

Michigan Feto-Infant Mortality Rate, 2012-2016

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Data source: Michigan resident live birth files (12/13/2017), infant mortality files (3/27/2018) and
fetal death files (4/9/2018), Division for Vital Records and Health Statistics, MDHHS
04/2018

1

This presentation provides updated 2012-2016 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 (12/13/2017), infant mortality files (3/27/2018) and fetal death files (4/9/2018), Division for Vital Records and Health Statistics, MDHHS

Revised: April 2018

Perinatal Periods of Risk (PPOR) Phase 1: Michigan Feto-Infant Mortality Rate 2012-2016

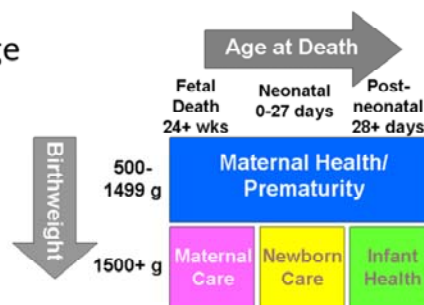
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

2

The following slides contain updated 2012-2016 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 <http://www.citymatch.org>

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

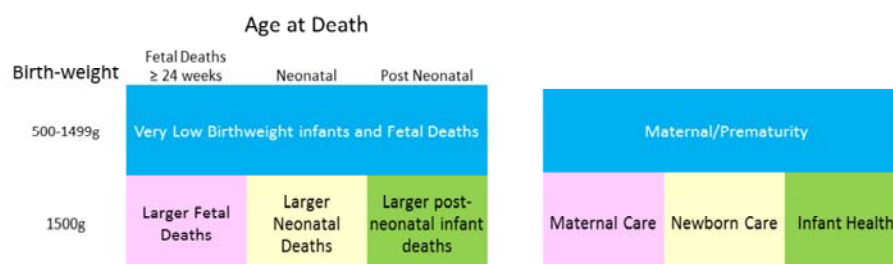
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Perinatal Periods of Risk (PPOR) is a comprehensive approach to help communities use data to reduce infant mortality. Designed for use in US cities with high infant mortality rates, PPOR brings community stakeholders together to build consensus and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

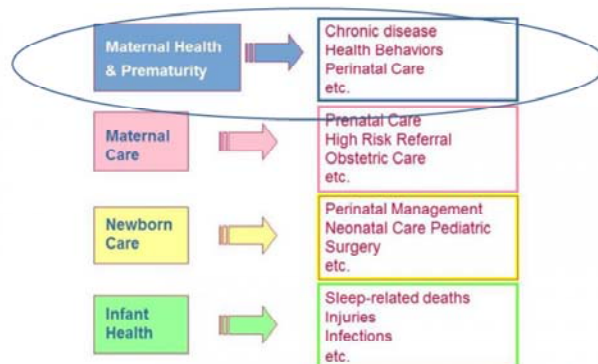
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

4

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 <http://www.citymatch.org>

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

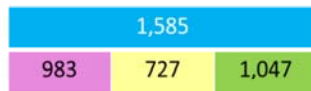
5

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.

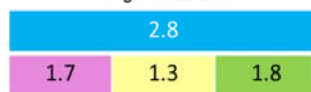
Maternal health and prematurity is associated with risk factors such as chronic disease, health behaviors, prenatal care, etc. Maternal care is associated with risk factors such as prenatal care, high risk referral, obstetric care, etc. Newborn care is linked to risk factors such as perinatal management,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

PPOR

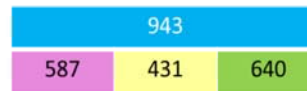
Number of Deaths: Michigan 2012-2016



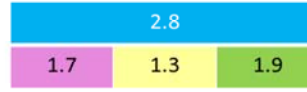
Feto-Infant Mortality Rate
(per 1,000 live births):
Michigan 2012-2016



Number of Deaths : Michigan 2014-2016



Feto-Infant Mortality Rate
(per 1,000 live births):
Michigan 2014-2016



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

6

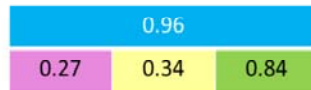
This slide shows the number of feto-infant deaths and feto-infant mortality rates in Michigan from 2012-2016 and from 2014-2016 for each of the four periods.

From 2012 to 2016, there were 1,585 deaths in the maternal health and prematurity period, 983 deaths in the maternal care period, 727 deaths in the newborn care period, and 1,047 deaths in the infant health period. From 2014 to 2016, in Michigan there were 943 deaths in the maternal health and prematurity period, 587 deaths in the maternal care period, 431 deaths in the newborn care period, and 640 deaths in the infant health period.

From 2012 to 2016, 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 1.8 per 1,000 live births in the infant health period. From 2014 to 2016, in Michigan 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.

PPOR

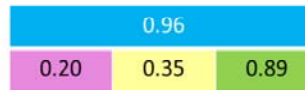
Excess Feto-Infant Mortality Rate*:
Michigan 2012-2016



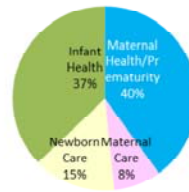
Year 2012-2016



Excess Feto-Infant Mortality Rate*:
Michigan 2014-2016



Year 2014-2016



* 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

7

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 2012 to 2016 and from 2014 to 2016 for each of the four periods. From 2012 to 2016, the excess feto-infant mortality rate was 0.96 per 1,000 live births in the maternal health and prematurity period, 0.27 per 1,000 live births in the maternal care period, 0.34 per 1,000 live births in the newborn care period, and 0.84 per 1,000 live births in the infant health period. From 2014 to 2016, the excess feto-infant mortality rate was 0.96 per 1,000 live births in the maternal health and prematurity period, 0.20 per 1,000 live births in the maternal care period, 0.35 per 1,000 live births in the newborn care period, and 0.89 per 1,000 live births in the infant health period.

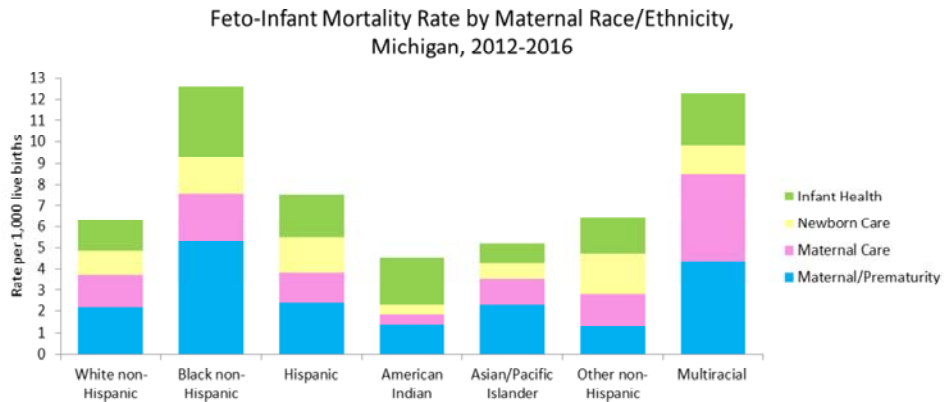
PPOR by Maternal Race/Ethnicity

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

8

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)



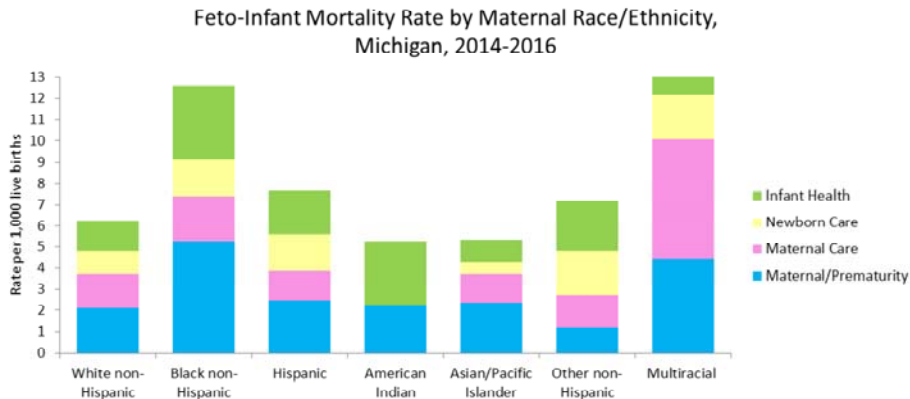
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

9

This slide shows the feto-infant mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, 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)



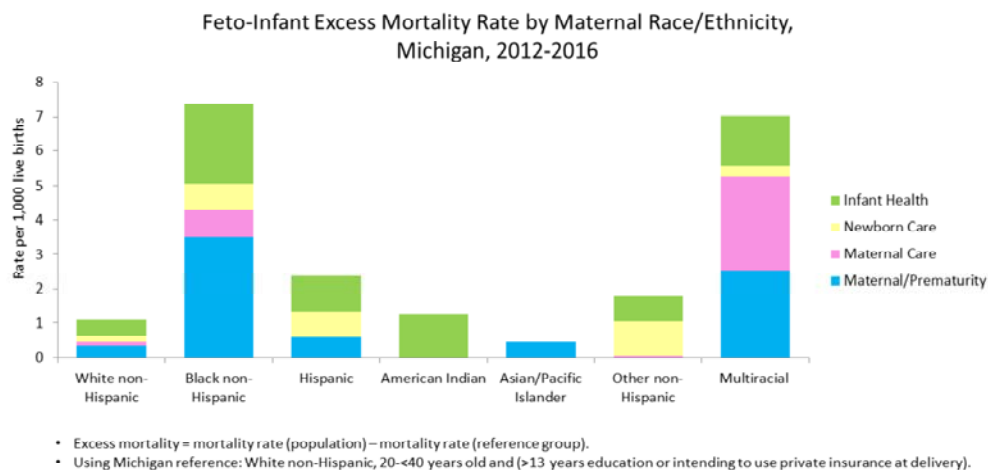
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

10

This slide shows the feto-infant mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2014 to 2016.

From 2014 to 2016, 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 Black non-Hispanic women in the infant health period.

Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2012-2016 (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

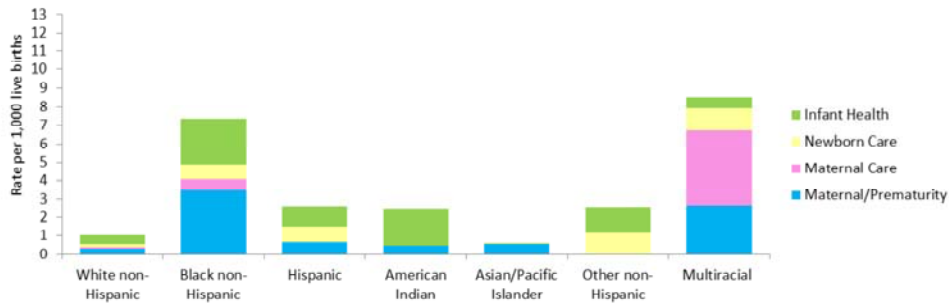
11

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, 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: 2014-2016 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Maternal Race/Ethnicity, Michigan, 2014-2016



- 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).

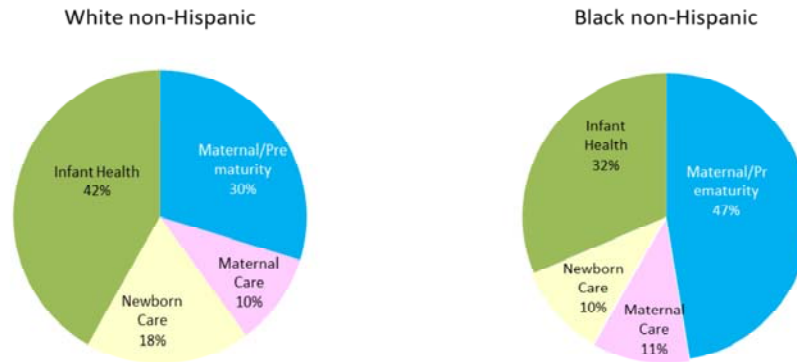
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

12

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2014 to 2016. 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 2014 to 2016, 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 Black non-Hispanic women in the infant health period.

Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2012-2016 (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 source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

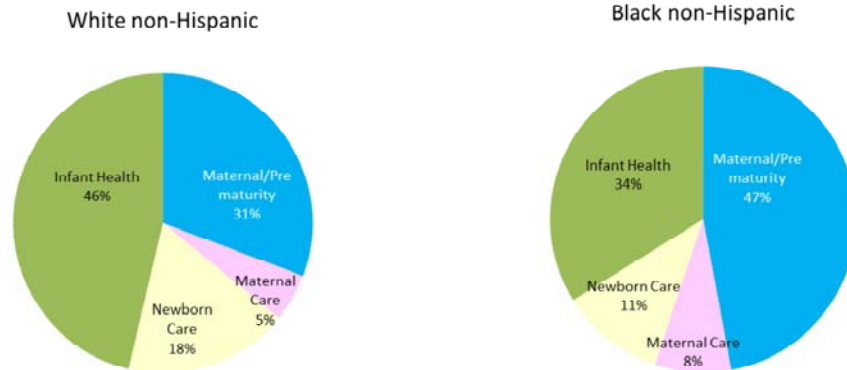
13

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, among White non-Hispanic women, the infant health period accounted for 42% of the feto-infant excess mortality; the maternal health and prematurity period accounted for 30%; the newborn care period accounted for 18%; and the maternal care period accounted for 10%.

From 2012 to 2016, among Black non-Hispanic women, the maternal health and prematurity period accounted for 47% of the feto-infant excess mortality; the infant health period accounted for 32%; the newborn care period accounted for 10%; and the maternal care period accounted for 11%.

Michigan Feto-Infant Excess Mortality Rate* by Maternal Race/Ethnicity: 2014-2016 (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 source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

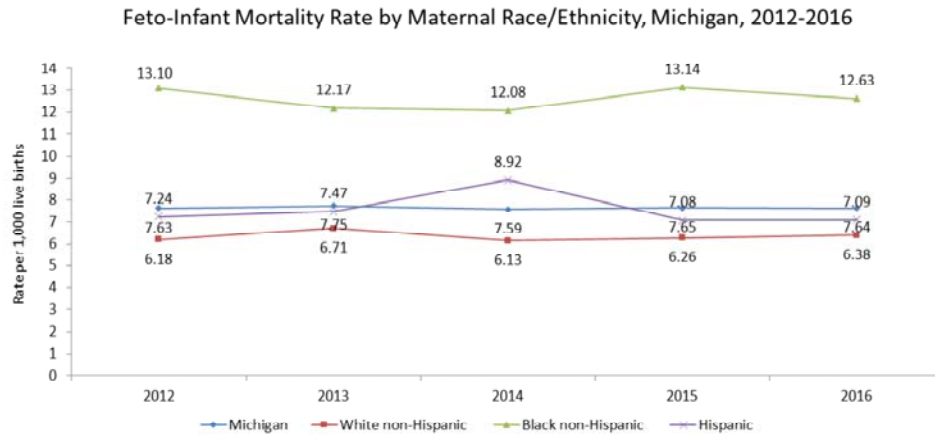
14

This slide shows the feto-infant excess mortality rate by maternal race/ethnicity and PPOR period in Michigan from 2014 to 2016. 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 2014 to 2016, among White non-Hispanic women, the infant health period accounted for 46% of the feto-infant excess mortality; the maternal health and prematurity period accounted for 31%; the newborn care period accounted for 18%; and the maternal care period accounted for 5%.

From 2014 to 2016, among Black non-Hispanic women, the maternal health and prematurity period accounted for 47% of the feto-infant excess mortality; the infant health period accounted for 34%; the newborn care period accounted for 11%; and the maternal care period accounted for 8%.

Michigan Feto-Infant Mortality Rate Trend by Maternal Race/Ethnicity: 2012-2016 (rate per 1,000 live births)



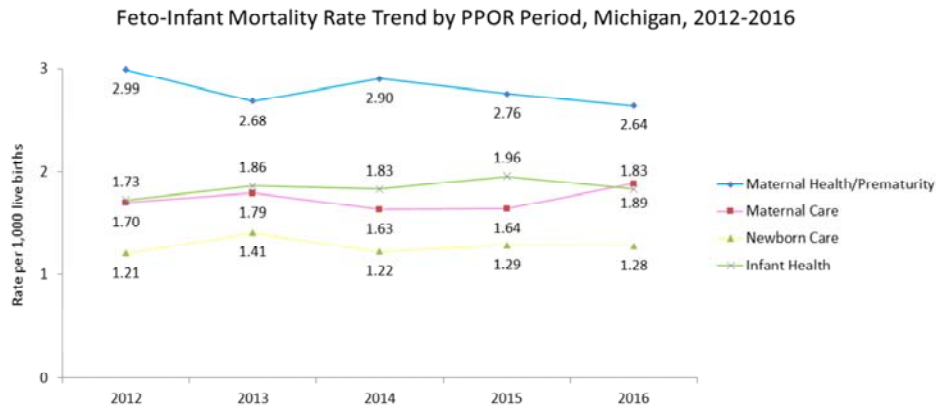
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

15

This slide shows the feto-infant mortality rate trend by maternal race/ethnicity in Michigan from 2012 to 2016.

From 2012 to 2016, 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 2012 to 2014, and then declined in 2015 and 2016.

Michigan Feto-Infant Mortality Rate Trend by PPOR Period: 2012-2016 (rate per 1,000 live births)



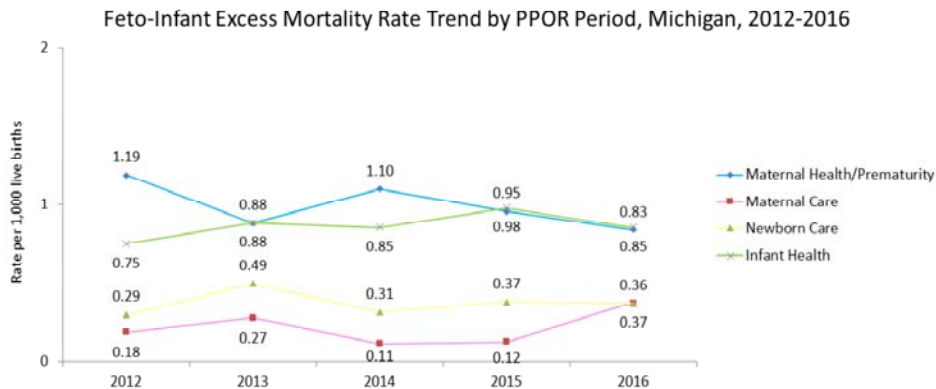
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

16

This slide shows the feto-infant mortality rate trend by PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, the feto-infant mortality rate in the maternal health and prematurity period was higher than the other periods and showed a slow decline. The feto-infant mortality rate in the newborn care period and the infant health period has been on a slow increase over time. The rate in the maternal care period declined from 2012 to 2014, however, it went up from 2014 to 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by PPOR Period: 2012-2016 (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).

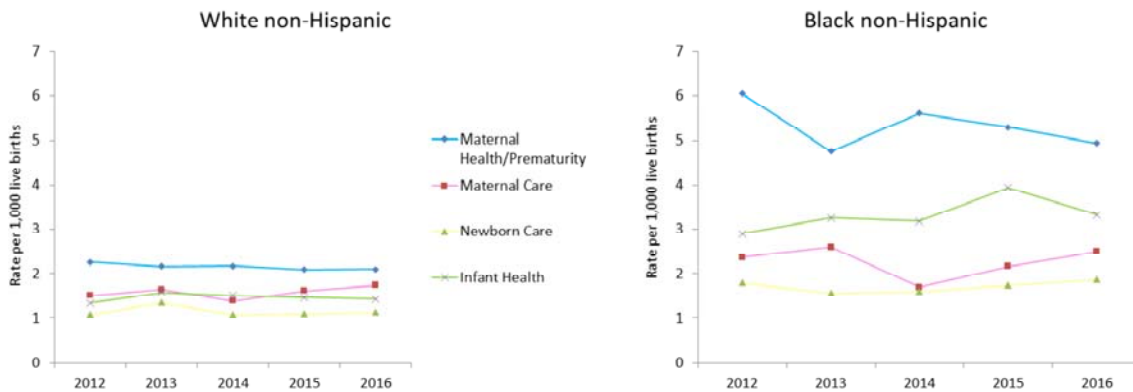
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

17

This slide shows the feto-infant mortality rate trend by PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, the feto-infant excess mortality rate in the maternal health and prematurity period declined from 2012 to 2013, went up from 2013 to 2014, and then decreased from 2014 to 2016. The excess rate in the newborn care period and the infant health period has been on a slow increase over time. The rate in the maternal care period increased from 2012 to 2013, declined from 2013 to 2014, and then went up from 2014 to 2016.

Michigan Feto-Infant Mortality Rate Trend by PPOR Period and Maternal Race/Ethnicity: 2012-2016 (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

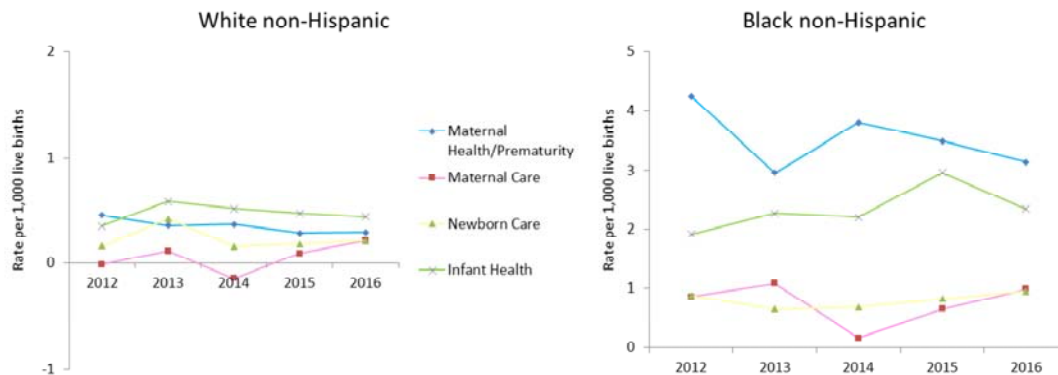
18

This slide shows the feto-infant mortality rate trend by PPOR period and maternal race/ethnicity in Michigan from 2012 to 2016.

From 2012 to 2016, 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 and the infant health period has been on a slow increase. The rate in the maternal care period declined from 2012 to 2014, and then went up from 2014 to 2016.

From 2012 to 2016, 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. The rate in the infant health period went up from 2012 to 2015, and then declined from 2015 to 2016. The rate in the maternal care period declined from 2012 to 2014, and then went up from 2014 to 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by PPOR Period and Race/Ethnicity: 2012-2016 (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

19

This slide shows the feto-infant excess mortality rate trend by PPOR period and maternal race/ethnicity in Michigan from 2012 to 2016. 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 2012 to 2016, 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 and the infant health period has been on a slow increase. The excess rate in the maternal care period declined from 2013 to 2014, and then went up from 2014 to 2016.

From 2012 to 2016, 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 stable. The excess rate in the infant health period went up from 2012 to 2016. The rate in the maternal care period declined from 2013 to 2014, and then went up from 2014 to 2016.

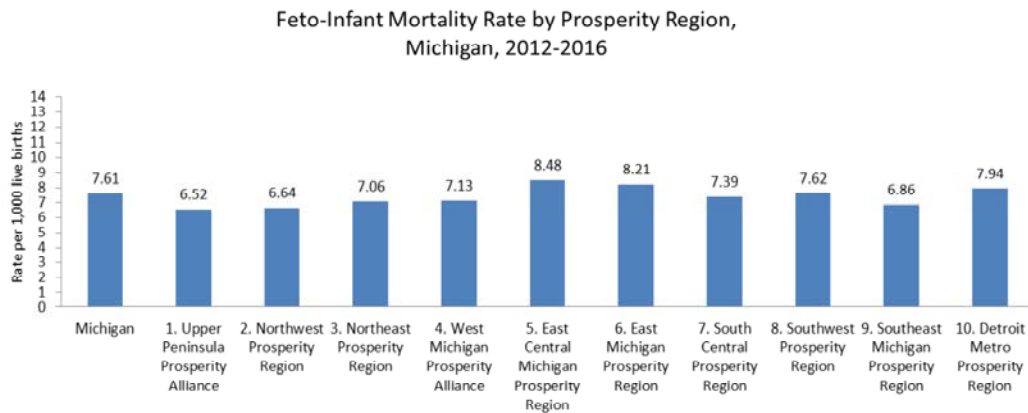
PPOR by Prosperity Region



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: 2012-2016 (rate per 1,000 live births)



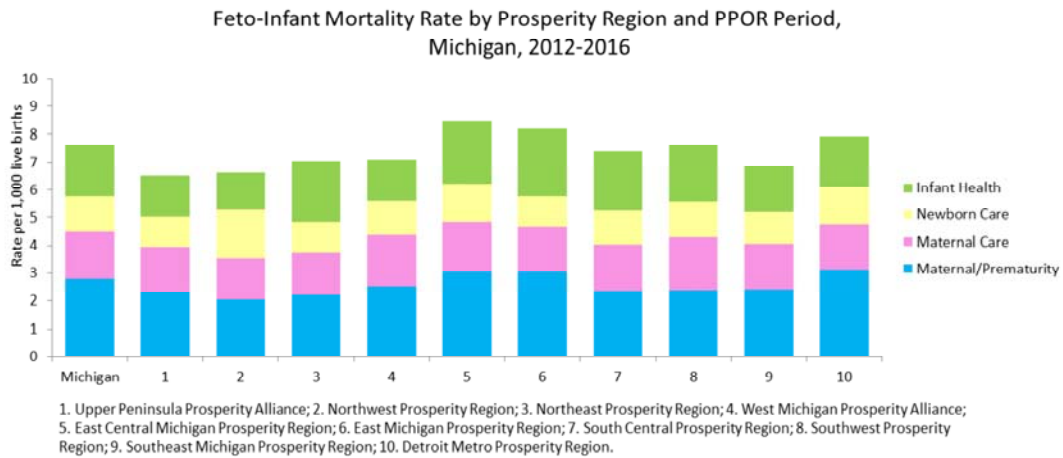
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

21

This slide shows the feto-infant mortality rate by prosperity region of residence in Michigan from 2012 to 2016.

The feto-infant mortality rate in the east central Michigan prosperity region was higher than that in other regions and it was 8.48 per 1,000 live births, followed by the East Michigan prosperity region (8.21 per 1,000 live births) and the Detroit metro prosperity region (7.94 per 1,000 live births). The rate in the upper peninsula prosperity alliance was the lowest (6.52 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2012-2016 (rate per 1,000 live births)

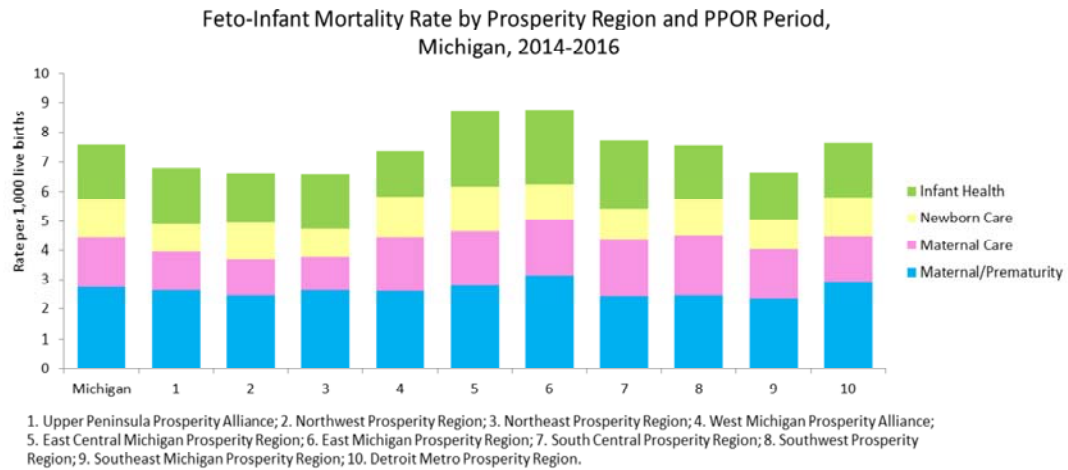


22

This slide shows the feto-infant mortality rate by prosperity region of residence and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, 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: 2014-2016 (rate per 1,000 live births)



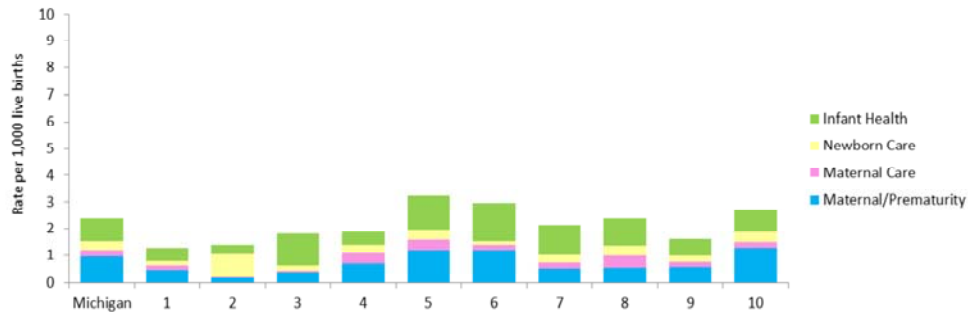
23

This slide shows the feto-infant mortality rate by prosperity region of residence and PPOR period in Michigan from 2014 to 2016.

From 2014 to 2016, the feto-infant mortality rate was highest in the east Michigan prosperity region for the maternal health and prematurity period, in the southwest prosperity region for the maternal care period, in the east central Michigan prosperity region for the newborn care period, and in the east central Michigan prosperity region for the infant health period.

Michigan Feto-Infant Excess Mortality Rate* by Prosperity Region: 2012-2016 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Prosperity Region and PPOR Period, Michigan, 2012-2016



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).

24

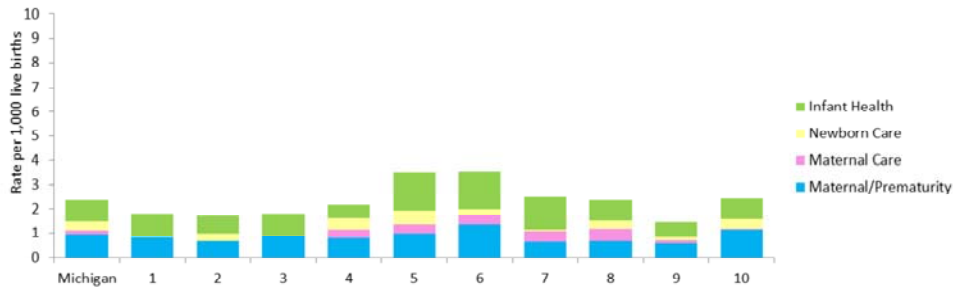
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

This slide shows the feto-infant mortality excess rate by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, 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: 2014-2016 (rate per 1,000 live births)

Feto-Infant Excess Mortality Rate by Prosperity Region and PPOR Period, Michigan, 2014-2016



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).

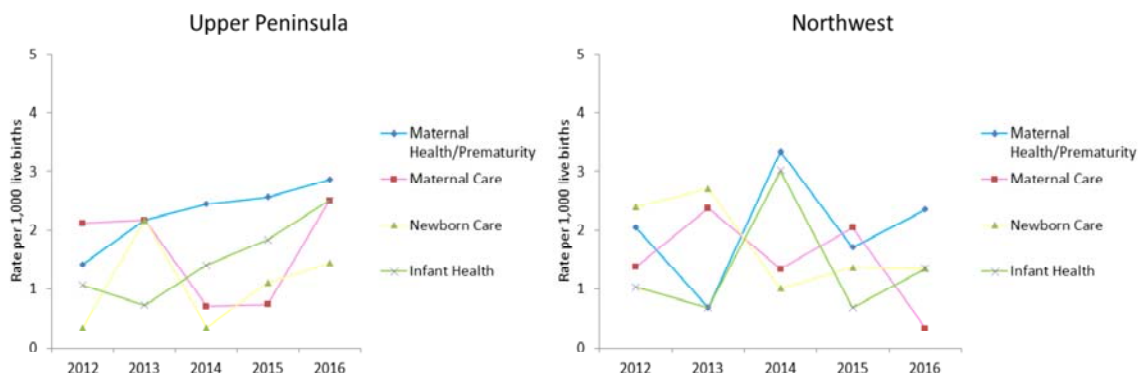
25

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 2014 to 2016. 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 2014 to 2016, the feto-infant mortality rate was highest in the east Michigan prosperity region for the maternal health and prematurity period, in the southwest prosperity region for the maternal care period, in the east central Michigan prosperity region for the newborn care period, and in the east central Michigan prosperity region for the infant health period.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 2012-2016 (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

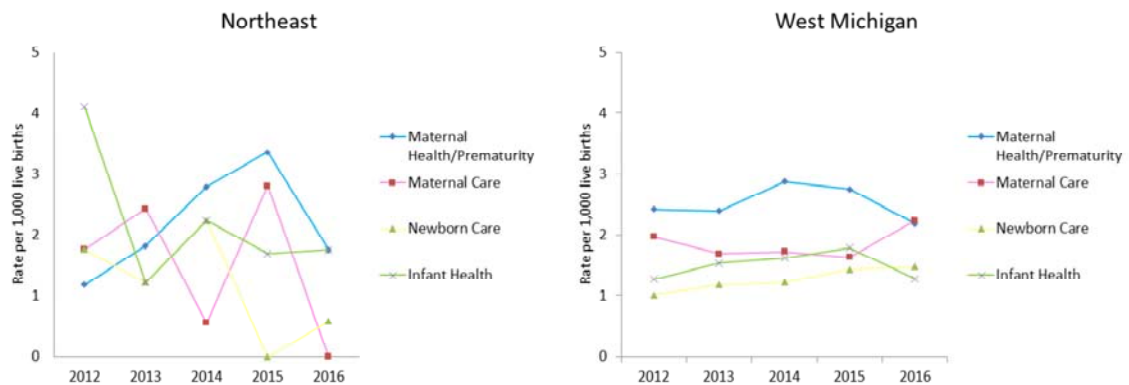
26

This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, in the upper peninsula prosperity alliance region, the feto-infant mortality rate in the maternal health and prematurity period went up from 2012 to 2016. The rate in the newborn care period has not been stable and reached its highest point in 2013, went down in 2014, and went up again from 2014 to 2016. The rate in the infant health period has been increased over time from 2013 to 2016. The rate in the maternal care period declined from 2012 to 2015 and then increased in 2016.

From 2012 to 2016, in the northwest prosperity region, the feto-infant mortality rate in the maternal health and prematurity period varied greatly over time. The rate in the newborn care period reached its highest point in 2013, went down in 2014, and went up again in 2015 and 2016. The rate in the infant health period declined from 2012 to 2013, went up in 2014, went down again in 2015, and then increased in 2016. The rate in the maternal care period went up from 2012 to 2013, declined in 2014, increased in 2015 and then decreased again in 2016.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 2012-2016 (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

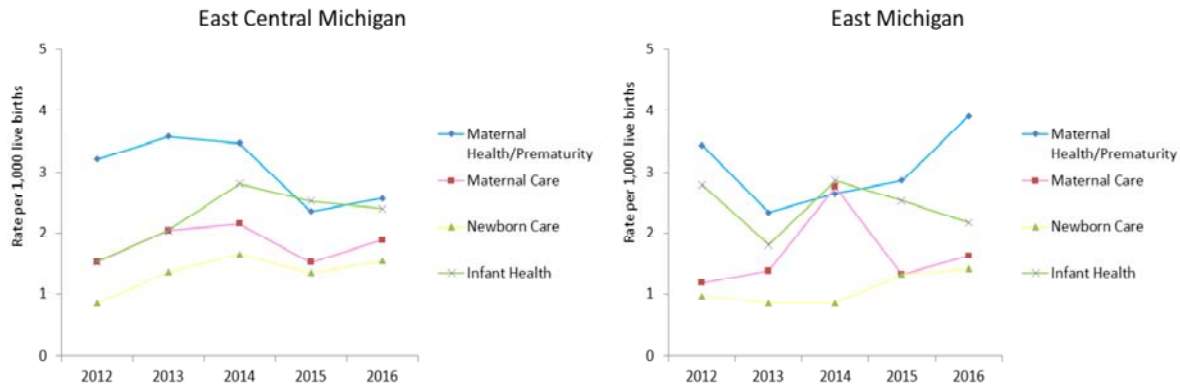
27

This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, in the northeast prosperity region, the feto-infant mortality rate in the maternal health and prematurity period went up from 2012 to 2015, and then declined in 2016. The rate in the newborn care period declined from 2012 to 2013, went up in 2014, went down again in 2015, and then increased again in 2016. The rate in the infant health period reached its highest point in 2012, went down in 2013, went up in 2014, declined again in 2015, and had a small increase in 2016. The rate in the maternal care period went up in 2013, declined in 2014, went up in 2015, and decreased again in 2016.

From 2012 to 2016, in the west Michigan prosperity alliance, the feto-infant mortality rate in the maternal health and prematurity period declined from 2012 to 2013, went up in 2014, and declined again in 2015 and 2016. The rate in the newborn care period has been on a slow increase from 2012 to 2016. The rate in the infant health period has been on a slow increase from 2012 to 2015, and declined in 2016. The rate in the maternal care period decreased from 2012 to 2015 and then went up in 2016.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 2012-2016 (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

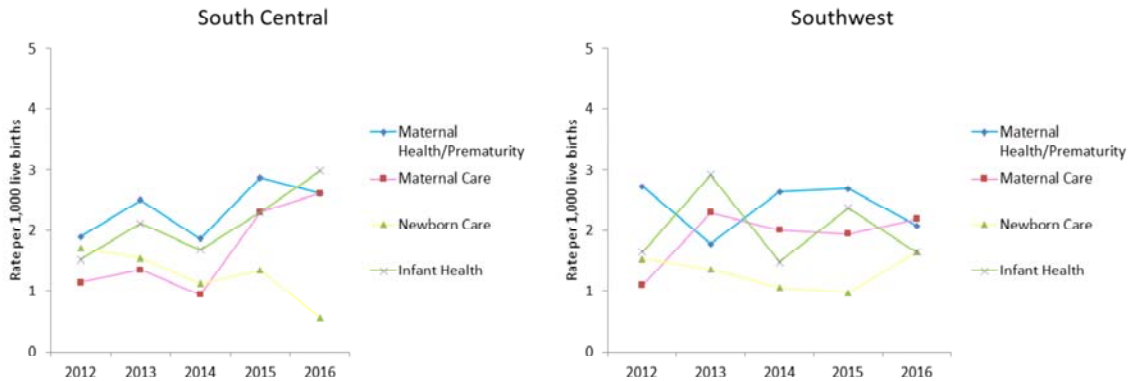
28

This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, in the east central Michigan prosperity region, the feto-infant mortality rate in the maternal health and prematurity period increased from 2012 to 2013, then went down from 2013 to 2015, and increased again in 2016. The rate in the newborn care period went up from 2012 to 2016. The rate in the infant health period went up from 2012 to 2014, and then declined in 2015 and 2016. The rate in the maternal care period went up from 2012 to 2014, declined in 2015, and increased again in 2016.

From 2012 to 2016, in the east Michigan prosperity alliance, the feto-infant mortality rate in the maternal health and prematurity period declined from 2012 to 2013, and then increased from 2013 to 2016. The rate in the newborn care period has been on a slow increase from 2012 to 2016. The rate in the infant health period declined from 2012 to 2013, increased in 2014, and then decreased again in 2015 and 2016. The rate in the maternal care period increased from 2012 to 2014, decreased in 2015, and then went up again in 2016.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 2012-2016 (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

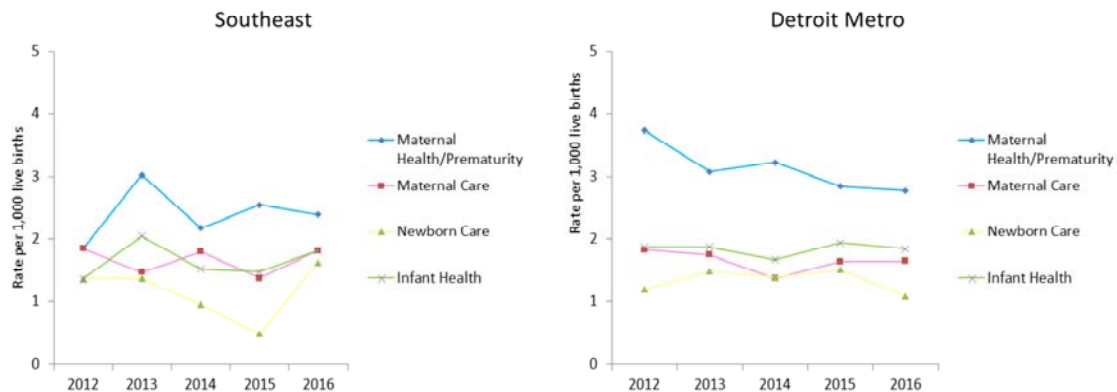
29

This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, in the south central Michigan prosperity region, the feto-infant mortality rate in the maternal health and prematurity period increased from 2012 to 2013, went down in 2014, went up again in 2015, and then decreased again in 2016. The rate in the newborn care period has been on a decline from 2012 to 2016. The rate in the infant health period went up from 2012 to 2013, went down in 2014, and increased again in 2015 and 2016. The rate in the maternal care period went up in 2013, went down in 2014, and increased again in 2015 and 2016.

From 2012 to 2016, in the southwest Michigan prosperity alliance, the feto-infant mortality rate in the maternal health and prematurity period decreased from 2012 to 2013, went up in 2014 and in 2015, and declined again in 2016. The rate in the newborn care period declined from 2012 to 2015, and went up in 2016. The rate in the infant health period increased from 2012 to 2013, went down in 2014, went up in 2015 and then decreased again in 2016. The rate in the maternal care period went up from 2012 to 2013, declined in 2014 and 2015, and then increased again in 2016.

Michigan Feto-Infant Mortality Rate Trend by Prosperity Region: 2012-2016 (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

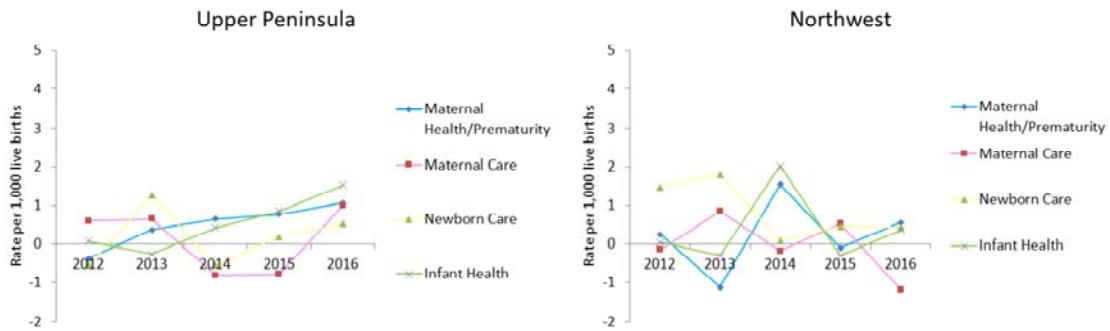
30

This slide shows the feto-infant mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, 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 increased from 2012 to 2013, declined in 2014, increased in 2015, and then decreased again in 2016. The rate in the newborn care period went down from 2012 to 2015, and then increased in 2016. The rate in the infant health period went up from 2012 to 2013, declined in 2014, and then increased from 2014 to 2016. The rate in the maternal care period declined from 2012 to 2013, went up in 2014, declined in 2015, and then increased again in 2016.

From 2012 to 2016, 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 has been on a slow decline over time. The rate in the newborn care period went up from 2012 to 2015, and then decreased in 2016. The rate in the infant health period has been on a slow increase from 2012 to 2016. The rate in the maternal care period declined from 2012 to 2014 and then increased in 2015 and 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 2012-2016 (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

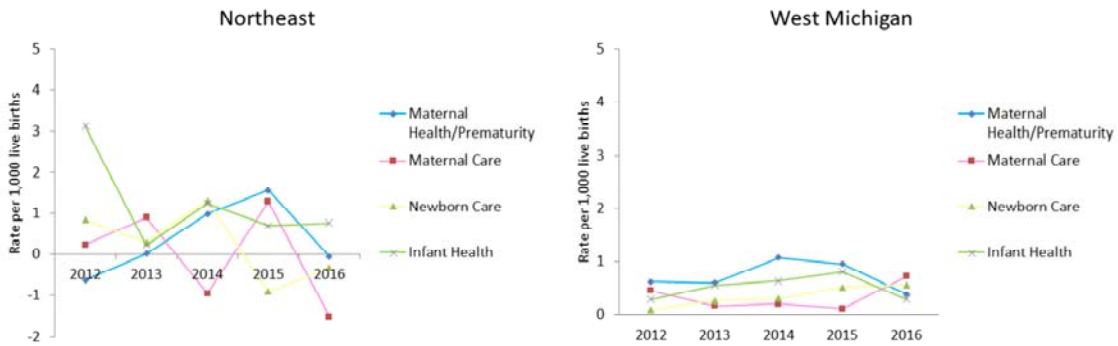
31

This slide shows the feto-infant mortality excess rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, in the upper peninsula prosperity alliance region, the feto-infant excess mortality rate in the maternal health and prematurity period went up from 2012 to 2016. The rate in the newborn care period has not been stable and reached its highest point in 2013, went down in 2014, and went up again from 2014 to 2016. The rate in the infant health period has increased over time from 2013 to 2016. The rate in the maternal care period declined from 2012 to 2015 and then increased in 2016.

From 2012 to 2016, in the northwest prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period declined from 2012 to 2013, went up in 2014, declined in 2015, and then increased again in 2016. The rate in the newborn care period reached its highest point in 2013, went down in 2014, and went up again in 2015 and 2016. The rate in the infant health period declined from 2012 to 2013, went up in 2014, went down again in 2015, and then increased in 2016. The rate in the maternal care period went up from 2012 to 2013, declined in 2014, increased in 2015, and then decreased again in 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 2012-2016 (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

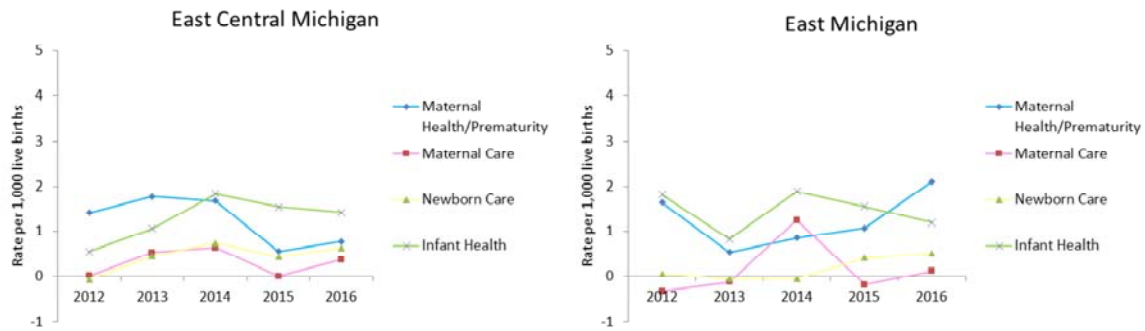
32

This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, in the northeast prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period went up from 2012 to 2015, and then declined in 2016. The rate in the newborn care period declined from 2012 to 2013, went up in 2014, went down again in 2015, and then increased in 2016. The rate in the infant health period reached its highest point in 2012, went down in 2013, went back up in 2014, declined again in 2015, and then increased again in 2016. The rate in the maternal care period went up in 2013, declined in 2014, went up in 2015, and then decreased again in 2016.

From 2012 to 2016, in the west Michigan prosperity alliance, the feto-infant excess mortality rate in the maternal health and prematurity period declined from 2012 to 2013, went up in 2014, and declined again in 2015 and 2016. The rate in the newborn care period has been on a slow increase from 2012 to 2016. The rate in the infant health period showed a slow increase from 2012 to 2015, and then declined in 2016. The rate in the maternal care period decreased from 2012 to 2015 and then went up in 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 2012-2016 (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

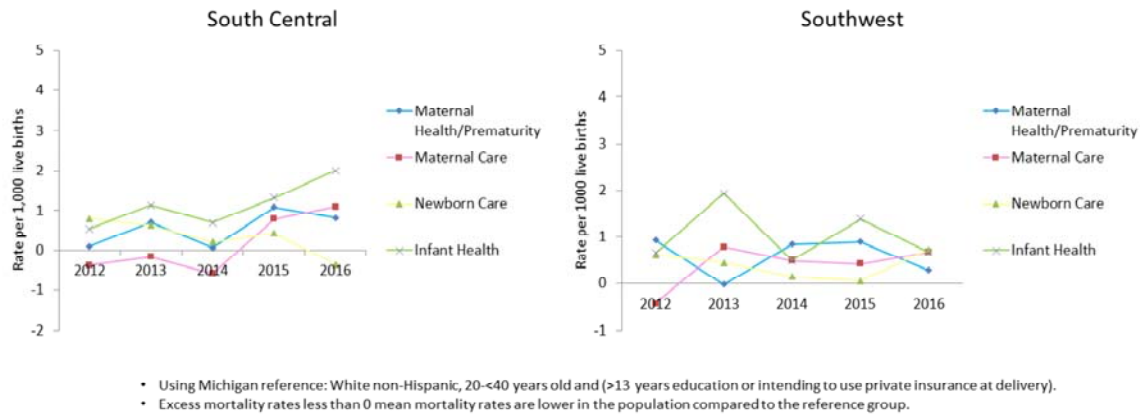
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This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the 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 2012 to 2016, in the east central Michigan prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2012 to 2013, then went down from 2013 to 2015, and increased in 2016. The rate in the newborn care period went up from 2012 to 2016. The rate in the infant health period went up from 2012 to 2014, and then declined in 2015 and 2016. The rate in the maternal care period went up from 2012 to 2014, declined in 2015, and increased again in 2016.

From 2012 to 2016, in the east Michigan prosperity alliance, the feto-infant excess mortality rate in the maternal health and prematurity period declined from 2012 to 2013, and then went up from 2013 to 2016. The rate in the newborn care period has been on a slow increase from 2012 to 2016. The rate in the infant health period declined from 2012 to 2013, increased in 2014, and then went down in 2015 and 2016. The rate in the maternal care period increased from 2012 to 2014, decreased in 2015, and then went up again in 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 2012-2016 (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

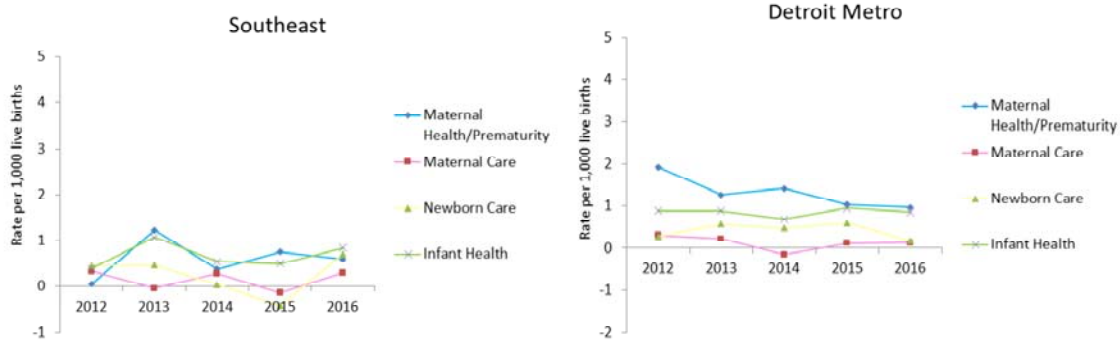
34

This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, in the south central Michigan prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2012 to 2013, went down in 2014, went up again in 2015, and then decreased in 2016. The rate in the newborn care period has been on a decline from 2012 to 2016. The rate in the infant health period went up from 2012 to 2013, went down in 2014, and increased again in 2015 and 2016. The rate in the maternal care period went up in 2013, went down in 2014, and increased again in 2015 and 2016.

From 2012 to 2016, in the southwest Michigan prosperity alliance, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2012 to 2013, went up in 2014 and 2015, and then declined again in 2016. The rate in the newborn care period declined from 2012 to 2015, and went up in 2016. The rate in the infant health period increased from 2012 to 2013, went down in 2014, went up in 2015, and then decreased in 2016. The rate in the maternal care period went up from 2012 to 2013, declined in 2014 and 2015, and then increased again in 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by Prosperity Region: 2012-2016 (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

35

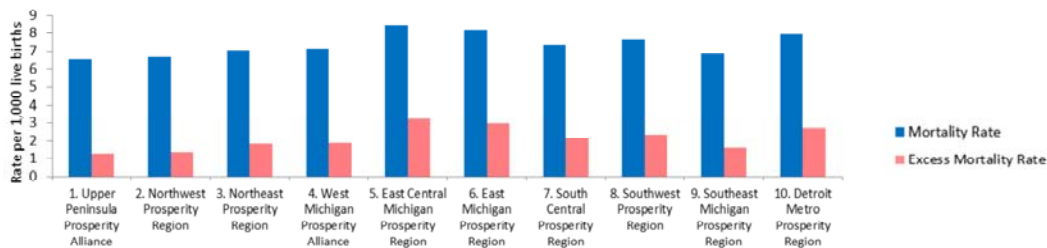
This slide shows the feto-infant excess mortality rate trend by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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 2012 to 2016, in the southeast prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2012 to 2013, declined in 2014, increased again in 2015, and then decreased again in 2016. The rate in the newborn care period went down from 2012 to 2015, and then increased in 2016. The rate in the infant health period went up from 2012 to 2013, declined in 2014, and then increased from 2014 to 2016. The rate in the maternal care period declined from 2012 to 2013, went up in 2014, declined again in 2015, and then increased in 2016.

From 2012 to 2016, in the Detroit metro prosperity region, the feto-infant excess mortality rate in the maternal health and prematurity period was higher than the other periods and has been on a slow decline over time. The rate in the newborn care period went up from 2012 to 2015, and then decreased in 2016. The rate in the infant health period has been on a slow increase from 2012 to 2016. The rate in the maternal care period declined from 2012 to 2014 and then increased in 2015 and 2016.

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2012-2016 (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 year	Excess rate of deaths per 1,000 live births					
		Maternal Health/Pr mortality	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr mortality	Maternal Care	Neonatal Care	Infant Health		Total	Maternal Health/Pr mortality	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
1. Upper Peninsula Prosperity Alliance	13955	32	23	15	21	2.29	1.65	1.07	1.50	91	6.52	0.46	0.19	0.13	0.50	1.28
2. Northwest Prosperity Region	14762	30	22	26	20	2.03	1.49	1.76	1.35	98	6.54	0.20	0.03	0.82	0.35	1.40
3. Northeast Prosperity Region	8635	19	13	10	19	2.20	1.51	1.16	2.20	61	7.06	0.37	0.04	0.21	1.20	1.82
4. West Michigan Prosperity Alliance	98516	249	182	124	147	2.53	1.85	1.26	1.49	702	7.13	0.70	0.39	0.31	0.49	1.88
5. East Central Michigan Prosperity Region	29611	90	54	40	67	3.04	1.82	1.35	2.26	251	8.48	1.21	0.36	0.41	1.26	3.23
6. East Michigan Prosperity Region	46428	141	77	50	113	3.04	1.66	1.08	2.43	381	8.21	1.29	0.20	0.13	1.43	2.96
7. South Central Prosperity Region	26391	62	44	33	56	2.35	1.67	1.25	2.12	195	7.39	0.52	0.21	0.30	1.12	2.15
8. Southwest Prosperity Region	46599	111	89	61	94	2.38	1.91	1.31	2.02	355	7.62	0.55	0.45	0.36	1.01	2.38
9. Southeast Michigan Prosperity Region	51785	124	86	60	85	2.39	1.66	1.16	1.64	355	6.86	0.56	0.20	0.21	0.64	1.61
10. Detroit Metro Prosperity Region	230794	722	379	307	424	3.13	1.64	1.33	1.84	1832	7.94	1.30	0.18	0.38	0.83	2.69



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

36

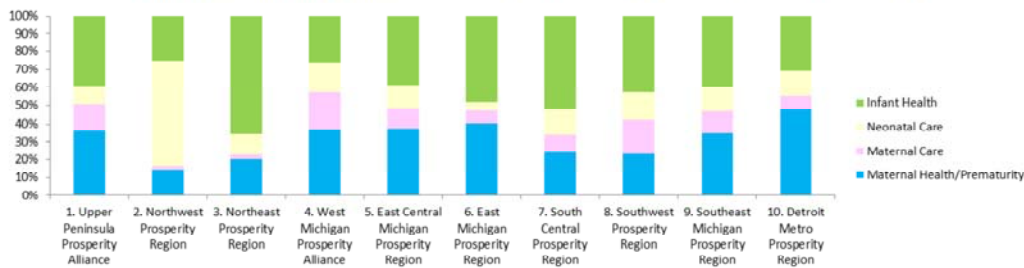
This slide shows the feto-infant mortality rate and excess rate by prosperity region of residence and PPOR period in Michigan from 2012 to 2016. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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 2012 to 2016, the feto-infant mortality rate in the east central Michigan prosperity region was higher than that in other regions at 8.48 per 1,000 live births, followed by the east Michigan prosperity region (8.21 per 1,000 live births) and the Detroit metro prosperity region (7.94 per 1,000 live births). The rate in the upper peninsula prosperity alliance was the lowest (6.52 per 1,000 live births).

From 2012 to 2016, the feto-infant excess mortality rate in the east central Michigan prosperity region was higher than that in other regions at 3.23 per 1,000 live births, followed by the east Michigan prosperity region (2.96 per 1,000 live births) and the Detroit metro prosperity region (2.69 per 1,000 live births). The rate in the upper peninsula prosperity alliance was the lowest (1.28 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2012-2016 (rate per 1,000 live births)

	Live births 5 years	% of excess infant deaths attributed to			
		Maternal Health/Prematurity	Maternal Care	Neonatal Care	Infant Health
1. Upper Peninsula Prosperity Alliance	13955	36.0	14.6	10.1	39.2
2. Northwest Prosperity Region	14762	14.3	2.1	58.5	25.1
3. Northeast Prosperity Region	8635	20.2	2.4	11.7	65.7
4. West Michigan Prosperity Alliance	98516	36.9	20.5	16.6	25.9
5. East Central Michigan Prosperity Region	29611	37.3	11.2	12.5	38.9
6. East Michigan Prosperity Region	46428	40.6	6.7	4.4	48.3
7. South Central Prosperity Region	26391	24.1	9.6	14.2	52.1
8. Southwest Prosperity Region	46599	23.1	18.9	15.3	42.7
9. Southeast Michigan Prosperity Region	51785	34.9	12.4	13.2	39.5
10. Detroit Metro Prosperity Region	230794	48.1	6.7	14.3	30.9



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

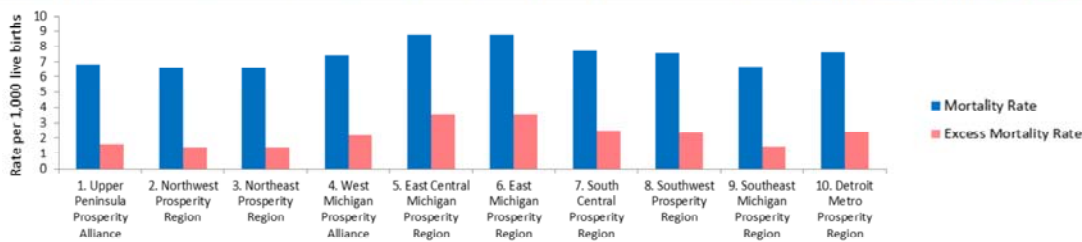
37

This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by prosperity region of residence in Michigan from 2012 to 2016. 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 2012 to 2016, in the east Michigan prosperity region, 40.6% of excess infant deaths were attributed to the maternal health and prematurity period. In the west Michigan prosperity region, 20.5% of excess infant deaths were attributed to the maternal care period. In the northwest prosperity region, 58.5% of excess infant deaths were attributed to the neonatal care period. In the northeast prosperity region, 65.7% of excess infant deaths were attributed to the infant health period.

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2014-2016 (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
1. Upper Peninsula Prosperity Alliance	8364	22	11	8	16	2.63	1.32	0.96	1.91	57	6.81	0.83	-0.20	0.04	0.93	1.59
2. Northwest Prosperity Region	8891	22	11	11	15	2.47	1.24	1.24	1.69	59	6.64	0.67	-0.28	0.32	0.70	1.41
3. Northeast Prosperity Region	5283	14	6	5	10	2.65	1.14	0.95	1.89	35	6.63	0.85	-0.38	0.03	0.91	1.40
4. West Michigan Prosperity Alliance	59125	154	110	81	92	2.60	1.86	1.37	1.56	437	7.39	0.80	0.34	0.45	0.57	2.17
5. East Central Michigan Prosperity Region	17822	50	33	27	46	2.81	1.85	1.51	2.58	156	8.75	1.00	0.33	0.60	1.60	3.53
6. East Michigan Prosperity Region	27710	87	53	33	70	3.14	1.91	1.19	2.53	243	8.77	1.34	0.39	0.28	1.54	3.55
7. South Central Prosperity Region	15927	39	31	16	37	2.45	1.95	1.00	2.32	123	7.72	0.65	0.43	0.09	1.34	2.50
8. Southwest Prosperity Region	27880	69	57	34	51	2.47	2.04	1.22	1.83	211	7.57	0.67	0.52	0.30	0.85	2.35
9. Southeast Michigan Prosperity Region	31241	74	52	32	50	2.37	1.66	1.02	1.60	208	6.66	0.57	0.14	0.11	0.62	1.44
10. Detroit Metro Prosperity Region	138794	409	215	184	252	2.95	1.55	1.33	1.82	1060	7.64	1.14	0.03	0.41	0.83	2.42



* Prosperity Region 1, 2 and 3 are based on less than 60 deaths for 2014-2016.

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

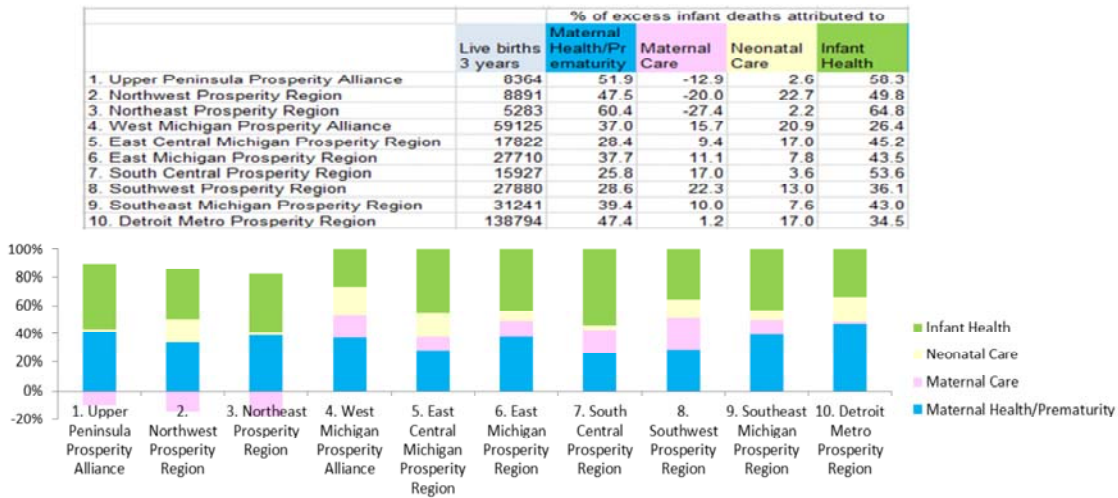
38

This slide shows the feto-infant mortality rate and excess rate by prosperity region of residence and PPOR period in Michigan from 2014 to 2016. 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 2014 to 2016, the feto-infant mortality rate in the east Michigan prosperity region was higher than that in other regions at 8.77 per 1,000 live births, followed by the east central Michigan prosperity region (8.75 per 1,000 live births) and the south central prosperity region (7.72 per 1,000 live births) and. The rate in the northeast prosperity region was the lowest (6.63 per 1,000 live births).

From 2014 to 2016, the feto-infant excess mortality rate in the east Michigan prosperity region was higher than that in other regions at 3.55 per 1,000 live births, followed by the east central Michigan prosperity region (3.53 per 1,000 live births) and the south central prosperity region (2.50 per 1,000 live births). The rate in the northeast prosperity region was the lowest (1.40 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by Prosperity Region: 2014-2016 (rate per 1,000 live births)



* Prosperity Region 1, 2 and 3 are based on less than 60 deaths for 2014-2016.

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

39

This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by prosperity region of residence in Michigan from 2014 to 2016. 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 2014 to 2016, in the northeast prosperity region, 60.4% of excess infant deaths were attributed to the maternal health and prematurity period. In the southwest prosperity region, 22.3% of excess infant deaths were attributed to the maternal care period. In the northwest prosperity region, 22.7% of excess infant deaths were attributed to the neonatal care period. In the northeast prosperity region, 64.8% of excess infant deaths were attributed to the infant health period.

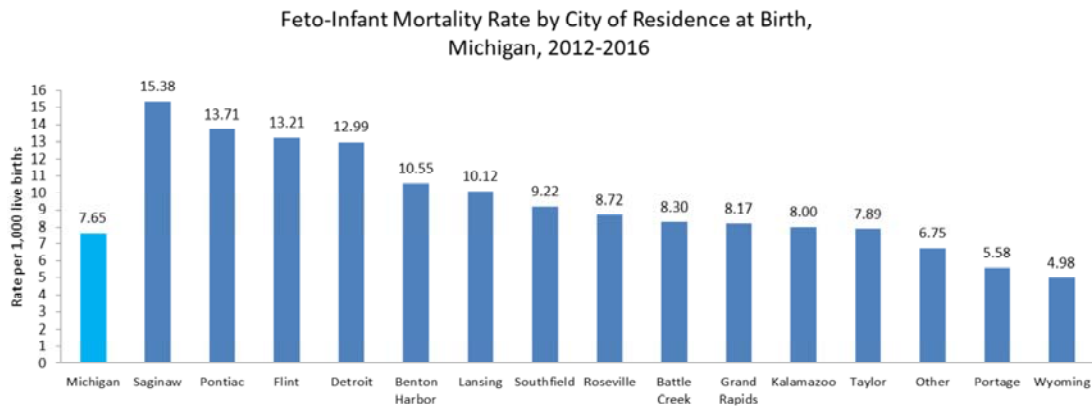
PPOR by City of Residence at Birth

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

40

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: 2012-2016 (rate per 1,000 live births)



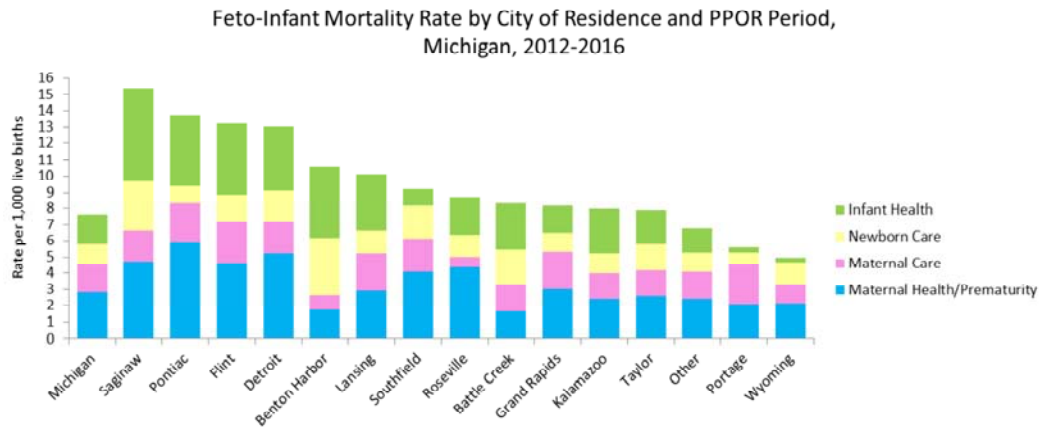
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

41

This slide shows the feto-infant mortality rate by selected city of residence in Michigan from 2012 to 2016.

The feto-infant mortality rate in Saginaw was higher than that in other cities at 15.38 per 1,000 live births, followed by Pontiac (13.71 per 1,000 live births), Flint (13.21 per 1,000 live births) and Detroit (12.99 per 1,000 live births). The rate in Wyoming was lower than other cities (4.98 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2012-2016 (rate per 1,000 live births)



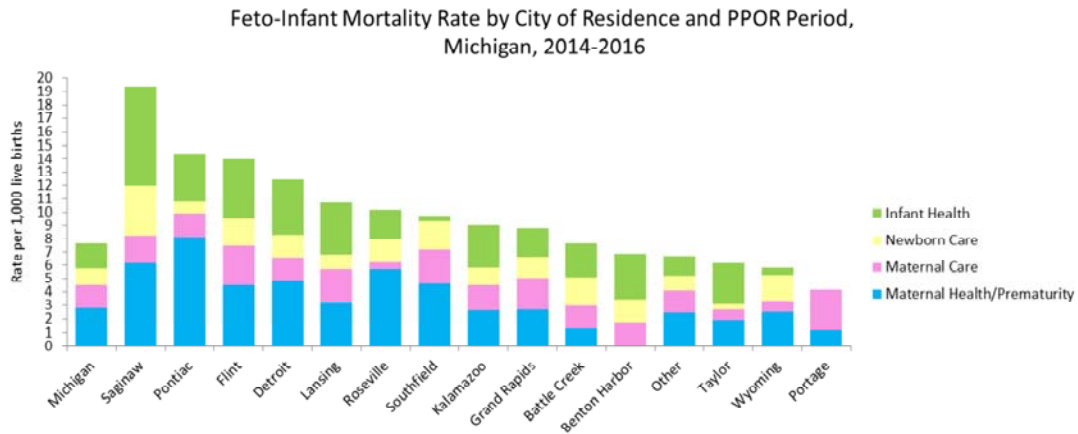
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

42

This slide shows the feto-infant mortality rate by selected city of residence at birth and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, the feto-infant mortality rate was highest in Pontiac for the maternal health and prematurity period, highest in Flint for the maternal care period, highest in Benton Harbor for the newborn care period, and highest in Saginaw for the infant health period.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2014-2016 (rate per 1,000 live births)



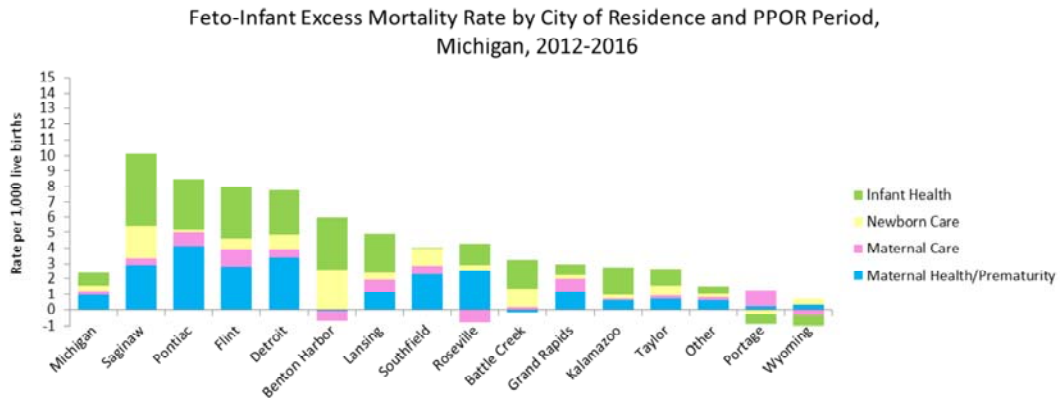
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

43

This slide shows the feto-infant mortality rate by selected city of residence at birth and PPOR period in Michigan from 2014 to 2016.

From 2014 to 2016, the feto-infant 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 in Saginaw for the infant health period.

Michigan Feto-Infant Excess Mortality Rate* by City of Residence at Birth: 2012-2016 (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).

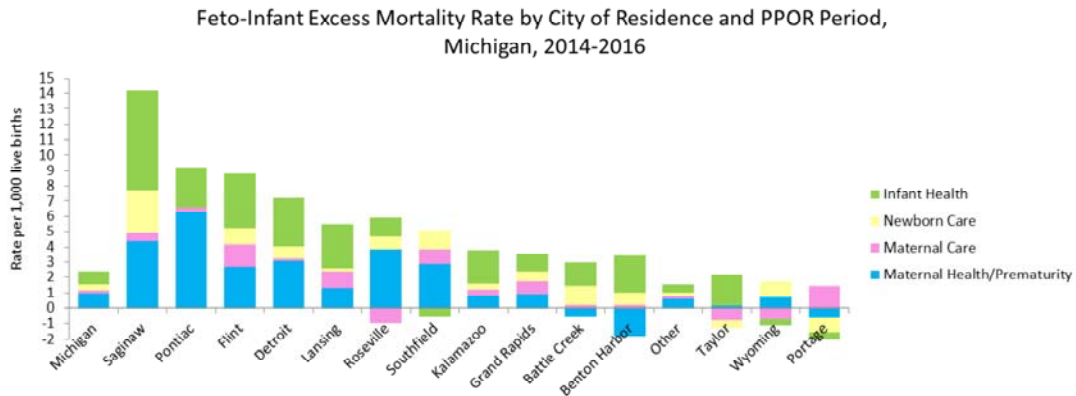
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

44

This slide shows the feto-infant mortality excess rate by selected city of residence at birth and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, the feto-infant excess mortality rate was highest in Pontiac for the maternal health and prematurity period, in Flint for the maternal care period, in Benton Harbor for the newborn care period, and in Saginaw for the infant health period.

Michigan Feto-Infant Excess Mortality Rate* by City of Residence at Birth: 2014-2016 (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).

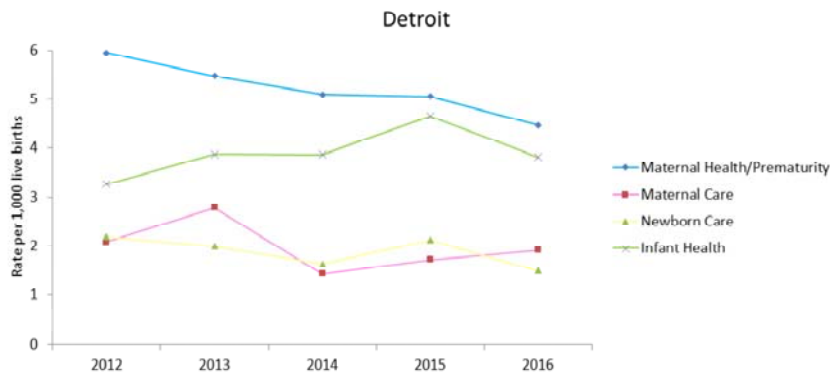
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

45

This slide shows the feto-infant mortality excess rate by selected city of residence at birth and PPOR period in Michigan from 2014 to 2016. 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 2014 to 2016, the feto-infant excess mortality rate was highest in Pontiac for the maternal health and prematurity period, in Portage for the maternal care period, and in Saginaw for the newborn care period and the infant health period.

Michigan Feto-Infant Mortality Rate Trend by City of Residence at Birth: 2012-2016 (rate per 1,000 live births)



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

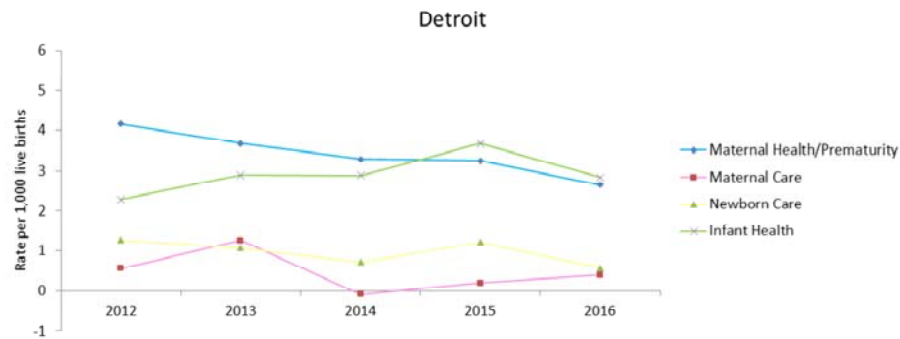
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

46

This slide shows the feto-infant mortality rate trend by selected city of residence and PPOR period in Michigan from 2012 to 2016. Data for some cities, except Detroit and Grand Rapids, is not stable enough for annual estimate.

From 2012 to 2016, in Detroit, the feto-infant mortality rate in the maternal health and prematurity period declined from 2012 to 2016. The rate in the newborn care period declined from 2012 to 2014, went up in 2015, and then decreased again in 2016. The rate in the infant health period has been on a slow increase from 2012 to 2015, and then went down in 2016. The rate in the maternal care period increased from 2012 to 2013, went down in 2014, and then increased again in 2015 and 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by City of Residence at Birth: 2012-2016 (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 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

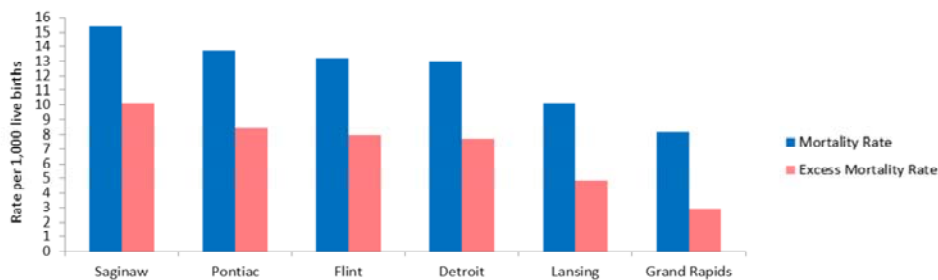
47

This slide shows the feto-infant excess mortality rate trend by selected city of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, in Detroit, the feto-infant excess mortality rate in the maternal health and prematurity period declined from 2012 to 2016. The rate in the newborn care period declined from 2012 to 2014, went up in 2015, and then decreased again in 2016. The rate in the infant health period increased from 2012 to 2015, and then went down in 2016. The rate in the maternal care period increased from 2012 to 2013, went down in 2014, and then increased again in 2015 and 2016.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2012-2016 (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	4226	20	8	13	24	4.73	1.89	3.08	5.68	65	15.38	2.90	0.43	2.13	4.68	10.14
Pontiac	5543	33	13	6	24	5.95	2.35	1.08	4.33	76	13.71	4.12	0.88	0.14	3.33	8.47
Flint	8027	37	21	13	35	4.61	2.62	1.62	4.36	106	13.21	2.78	1.15	0.67	3.36	7.96
Detroit	49264	257	98	93	192	5.22	1.99	1.89	3.90	640	12.99	3.38	0.53	0.94	2.89	7.75
Lansing	9190	27	21	13	32	2.94	2.29	1.41	3.48	93	10.12	1.11	0.82	0.47	2.48	4.88
Grand Rapids	16273	49	37	19	28	3.01	2.27	1.17	1.72	133	8.17	1.18	0.81	0.22	0.72	2.93



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

48

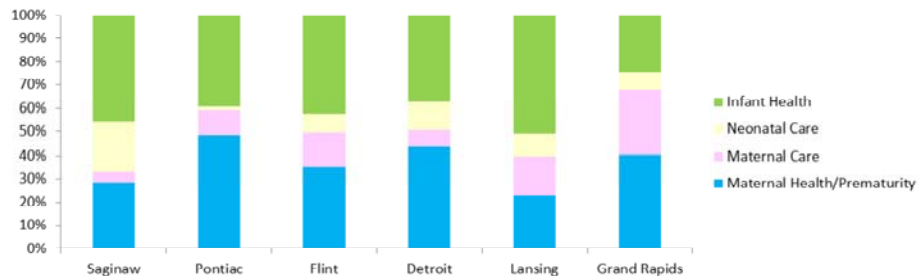
This slide shows the feto-infant mortality rate and excess rate by selected city of residence and PPOR period in Michigan from 2012 to 2016. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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 2012 to 2016, the feto-infant mortality rate in Saginaw was higher than that in other cities at 15.38 per 1,000 live births, followed by Pontiac (13.71 per 1,000 live births) and Flint (13.21 per 1,000 live births). The rate in Grand Rapids was lower than other selected cities (8.17 per 1,000 live births).

From 2012 to 2016, the feto-infant excess mortality rate in Saginaw was higher than that in other selected cities at 10.14 per 1,000 live births, followed by Pontiac (8.47 per 1,000 live births) and Flint (7.96 per 1,000 live births). The excess rate in Grand Rapids was lower than other selected cities (2.93 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2012-2016 (rate per 1,000 live births)

	Live births 5 years	% of excess infant deaths attributed to			
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health
Saginaw	4226	28.6	4.3	21.0	46.1
Pontiac	5543	48.7	10.4	1.6	39.3
Flint	8027	34.9	14.5	8.5	42.2
Detroit	49264	43.7	6.8	12.2	37.3
Lansing	9190	22.7	16.9	9.6	50.8
Grand Rapids	16273	40.2	27.7	7.6	24.5



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

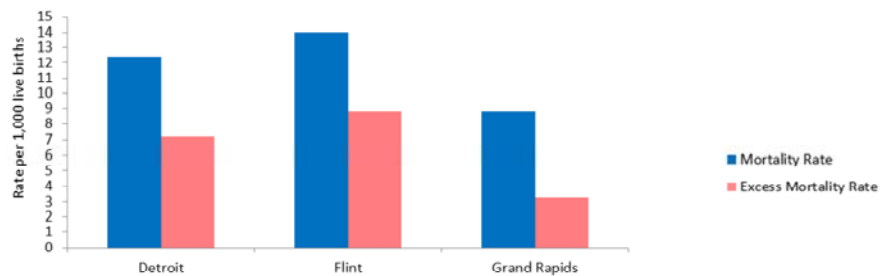
49

This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected city of residence in Michigan from 2012 to 2016. 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 2012 to 2016, in Pontiac, 48.7% of excess infant deaths were attributed to the maternal health and prematurity period. In Grand Rapids, 27.7% of excess infant deaths were attributed to the maternal care period. In Saginaw, 21.0% of excess infant deaths were attributed to the neonatal care period. In Lansing, 50.8% were attributed to the infant health period.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2014-2016 (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	29128	142	49	51	120	4.88	1.68	1.75	4.12	362	12.43	3.07	0.16	0.84	3.14	7.21
Flint	4424	20	13	9	20	4.52	2.94	2.03	4.52	62	14.01	2.72	1.42	1.12	3.54	8.79
Grand Rapids	9337	25	22	15	20	2.68	2.36	1.61	2.14	82	8.78	0.87	0.84	0.38	1.16	3.24



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

50

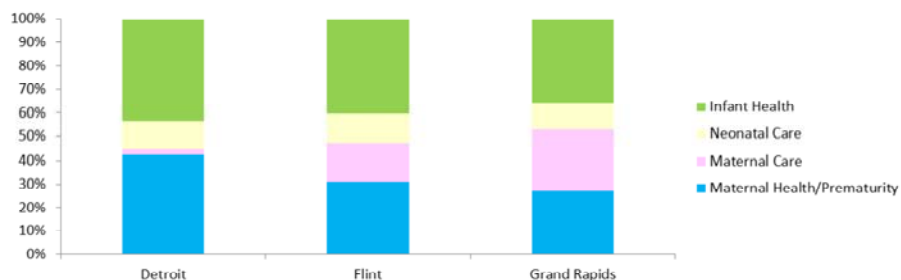
This slide shows the feto-infant mortality rate and excess rate by selected city of residence and PPOR period in Michigan from 2014 to 2016. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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 2014 to 2016, the feto-infant mortality rate was 12.43 per 1,000 live births in Detroit, 14.05 per 1,000 live births in Flint, and 8.78 per 1,000 live births in Grand Rapids.

From 2014 to 2016, the feto-infant excess mortality rate was 7.21 per 1,000 live births in Detroit, 8.79 per 1,000 live births in Flint, and 3.24 per 1,000 live births in Grand Rapids.

Michigan Feto-Infant Mortality Rate by City of Residence at Birth: 2014-2016 (rate per 1,000 live births)

	Live births 3 years	% of excess infant deaths attributed to			
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health
Detroit	29128	42.6	2.2	11.6	43.5
Flint	4424	30.9	16.1	12.7	40.2
Grand Rapids	9337	27.0	25.8	11.6	35.7



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

51

This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected city of residence in Michigan from 2014 to 2016. 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 2014 to 2016, in Detroit, 42.6% of excess infant deaths were attributed to the maternal health and prematurity period. In Grand Rapids, 25.8% of excess infant deaths were attributed to the maternal care period. In Flint, 12.7% of excess infant deaths were attributed to the neonatal care period. In Detroit, 43.5% of excess infant deaths were attributed to the infant health period.

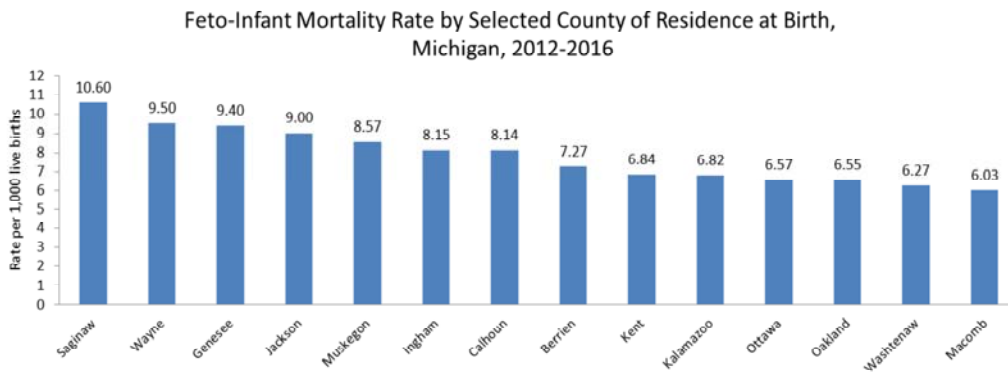
PPOR by County of Residence

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

52

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: 2012-2016 (rate per 1,000 live births)



Selected residence counties with the overall number of deaths > 60 for 2012-2016.

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

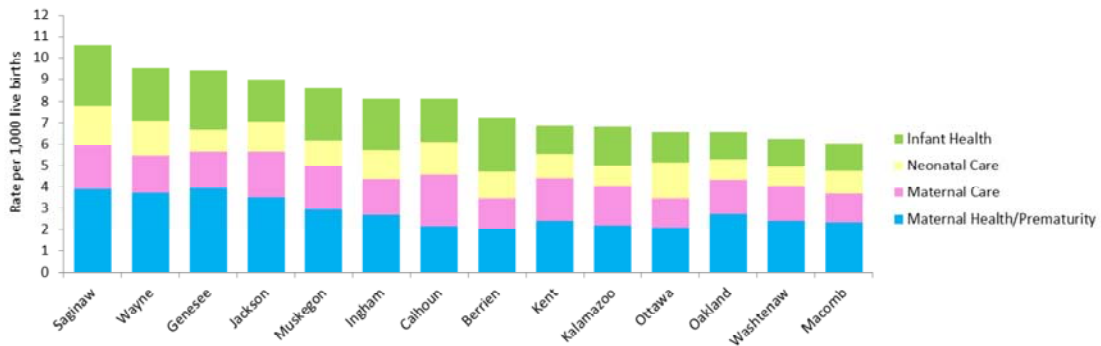
53

This slide shows the feto-infant mortality rate by selected county of residence in Michigan from 2012 to 2016.

The feto-infant mortality rate in Saginaw county was higher than that in other counties at 10.60 per 1,000 live births, followed by Wayne county (9.50 per 1,000 live births) and Genesee county (9.40 per 1,000 live births). The rate in Macomb county was lower than other selected counties (6.03 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by County of Residence: 2012-2016 (rate per 1,000 live births)

Feto-Infant Mortality Rate by Selected County of Residence and PPOR Period, Michigan, 2012-2016



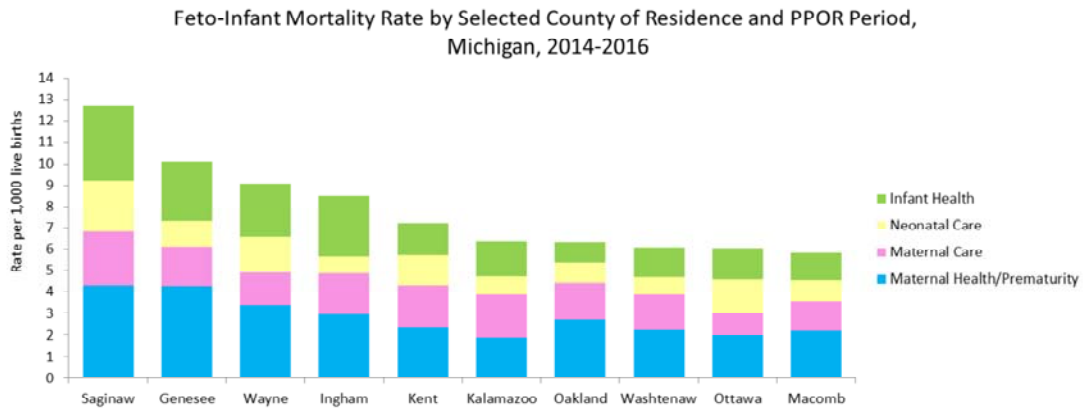
Selected residence counties with the overall number of deaths > 60 from 2012 to 2016.

54

This slide shows the feto-infant mortality rate by selected county of residence at birth and PPOR period in Michigan from 2012 to 2016.

From 2012 to 2016, 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: 2014-2016 (rate per 1,000 live births)



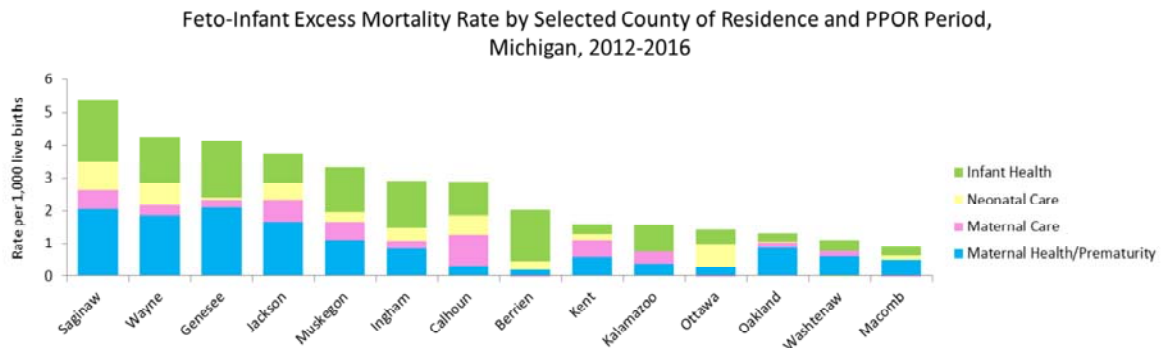
Selected residence counties with the overall number of deaths > 60 from 2014 to 2016.

55

This slide shows the feto-infant mortality rate by selected county of residence at birth and PPOR period in Michigan from 2014 to 2016.

From 2014 to 2016, the feto-infant mortality rate was highest in Saginaw county for the maternal health and prematurity period, the maternal care period, the newborn care period and the infant health period, respectively.

Michigan Feto-Infant Excess Mortality Rate* by County of Residence: 2012-2016 (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). Selected residence counties with the overall number of deaths > 60 from 2012 to 2016.

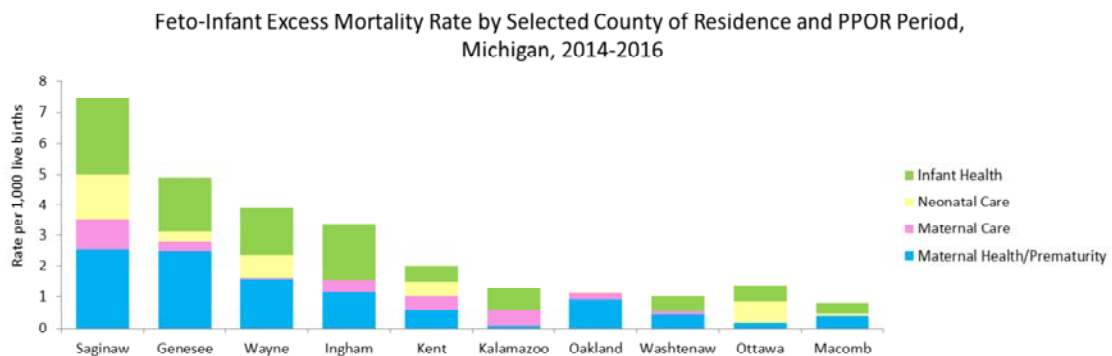
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

56

This slide shows the feto-infant excess mortality rate by selected county of residence at birth and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, 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: 2014-2016 (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). Selected residence counties with the overall number of deaths > 60 from 2014 to 2016.

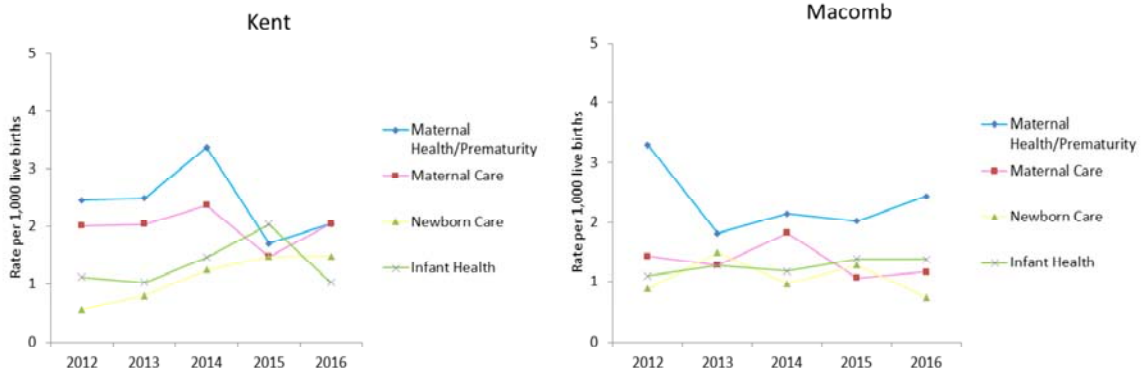
Data source: Michigan resident live birth files, infant mortality files and fetal death files, Division for Vital Records and Health Statistics, MDHHS

57

This slide shows the feto-infant excess mortality rate by selected county of residence at birth and PPOR period in Michigan from 2014 to 2016. 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 2014 to 2016, the feto-infant excess mortality rate was highest in Saginaw county for the maternal health and prematurity period, the maternal care period, the newborn care period and the infant health period, respectively.

Michigan Feto-Infant Mortality Rate Trend by County of Residence: 2012-2016 (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

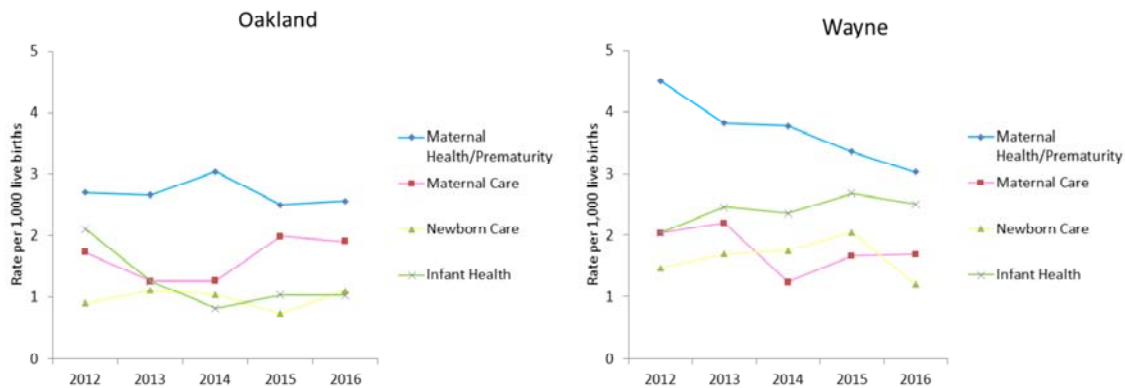
58

This slide shows the feto-infant mortality rate trend by selected county of residence and PPOR period in Michigan from 2012 to 2016. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

From 2012 to 2016, in Kent county, the feto-infant mortality rate in the maternal health and prematurity period increased from 2012 to 2014, went down in 2015, and went up again in 2016. The rate in the newborn care period increased from 2012 to 2016. The rate in the infant health period decreased from 2012 to 2013, increased in 2014 and 2015, and then decreased again in 2016. The rate in the maternal care period increased from 2012 to 2014, declined in 2015, and then went up again in 2016.

From 2012 to 2016, in Macomb county, the feto-infant mortality rate in the maternal health and prematurity period decreased from 2012 to 2013, and then had a slow increase from 2013 to 2016. The rate in the newborn care period increased from 2012 to 2013, went down in 2014, went up in 2015, and decreased again in 2016. The rate in the infant health period has been on a slow increase over time. The rate in the maternal care period decreased from 2012 to 2013, went up in 2014, went down in 2015, and then increased again in 2016.

Michigan Feto-Infant Mortality Rate Trend by County of Residence: 2012-2016 (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

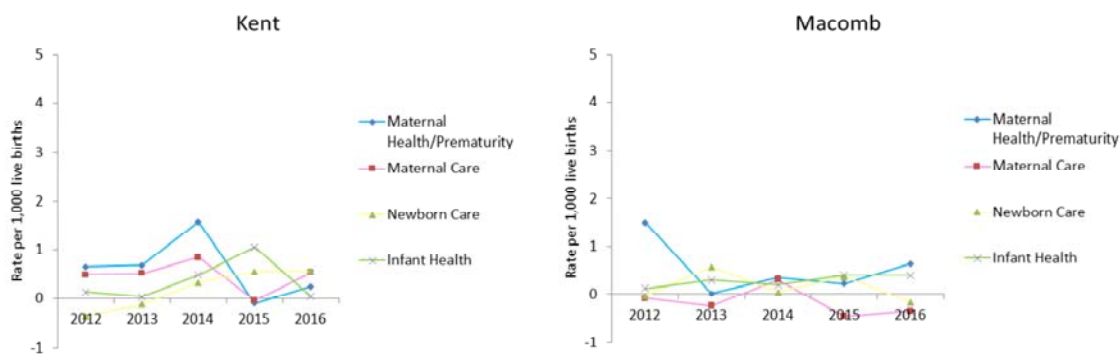
59

This slide shows the feto-infant mortality rate trend by selected county of residence and PPOR period in Michigan from 2012 to 2016. Data for some counties, except Kent, Macomb, Oakland, and Wayne, is not stable enough for annual estimate.

From 2012 to 2016, 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 2012 to 2014, declined in 2015, and then went up again in 2016. The rate in the newborn care period increased from 2012 to 2013, decreased in 2014 and 2015, and then went up again in 2016. The rate in the infant health period decreased from 2012 to 2014, and then went up in 2015 and 2016. The rate in the maternal care period declined from 2012 to 2014, and then went up from 2013 to 2016.

From 2012 to 2016, 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 2012 to 2016. The rate in the newborn care period increased slowly from 2012 to 2015, and then decreased in 2016. The rate in the infant health period increased slowly from 2012 to 2016. The rate in the maternal care period increased from 2012 to 2013, went down in 2014, and then went up in 2015 and 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by County of Residence: 2012-2016 (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

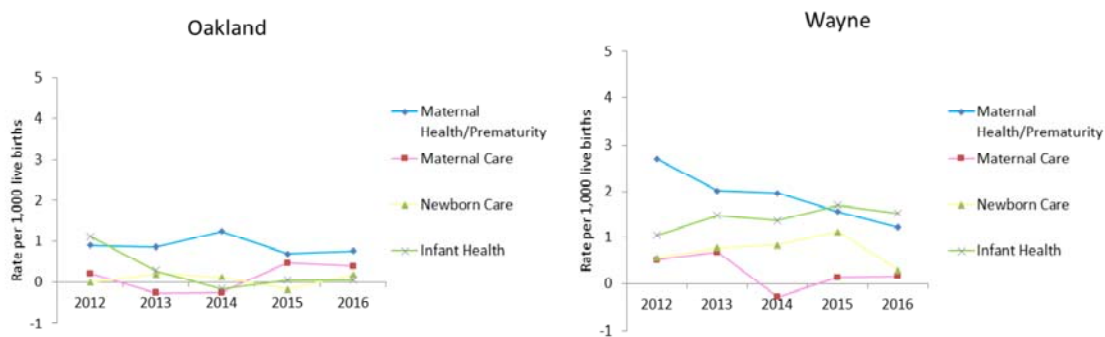
60

This slide shows the feto-infant excess mortality rate trend by selected county of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, in Kent county, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2012 to 2014, went down in 2015, and then went up again in 2016. The rate in the newborn care period increased from 2012 to 2016. The rate in the infant health period decreased from 2012 to 2013, increased in 2014 and 2015, and then decreased in 2016. The rate in the maternal care period increased from 2012 to 2014, declined in 2015, and then went up again in 2016.

From 2012 to 2016, in Macomb county, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2012 to 2013, and then increased slowly from 2013 to 2016. The rate in the newborn care period increased from 2012 to 2013, went down in 2014, went up in 2015, and then decreased again in 2016. The rate in the infant health period has been on a slow increase over time. The rate in the maternal care period decreased from 2012 to 2013, went up in 2014, went down in 2015, and then increased again in 2016.

Michigan Feto-Infant Excess Mortality Rate* Trend by County of Residence: 2012-2016 (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

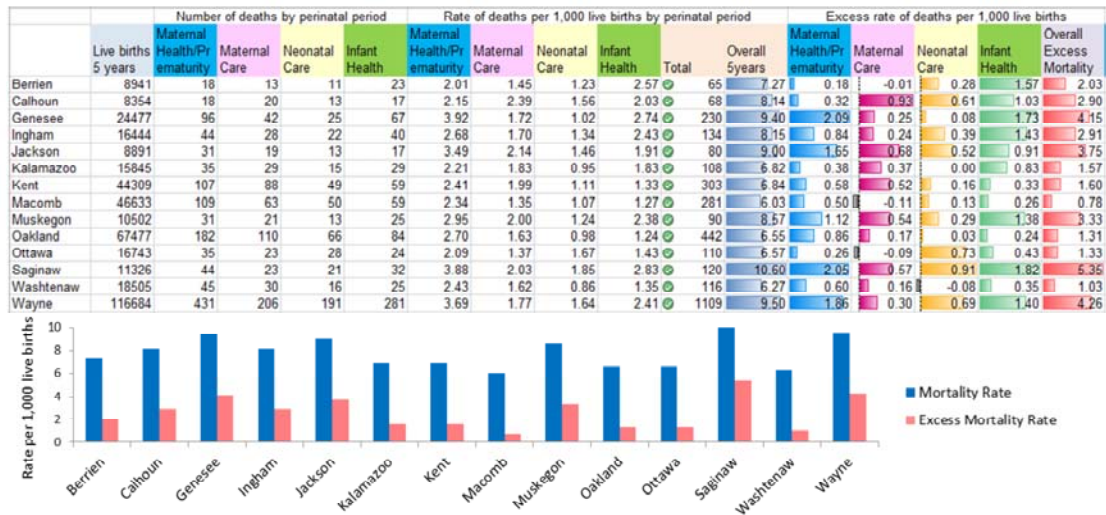
61

This slide shows the feto-infant excess mortality rate trend by selected county of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, in Oakland county, the feto-infant excess mortality rate in the maternal health and prematurity period increased from 2012 to 2014, declined in 2015, and then went up again in 2016. The rate in the newborn care period increased from 2012 to 2013, decreased in 2014 and 2015, and then went up again in 2016. The rate in the infant health period decreased from 2012 to 2014, and then went up in 2015 and 2016. The rate in the maternal care period declined from 2012 to 2014, and then went up from 2013 to 2016.

From 2012 to 2016, in Wayne county, the feto-infant excess mortality rate in the maternal health and prematurity period decreased from 2012 to 2016. The rate in the newborn care period increased slowly from 2012 to 2015, and then decreased in 2016. The rate in the infant health period has been on a slow increase from 2012 to 2016. The rate in the maternal care period increased from 2012 to 2013, went down in 2014, and then went up in 2015 and 2016.

Michigan Feto-Infant Mortality Rate by County of Residence: 2012-2016 (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

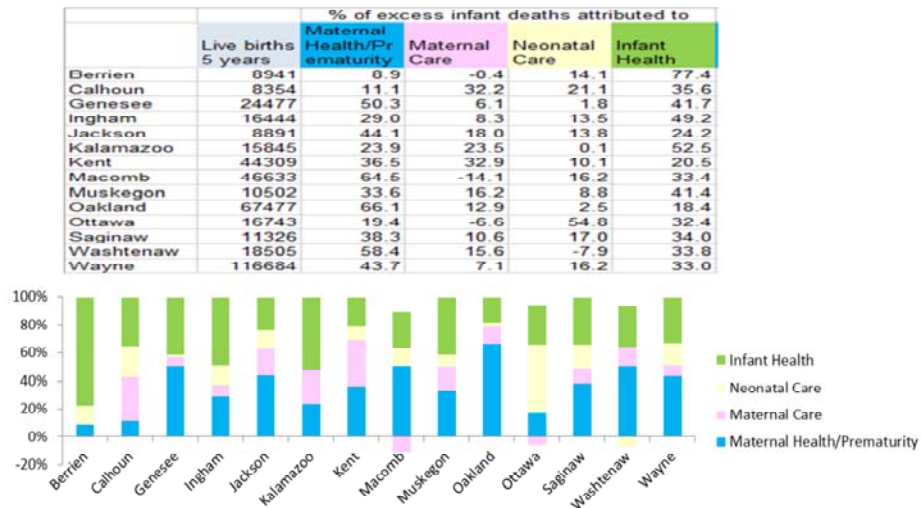
62

This slide shows the feto-infant mortality rate and excess rate by selected county of residence and PPOR period in Michigan from 2012 to 2016. 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 2012 to 2016, the feto-infant mortality rate in Saginaw county was higher than that in other counties and it was 10.60 per 1,000 live births, followed by Wayne county (9.50 per 1,000 live births), Genesee county (9.40 per 1,000 live births), and Jackson county (9.00 per 1,000 live births). The rate in Macomb county was lower than other selected counties (6.03 per 1,000 live births).

From 2012 to 2016, the feto-infant excess mortality rate in Saginaw county was higher than that in other selected counties at 5.35 per 1,000 live births, followed by Wayne county (4.26 per 1,000 live births), Genesee county (4.15 per 1,000 live births), and Jackson county (3.75 per 1,000 live births). The excess rate in Macomb county was lower than other selected counties (0.78 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by County of Residence: 2012-2016 (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

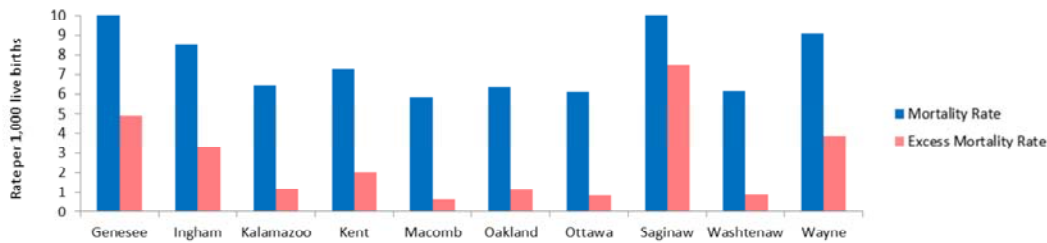
63

This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected county of residence in Michigan from 2012 to 2016. 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 2012 to 2016, in Oakland county, 66.1% of excess infant deaths were attributed to the maternal health and prematurity period. In Kent county, 32.9% of excess infant deaths were attributed to the maternal care period. In Ottawa county, 54.8% of excess infant deaths were attributed to the neonatal care period. In Berrien county, 77.4% of excess infant deaths were attributed to the infant health period.

Michigan Feto-Infant Mortality Rate by County of Residence: 2014-2016 (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				Total	Excess rate of deaths per 1,000 live births					
		Maternal Health/Pr amaturity	Maternal Care	Neonatal Care	Infant Health	Maternal Health/Pr amaturity	Maternal Care	Neonatal Care	Infant Health		Overall 3years	Maternal Health/Pr amaturity	Maternal Care	Neonatal Care	Infant Health	Overall Excess Mortality
Genesee	14517	62	27	18	40	4.27	1.86	1.24	2.76	147	10.13	2.47	0.34	0.32	1.77	4.90
Ingham	9873	29	19	8	28	2.94	1.92	0.81	2.84	84	8.51	1.13	0.40	-0.11	1.85	3.29
Kalamazoo	9527	18	19	8	16	1.89	1.99	0.84	1.68	61	6.40	0.09	0.47	-0.08	0.70	1.18
Kent	26512	63	52	37	40	2.38	1.96	1.40	1.51	192	7.24	0.57	0.44	0.48	0.53	2.02
Macomb	28158	62	38	28	37	2.20	1.35	0.99	1.31	165	5.86	0.40	-0.17	0.08	0.33	0.64
Oakland	40669	110	70	39	39	2.70	1.72	0.96	0.96	258	6.34	0.90	0.20	0.04	-0.02	1.12
Ottawa	10050	20	10	16	15	1.99	1.00	1.59	1.49	61	6.07	0.19	-0.53	0.68	0.51	0.85
Saginaw	6707	29	17	16	23	4.32	2.53	2.39	3.43	85	12.67	2.52	1.01	1.47	2.45	7.45
Washtenaw	11113	25	18	9	16	2.25	1.62	0.81	1.44	68	6.12	0.45	0.10	-0.11	0.46	0.90
Wayne	69967	237	107	117	176	3.39	1.53	1.67	2.52	637	9.10	1.58	0.01	0.76	1.53	3.88



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

64

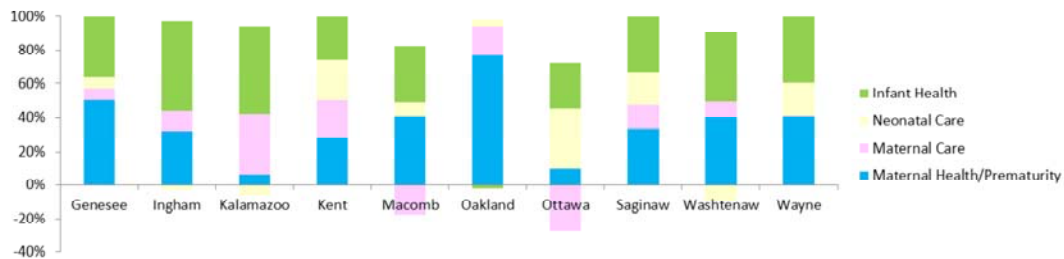
This slide shows the feto-infant mortality rate and excess rate by selected county of residence and PPOR period in Michigan from 2014 to 2016. The excess mortality rate is calculated by subtracting the mortality rate of the reference group from the mortality rate of the population group. The reference 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 2014 to 2016, the feto-infant mortality rate in Saginaw county was higher than that in other counties at 12.67 per 1,000 live births, followed by Genesee county (10.13 per 1,000 live births) and Wayne county (9.10 per 1,000 live births). The rate in Macomb county was lower than other selected counties (5.86 per 1,000 live births).

From 2014 to 2016, the feto-infant excess mortality rate in Saginaw county was higher than that in other selected counties at 7.45 per 1,000 live births, followed by Genesee county (4.90 per 1,000 live births) and Wayne county (3.88 per 1,000 live births). The excess rate in Macomb county was lower than other selected counties (0.64 per 1,000 live births).

Michigan Feto-Infant Mortality Rate by County of Residence: 2014-2016 (rate per 1,000 live births)

	Live births 3 years	% of excess infant deaths attributed to			
		Maternal Health/Pr ematurity	Maternal Care	Neonatal Care	Infant Health
Genesee	14517	50.3	6.9	6.6	36.1
Ingham	9873	34.5	12.3	-3.2	56.4
Kalamazoo	9527	7.3	40.1	-6.4	58.9
Kent	26512	28.4	21.8	23.8	26.0
Macomb	28158	62.5	-26.7	12.4	51.8
Oakland	40669	80.4	17.9	3.9	-2.2
Ottawa	10050	22.1	-61.9	79.8	60.0
Saginaw	6707	33.8	13.6	19.7	32.8
Washtenaw	11113	49.8	11.1	-11.8	50.9
Wayne	69967	40.8	0.2	19.5	39.5



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

65

This slide shows the percentage of feto-infant excess mortality rate attributed to each PPOR period by selected county of residence in Michigan from 2014 to 2016. 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 2014 to 2016, in Oakland county, 80.4% of excess infant deaths were attributed to the maternal health and prematurity period. In Kalamazoo county, 40.1% of excess infant deaths were attributed to the maternal care period. In Ottawa county, 79.8% of excess infant deaths were attributed to the neonatal care period. In Kalamazoo county, 58.9% of excess infant deaths were attributed to the infant health period.