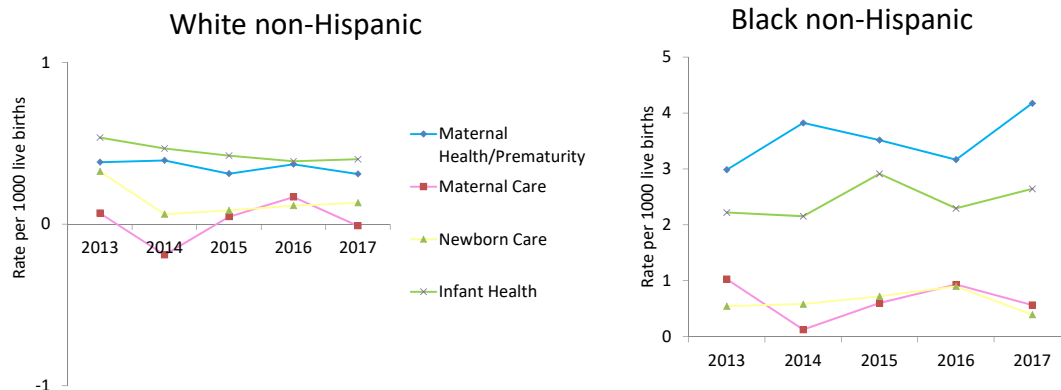
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This slide shows the feto-infant mortality rate trend by PPOR period and maternal race/ethnicity in Michigan from 2013 to 2017.

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)



- 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

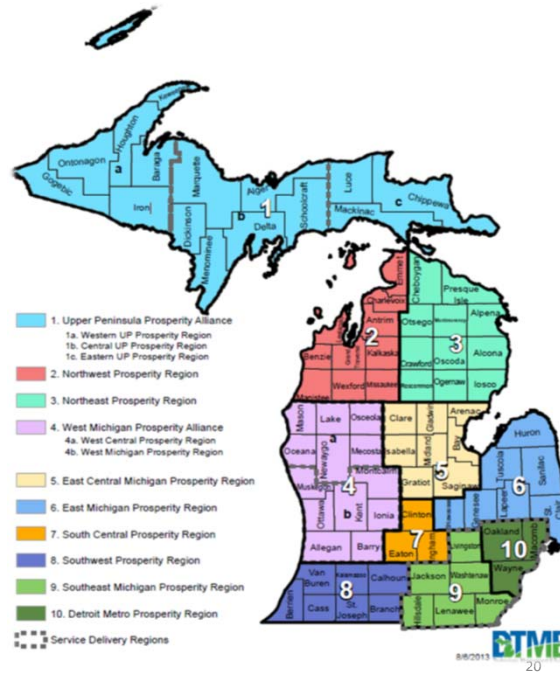
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This slide shows the feto-infant excess mortality rate trend by PPOR period and maternal race/ethnicity in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality 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.

PPOR by Prosperity Region

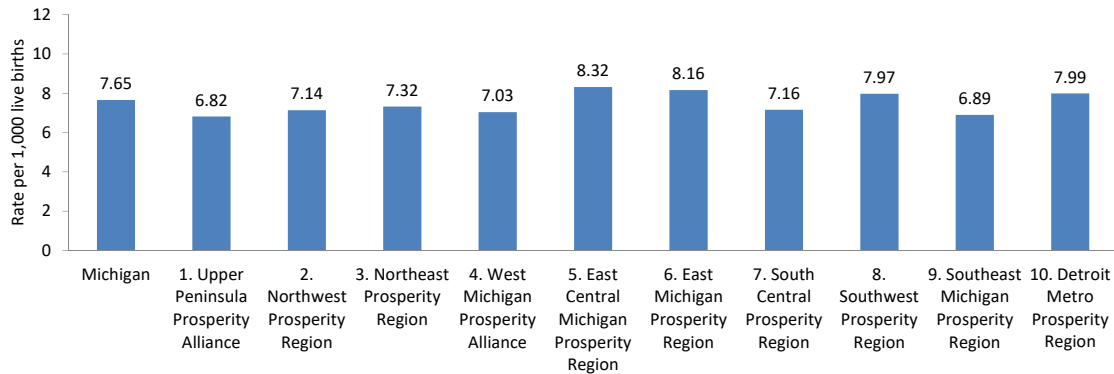


Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

The next several slides contain updated PPOR by prosperity regions of residence at birth for the State of Michigan.

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2013-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate by Prosperity Region, Michigan, 2013-2017



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

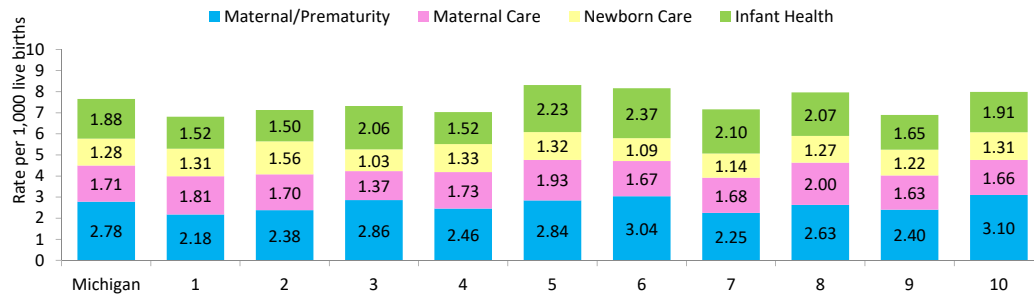
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This slide shows the feto-infant mortality rate by prosperity region of residence in Michigan from 2013 to 2017.

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).

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2013-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate by Prosperity Region and PPOR Period, Michigan, 2013-2017



1. Upper Peninsula Prosperity Alliance; 2. Northwest Prosperity Region; 3. Northeast Prosperity Region; 4. West Michigan Prosperity Alliance; 5. East Central Michigan Prosperity Region; 6. East Michigan Prosperity Region; 7. South Central Prosperity Region; 8. Southwest Prosperity Region; 9. Southeast Michigan Prosperity Region; 10. Detroit Metro Prosperity Region.

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

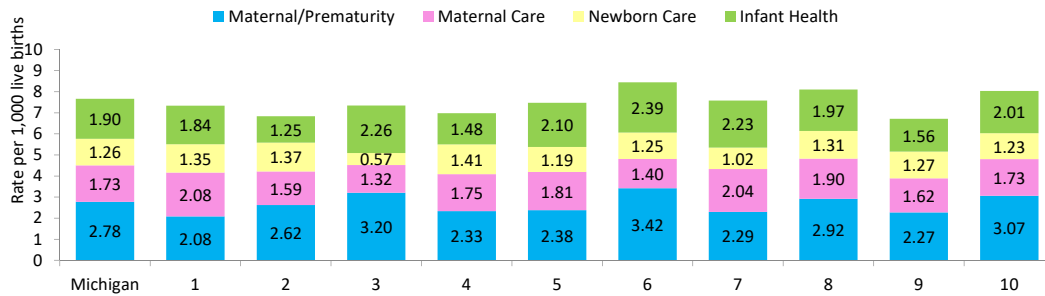
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This slide shows the feto-infant mortality rate by prosperity region of residence and PPOR period in Michigan from 2013 to 2017.

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)

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



1. Upper Peninsula Prosperity Alliance; 2. Northwest Prosperity Region; 3. Northeast Prosperity Region; 4. West Michigan Prosperity Alliance; 5. East Central Michigan Prosperity Region; 6. East Michigan Prosperity Region; 7. South Central Prosperity Region; 8. Southwest Prosperity Region; 9. Southeast Michigan Prosperity Region; 10. Detroit Metro Prosperity Region.

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

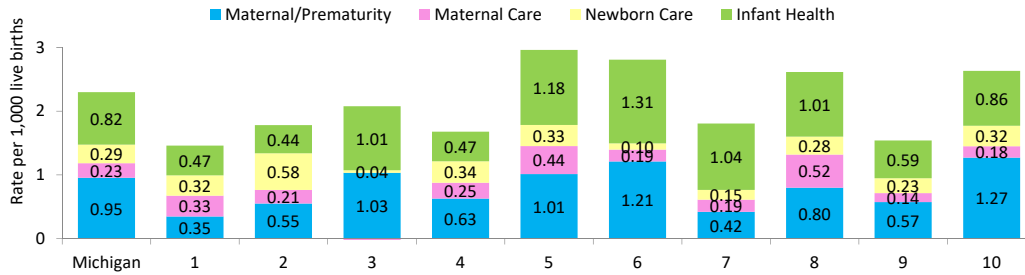
23

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.

Michigan Feto-Infant Excess Mortality Rate* by Prosperity Region: 2013-2017 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Prosperity Region and PPOR Period, Michigan, 2013-2017



1. Upper Peninsula Prosperity Alliance; 2. Northwest Prosperity Region; 3. Northeast Prosperity Region; 4. West Michigan Prosperity Alliance; 5. East Central Michigan Prosperity Region; 6. East Michigan Prosperity Region; 7. South Central Prosperity Region; 8. Southwest Prosperity Region; 9. Southeast Michigan Prosperity Region; 10. Detroit Metro Prosperity Region.

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

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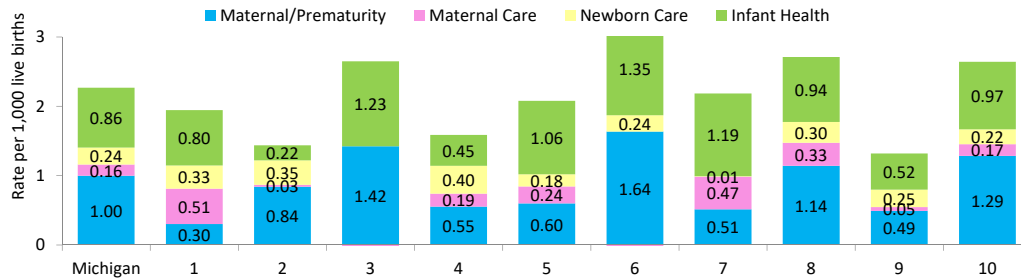
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant mortality excess rate 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



1. Upper Peninsula Prosperity Alliance; 2. Northwest Prosperity Region; 3. Northeast Prosperity Region; 4. West Michigan Prosperity Alliance; 5. East Central Michigan Prosperity Region; 6. East Michigan Prosperity Region; 7. South Central Prosperity Region; 8. Southwest Prosperity Region; 9. Southeast Michigan Prosperity Region; 10. Detroit Metro Prosperity Region.

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

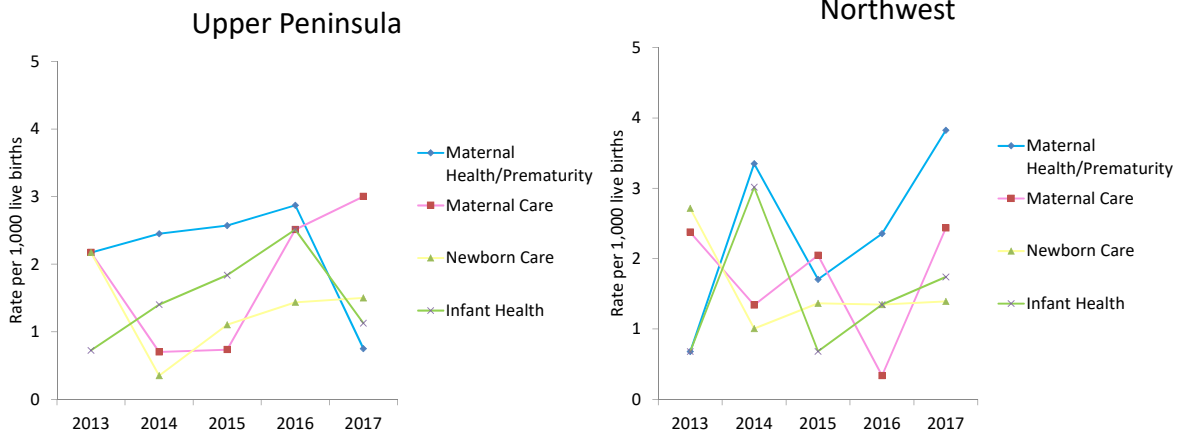
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Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant mortality excess rate 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.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 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

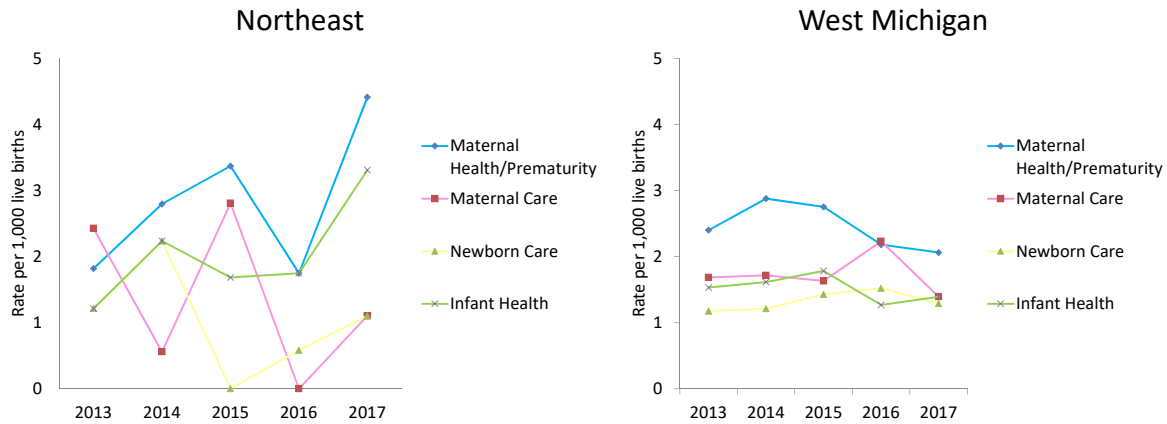
26

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.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 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

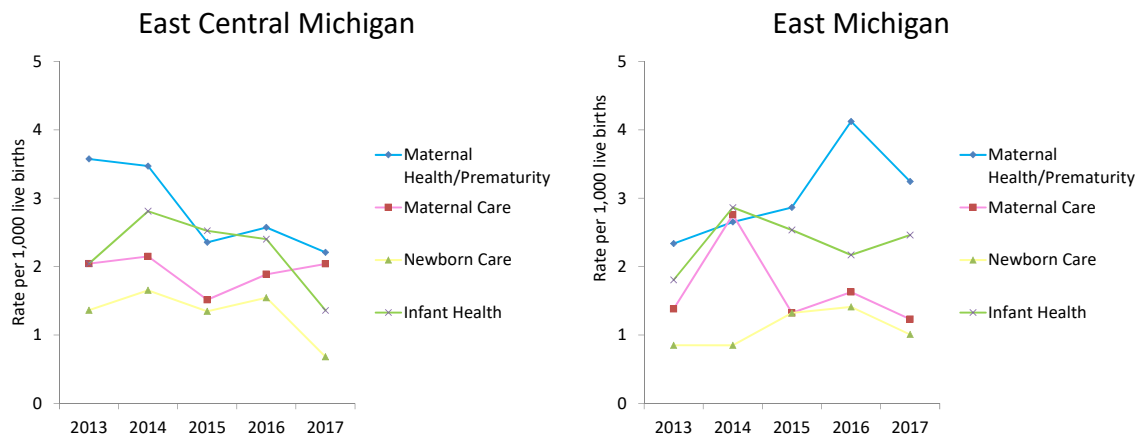
27

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.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 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

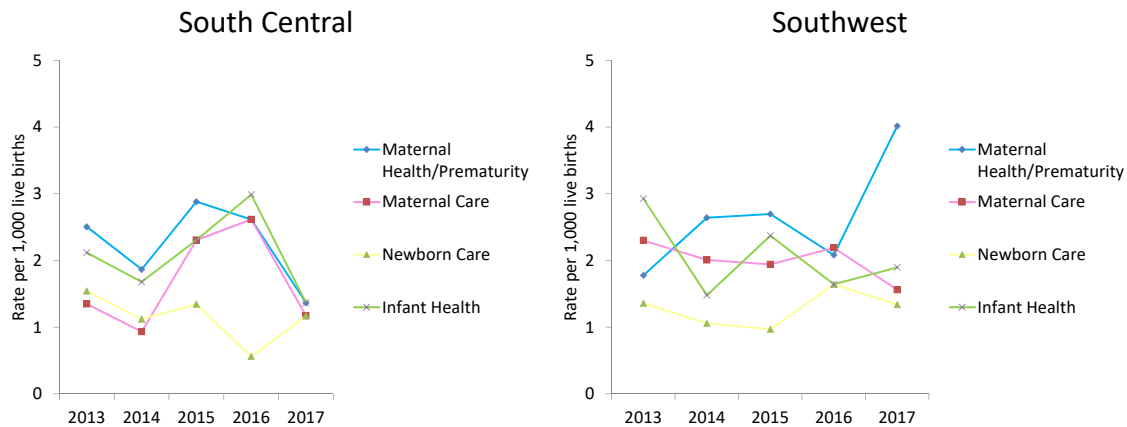
28

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.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 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

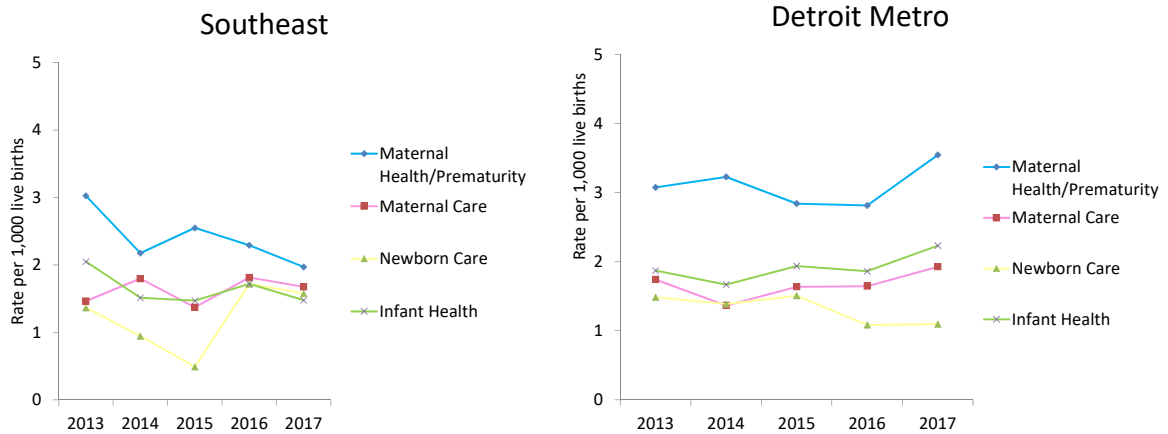
29

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 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 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.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 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

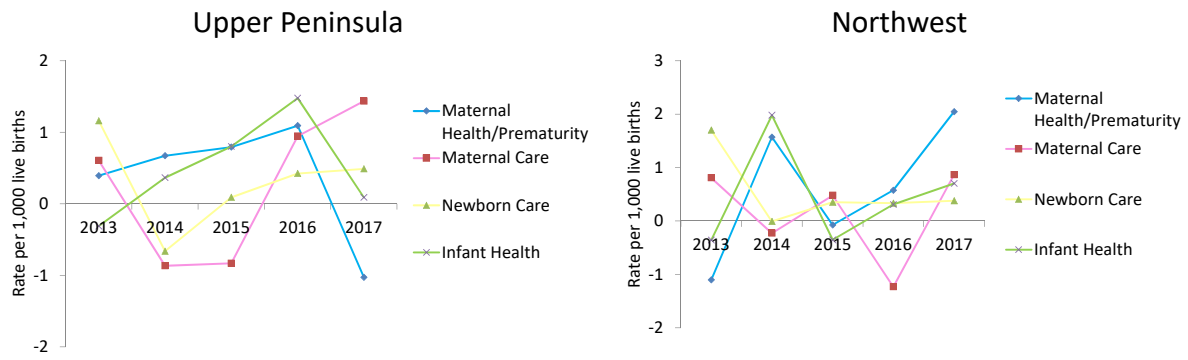
30

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

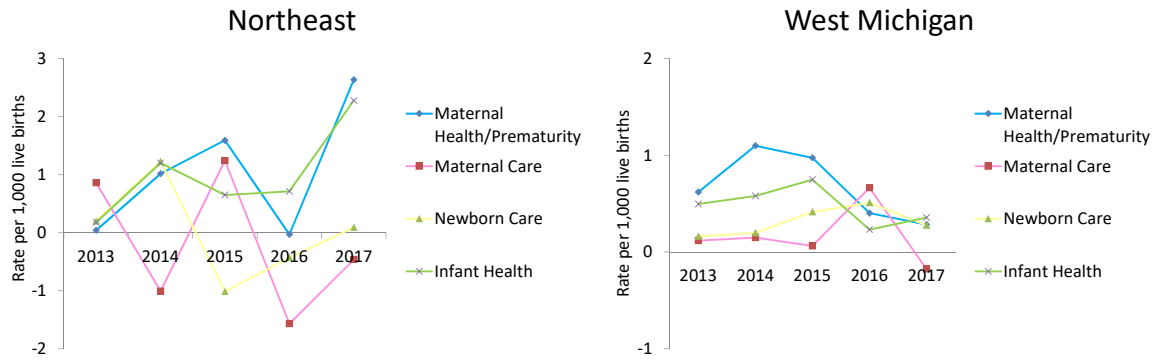
31

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.

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

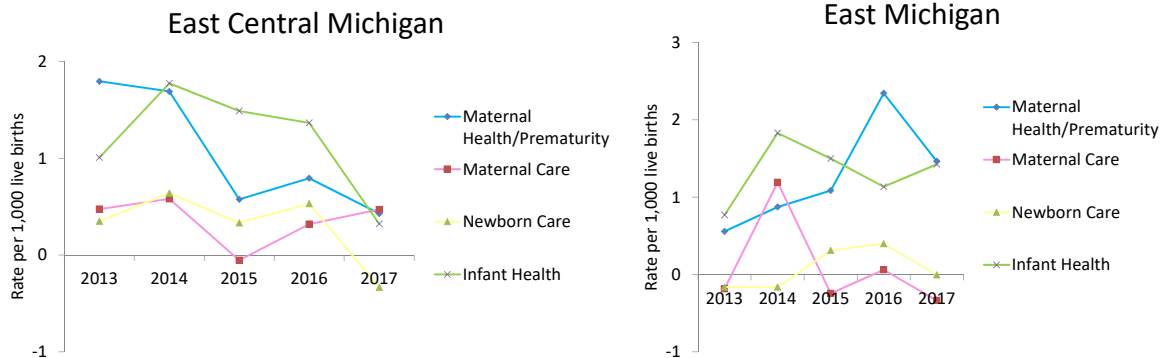
32

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.

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

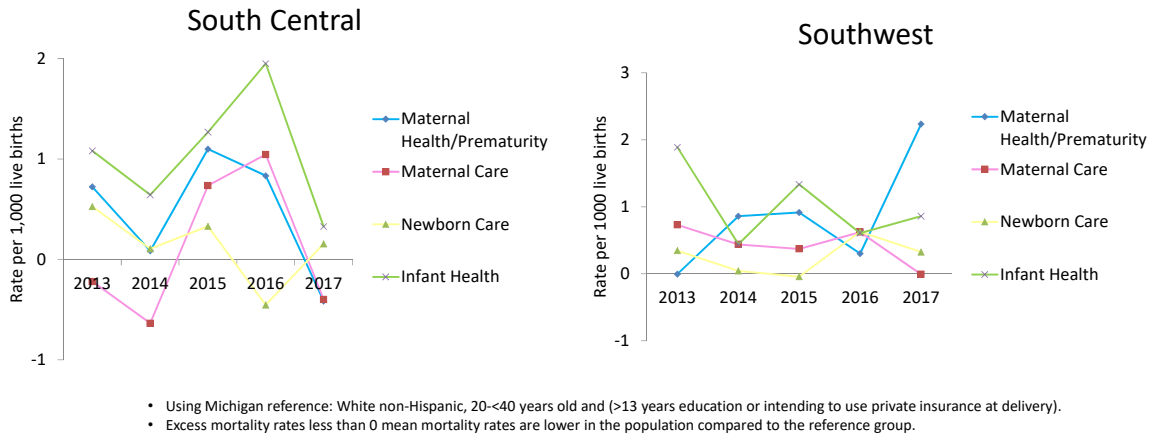
33

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 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 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.

Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 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

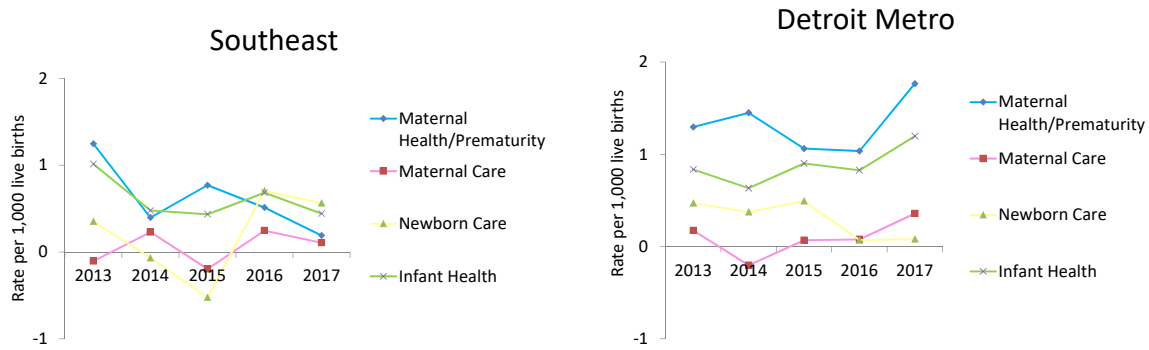
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This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the 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 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 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.

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

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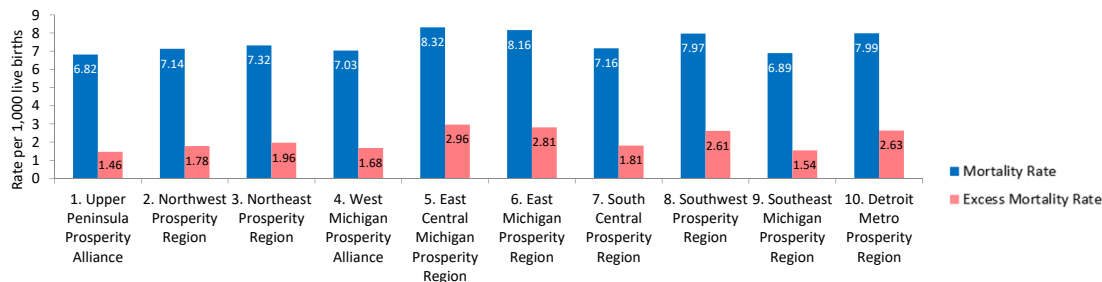
This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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.

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2013-2017 (rate per 1,000 live births)

	Live births 5 years	Number of deaths by perinatal period				Rate of deaths per 1,000 live births by perinatal period				Total	Overall Year	Excess rate of deaths per 1,000 live births				Overall Excess Mortality
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health			Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	
1. Upper Peninsula Prosperity Alliance	13791	30	25	18	21	2.18	1.81	1.31	1.52	94	6.82	0.35	0.33	0.32	0.47	1.46
2. Northwest Prosperity Region	14713	35	25	23	22	2.38	1.70	1.56	1.50	105	7.14	0.55	0.21	0.58	0.44	1.78
3. Northeast Prosperity Region	8743	25	12	9	18	2.86	1.37	1.03	2.06	64	7.32	1.03	-0.11	0.04	1.01	1.96
4. West Michigan Prosperity Alliance	98092	241	170	130	149	2.46	1.73	1.33	1.52	690	7.03	0.63	0.25	0.34	0.47	1.68
5. East Central Michigan Prosperity Region	29581	84	57	39	66	2.84	1.93	1.32	2.23	246	8.32	1.01	0.44	0.33	1.18	2.96
6. East Michigan Prosperity Region	48090	140	77	50	109	3.04	1.67	1.09	2.37	376	8.16	1.21	0.19	0.10	1.31	2.81
7. South Central Prosperity Region	26251	59	44	30	35	2.25	1.68	1.14	2.10	188	7.16	0.42	0.19	0.15	1.04	1.81
8. Southwest Prosperity Region	46422	122	93	59	96	2.63	2.00	1.27	2.07	370	7.97	0.80	0.52	0.28	1.01	2.61
9. Southeast Michigan Prosperity Region	51637	124	84	63	85	2.40	1.63	1.22	1.65	356	6.89	0.57	0.14	0.23	0.59	1.54
10. Detroit Metro Prosperity Region	230982	716	384	303	442	3.10	1.66	1.31	1.91	1845	7.99	1.27	0.18	0.32	0.86	2.63



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

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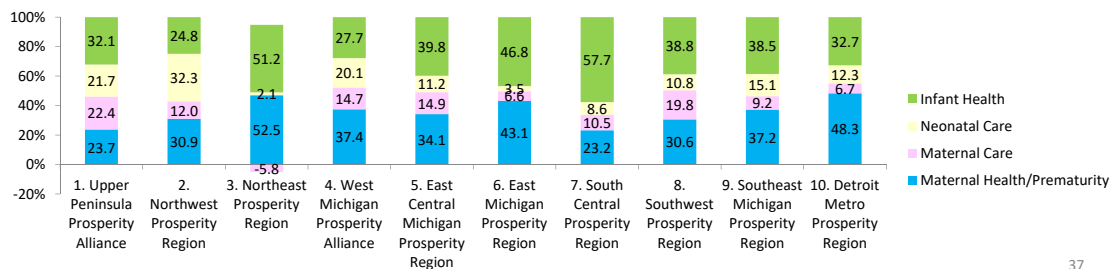
This slide shows the feto-infant mortality rate and excess rate by prosperity region of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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).

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2013-2017 (rate per 1,000 live births)

	% of excess infant deaths attributed to			
	Maternal Health/Prematurity	Maternal Care	Neonatal Care	Infant Health
1. Upper Peninsula Prosperity Alliance	23.7	22.4	21.7	32.1
2. Northwest Prosperity Region	30.9	12.0	32.3	24.8
3. Northeast Prosperity Region	52.5	-5.8	2.1	51.2
4. West Michigan Prosperity Alliance	37.4	14.7	20.1	27.7
5. East Central Michigan Prosperity Region	34.1	14.9	11.2	39.8
6. East Michigan Prosperity Region	43.1	6.6	3.5	46.8
7. South Central Prosperity Region	23.2	10.5	8.6	57.7
8. Southwest Prosperity Region	30.6	19.8	10.8	38.8
9. Southeast Michigan Prosperity Region	37.2	9.2	15.1	38.5
10. Detroit Metro Prosperity Region	48.3	6.7	12.3	32.7



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

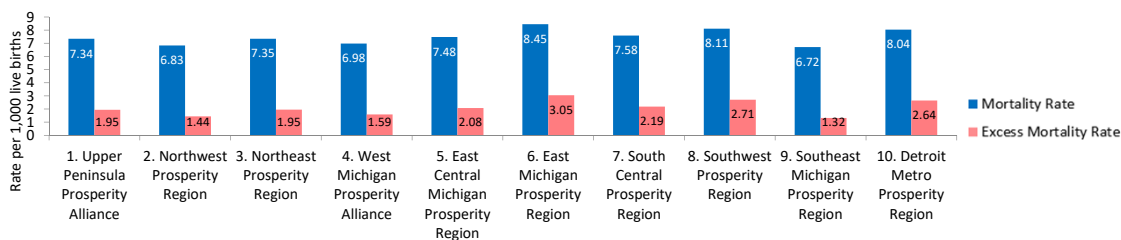
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This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by prosperity region of residence in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference 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)

	Live births 3 years	Number of deaths by perinatal period				Rate of deaths per 1,000 live births by perinatal period					Excess rate of deaths per 1,000 live births					
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Total	Overall 3-year	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
1. Upper Peninsula Prosperity Alliance	8173	17	17	11	15	2.08	2.08	1.35	1.84	60	7.34	0.30	0.51	0.33	0.80	1.95
2. Northwest Prosperity Region	8780	23	14	12	11	2.62	1.59	1.37	1.25	60	6.83	0.84	0.03	0.35	0.22	1.44
3. Northeast Prosperity Region	5307	17	7	3	12	3.20	1.32	0.57	2.26	39	7.35	1.42	-0.25	0.45	1.23	1.95
4. West Michigan Prosperity Alliance	58710	137	103	83	87	2.33	1.75	1.41	1.48	410	6.98	0.55	0.19	0.40	0.45	1.59
5. East Central Michigan Prosperity Region	17657	42	32	21	37	2.38	1.81	1.19	2.10	132	7.48	0.60	0.24	0.18	1.06	2.08
6. East Michigan Prosperity Region	27224	93	38	34	65	3.42	1.40	1.25	2.39	230	8.45	1.64	-0.17	0.24	1.35	3.05
7. South Central Prosperity Region	15696	36	32	16	35	2.29	2.04	1.02	2.23	119	7.58	0.51	0.47	0.01	1.19	2.19
8. Southwest Prosperity Region	27380	80	52	36	54	2.92	1.90	1.31	1.97	222	8.11	1.14	0.33	0.30	0.94	2.71
9. Southeast Michigan Prosperity Region	30819	70	50	39	48	2.27	1.62	1.27	1.56	207	6.72	0.49	0.05	0.25	0.52	1.32
10. Detroit Metro Prosperity Region	138335	424	240	170	278	3.07	1.73	1.23	2.01	1112	8.04	1.29	0.17	0.22	0.97	2.64



* Prosperity Region 1, 2 and 3 are based on less than 60 deaths for 2015-2017.

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

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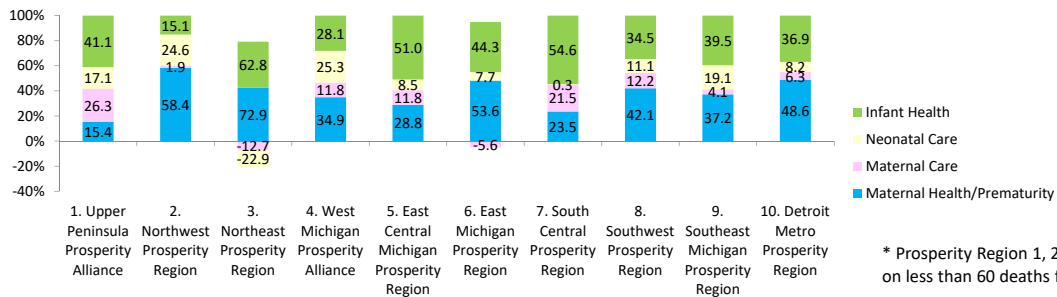
This slide shows the feto-infant mortality rate and excess rate by prosperity region of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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).

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2015-2017 (rate per 1,000 live births)

	% of excess infant deaths attributed to			
	Maternal Health/Prematurity	Maternal Care	Neonatal Care	Infant Health
1. Upper Peninsula Prosperity Alliance	15.4	26.3	17.1	41.1
2. Northwest Prosperity Region	58.4	1.9	24.6	15.1
3. Northeast Prosperity Region	72.9	-12.7	-22.9	62.8
4. West Michigan Prosperity Alliance	34.9	11.8	25.3	28.1
5. East Central Michigan Prosperity Region	28.8	11.8	8.5	51.0
6. East Michigan Prosperity Region	53.6	-5.6	7.7	44.3
7. South Central Prosperity Region	23.5	21.5	0.3	54.6
8. Southwest Prosperity Region	42.1	12.2	11.1	34.5
9. Southeast Michigan Prosperity Region	37.2	4.1	19.1	39.5
10. Detroit Metro Prosperity Region	48.6	6.3	8.2	36.9



* Prosperity Region 1, 2 and 3 are based on less than 60 deaths for 2015-2017.

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

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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.

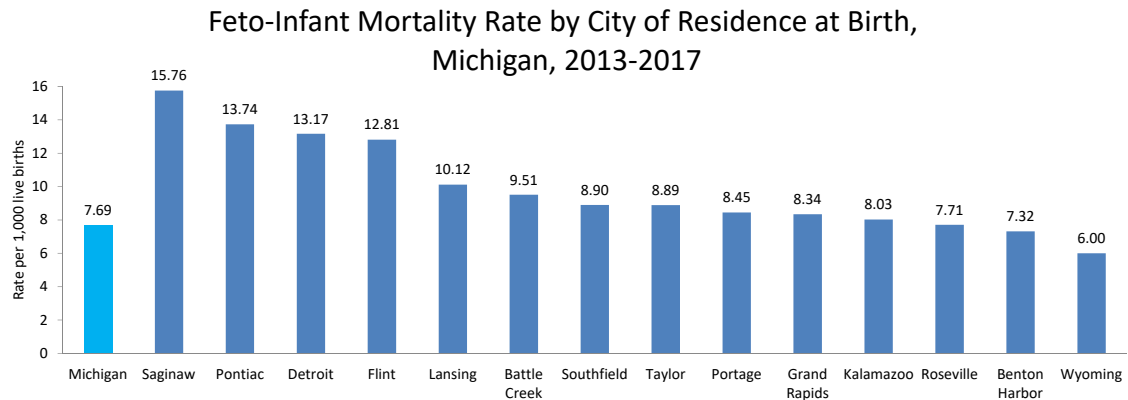
PPOR by City of Residence at Birth

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

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The next several slides contain updated PPOR results by city of residence at birth for the State of Michigan.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 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

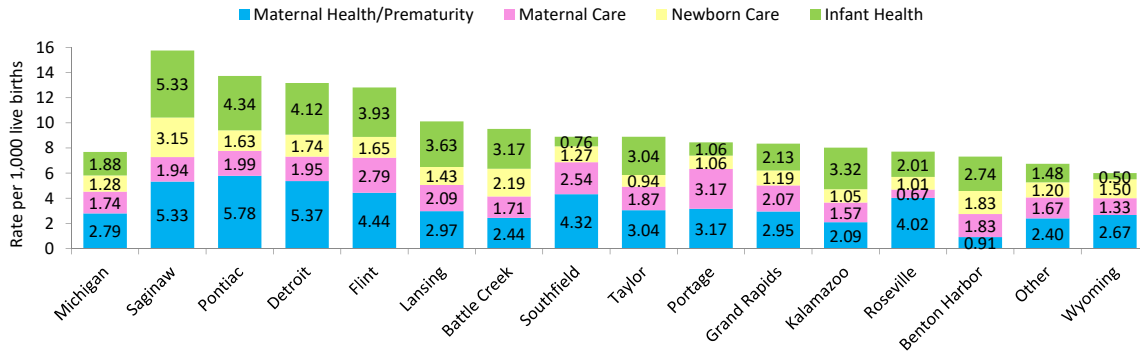
41

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).

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2013-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate by City of Residence and PPOR Period, Michigan, 2013-2017



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

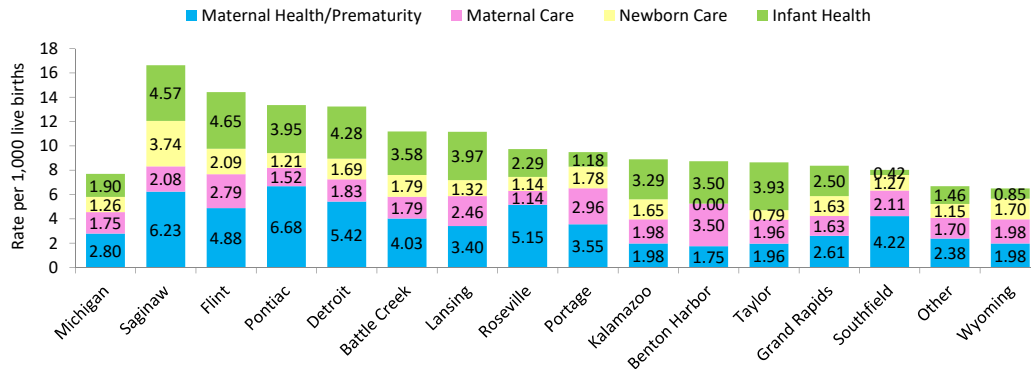
42

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



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

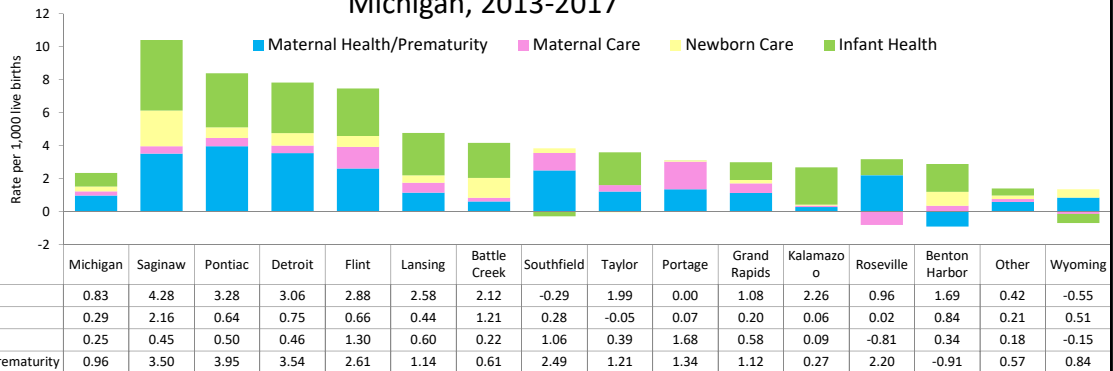
43

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.

Michigan Feto-Infant Excess Mortality Rate* by City of Residence at Birth: 2013-2017 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by City of Residence and PPOR Period, Michigan, 2013-2017



* 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

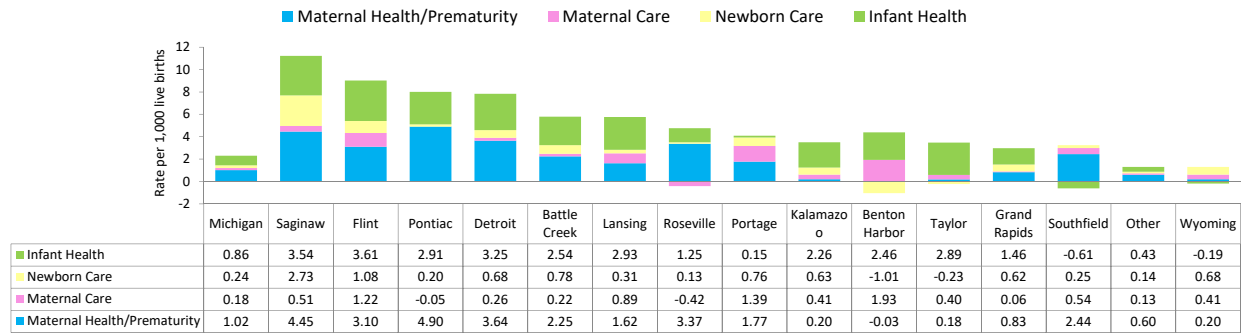
44

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)

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



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

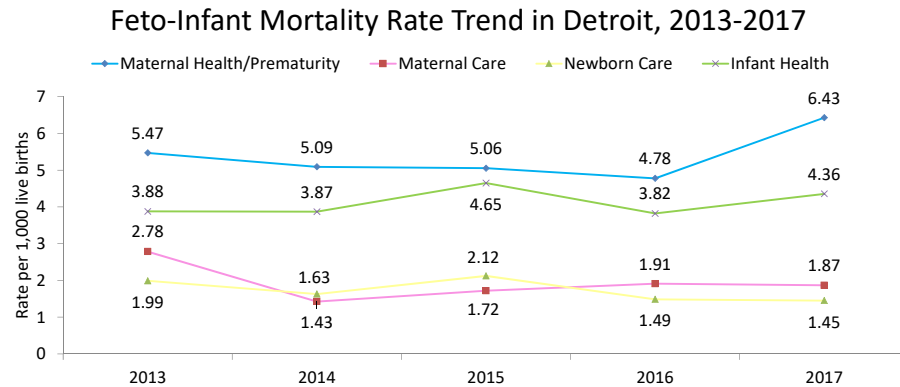
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

45

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.

Michigan Feto-Infant Mortality Rate Trend by City of Residence at Birth: 2013-2017 (rate per 1,000 live births)



Data for other cities is not stable enough for annual estimate.

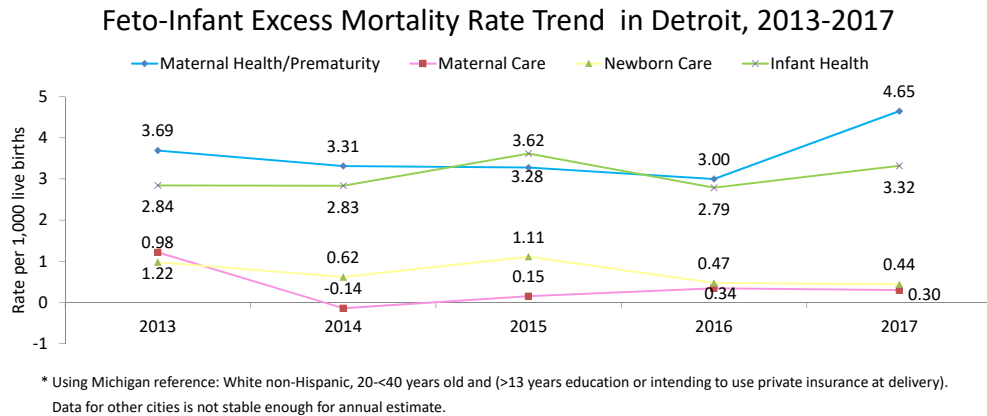
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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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.

Michigan Feto-Infant Excess Mortality Rate* Trend by City of Residence at Birth: 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

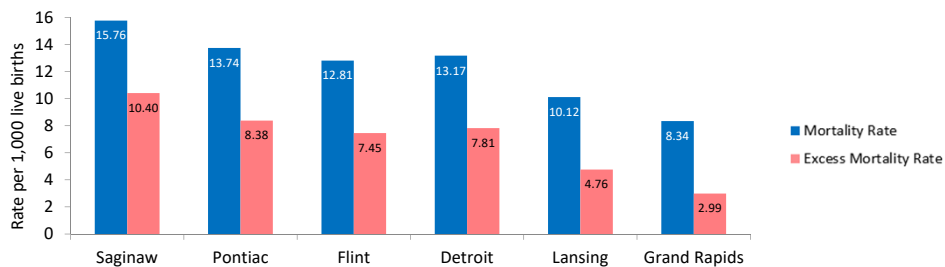
47

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.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2013-2017 (rate per 1,000 live births)

	Live births 5 years	Number of deaths by perinatal period				Rate of deaths per 1,000 live births by perinatal period					Excess rate of deaths per 1,000 live births					
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Total	Overall 5year	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
Saginaw	4125	22	8	13	22	5.33	1.94	3.15	5.33	65	15.76	3.50	0.45	2.16	4.28	10.40
Pontiac	5533	32	11	9	24	5.78	1.99	1.63	4.34	76	13.74	3.95	0.50	0.64	3.28	8.38
Flint	7884	35	22	13	31	4.44	2.79	1.65	3.93	101	12.81	2.61	1.30	0.66	2.88	7.45
Detroit	48827	262	95	85	201	5.37	1.95	1.74	4.12	643	13.17	3.54	0.46	0.75	3.06	7.81
Lansing	9094	27	19	13	33	2.97	2.09	1.43	3.63	92	10.12	1.14	0.60	0.44	2.58	4.76
Grand Rapids	15944	47	33	19	34	2.95	2.07	1.19	2.13	133	8.34	1.12	0.58	0.20	1.08	2.99



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

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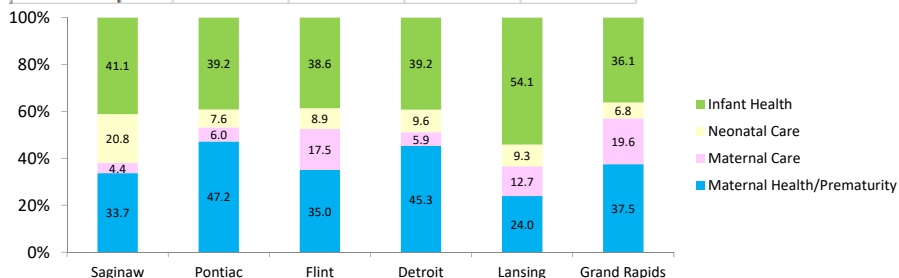
This slide shows the feto-infant mortality rate and excess rate by selected city of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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 (13.17 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).

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2013-2017 (rate per 1,000 live births)

	% of excess infant deaths attributed to			
	Maternal Health/Prematurity	Maternal Care	Neonatal Care	Infant Health
Saginaw	33.7	4.4	20.8	41.1
Pontiac	47.2	6.0	7.6	39.2
Flint	35.0	17.5	8.9	38.6
Detroit	45.3	5.9	9.6	39.2
Lansing	24.0	12.7	9.3	54.1
Grand Rapids	37.5	19.6	6.8	36.1



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

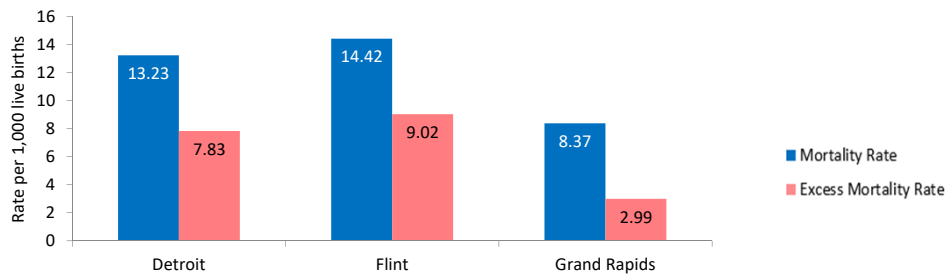
49

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.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2015-2017 (rate per 1,000 live births)

	Live births 3 years	Number of deaths by perinatal period				Rate of deaths per 1,000 live births by perinatal period					Excess rate of deaths per 1,000 live births					
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Total	Overall 3year	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
Detroit	28954	157	53	49	124	5.42	1.83	1.69	4.28	383	13.23	3.64	0.26	0.68	3.25	7.83
Flint	4301	21	12	9	20	4.88	2.79	2.09	4.65	62	14.42	3.10	1.22	1.08	3.61	9.02
Grand Rapids	9199	24	15	15	23	2.61	1.63	1.63	2.50	77	8.37	0.83	0.06	0.63	1.46	2.99



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

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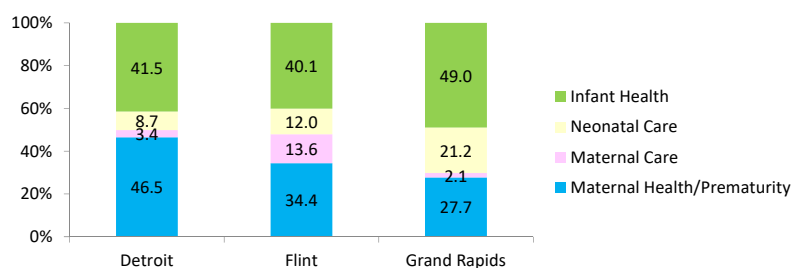
This slide shows the feto-infant mortality rate and excess rate by selected city of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2015-2017 (rate per 1,000 live births)

	% of excess infant deaths attributed to			
	Maternal Health/Prematurity	Maternal Care	Neonatal Care	Infant Health
Detroit	46.5	3.4	8.7	41.5
Flint	34.4	13.6	12.0	40.1
Grand Rapids	27.7	2.1	21.2	49.0



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

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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.

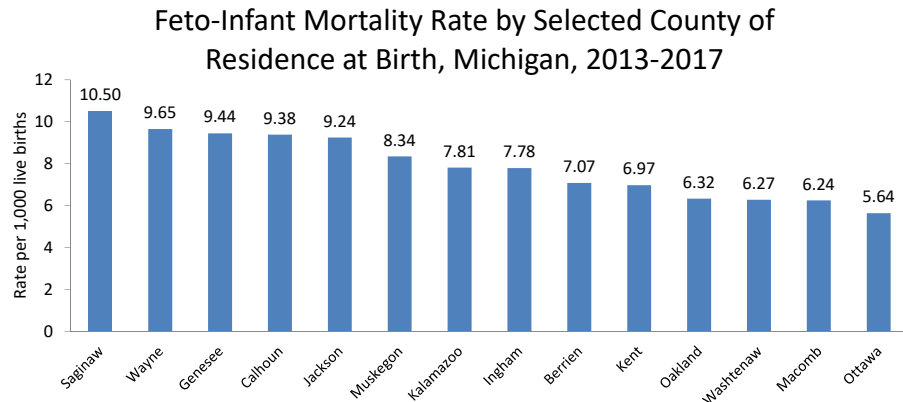
PPOR by County of Residence

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

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The next several slides contain updated PPOR by county of residence at birth for the State of Michigan.

Michigan Feto-Infant Mortality Rate by County of Residence at Birth: 2013-2017 (rate per 1,000 live births)



Selected residence counties with the overall number of deaths > 60 for 2013-2017.

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

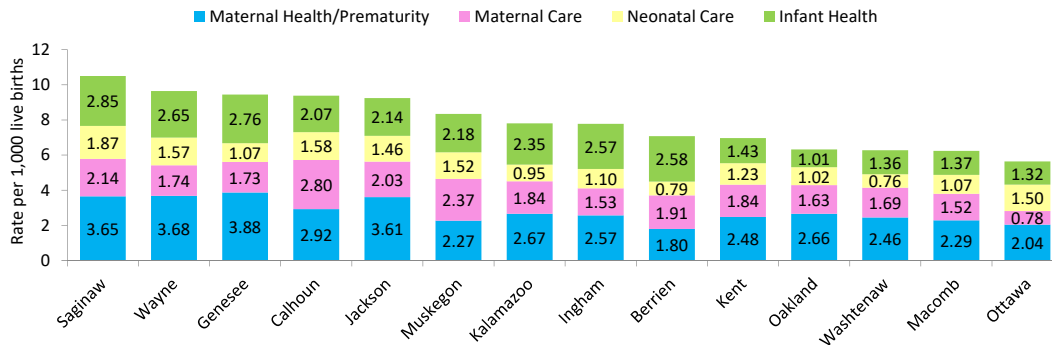
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This slide shows the feto-infant mortality rate by selected county of residence in Michigan from 2013 to 2017.

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).

Michigan Feto-Infant Mortality Rate by County of Residence: 2013-2017 (rate per 1,000 live births)

Feto-Infant Mortality Rate by Selected County of Residence and PPOR Period, Michigan, 2013-2017



Selected residence counties with the overall number of deaths > 60 from 2013 to 2017.

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

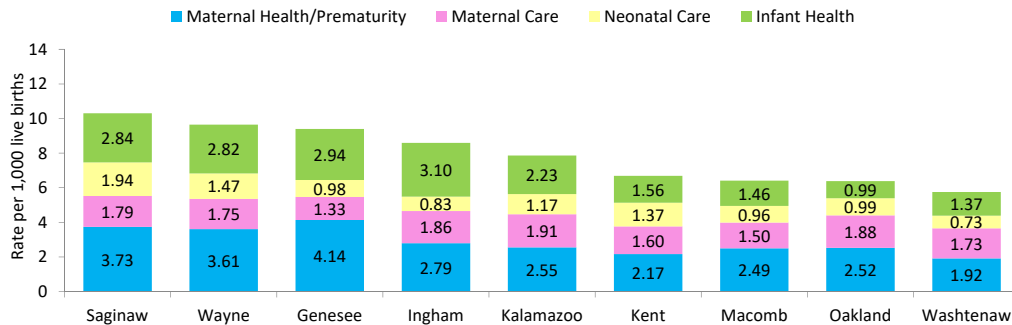
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This slide shows the feto-infant mortality rate by selected county of residence at birth and PPOR period in Michigan from 2013 to 2017.

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



Selected residence counties with the overall number of deaths > 60 from 2015 to 2017.

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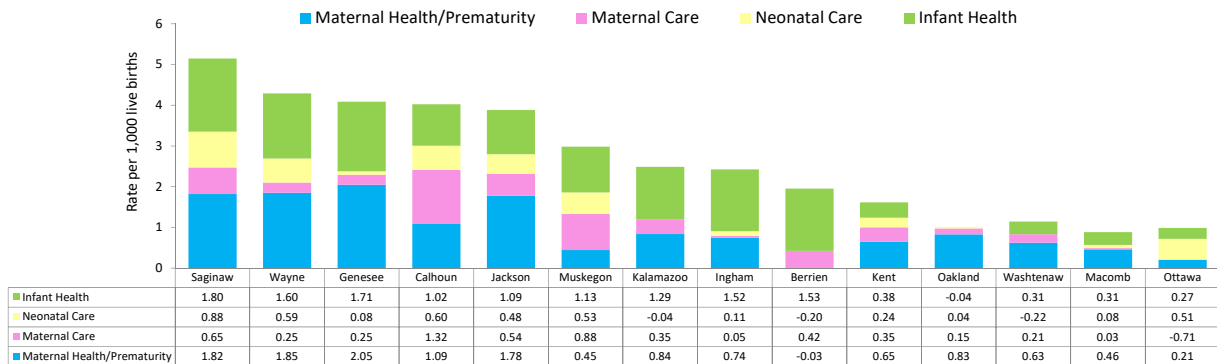
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant mortality rate by 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.

Michigan Feto-Infant Excess Mortality Rate* by County of Residence: 2013-2017 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Selected County of Residence and PPOR Period, Michigan, 2013-2017



* Using Michigan reference: White non-Hispanic, 20-<40 years old and (>13 years education or intending to use private insurance at delivery). Selected residence counties with the overall number of deaths > 60 from 2013 to 2017.

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

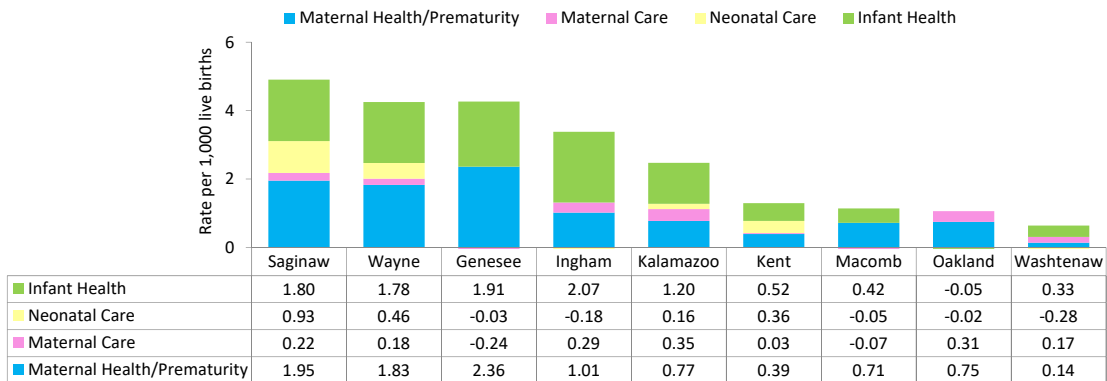
56

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.

Michigan Feto-Infant Excess Mortality Rate* by County of Residence: 2015-2017 (rate per 1,000 live births)

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



* Using Michigan reference: White non-Hispanic, 20-<40 years old and (>13 years education or intending to use private insurance at delivery). Selected residence counties with the overall number of deaths > 60 from 2015 to 2017.

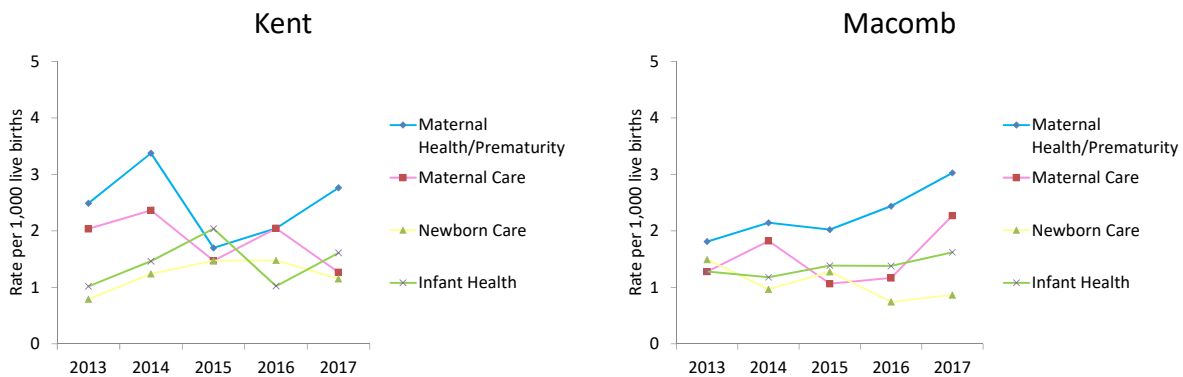
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

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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.

Michigan Feto-Infant Mortality Rate Trend by County of Residence: 2013-2017 (rate per 1,000 live births)



Data for other residence counties is not stable enough for annual estimate.

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

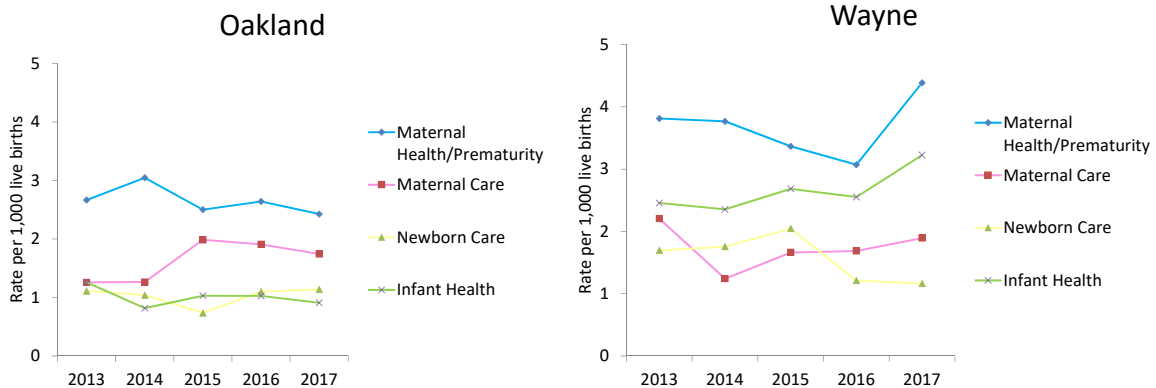
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This slide shows the feto-infant mortality rate trend by selected county of residence and PPOR period in Michigan from 2013 to 2017. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

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.

Michigan Feto-Infant Mortality Rate Trend by County of Residence: 2013-2017 (rate per 1,000 live births)



Data for other residence counties is not stable enough for annual estimate.

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

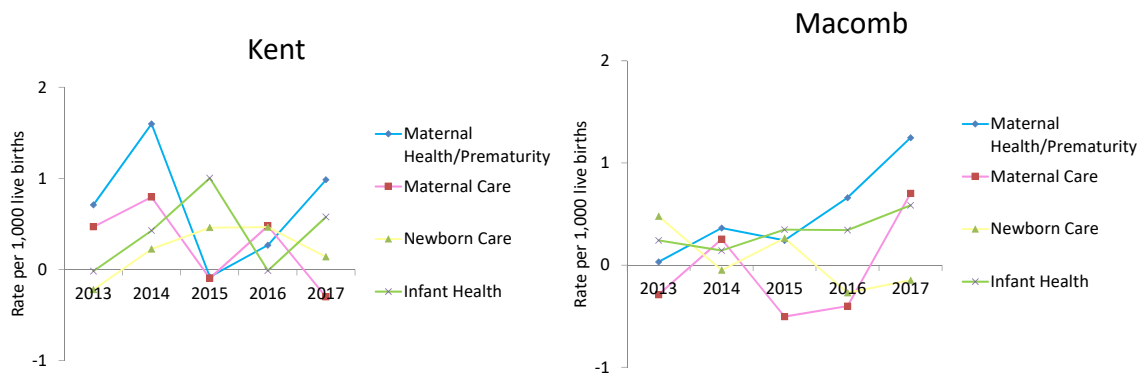
59

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.

Michigan Feto-Infant Excess Mortality Rate* Trend by County of Residence: 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).
Data for other residence counties is not stable enough for annual estimate.

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

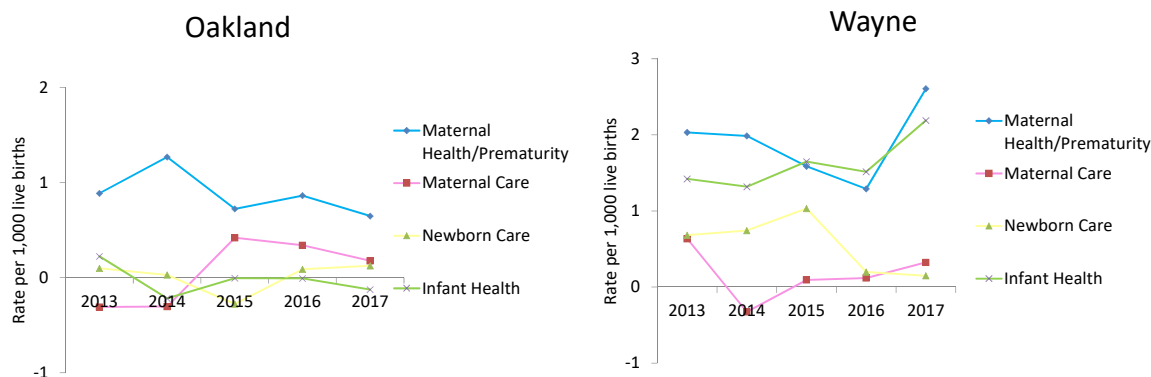
60

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.

Michigan Feto-Infant Excess Mortality Rate* Trend by County of Residence: 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).
Data for other residence counties is not stable enough for annual estimate.

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

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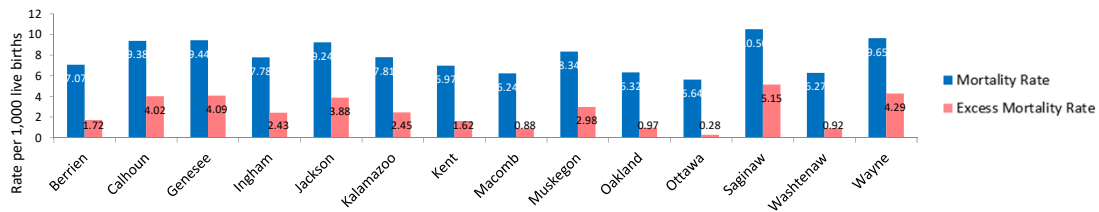
This slide shows the feto-infant excess mortality rate trend by selected county of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference group 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.

Michigan Feto-Infant Mortality Rate by County of Residence: 2013-2017 (rate per 1,000 live births)

	Live births 5 years	Number of deaths by perinatal period				Rate of deaths per 1,000 live births by perinatal period					Overall 5 years	Excess rate of deaths per 1,000 live births				
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Total		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
Berrien	8906	16	17	7	23	1.80	1.91	0.79	2.58	63	7.07	-0.03	0.42	-0.20	1.53	1.72
Calhoun	8209	24	23	13	17	2.92	2.80	1.58	2.07	77	9.38	1.09	1.32	0.60	1.02	4.02
Genesee	24249	94	42	26	67	3.88	1.73	1.07	2.76	229	9.44	2.05	0.25	0.08	1.71	4.09
Ingham	16320	42	25	18	42	2.57	1.53	1.10	2.57	127	7.78	0.74	0.05	0.11	1.52	2.43
Jackson	8874	32	18	13	19	3.61	2.03	1.46	2.14	82	9.24	1.78	0.54	0.48	1.09	3.88
Kalamazoo	15758	42	29	15	37	2.67	1.84	0.95	2.35	123	7.81	0.84	0.35	-0.04	1.29	2.45
Kent	44035	109	81	54	63	2.48	1.84	1.23	1.43	307	6.97	0.65	0.35	0.24	0.38	1.62
Macomb	46796	107	71	50	64	2.29	1.52	1.07	1.37	292	6.24	0.46	0.03	0.08	0.31	0.88
Muskegon	10552	24	25	16	23	2.27	2.37	1.52	2.18	88	8.34	0.45	0.88	0.53	1.13	2.98
Oakland	67354	179	110	69	68	2.66	1.63	1.02	1.01	426	5.32	0.83	0.15	0.04	-0.04	0.97
Ottawa	16680	34	13	25	22	2.04	0.78	1.50	1.32	94	5.64	0.21	-0.71	0.51	0.27	0.28
Saginaw	11233	41	24	21	32	3.65	2.14	1.87	2.85	118	10.50	1.82	0.65	0.88	1.80	5.15
Washtenaw	18328	45	31	14	25	2.46	1.69	0.76	1.36	115	6.27	0.63	0.21	-0.22	0.31	0.92
Wayne	116832	430	203	184	310	3.68	1.74	1.57	2.65	1127	9.65	1.85	0.25	0.59	1.60	4.29



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

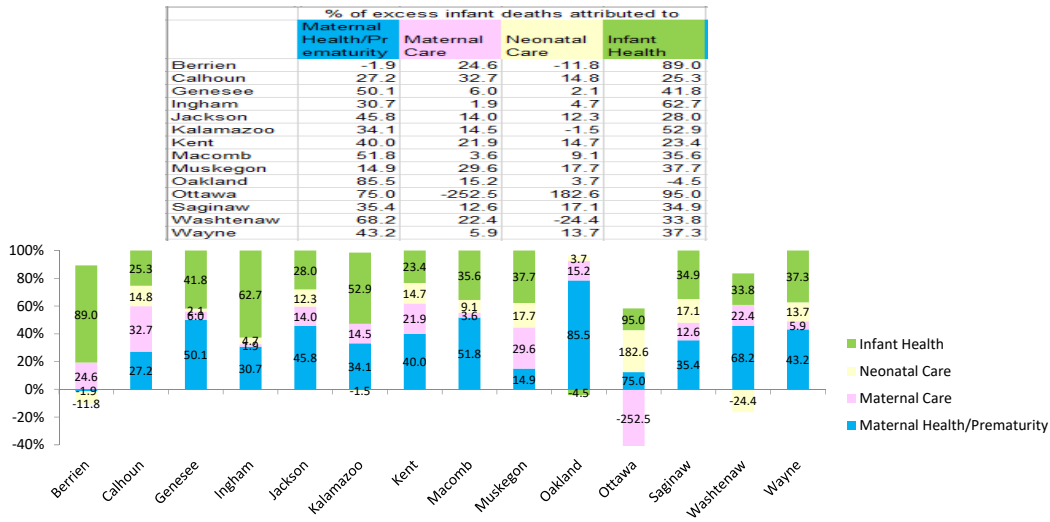
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This slide shows the feto-infant mortality rate and excess rate by selected county of residence and PPOR period in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the 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).

Michigan Feto-Infant Mortality Rate by County of Residence: 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

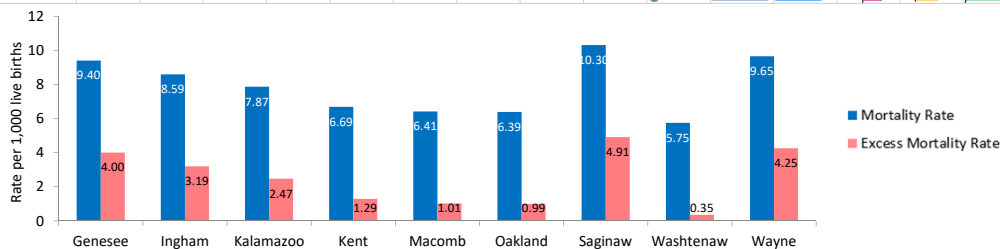
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This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected county of residence in Michigan from 2013 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference 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)

	Live births 3 years	Number of deaths by perinatal period				Rate of deaths per 1,000 live births by perinatal period					Excess rate of deaths per 1,000 live births					
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Total	Overall 3years	Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
Genesee	14262	59	19	14	42	4.14	1.33	0.98	2.94	134	9.40	2.36	-0.24	-0.03	1.91	4.00
Ingham	9663	27	18	8	30	2.79	1.86	0.83	3.10	83	8.59	1.01	0.29	-0.18	2.07	3.19
Kalamazoo	9408	24	18	11	21	2.55	1.91	1.17	2.23	74	7.87	0.77	0.35	0.16	1.20	2.47
Kent	26310	57	42	36	41	2.17	1.60	1.37	1.56	176	6.69	0.39	0.03	0.36	0.52	1.29
Macomb	28078	70	42	27	41	2.49	1.50	0.96	1.46	180	6.41	0.71	-0.07	-0.05	0.42	1.01
Oakland	40399	102	76	40	40	2.52	1.88	0.99	0.99	258	6.39	0.75	0.31	-0.02	-0.05	0.99
Saginaw	6696	25	12	13	19	3.73	1.79	1.94	2.84	69	10.30	1.95	0.22	0.93	1.80	4.91
Washtenaw	10957	21	19	8	15	1.92	1.73	0.73	1.37	63	5.75	0.14	0.17	-0.28	0.33	0.35
Wayne	69858	252	122	103	197	3.61	1.75	1.47	2.82	674	9.65	1.83	0.18	0.46	1.78	4.25



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

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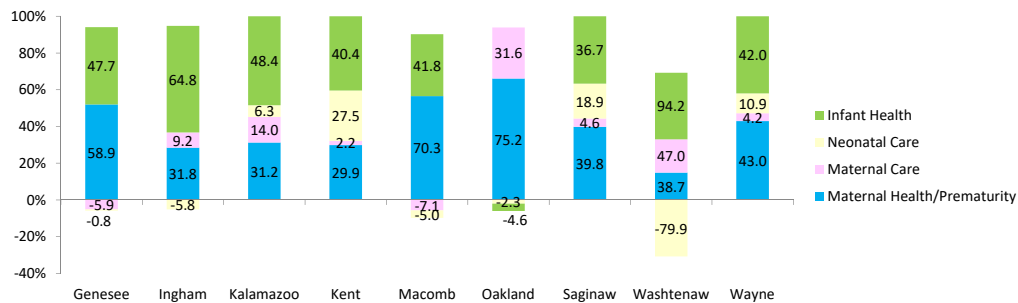
This slide shows the feto-infant mortality rate and excess rate by selected county of residence and PPOR period in Michigan from 2015 to 2017. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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).

Michigan Feto-Infant Mortality Rate by County of Residence: 2015-2017 (rate per 1,000 live births)

	% of excess infant deaths attributed to			
	Maternal Health/Prematurity	Maternal Care	Neonatal Care	Infant Health
Genesee	58.9	-5.9	-0.8	47.7
Ingham	31.8	9.2	-5.8	64.8
Kalamazoo	31.2	14.0	6.3	48.4
Kent	29.9	2.2	27.5	40.4
Macomb	70.3	-7.1	-5.0	41.8
Oakland	75.2	31.6	-2.3	-4.6
Saginaw	39.8	4.6	18.9	36.7
Washtenaw	38.7	47.0	-79.9	94.2
Wayne	43.0	4.2	10.9	42.0



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

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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.