MOMS

Montana Obstetrics & Maternal Support

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MOMS Research & Evaluation

Montana Maternal Health: By the Numbers

Learning Objectives

Understand	Understand how maternal mortality and morbidity are measured
Describe	Describe health equity and racial disparities in health
Assess	Assess burden of maternal morbidity and mortality for different groups

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Contextualizing Data

Behind the Numbers

Considerations for data interpretation

- Data illustrate patterns and trends in the population
  - We speak in averages; there are always exceptions, outliers, and extremes
- Avoid drawing individual-level conclusions from population-level data (ecological fallacy)
  - These data should inform policy, not individual clinical decisions
- Each of these numbers represent a real patient with a story, a family, and a community
- Data can describe that variations exist; it cannot fully explain why

Racial disparities are the most dramatic population-level factors in maternal health.

CDC recommends against treating race as a confounder to be controlled for in an analysis

- This can mask higher risks for racial minorities

Instead, stratify by racial categories

- Racism is the risk factor, not race[1]
- Race as a biological risk factor has long been disproven, but is still widely believed (e.g. firewater myth[2], thick skin myth[3])
- Race variable is a proxy measure for exposure to racism
- Racism acts through complex causal pathways, including interpersonal bias, institutional racism, structural racism, historical trauma[4]

How to proceed with data-driven discussions?

- Compare groups to focus resources and interventions, not to stigmatize or stereotype
- Honor the sacredness of motherhood…
  - Likewise, acknowledge the tragic history of motherhood in native communities in Montana
- Continue to study and report racial disparities to prevent invisibility of this public health crisis
- Remember that there is more variation within groups than between groups; treat patients as individuals

Sun Worship in Montana, Charlie Russell, 1907

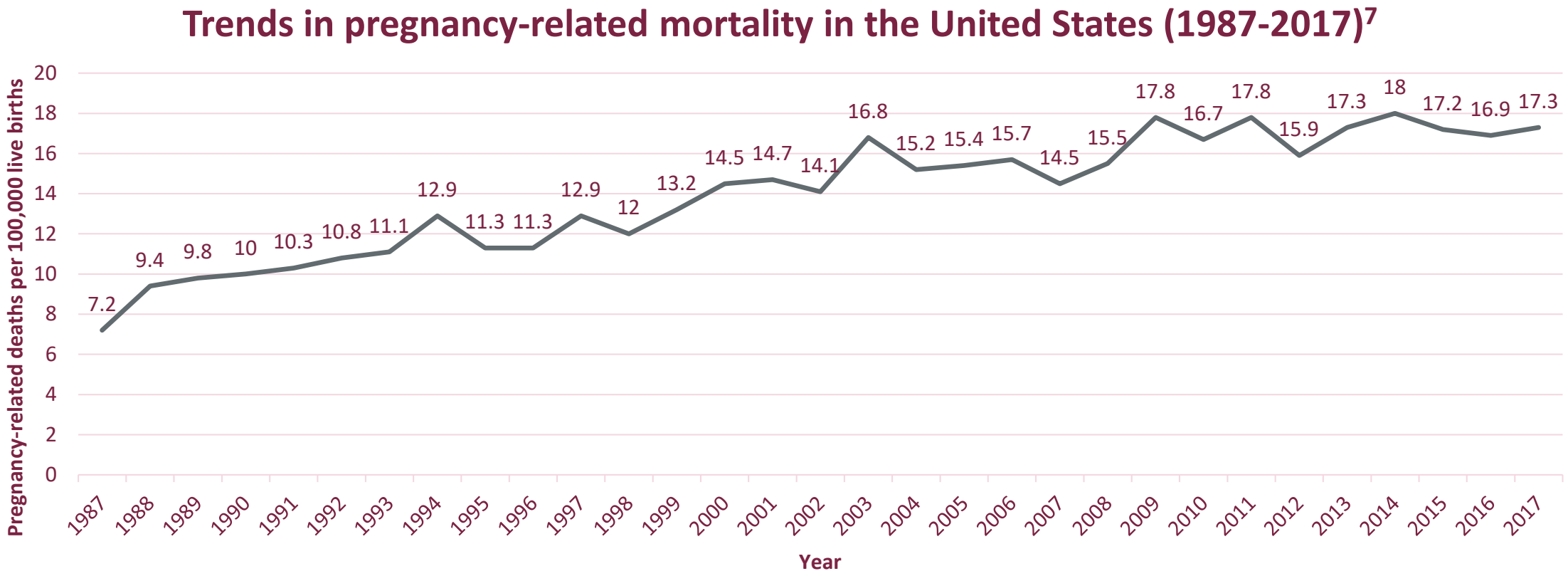
Maternal Mortality

Trends & Comparisons

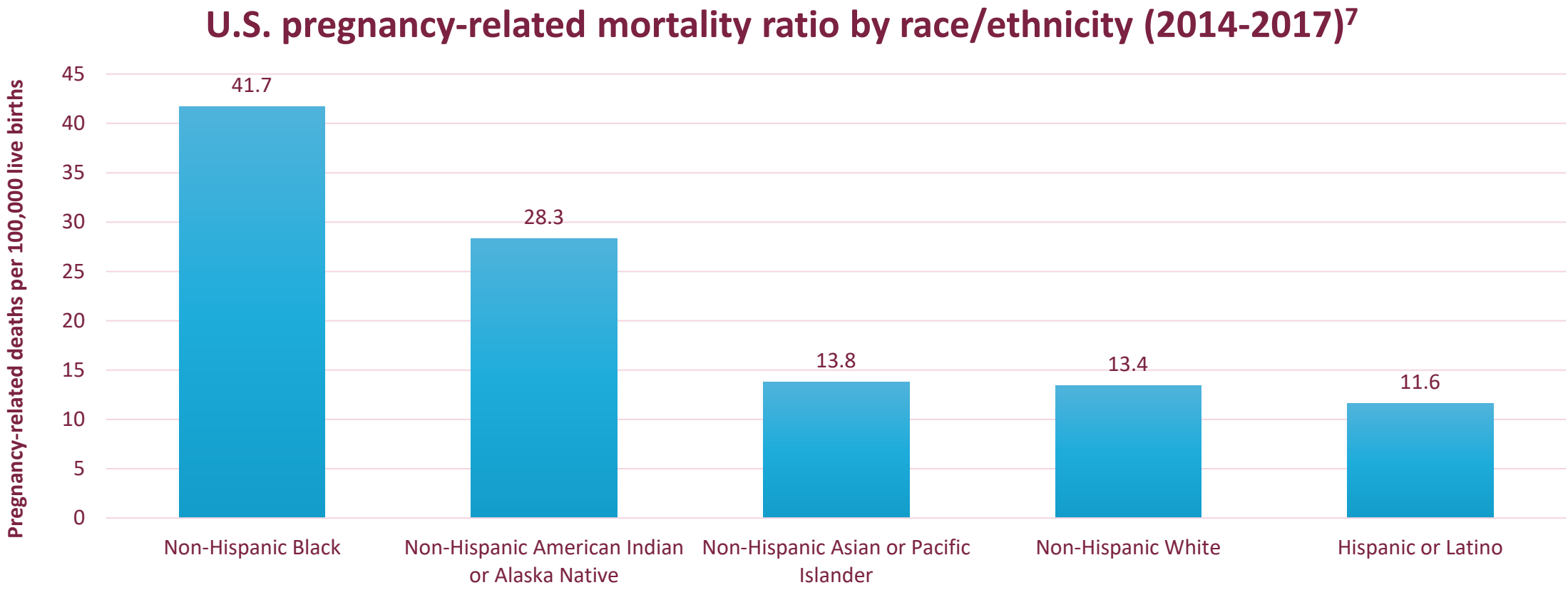
Maternal Mortality Measures

Pregnancy-related death	Pregnancy-related mortality ratio	Maternal death	Maternal mortality rate
• Death while pregnant or within 1 year of the end of a pregnancy—regardless of the outcome, duration, or site of the pregnancy—from any cause related to or aggravated by the pregnancy or its management, excluding accidental or incidental causes	• Pregnancy-related deaths per 100,000 live births (CDC Pregnancy Mortality Surveillance System)	• A death while pregnant or within 42 days of the end of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes	• Maternal deaths per 100,000 live births (CDC National Vital Statistics System, World Health Organization)

National increase in pregnancy-related deaths



Racial pregnancy-related death health disparities



Maternal Mortality Measurement Challenges

- Rare events: Small numbers mean wide confidence intervals and rate instability
  - Hard to measure change over time at the state level
- Per CDC, Maternal Mortality Review Committees are the gold standard in measuring maternal mortality
  - Multi-disciplinary investigations better identify pregnancy-relatedness
  - Montana does not yet have MMRC
- Montana's maternal mortality rate and pregnancy-related death rate, and associated rankings, are not good measures of maternal health in Montana at this time

Montana pregnancy-related mortality

- America's Health Rankings (2013-2017)[8]
  - 40.7 pregnancy-related deaths per 100,000 live births
  - 6th highest rate in the United States
- However…
  - This rate is based on CDC Wonder Database: Underlying Cause of Death, Multiple Cause of Death files
  - This is not CDC gold standard in measuring maternal mortality
- But we can conclude that maternal mortality is a significant problem in our state.

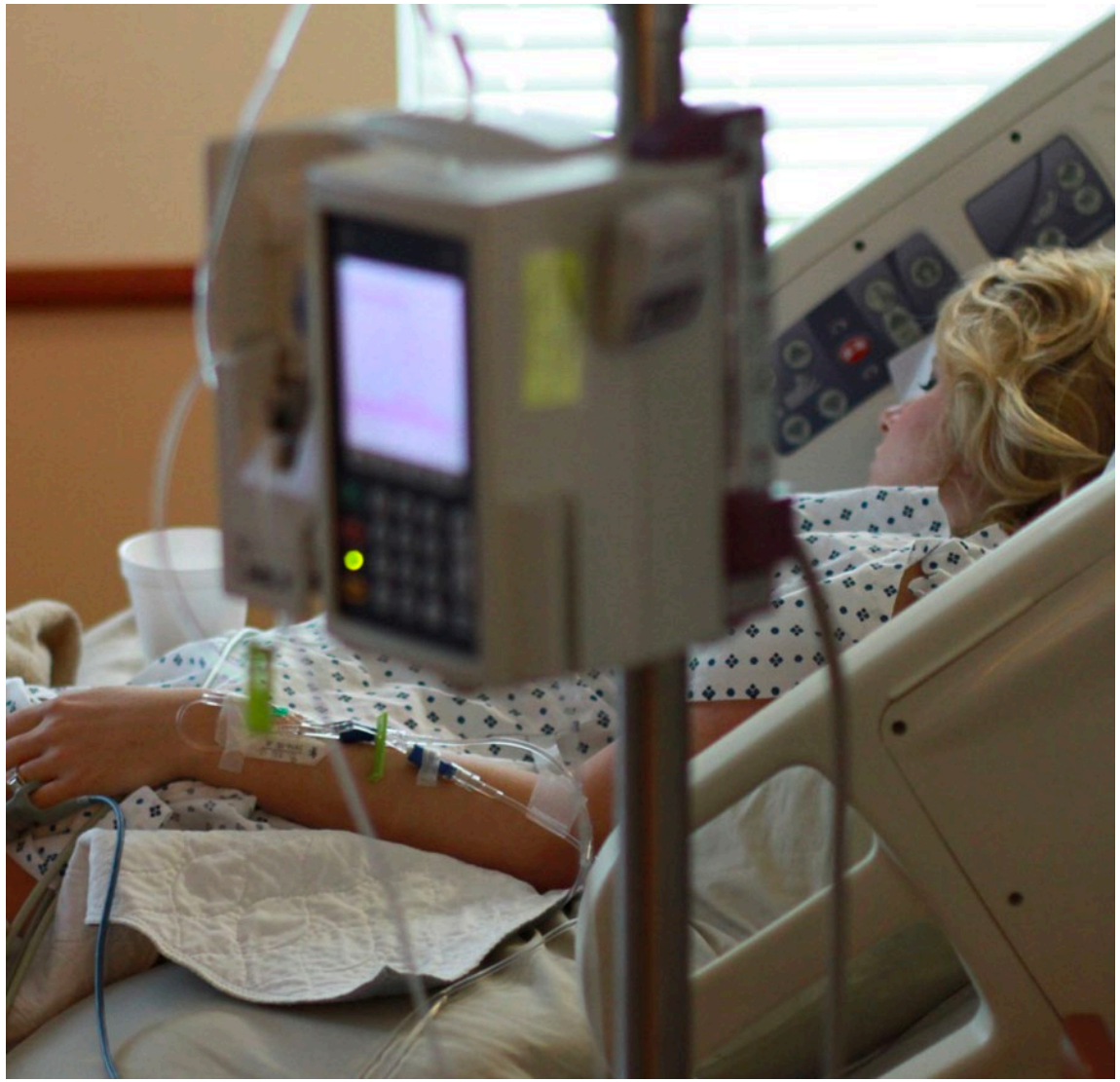
Severe Maternal Morbidity

Hospital-based deliveries in Montana, 2016-2018

Preliminary Analysis

Severe Maternal Morbidity (SMM)

- **Definition**
  - The unintended outcomes of the process of labor and delivery that result in significant short-term or long-term consequences for women's health[5]
- **Operationalization**
  - 21 indicators based on diagnosis and procedure codes from the International Classification of Disease (ICD)[6]
  - Standardized rate reported per 10,000 hospitalized deliveries



Maternal Health Disparities: National Context

Race

- AI/AN SMM rate 206.0 per 10,000 vs. non-Hispanic white SMM rate 139.2 per 10,000[9]
  - There would be a 43.9% reduction in SMM and maternal mortality among AI/AN individuals if AI/AN patients experienced SMM at the same rate as non-Hispanic white patients[10]

Rurality

- Patients from rural communities have 9% greater probability of SMM and maternal mortality[11]
  - Risk varies by degree of rurality[12]
- Overall, obstetric outcomes at Critical Access Hospitals (CAH) are worse than those at high-volume hospitals[13]
  - CAHs perform comparably to non-CAH among low-risk populations[13]

Montana
Severe Maternal Morbidity Study

- De-identified data compiled from the Montana Hospital Discharge Data System (MHDDS), administered by the Montana Hospital Association (MHA)
- Study Population:
  - Included: all hospitalized deliveries to Montana residents at health facilities that participated in the MHDDS from January 1, 2016 to December 31, 2018
    - Represents 83.5% of all births in Montana 2016-2018 compared to vital records
  - Excluded: non-facility births, births at non-participating hospitals (IHS), miscarriages, births to non-Montana residents
- Used CDC definition of Severe Maternal Morbidity (SMM)

Study patient characteristics among hospitalized deliveries in Montana 2016-2018, N= 29,681

- Source: Montana Hospital Discharge Data System
- Rurality categories based on the 2013 National Center for Health Statistics Urban-Rural Classification
  - Small metro: County with at least one urbanized area of 50,000
  - Micropolitan: County with at least one urban cluster of 10,000-49,999
  - Noncore: Rural, no urban cluster
- Large population of missing race data; will be proposing data match to complete this set

Patient Characteristics	N (%)
Payer	
Medicaid	13,335 (44.9)
Non-Medicaid	16,346 (55.1)
Age	
<20 years	1,596 (5.4)
20-34 years	23,862 (80.4)
≥35 years	4,223 (14.2)
Patient rurality*	
Small metro	10,206 (34.4)
Micropolitan	9,679 (32.6)
Noncore	9,796 (33.0)
Race	
White	16,516 (55.7)
American Indian/Alaska Native	2,034 (6.9)
Other	1,462 (4.9)
Declined/Missing	9,669 (32.6)

Most common indicators of SMM by risk category among hospitalized deliveries in Montana, 2016-2018 N= 29,681

Patient Characteristics	Most common	Second most common	Third most common
Payer			
Non-Medicaid	Blood transfusion	Hysterectomy	Acute renal failure
Medicaid	Blood transfusion	Hysterectomy	Eclampsia, puerperal cerebrovascular disorders, pulmonary edema
Patient rurality			
Small metro	Blood transfusion	Hysterectomy	Puerperal cerebrovascular disorders
Micropolitan	Blood transfusion	Eclampsia	Pulmonary edema
Noncore	Blood transfusion	Hysterectomy	Pulmonary edema, severe anesthesia complications, ventilation
Race			
White	Blood transfusion	Hysterectomy	Eclampsia
American Indian/ Alaska Native	Blood transfusion	Hysterectomy	Acute renal failure, puerperal cerebrovascular disorders, severe anesthesia complications, air and thrombotic embolism, ventilation
Other	Blood transfusion	Hysterectomy	Acute renal failure

Relative Risk for SMM by Patient Characteristic

Patients for whom **Medicaid** was the primary payer had **1.3 times greater risk of SMM** than those who did not have Medicaid

Compared to residents of small metro areas, **noncore** patients had **1.9 times greater risk of SMM**

Compared to white patients, **AI/AN** patients had **3.0 times greater risk of SMM**

Bivariate analysis (crude) by patient characteristic among hospitalized deliveries in Montana 2016-2018 N=29,681

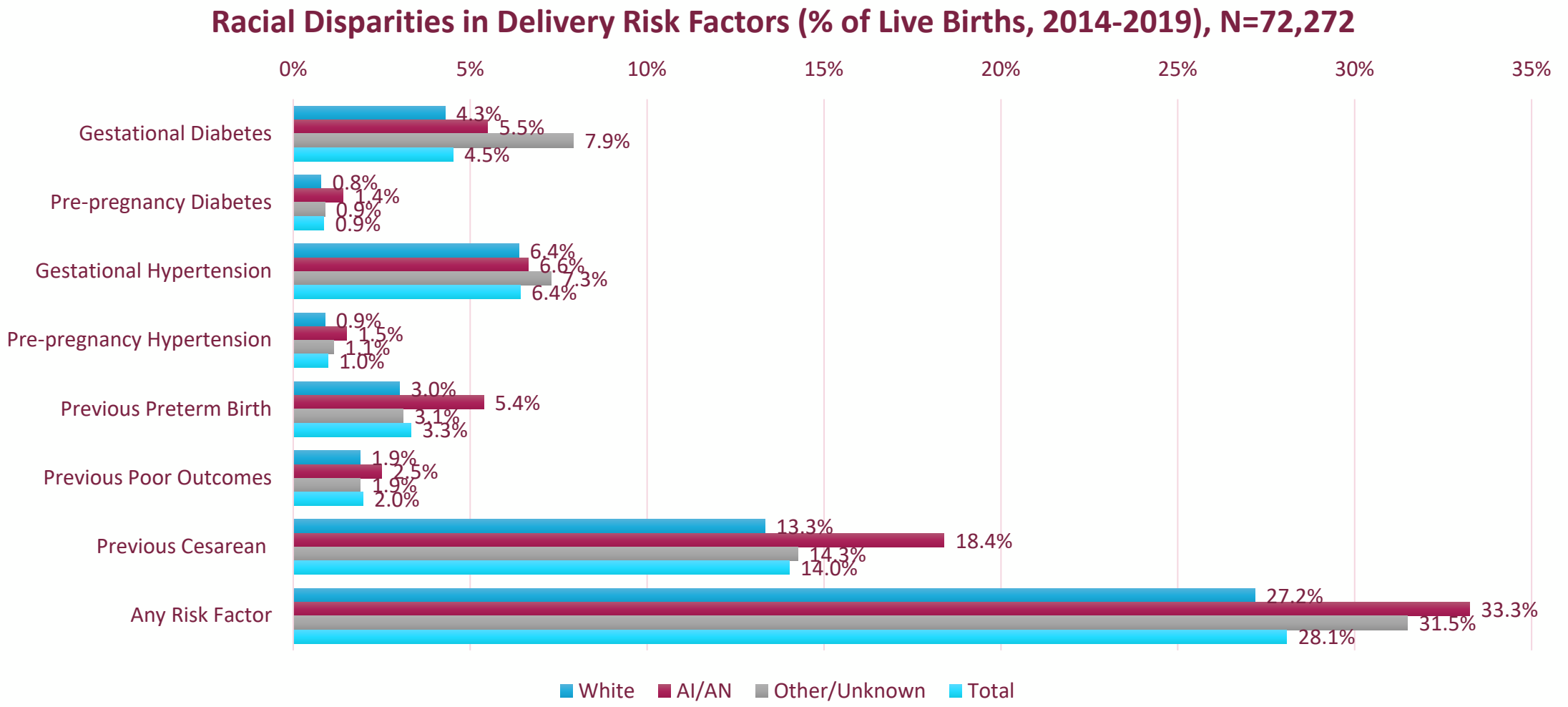
Patient Characteristics	Relative Risk (95% CI)
Payer	
Non-Medicaid	Ref
Medicaid	1.3* (1.0 – 1.6)
Patient rurality	
Small metro	Ref
Micropolitan	1.1 (0.8-1.5)
Noncore	1.9* (1.5-2.5)
Race	
White	Ref
American Indian/ Alaska Native	3.0* (2.1-4.2)
Other	1.4 (0.8-2.4)

*p< .05 ; ** p< .01; *** p < .001
Source: Montana Hospital Discharge Data System

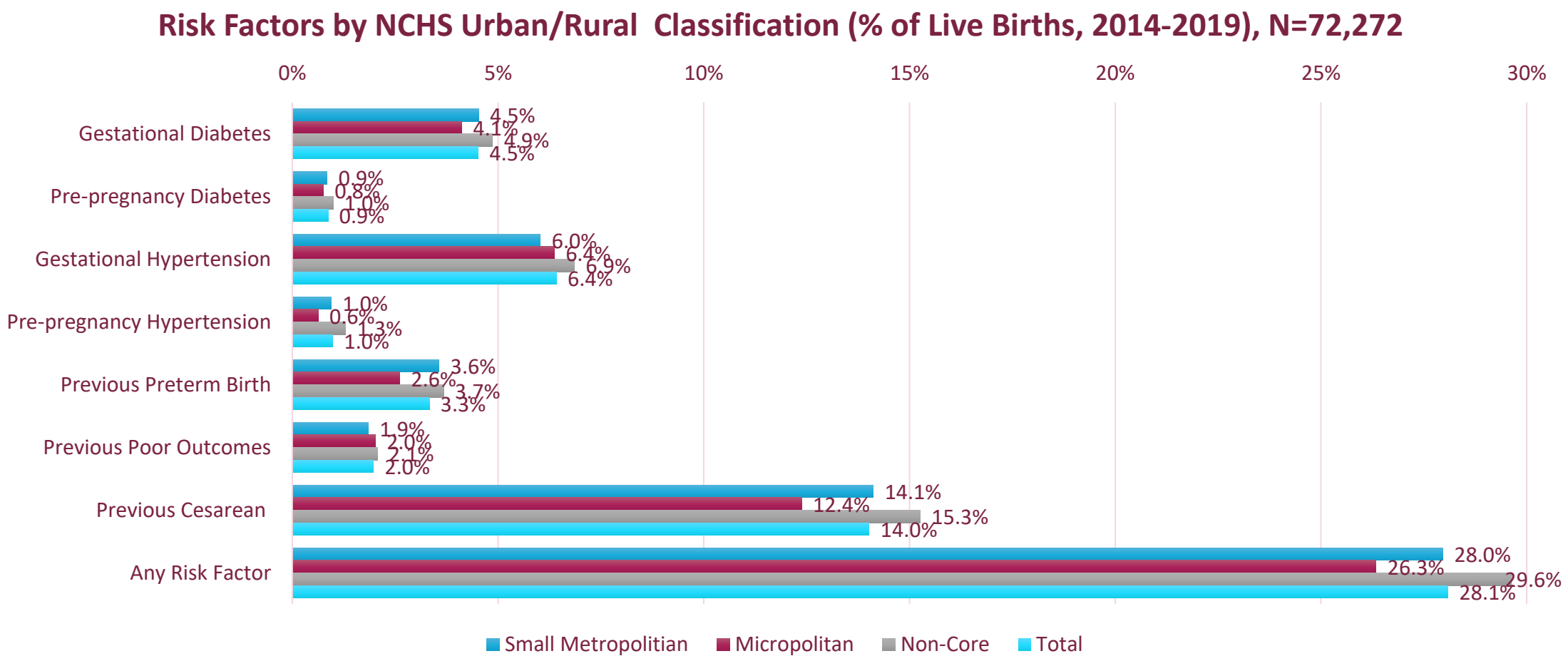
Pregnancy Risk Factors

Montana Birth Records Analysis, 2014-2019

Racial disparities in risk factors at delivery

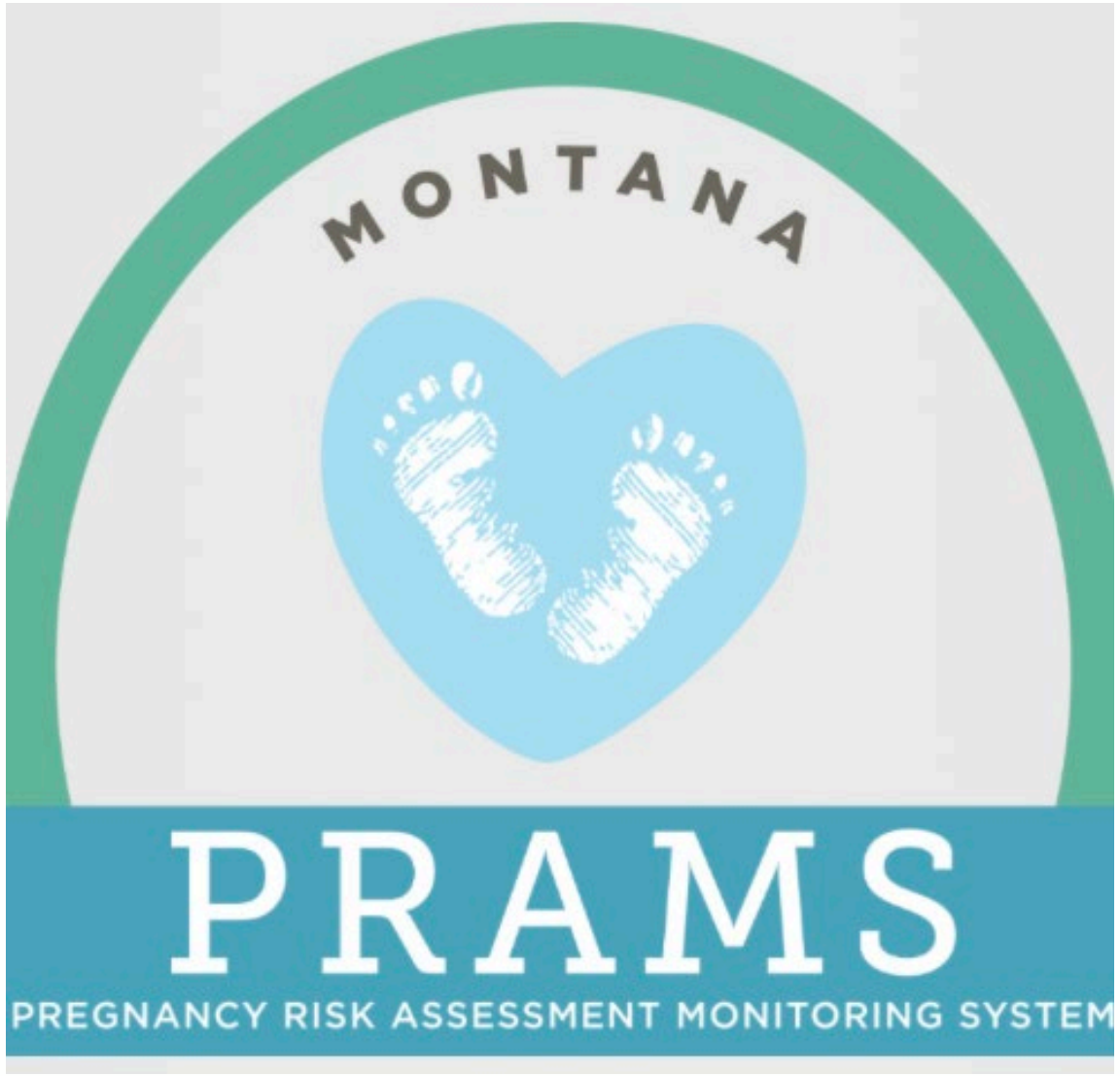


Geographic disparities in risk factors at delivery



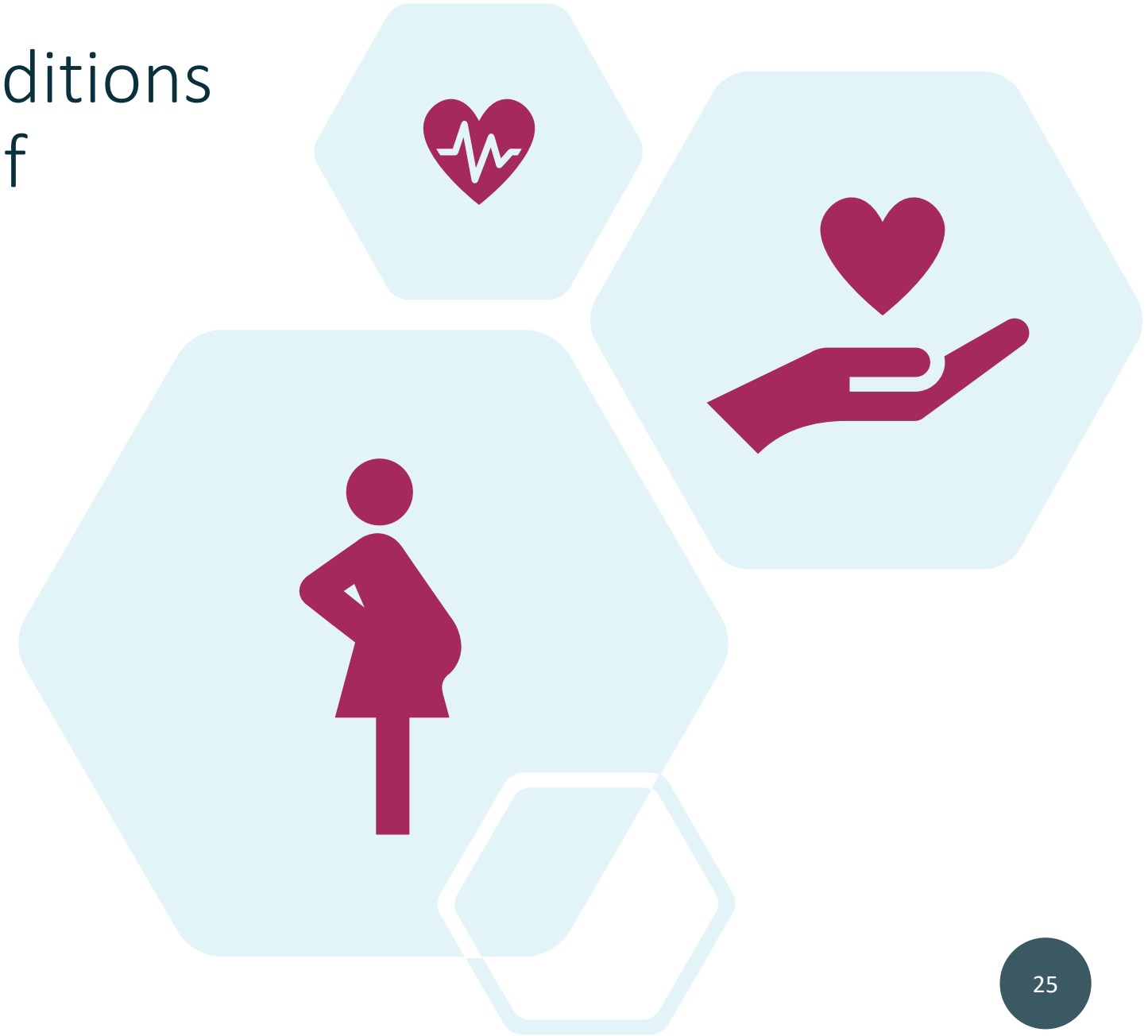
Montana's Pregnancy Risk Assessment Monitoring System (PRAMS)

- Random, population-based survey about maternal behaviors and experiences before, during, and after pregnancy
- Respondents are mailed a survey 3-6 months after delivering, telephone follow-up
- Collaborative effort with CDC
- Montana has conducted PRAMS survey since 2017
- DPHHS Staff:
  - Dr. Miriam Naiman-Sessions, PI and Project Director
  - Carol Hughes, Data Manager

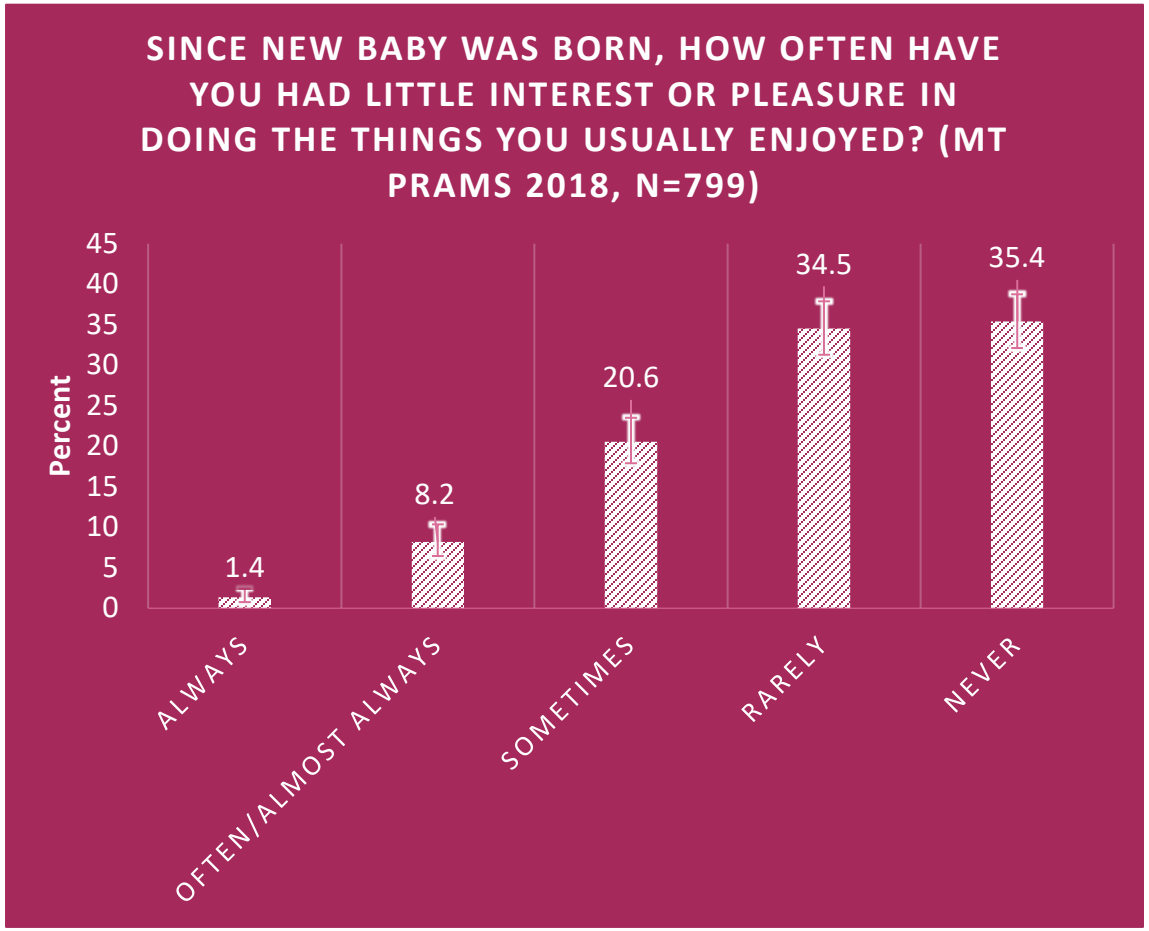


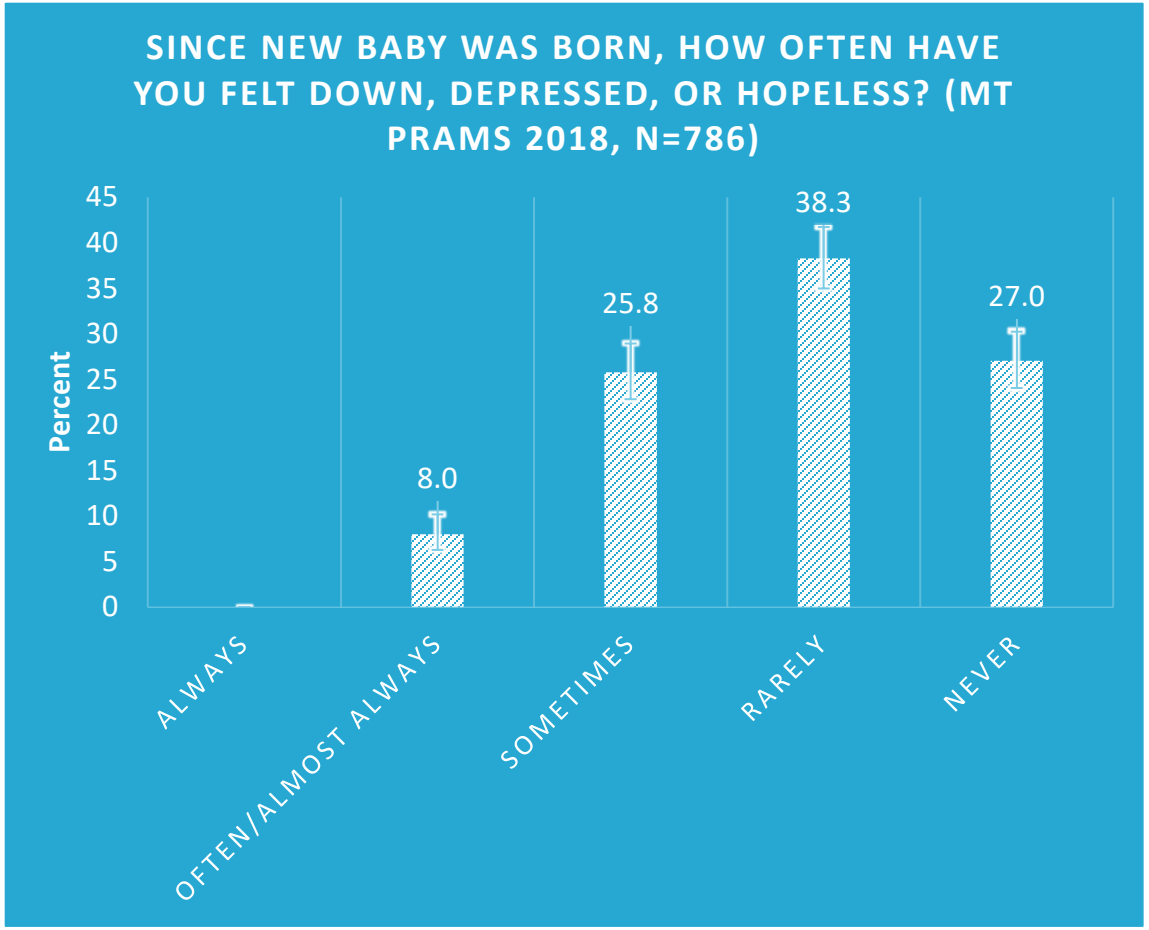
Diagnosed health conditions during pregnancy (Self report, N=806)

- Gestational diabetes: 5.5%
- High blood pressure: 10.2%
- Depression: 16.9%
- Health disparities:
  - Race: No significant difference
  - Rurality: No significant difference



Postpartum Depression





Conclusions & Recommendations

Maternal Mortality

- Montana must invest in MMRC to establish more valid pregnancy-related mortality rate
- Investigations will identify pregnancy relatedness of suicide and substance-related deaths

Severe Maternal Morbidity

- Blood transfusion and hysterectomy is most common SMM subtype in MT
- Rate of eclampsia higher in Montana than the national rate (3.7 per 10,000 vs. 2.0 per 10,000 hospital deliveries)
- National studies on rurality indicate CAH can safely handle low risk patients; higher rate of SMM in rural MT patients indicates need for risk appropriate care

Pregnancy Risk Factors & Conditions

- Racial disparities are more pronounced than geographic disparities indicating need for targeted resources and interventions by and for AI/AN communities
- Depression during pregnancy (16.9%) and in the postpartum period

References

1. ACOG. 2020. Joint Statement: Obstetrics and Gynecology: Collective Action Addressing Racism. https://www.acog.org/news/news-articles/2020/08/joint-statement-obstetrics-and-gynecology-collective-action-addressing-racism

2. 1. Garcia-Andrade C, Wall TL, Ehlers CL. The firewater myth and response to alcohol in Mission Indians. Am J Psychiatry. 1997 Jul;154(7):983-8. doi: 10.1176/ajp.154.7.983. PMID: 9210750.

3. Rana Asali Hogarth, 2019: The myth of innate racial differences between white and black people's bodies: Lessons from the 1793 yellow fever epidemic in Philadelphia, Pennsylvania *American Journal of Public Health* **109**, 1339-1341.

4. O'Reilly, KB. 2020. AMA: Racism is a threat to public health. https://www.ama-assn.org/delivering-care/health-equity/ama-racism-threat-public-health

5. CDC, ACOG,SMFM Definition. Kilpatrick SK, Ecker JL. Severe maternal morbidity: screening and review. *Am J Obstet Gynecol*. 2016;215(3):B17-B22. doi:10.1016/j.ajog.2016.07.050

6. Rates in Severe Morbidity Indicators per 10,000 Delivery Hospitalizalization | Maternal Infant Health | Reproductive Health | CDC. Accessed October 5, 2020. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/rates-severe-morbidity-indicator.htm

7. CDC. 2020. Pregnancy Mortality Surveillance System. https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm

8. CDC Wonder, 2019 report of 5-year (2013-17) pregnancy-related death rate estimate; Rankings by America's Health Rankings, United Health Foundation

9. Creanga AA, Bateman BT, Kuklina E V., Callaghan WM. Racial and ethnic disparities in severe maternal morbidity: A multistate analysis, 2008-2010. *Am J Obstet Gynecol*. 2014;210(5):435.e1-435.e8. doi:10.1016/j.ajog.2013.11.039

10. Kozhimannil KB, Interrante JD, Tofte AN, Admon LK. Severe Maternal Morbidity and Mortality Among Indigenous Women in the United States. *Obstet Gynecol*. 2020;135(2):294-300. doi:10.1097/AOG.0000000000003647

11. Kozhimannil KB, Interrante JD, Henning-Smith C, Admon LK. Rural-Urban Differences In Severe Maternal Morbidity And Mortality In The US, 2007–15. *Health Aff (Millwood)*. 2019;38(12):2077-2085. doi:10.1377/hlthaff.2019.00805

12. Disparities H, Women R. Committee Opinion. *Female Pelvic Med Reconstr Surg*. 2014;20(5):248-251. doi:10.1097/spv.0000000000000113

13. Kozhimannil K, Casey M, Hung P, Prasad S, Moscovice I. The Obstetric Care Workforce in Critical Access Hospitals (CAHs) and Rural Non-CAHs. Published online 2014:7.

Appendix

CDC SMM Measurement

Denominator:

- Hospitalized Delivery: Number of hospitalized deliveries
  - Defined as: a vaginal delivery, cesarean delivery, or a delivery outcome.
  - All miscarriages are excluded
  - All non-facility births excluded
    - Non-facility births only made up 4.1% of all births in Montana from 2016-2018.[12]

Severe Maternal Mortality Indicator: Numerator
1. Acute myocardial infarction
2. Aneurysm
3. Acute renal failure
4. Adult respiratory distress syndrome
5. Amniotic fluid embolism
6. Cardiac arrest/ventricular fibrillation
7. Conversion of cardiac rhythm
8. Disseminated intravascular coagulation
9. Eclampsia
10. Heart failure/arrest during surgery or procedure
11. Puerperal cerebrovascular disorders
12. Pulmonary edema/Acute heart failure
13. Severe anesthesia complications
14. Sepsis
15. Shock
16. Sickle cell disease with crisis
17. Air and thrombotic embolism
18. Blood products transfusion
19. Hysterectomy
20. Temporary tracheostomy
21. Ventilation