



UNIVERSITY OF MINNESOTA  
RURAL HEALTH  
RESEARCH CENTER

# Changes in Access to Rural Obstetric Services and Associated Outcomes

**Carrie Henning-Smith, PhD, MPH, MSW**

Reforming States Group Meeting  
Milbank Memorial Fund  
Portland, Oregon  
November 14, 2018

# Acknowledgements

- My colleagues at RHRC:
  - Katy Kozhimannil, PhD, MPA
  - Michelle Casey, MS
  - Peiyin Hung, PhD
  - Shailey Prasad, MD, MPH
  - Alex Evenson
  - Ira Moscovice, PhD
- This research was supported by the Federal Office of Rural Health Policy (FORHP), Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (HHS) under PHS Grant #5U1CRH03717. The information, conclusions and opinions expressed are those of the authors and no endorsement by FORHP, HRSA, or HHS is intended or should be inferred.

# Access to Rural Maternity Care

- 18 million reproductive-age women live in rural US communities
- Half a million babies born in rural hospitals each year
- Declining access to obstetric services at rural hospitals
- Distance to maternity care is correlated with outcomes (NICU, infant mortality)



UNIVERSITY OF MINNESOTA  
**RURAL HEALTH**  
RESEARCH CENTER

# Rural Obstetric Unit and Hospital Closures

- From 2004-2014, how many rural communities lost hospital-based obstetric services?



UNIVERSITY OF MINNESOTA  
RURAL HEALTH  
RESEARCH CENTER

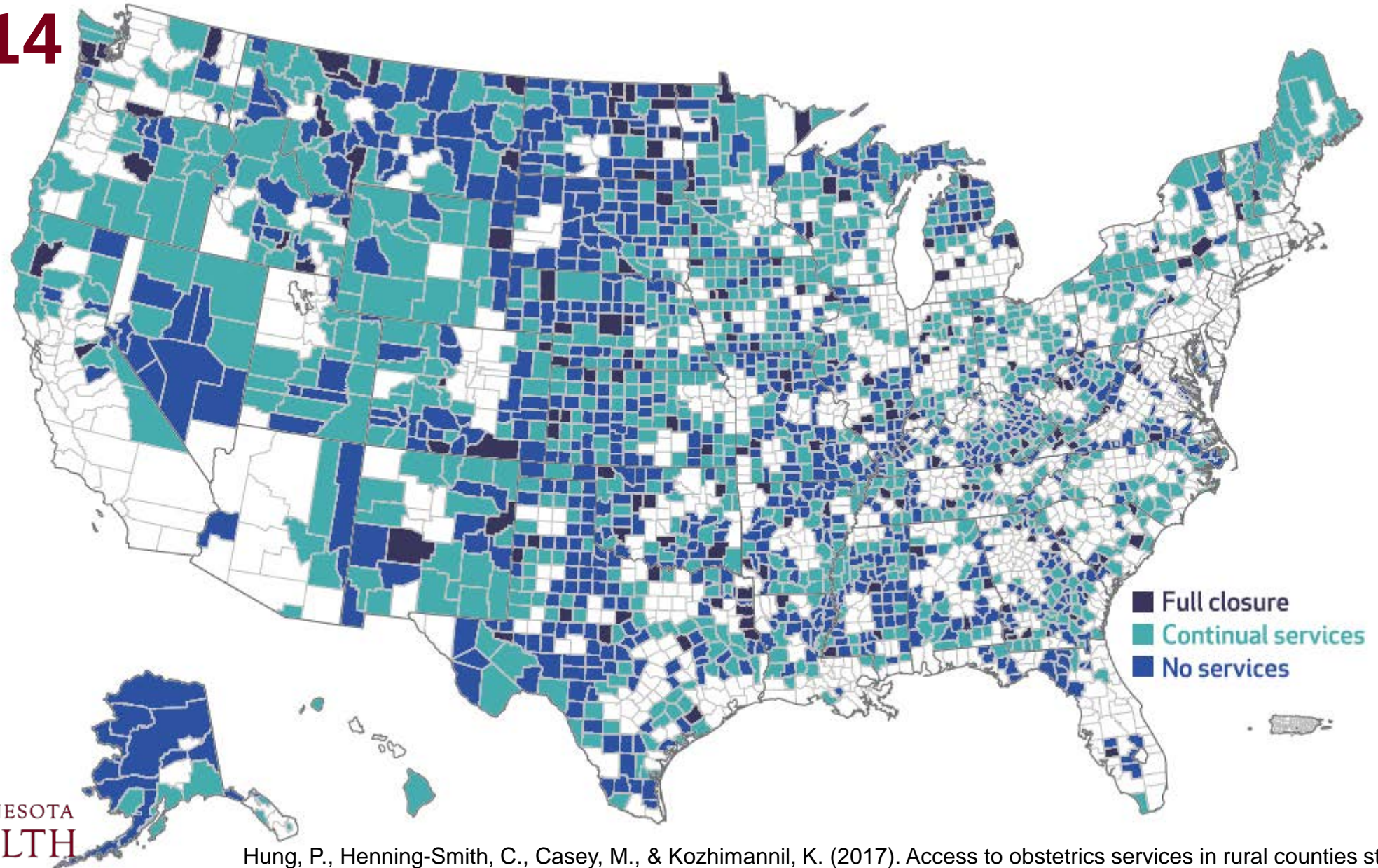
# Data Sources

<b>Hospital-level</b>	American Hospital Association Annual Survey	2003-2014
<b>County-level</b>	Area Health Resources Files	2004, 2014
	US Census data	2000, 2010

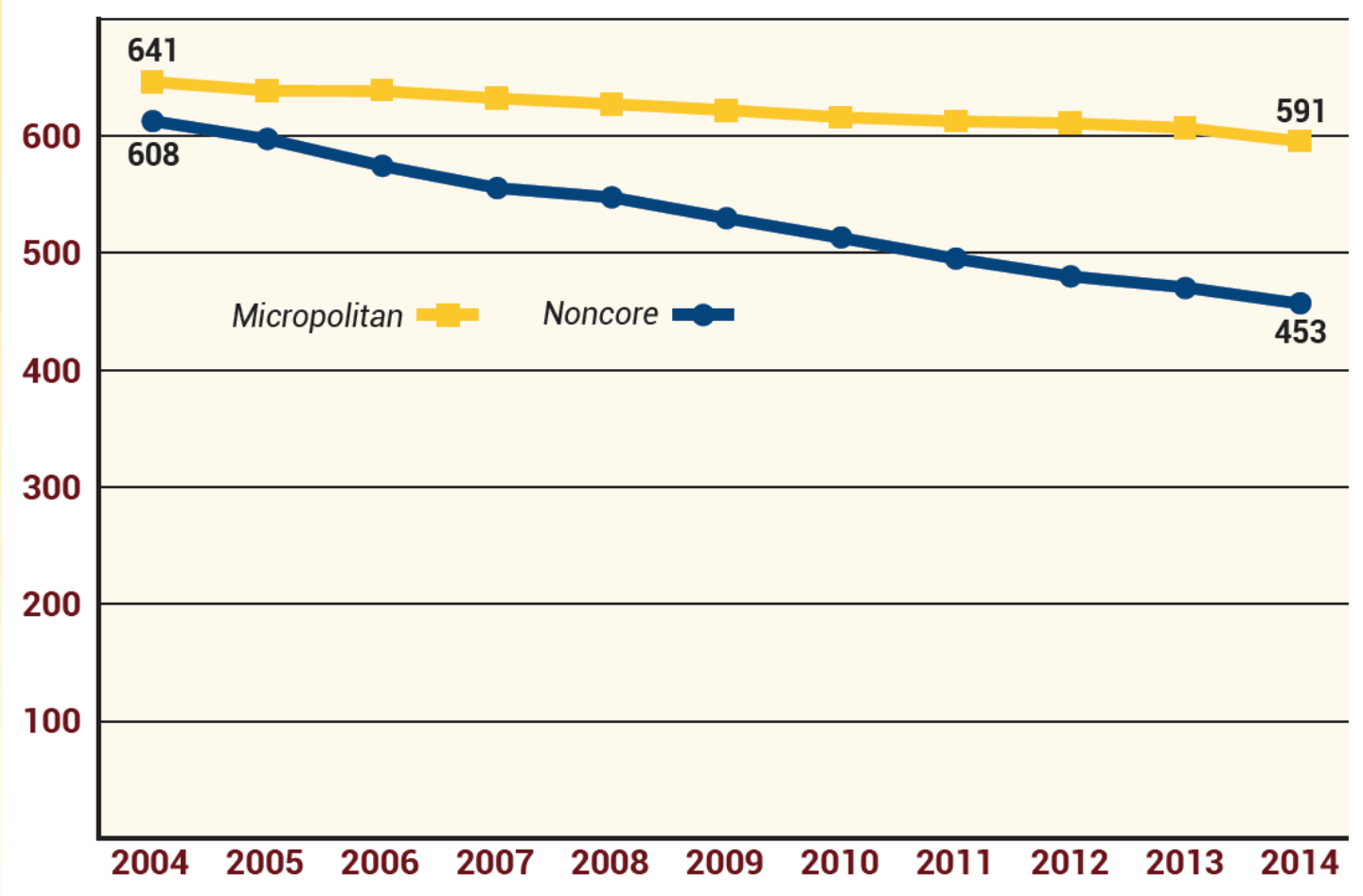




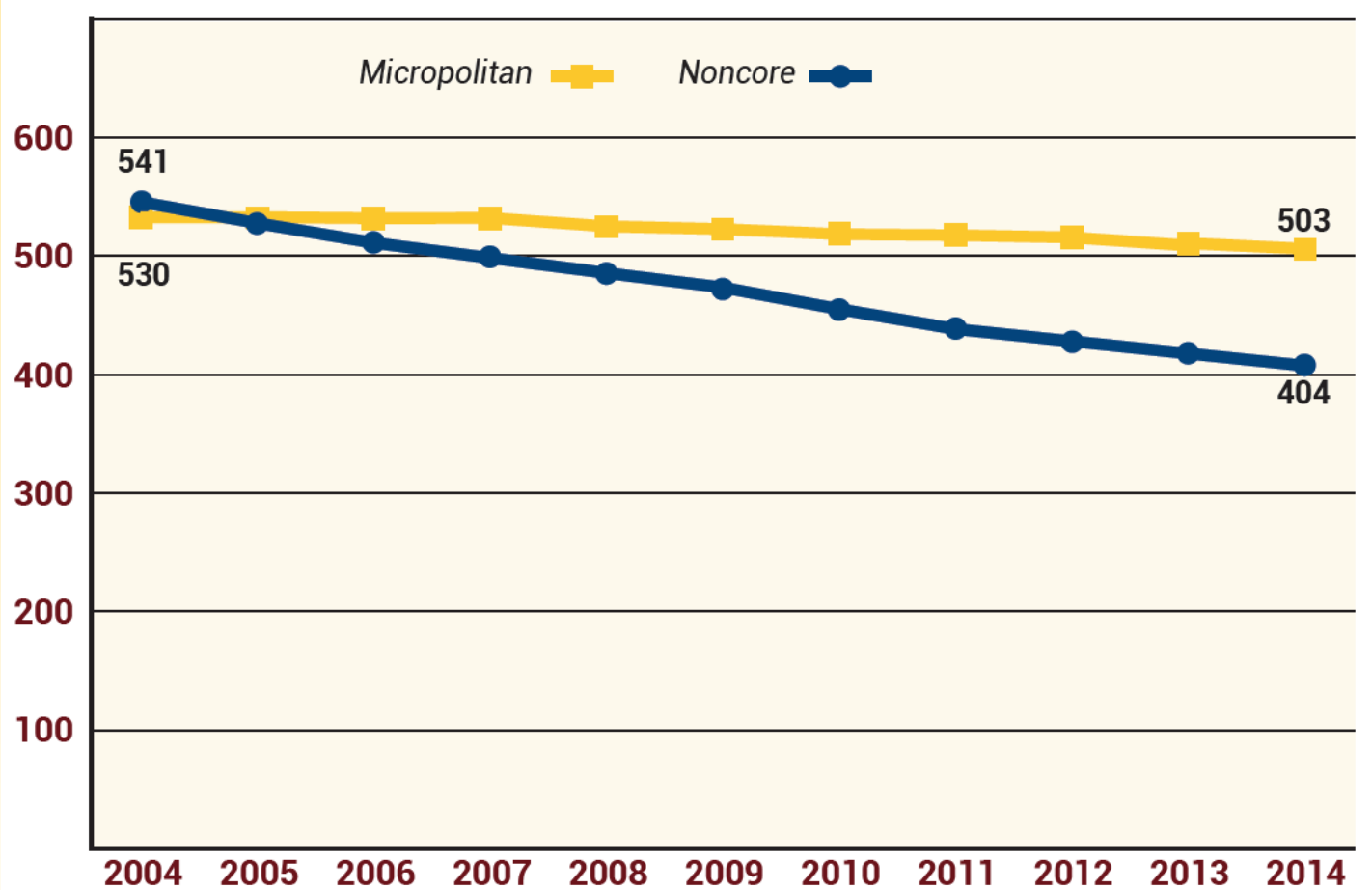
# Hospital Obstetric Services in Rural Counties, 2004 - 2014



# Number of Rural Hospitals with OB Services, 2004-2014

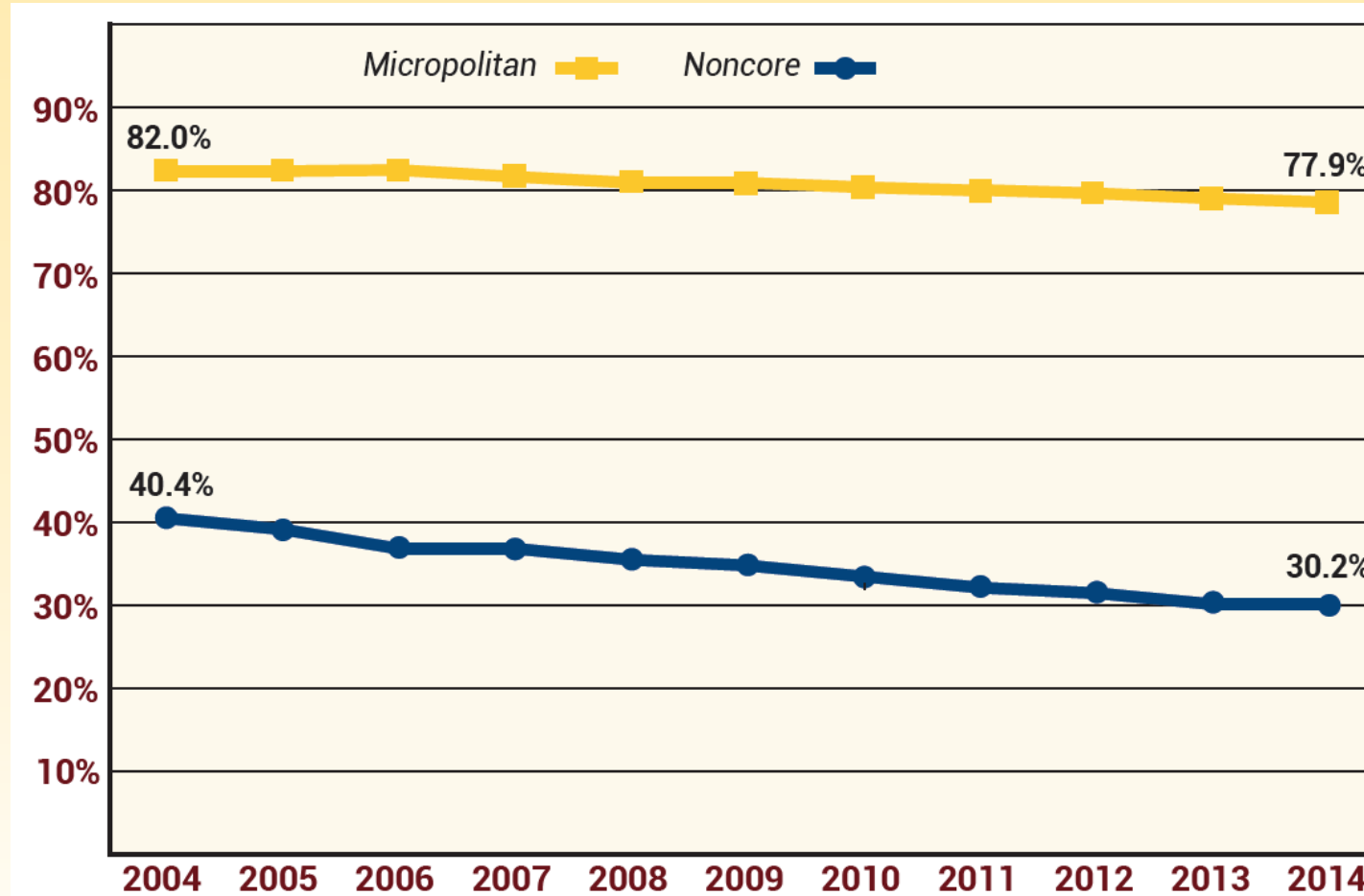


# Number of Rural Counties with OB Services, 2004-2014





# Percent of Rural Counties with Hospital OB Services, 2004-2014



# Factors Associated with OB Unit Loss

- Counties that had higher rates of obstetric unit loss had, on average:
  - Lower birthrates
  - More Black residents
  - Lower median income
  - Fewer family practice doctors and OBGYNs



# Variability Across States, 2004-2014

- More than two-thirds of rural counties in FL (78%), NV (69%), and SD (66%) had no in-county hospital obstetric services.
- Rural counties in SC (25%), WA (22%), and ND (21%) experienced the greatest decline in access.
- ND (15%), FL (17%), and VA (21%) had the lowest percentage of rural counties with continual hospital obstetric services.
  - Closures in rural noncore areas of ND and VA
  - Closures in micropolitan areas of FL



# Key Findings on Rural Maternity Care Access

- More than half of rural counties have no hospital-based obstetrics services
  - 9% of rural counties lost OB services between 2004-2014
  - Most vulnerable communities: black, low-income, shortage areas, remote, less generous Medicaid programs

# What are the consequences of losing hospital-based obstetric services?: Birth location and outcomes

- For rural counties that lost hospital-based obstetric services between 2004-2014, what were the associated changes in birth location and birth outcomes?





JAMA | Original Investigation

## Association Between Loss of Hospital-Based Obstetric Services and Birth Outcomes in Rural Counties in the United States

Katy B. Kozhimannil, PhD, MPA; Peiyin Hung, PhD, MSPH; Carrie Henning-Smith, PhD, MPH, MSW; Michelle M. Casey, MS; Shailendra Prasad, MBBS, MPH

← Editorial and Viewpoint

⊕ Supplemental content

**IMPORTANCE** Hospital-based obstetric services have decreased in rural US counties, but whether this has been associated with changes in birth location and outcomes is unknown.

**OBJECTIVE** To examine the relationship between loss of hospital-based obstetric services and location of childbirth and birth outcomes in rural counties.

**DESIGN, SETTING, AND PARTICIPANTS** A retrospective cohort study, using county-level regression models in an annual interrupted time series approach. Births occurring from 2004 to 2014 in rural US counties were identified using birth certificates linked to American Hospital Association Annual Surveys. Participants included 4 941 387 births in all 1086 rural counties with hospital-based obstetric services in 2004.

**EXPOSURES** Loss of hospital-based obstetric services in the county of maternal residence, stratified by adjacency to urban areas.

**MAIN OUTCOMES AND MEASURES** Primary outcomes were county rates of (1) out-of-hospital births; (2) births in hospitals without obstetric units; and (3) preterm births (<37 weeks' gestation).

**RESULTS** Between 2004 and 2014, 179 rural counties lost hospital-based obstetric services. Of the 4 941 387 births studied, the mean (SD) maternal age was 26.2 (5.8) years. A mean (SD) of 75.9% (23.2%) of women who gave birth were non-Hispanic white, and 49.7% (15.6%) were college graduates. Rural counties not adjacent to urban areas that lost hospital-based obstetric services had significant increases in out-of-hospital births (0.70 percentage points [95% CI, 0.30 to 1.10]); births in a hospital without an obstetric unit (3.06 percentage points [95% CI, 2.66 to 3.46]); and preterm births (0.67 percentage points [95% CI, 0.02 to 1.33]), in the year after loss of services, compared with those with continual obstetric services. Rural counties adjacent to urban areas that lost hospital-based obstetric services also had significant increases in births in a hospital without obstetric services (1.80 percentage points [95% CI, 1.55 to 2.05]) in the year after loss of services, compared with those with continual obstetric services, and this was followed by a decreasing trend (-0.19 percentage points per year [95% CI, -0.25 to -0.14]).

**CONCLUSIONS AND RELEVANCE** In rural US counties not adjacent to urban areas, loss of hospital-based obstetric services, compared with counties with continual services, was associated with increases in out-of-hospital and preterm births and births in hospitals without obstetric units in the following year; the latter also occurred in urban-adjacent counties. These findings may inform planning and policy regarding rural obstetric services.

**Author Affiliations:** University of Minnesota Rural Health Research Center, Division of Health Policy and Management, University of Minnesota School of Public Health, Minneapolis (Kozhimannil, Henning-Smith, Casey, Prasad); Yale School of Public Health, New Haven, Connecticut (Hung); Department of Family Medicine and Community Health, University of Minnesota Medical School, Minneapolis (Prasad).

**Corresponding Author:** Katy B. Kozhimannil, PhD, MPA, Division of Health Policy and Management, University of Minnesota School of Public Health, 420 Delaware St SE, MMC 729, Minneapolis, MN 55455 (kbl@umn.edu).

JAMA. doi:10.1001/jama.2018.1830  
Published online March 8, 2018.

**JAMA** Journal of the American Medical Association

Kozhimannil, Hung, Henning-Smith, et al.

Association Between Loss of Hospital-Based Obstetric Services and Birth Outcomes in Rural Counties in the United States

Published online March 8, 2018

Available at [jama.com](http://jama.com) and on The JAMA Network Reader at [mobile.jamanetwork.com](http://mobile.jamanetwork.com)



UNIVERSITY OF MINNESOTA  
**RURAL HEALTH  
RESEARCH CENTER**  
[jamanetwork.com](http://jamanetwork.com)

# Data Sources

<b>Hospital-level</b>	American Hospital Association Annual Survey	2003-2014
<b>County-level</b>	Area Health Resources Files	2004, 2014
	US Census data	2000, 2010
<b>Individual-level</b>	Restricted Use Natality Detail File (NDF) with county identifiers (maternal residence, hospital location)	2004-2014



# Outcomes

- Birth location:
  - Out-of-hospital birth
  - Birth in a hospital without an obstetric unit
- Birth outcomes: Preterm birth (<37 weeks' gestation)
- Secondary outcomes:
  - Low prenatal care ( $\leq 10$  visits)
  - Cesarean delivery
  - Low infant Apgar scores (<7 at 5 minutes)



# Results

- Increase in out-of-hospital birth (1 to 2%); bigger jump in rural counties not adjacent to urban counties
- Increase in births in hospitals without obstetric units (from <1% to 3%) in non-adjacent rural counties
- Preterm birth increase of 0.4–percentage points in non–urban-adjacent rural counties and a 0.2–percentage points in urban-adjacent counties



# Key Findings on Changes in Birth Location and Outcomes

- After losing obstetric services, rural counties that are not adjacent to urban areas had higher rates of preterm birth, out-of-hospital birth, and births in hospitals without obstetric units.
- In rural counties next to urban areas, there was also an increase in births in hospitals without obstetric units, although this declined as time went on.





# US Senate Briefing and Media Coverage

npr set station news arts & life music programs shop

shots HEALTH NEWS FROM NPR

HEALTH INC.  
More Rural Hospitals Are Closing Their Maternity Units  
February 24, 2016 9:08 AM ET  
MICHELLE ANDREWS

PROPUBLICA TOPICS SERIES NEWS APPS GET INVOLVED IMPACT ABOUT

LOST MOTHERS

## Another Thing Disappearing From Rural America: Maternal Care

A new study shows that rural hospitals have the hardest time keeping their labor and delivery units open.

by Adriana Gallardo and Nina ...

KHN KAISER HEALTH NEWS HEALTH LAW AGING INDUSTRY PHARMA INVESTIGATIONS MORE TOPICS PODCASTS

Maternal Health Care Is Disappearing in Rural America

## As Rural Hospitals Struggle, Some Opt To Close Labor And Delivery Units

SCIENTIFIC AMERICAN®

*It's 4 A.M. The Baby's Coming. But the Hospital Is 100 Miles Away.*



Kate Abernathy snapped while visiting with her son Eliab at Saint Francis Medical Center in Cape Girardeau, Mo. Andrea Morales for The New York Times

By Jack Healy



# The Way Forward – Federal Policy

- Federal policy efforts to address workforce shortages.
  - Improving Access to Maternity Care Act
- Federal policy efforts to improve maternity care quality
  - Quality of Care for Moms and Babies Act



# The Way Forward – State and Local Efforts

- Medicaid policy
- State scope of practice laws
- State and local efforts
  - Subsidies; “home-grown” rural workforce
  - Education and training; rotations that include obstetrics in rural areas
  - Capacity building/training: CME support
  - Telemedicine for obstetrics
  - Training for law enforcement, EMTs, and others who might encounter births
  - Housing and transportation support for rural families
  - Insurance regulation/costs  
(for hospitals, doctors)



UNIVERSITY OF MINNESOTA  
RURAL HEALTH  
RESEARCH CENTER

# The Goal for Rural Communities

- Workable solutions to the challenges that rural communities face to ensure maternity care **access** and **quality**



UNIVERSITY OF MINNESOTA  
**RURAL HEALTH**  
RESEARCH CENTER



# For Additional Information

- Kozhimannil, K., Hung, P., Henning-Smith, C., Casey, M, & Prasad, S. **Association between loss of hospital-based obstetric services in rural counties and birth location, healthcare utilization, and clinical outcomes.** *JAMA*, 2017; 319(12):1239-1247.
- Kozhimannil KB, Henning-Smith C, Hung P, Casey MM, Prasad S. **Ensuring access to high-quality maternity care in rural America,** *Women's Health Issues*, 2016; 26(3):247-250.
- Henning-Smith, C., Almanza, J., & Kozhimannil, K.B. (2017). **The maternity care nurse workforce in rural US hospitals.** *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, 46(3), 411-422.
- Hung P, Kozhimannil KB, Casey M, Moscovice IS. **Why are obstetric units in rural hospitals closing their doors?** *Health Services Research*, 2016; 51(4):1546-60.
- Hung, P., Henning-Smith, C., Casey, M., & Kozhimannil, K. **Access to obstetrics services in rural counties still declining, with 9 percent losing services, 2004-2014.** *Health Affairs*, 2017;36(9), 1663-1671.
- Hung P, Kozhimannil KB, Henning-Smith C, Casey MM. **Closure of hospital obstetric services disproportionately affects less-populated rural counties.** University of Minnesota Rural Health Research Center Policy Brief, April 2017. <http://rhrc.umn.edu/2017/04/closure-of-hospital-ob-services/>
- Hung, P., Kozhimannil, K.B., Casey, M., & Henning-Smith, C. **State variability in access to hospital-based obstetric services in rural US counties.** University of Minnesota Rural Health Research Center Policy Brief, April 2017. <http://rhrc.umn.edu/2017/04/state-variability-in-access-to-hospital-based-obstetric-services-in-rural-u-s-counties/>





# Thank You!

Carrie Henning-Smith | [henn0329@umn.edu](mailto:henn0329@umn.edu)

**rhrc.umn.edu**



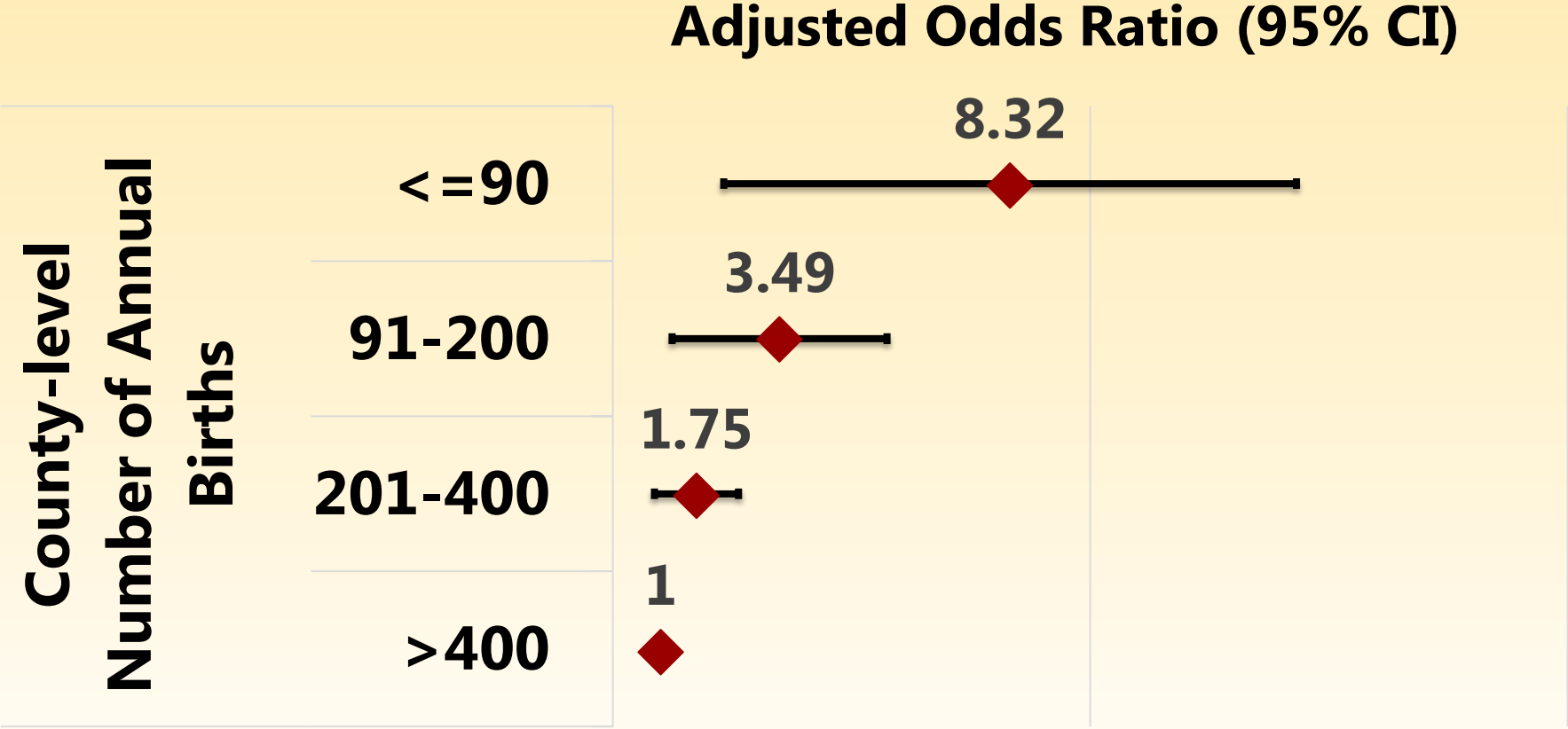
UNIVERSITY OF MINNESOTA  
RURAL HEALTH  
RESEARCH CENTER

# Appendix

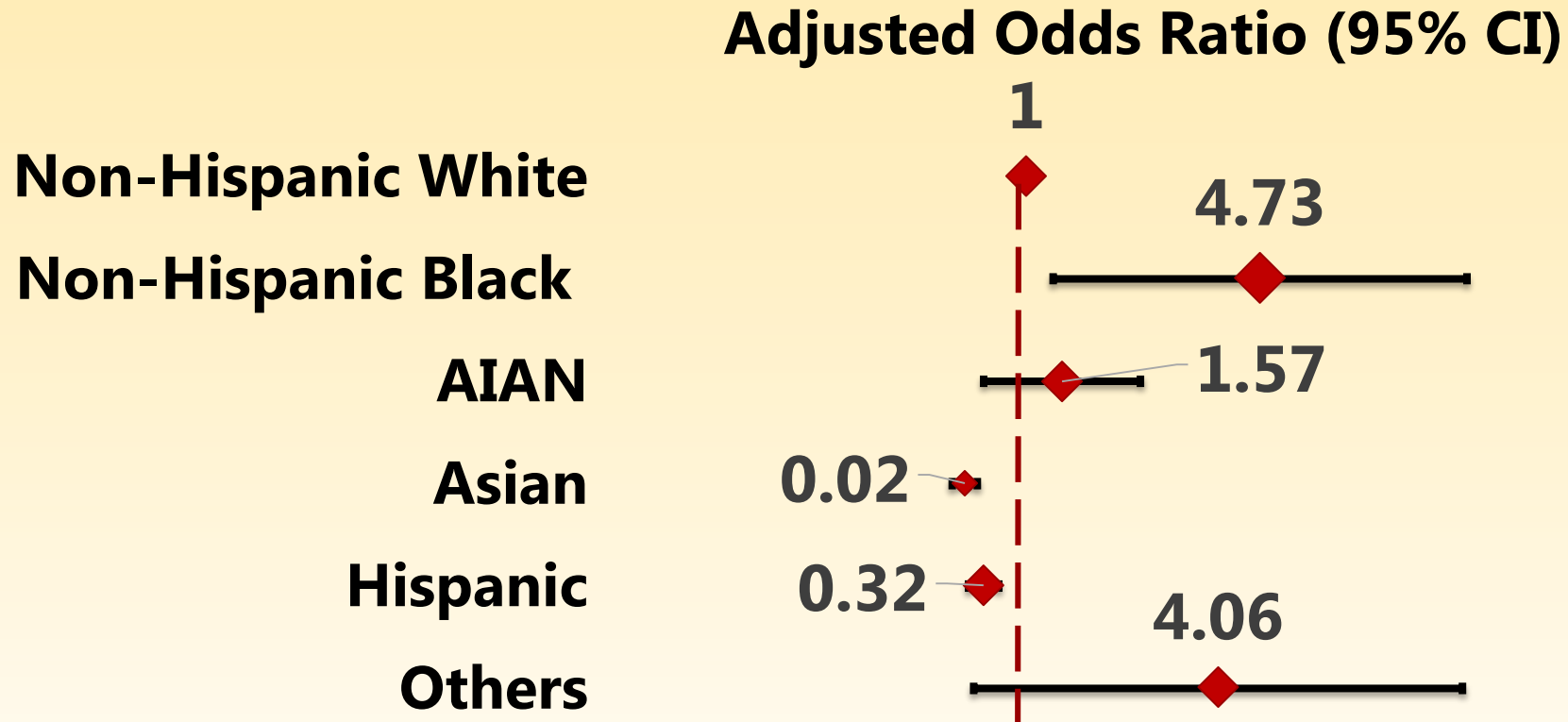


UNIVERSITY OF MINNESOTA  
**RURAL HEALTH**  
RESEARCH CENTER

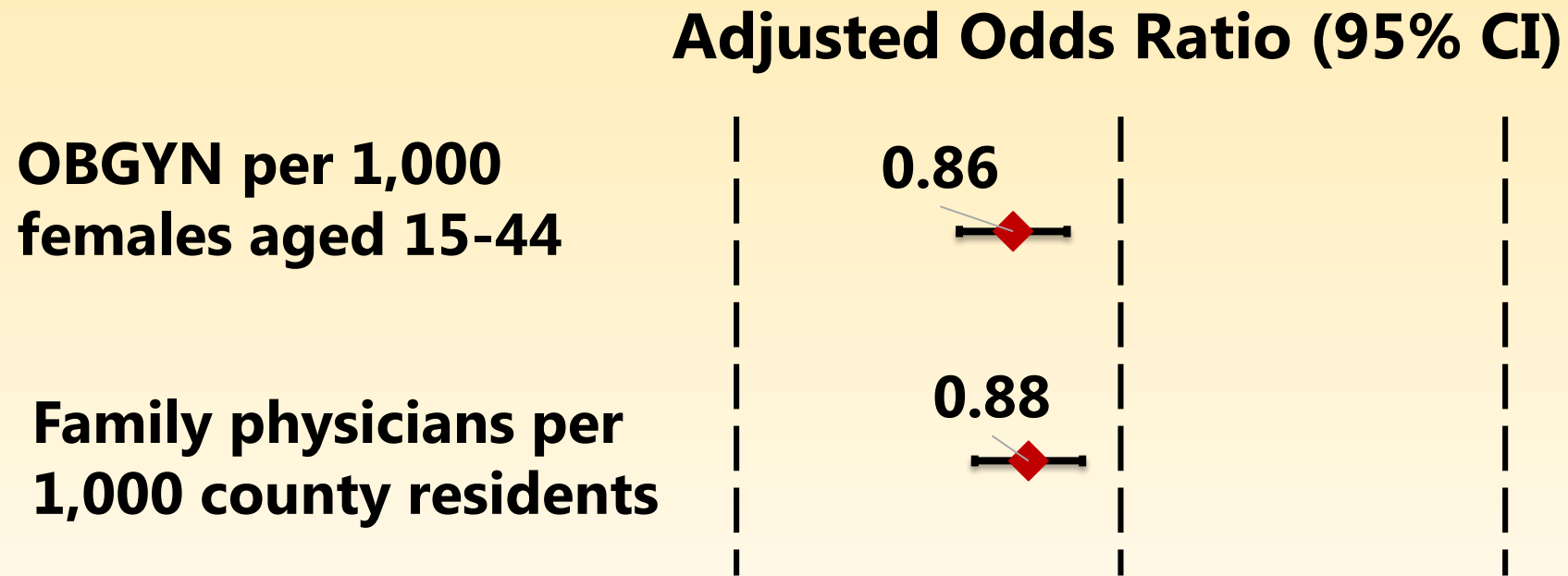
# Counties with Lower Birthrates Had Higher Odds of Losing OB Services



# Counties with More Black Residents Had Higher Odds of Losing OB Services



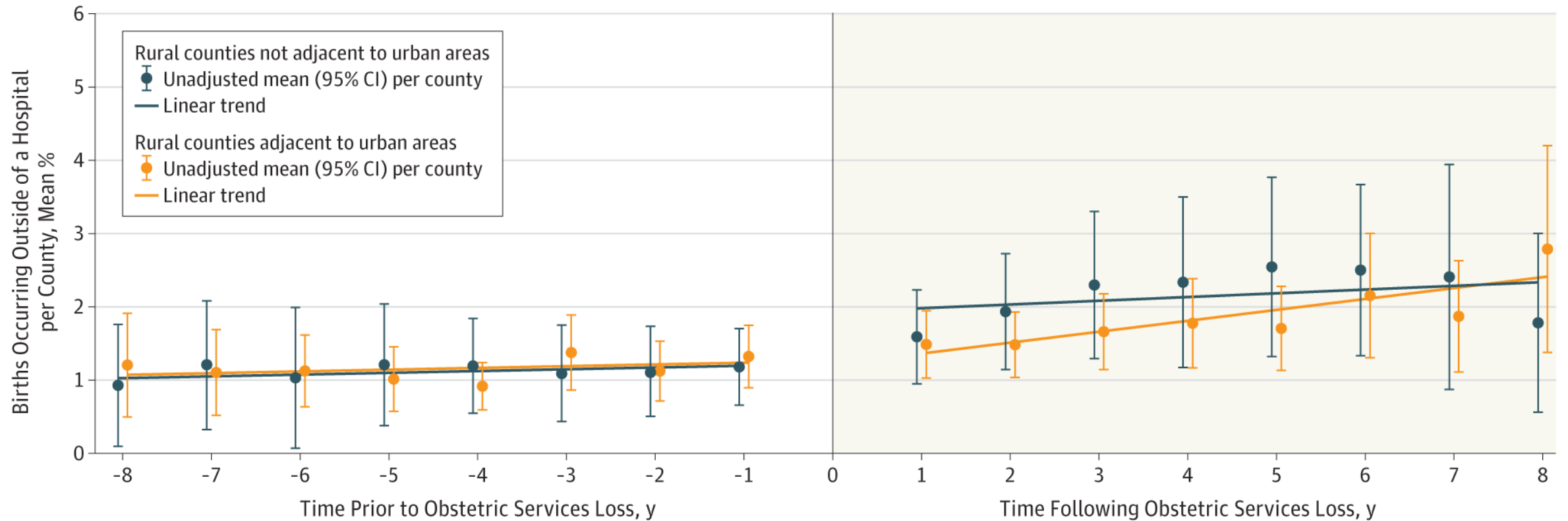
# Higher Workforce Supply was Associated with Lower Odds of Losing OB Services





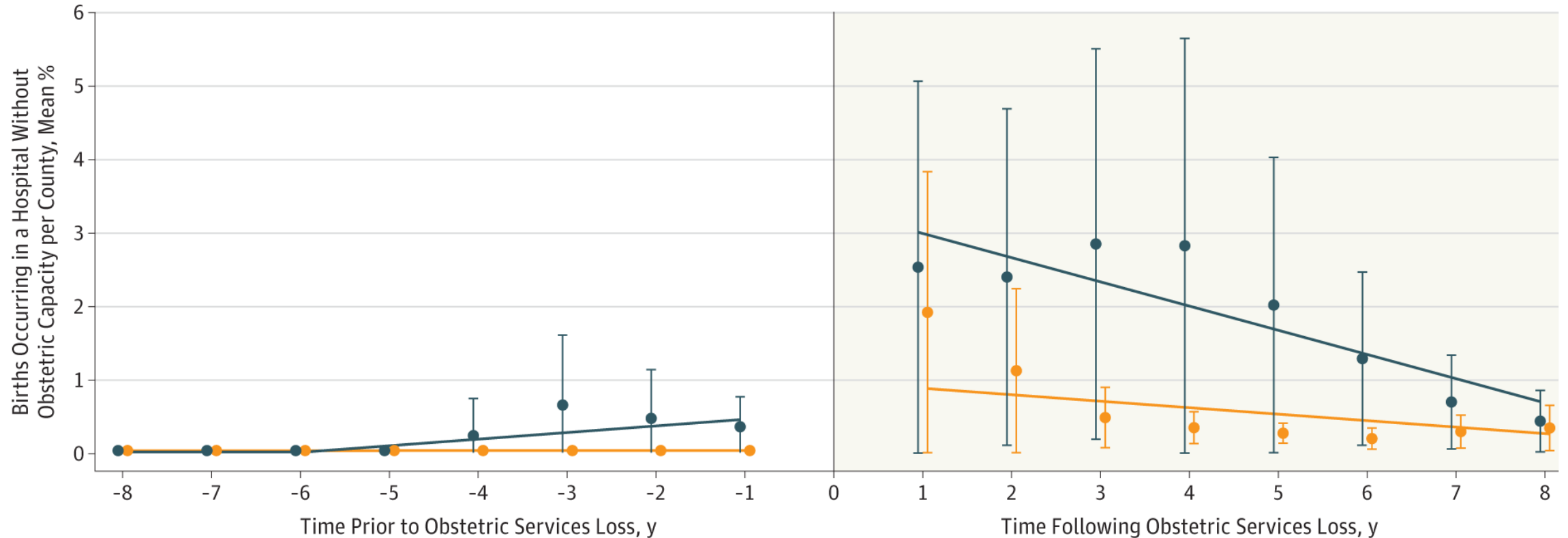
# Changes in Out-of-Hospital Birth

**A** Out-of-hospital births



# Changes in Births in Hospitals without Obstetric Services

**B** Births in hospital without obstetric services



# Changes in Preterm Birth

