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# **Rural/urban differences that emerge early in the life course: Maternity care and child care**

**Katy B. Kozhimannil, Ph.D., M.P.A.**

**Carrie Henning-Smith, Ph.D., M.S.W., M.P.H.**

Human Capital Research Collaborative

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**Rural Health Research  
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# Born in the rural USA



- Childbirth is the most common and costly reason for hospitalization in the US
- Half a million babies are born each year in rural hospitals
- Decline in access to obstetric services at rural hospitals
  - More than half of rural counties have no obstetric services
- Access to affordable, high-quality child care is important for young children's development and for allowing parents to work
  - Important in rural areas, where there are shortages of health care professionals in the workforce



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# Overview: Three Studies

- Access: Predictors of obstetric unit closure in rural areas
- Quality: Differences in obstetric care between rural and urban areas
- Workforce: Access to child care in rural and urban areas



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# Access to maternity care in rural areas: hospital OB unit closures



Hung P, Kozhimannil KB, Casey M, Moscovice IS.  
Why are obstetric units in rural hospitals closing  
their doors? *Health Services Research*, 2016 Jan  
25. [Epub ahead of print].



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# Research questions



- What are the risk factors for rural obstetric unit closure?
- What do rural hospital administrators say about the reality of unit closures?
  - Reasons for obstetric unit closures
  - Prenatal care capacity in the community





# What is happening to rural obstetric care?

Rural mothers-to-be may have a harder time finding a hospital to give birth in

A hospital in Grand Marais may no longer be open, reflecting a growing trend among rural hospitals across the country.

January 26, 2015

**Hospital closures, Medicaid expansion to lead rural health meeting agenda**

By Jaimy Lee | April 19, 2014  
Attendees at the National Rural Health Association annual meeting this week in Las Vegas will hear a lot about recent closures of rural hospitals in states such as Louisiana and Texas. More rural hospital closures across the country over the past 15 years are worried about surviving. Alan Morgan, the executive director of the National Rural Health Association, says that rural hospitals are closing on a number of factors, including the loss of Medicaid funding to expand Medicaid under Obamacare.

**Closing Maternity Wards: Costly and Risky**

Health

04/27/2011

4 comments

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Maternity wards are closing in rural areas already underserved by physicians. Rural women need a new model for prenatal care and more options for birthing.

By Kelli B. Haywood

Health

Rural hospitals getting out of the birthing business?

By Bob Collins January 26, 2015, 8:07 AM

**Hospital Maternity Wards Are Closing Across U.S.**

By Naomi Abraham  
WeNews correspondent  
Friday, January 21, 2011

More women of child-rearing age are uninsured and dependent on Medicaid, creating a financial noose around hospital maternity wards.

**Memorial Hospital of Salem County to close maternity ward**

Officials at The Memorial Hospital of Salem County in Mannington Township announced Tuesday, April 8, 2014, that the facility's maternity ward would close by May 31, 2014. (Staff photo by Spencer Kane/South Jersey Times)

By Alex Young | South Jersey Times  
Email the author | Follow on Twitter  
on April 08, 2014 at 9:40 PM

Rural hospital to end birthing services because of insurance changes

By John Lundy on Jan 24, 2015 at 7:42 p.m.



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# Concerns about Access

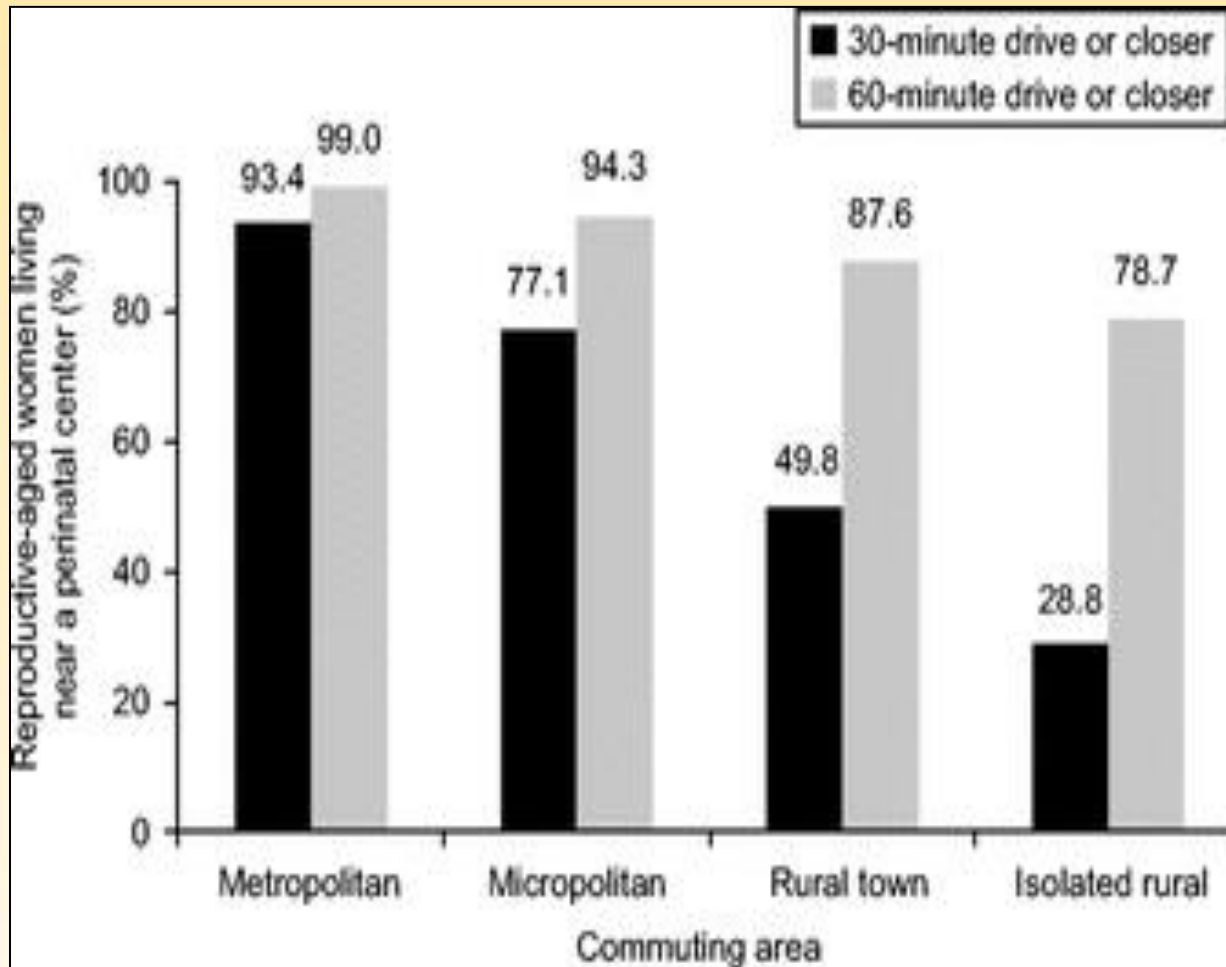


Fig. 1 . Percentages of reproductive-aged women living within a 30-minute drive and a 60-minute drive of their nearest hospital offering perinatal care, according to their community areas. Fig. 1. Rayburn. Drive Times to Hospitals. Obstet Gynecol 2012.



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# Data

- All 306 rural hospitals in 9 states with >10 births in 2010
  - CO, IA, KY, NY, NC, OR, VT, WA, WI
  - 263 responded (86% ); 19 (7.2%) had closed their obstetric units

Data set	Time Frame	Variables
Telephone Survey of Obstetric Unit Managers (Primary Data)	2013-2014	Date of stopping deliveries, reasons for closure, availability of prenatal care in the community after unit closures
Statewide Inpatient Databases from Health Care Cost and Utilization Project	2010	Number of births per hospital, quality indicators
Area Resource File	2010	County-level provider supply and population characteristics
American Hospital Association Annual Survey	2010	Hospital characteristics



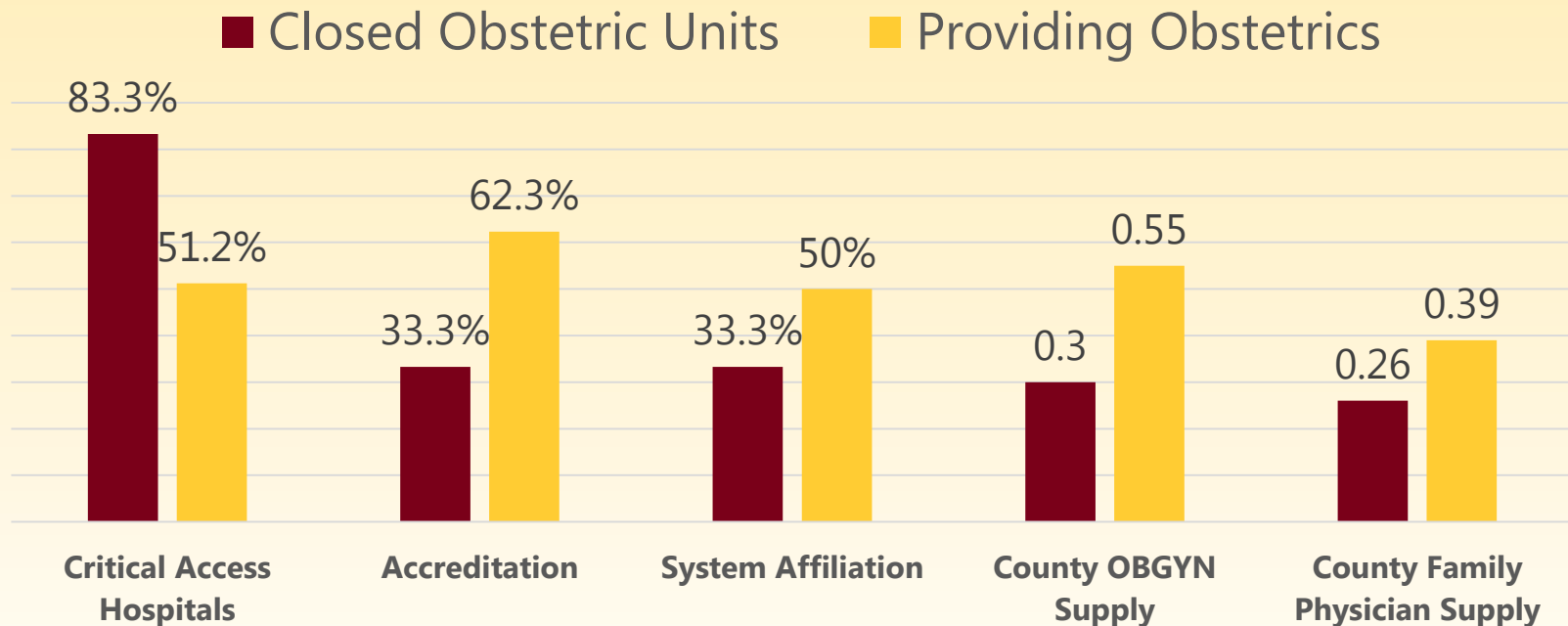
# Analysis

- Two-group  $t$  tests and Fisher's tests for bivariate analysis
- Multivariate logistic regression to estimate the likelihood of obstetric unit closures, accounting for:

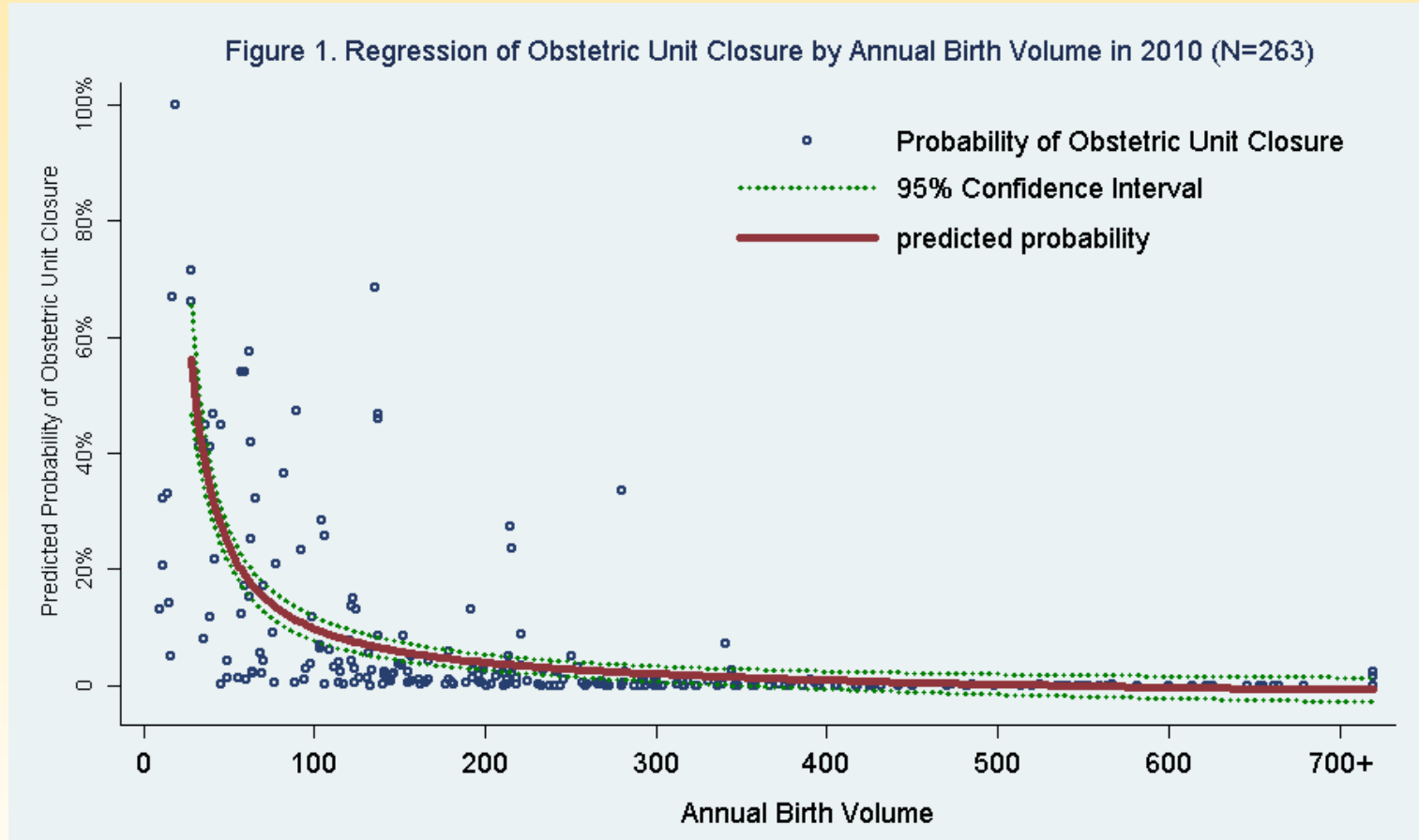
Quality measures	Hospital characteristics	County-level characteristics
<ul style="list-style-type: none"><li>• Low-risk cesarean rates (among term, singleton, and vertex pregnancies)</li><li>• Episiotomy rates</li><li>• Perineal laceration rates</li><li>• Rates of labor induction without medical indication for the procedure</li></ul>	<ul style="list-style-type: none"><li>• Hospital accreditation</li><li>• System affiliation</li><li>• Ownership</li><li>• Payer mix</li><li>• Nurse staffing</li><li>• Birth volume</li><li>• Distance to and birth volume in the closest hospital providing obstetrics</li></ul>	<ul style="list-style-type: none"><li>• Number of OB/GYN and CNM per 1,000 females age 18-40</li><li>• Number of family physicians per 10,000 population in 2010</li><li>• Median family income 2006-2010</li><li>• Number of females age 18-40</li></ul>

# Findings

- Hospitals that closed their obstetric units were relatively smaller, non-accredited, non-system affiliated, and in communities with a limited obstetric workforce.

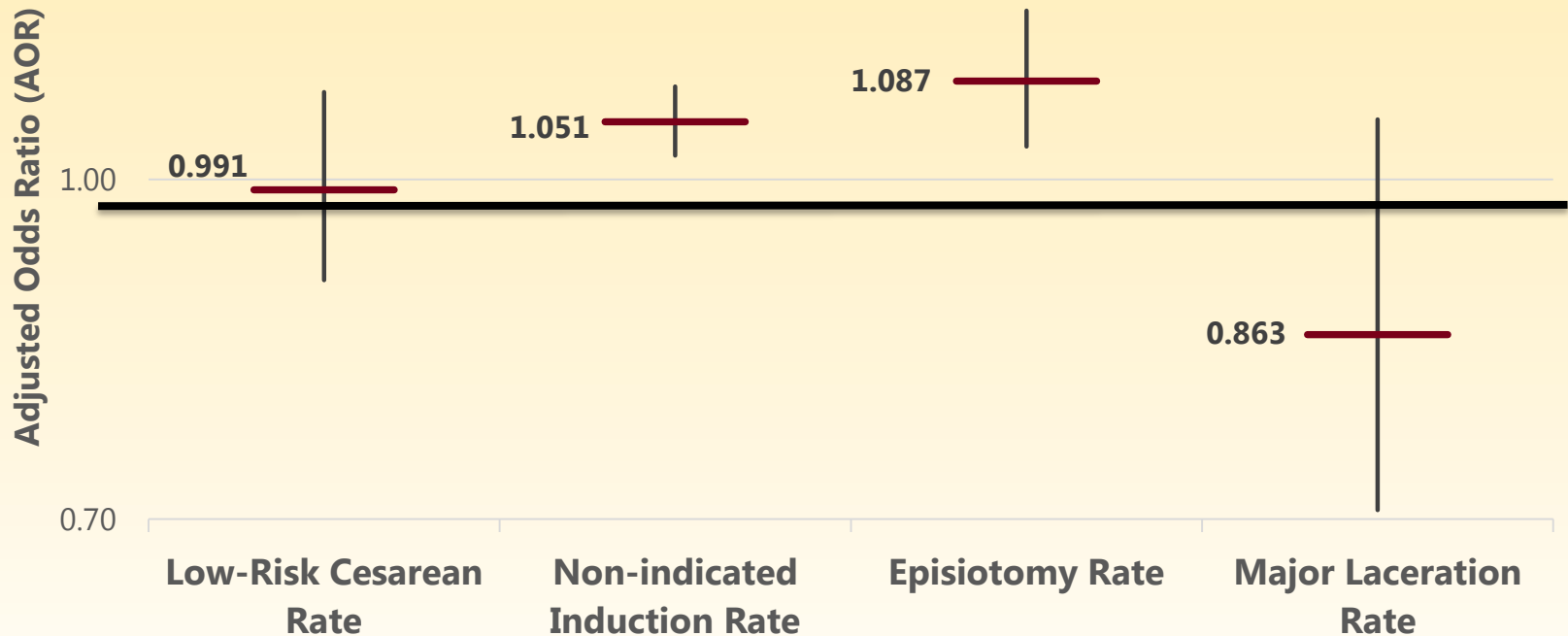


# Lower Birth Volume Hospitals More Likely to Close OB Units



# What about Quality?

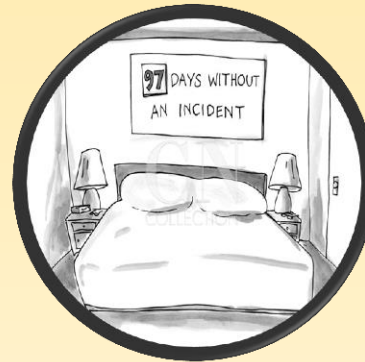
- Elevated rates of episiotomy and non-indicated induction were associated with *increased* odds of rural obstetric unit closures, but not other measures.



# Administrators' Responses – Why?



**Staffing issues [N=15 (79%)]**



**Low birth volume [N=9 (47%)]**



**Financial issues [N=6 (32%)]**



**Low reimbursement [N=3 (16%)]**



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# What about prenatal care?

- All but two rural hospitals closing their obstetric units reported that prenatal care was still available in the community after the unit closures.

**Prenatal Care Services**

**and**

**~~Hospital Obstetric Care~~**



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# Key Findings

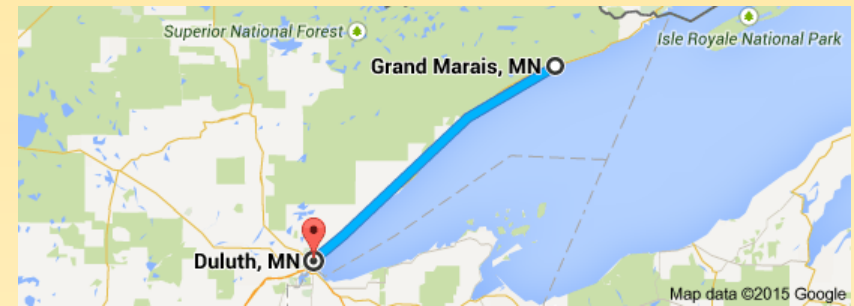


1. Low birth volume was associated with obstetric unit closures, but high birth volume alone does not assure continued operation.
2. Local supply of family physicians matters.
3. Private hospitals were more likely to close their OB units than public hospitals.
4. Most rural women continued to have access to prenatal care in their communities after closing the rural obstetric units.



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# Close to home....



- Cook County Hospital (Grand Marais)
  - 7 births per year since 2011
  - Critical Access Hospital
  - No surgical capacity (no anesthesia, no operating room)
  - On Jan 25, 2015 announced decision to close obstetric unit in July 2015
  - Nearest hospital that has obstetric services is in Duluth (110 miles away, on the often-treacherous Hwy 61)

*"The decision in Grand Marais followed a finding from a liability insurer that the hospital did not conform to safety standards set by the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics. Specifically, the hospital can't perform Caesarean sections or get pregnant women to other hospitals within 30 minutes of needing those surgical deliveries."*



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# Quality: Differences in obstetric care between rural and urban areas

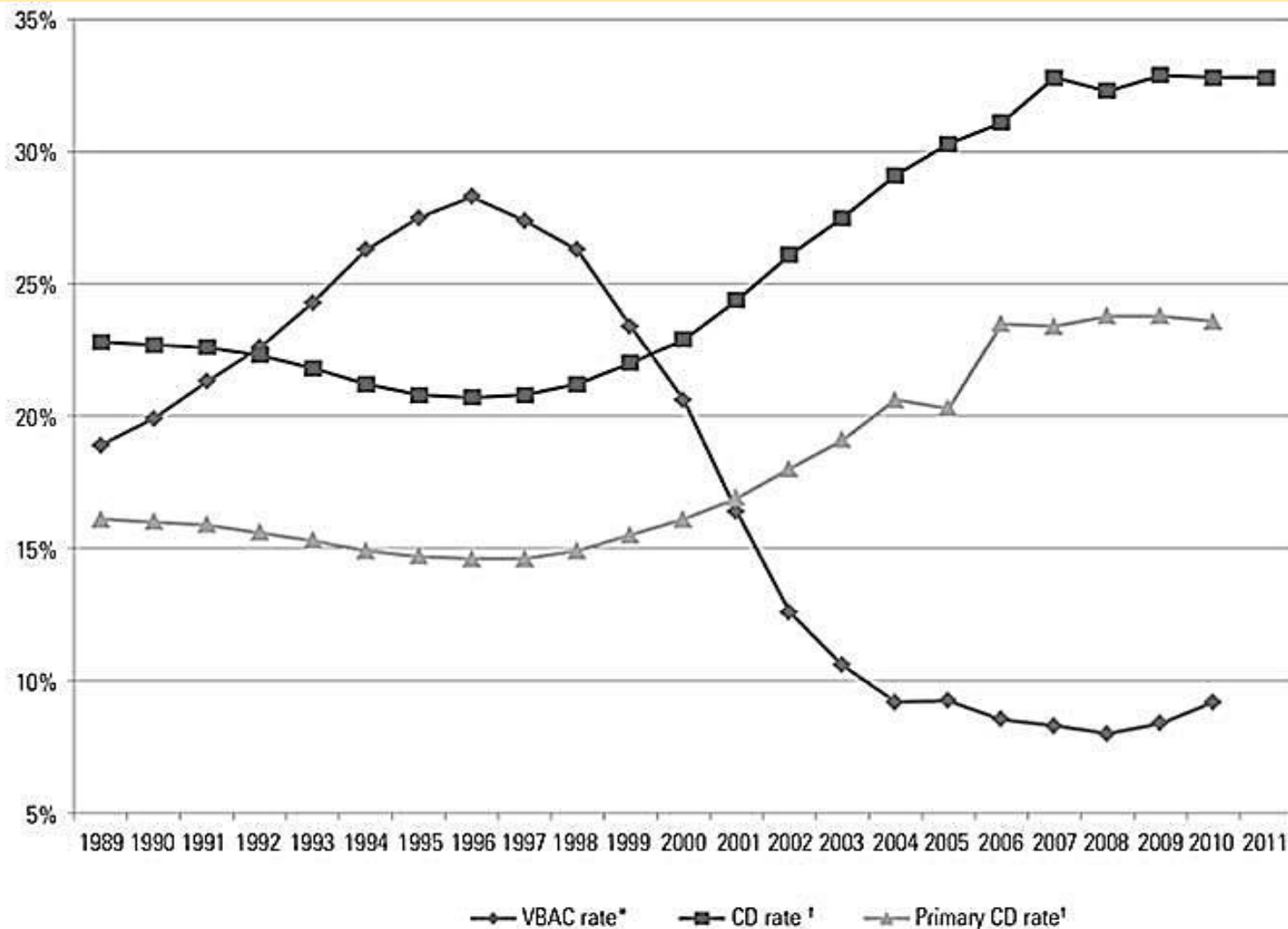


Kozhimannil KB, Hung P, Prasad S, Casey M, Moscovice IS. Rural-urban differences in obstetric care trends, 2002-2010, and implications for the future. *Medical Care*, 2014;52(1):4-9.



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# National trends: cesarean rates



**Fig. 1.** U.S. delivery rates, 1989–2011. Data from National Vital Statistics. Abbreviations: CD, cesarean delivery; VBAC, vaginal birth after cesarean delivery. \*Percent of women who have a vaginal birth after prior cesarean delivery. <sup>1</sup>Rate based on total number of deliveries. (Data from Martin JA, Hamilton BE, Ventura SJ, Osterman MJ, Mathews TJ. Births: final data for 2011. Natl Vital Stat Rep 2013;62(2):1–90.)



# Why rural-urban differences?

- Health outcomes – known differences
  - Maternal morbidity, re-hospitalization
  - Infant respiratory morbidity, NICU admission,
- Policy implications – different capacity
  - Implementation of professional guidelines and recommendations
  - Quality measurement
  - Payment reform
  - Accreditation (Joint Commission)



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# Research question

Do recent obstetric care trends differ between rural and urban hospitals?

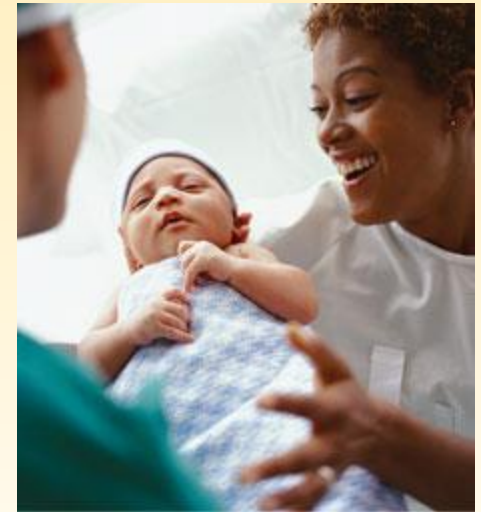
- Low-risk cesarean
- VBAC
- Non-indicated cesarean
- Non-indicated induction



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# Data and study population

- HCUP Nationwide Inpatient Sample
  - nationally-representative 20% sample of U.S. hospitals
  - Years 2002-2010
- All obstetric deliveries
  - N=7,188,972 total births
  - 6,316,743 in urban hospitals
  - 837,772 in rural hospitals



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# Methods

- Design: Retrospective, longitudinal difference-in-differences analysis
- Models: generalized estimating equations (GEE)
  - Clustered standard errors (hospital)
  - Interaction terms to assess rural-urban differences over time
  - Conditional on eligibility for study outcomes



# Measurement

- Outcomes
  - Low-risk cesarean, VBAC
  - Cesarean or induction without medical indication
    - Indications based on Joint Commission criteria
- Rural-urban hospital location
  - US Census Core-Based Statistical Area
- Patient covariates
  - Age, race/ethnicity, payer, maternal medical conditions (ICD-9 codes)





**Table 1: Maternal Descriptive Statistics for Childbirth Hospitalizations in Rural and Urban Hospitals, 2002 - 2010**

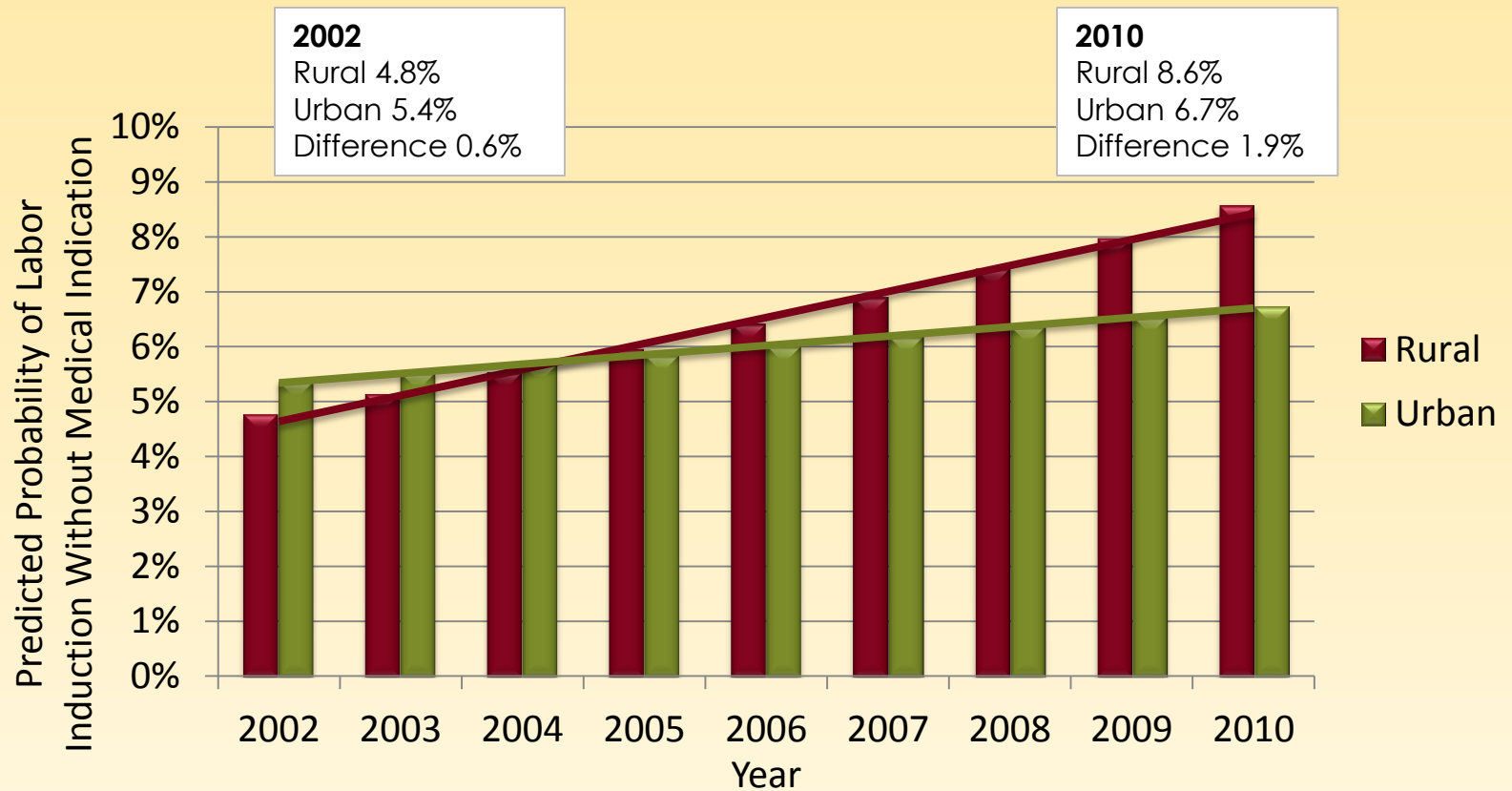
	Number of Birth Hospitalizations 2002-2010 (%)	
	<b>RURAL (n=837,772)</b>	<b>URBAN (n=6,316,743)</b>
<i>Age</i>		
<20	169,366 (20.2)	842,300 (13.3)
21-25	273,732 (32.7)	1,529,501 (24.2)
26-30	216,462 (25.8)	1,751,672 (27.7)
31-35	123,456 (14.7)	1,427,640 (22.6)
35+	54,587 (6.5)	759,720 (12)
<i>Race/Ethnicity</i>		
White	392,855 (46.9)	2,433,821 (38.5)
Black	49,684 (5.9)	672,006 (10.6)
Hispanic	50,176 (6.0)	1,194,171 (18.9)
Other	44,931 (5.4)	532,932 (8.4)
<i>Primary Payer</i>		
Medicaid	425,967 (50.8)	2,483,937 (39.3)
Private Insurance	340,842 (40.7)	3,420,363 (54.1)



**Table 2: Changes Over Time in Obstetric Care Outcomes, 2002-2010, in Rural and Urban Hospitals**

	2002 (n=735,322)	2010 (n=776,191)	% change
<b>Rural Hospitals (n=837,772)</b>			
Cesarean delivery, low risk women	12.9	15.5	19.4%
Vaginal birth after cesarean (VBAC)	13.1	5.0	-61.8%
Labor induction without indication	9.3	16.5	77.7%
Cesarean delivery without indication	14.3	16.9	17.8%
<b>Urban Hospitals (n=6,316,743)</b>			
Cesarean delivery among low risk women	12.7	16.1	26.6%
vaginal birth after cesarean (VBAC)	18.8	10.0	-46.9%
Labor induction without indication	10.3	12.0	17.3%
Cesarean delivery without indication	14.3	17.8	24.3%





**Figure 1. Predicted Probability of Labor Induction Without Medical Indication Over Time (2002-2010) For A 28-Year-Old, White, and Privately Insured, Low Risk Women, by Hospital Location**



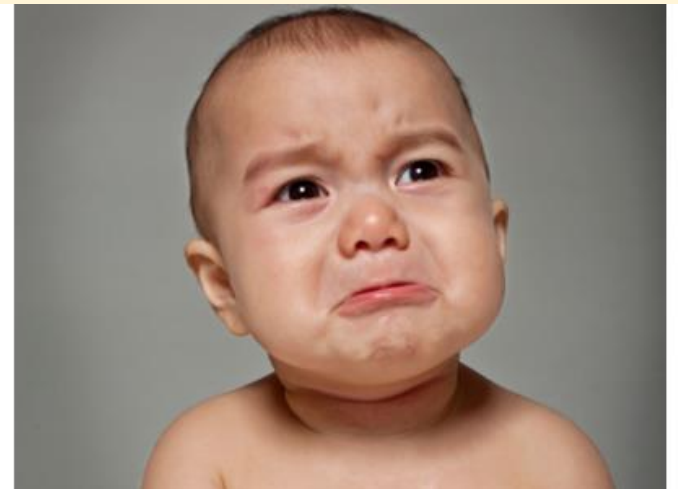
# Key findings

- Rising cesarean rates for low-risk pregnancies and limited VBAC access are problematic for both rural and urban hospitals.
  - Low risk cesarean rates ~16% in 2010 (both rural and urban)
  - VBAC rates 10% urban, 5% rural in 2010
- Rates of non-indicated labor induction rose overall, but increased more rapidly in rural vs. urban hospitals.
  - 16.5% of women with no indication had labor induced in rural hospitals in 2010



# Limitations

- Administrative data
  - No clinical notes
  - No information on prenatal care, parity, gestational age
- ICD-9 codes (no CPT or HCPCS)
  - Under-coding possible, not likely differential by rural-urban status





# Conclusions

- Rising cesarean rates for low-risk pregnancies and limited VBAC access are increasingly problematic for both rural and urban hospitals.
- National trends toward greater use of non-indicated labor induction were especially pronounced in rural hospitals.
- Maternity care policies, including payment reforms for non-indicated interventions and labor management practices, may face different implementation challenges in rural and urban hospitals.



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# Workforce: Access to child care in rural and urban areas



Henning-Smith C, Kozhimannil KB. Availability of Child Care in Rural Communities: Implications for Workforce Recruitment and Retention. *Journal of Community Health*, 2015 Nov 24 [Epub ahead of print].



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# Access to Child Care in Rural Areas

- Early childhood care and education has:
  - An immediate impact on children's well-being
  - A strong predictive effect on health over the life course
- Implications for health care workforce:
  - Rural areas face severe shortages in health care workforce
  - Access to child care may be one way to recruit and support health care professionals
- Little is known about rural-urban differences in child care availability



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# Rural Health Professional Shortages

- Rural areas face workforce shortages in all areas of health care
- In particular, rural areas are aging at a faster rate than the rest of the country, and face serious shortages in long-term care workforce
- Efforts to recruit and retain rural health care workforce mostly focus on the individual professional (e.g., loan forgiveness and training programs), but neglect the broader community and family context



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# Importance of Child Care

- Availability of child care has been linked to increases in fertility and women's workforce participation
  - Women make up the vast majority of all health professionals, including >90% of all nurses and health care paraprofessionals
- Despite recent efforts to increase funding for child care and pre-K education, availability of child care varies by geography and community socio-economic conditions.



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# Research Questions

- How does the availability of child care differ by rural/urban setting?
- What impact do labor participation and family structure have on child care availability?



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# Data

- KIDS COUNT (Annie E. Casey Foundation) – number of licensed child care slots (family and center-based)
- County Health Rankings (RWJF and University of Wisconsin) - community socio-demographic characteristics
- American Community Survey (US Census Bureau) – county-level demographics and labor force participation
- Setting: Wisconsin, 2013



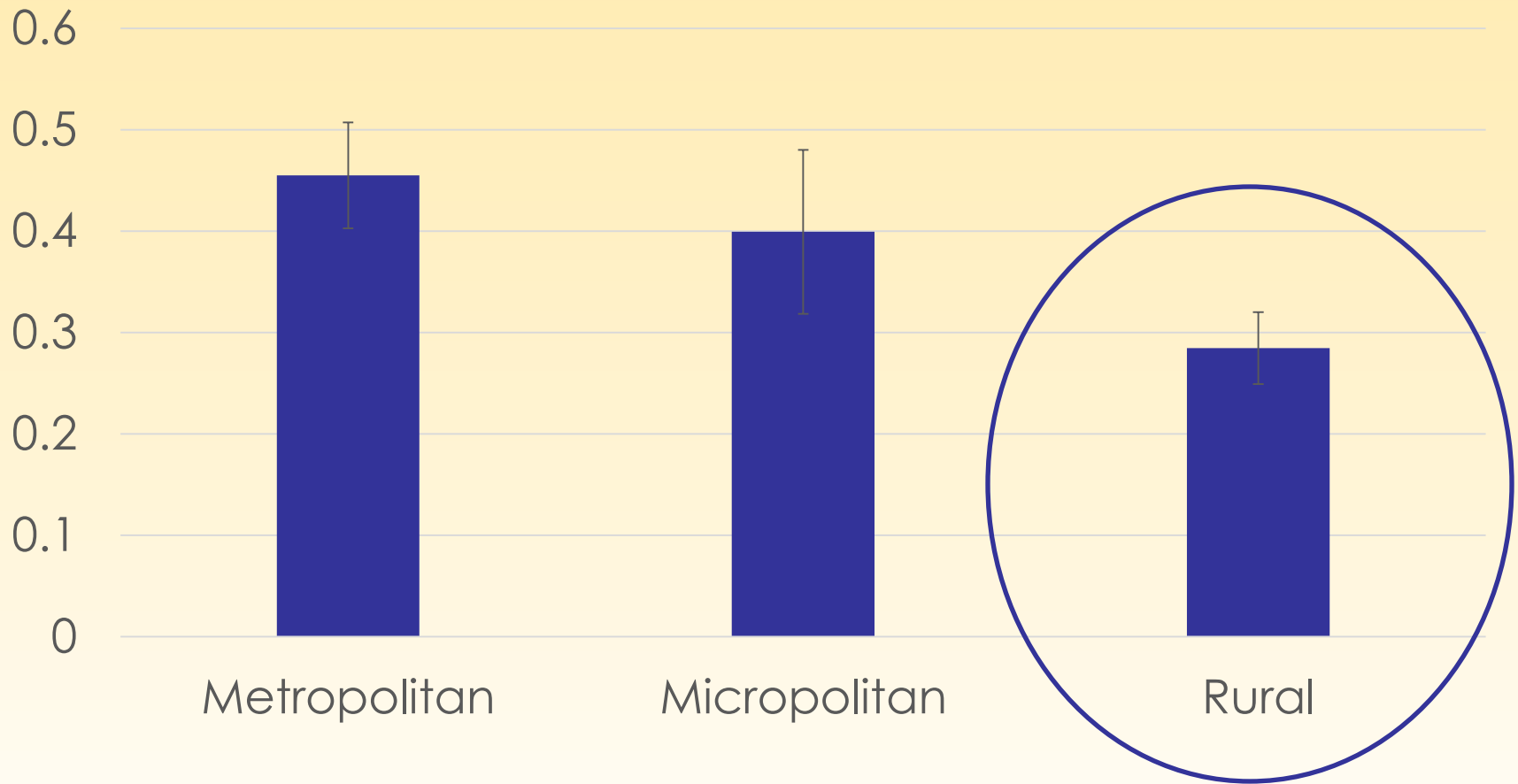
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# Analysis

- Bi-variate t-tests to compare child care slots and community characteristics by location
- Ordinary least squares regression predicting number of child care slots, adjusting for location, labor force participation, and household structure



# Mean Number of Child Care Slots per Child Under 5 by Location



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# Regression Results Predicting Number of Child Care Slots

	Coef.	Std. Error
Location (Ref: Metropolitan)		
Micropolitan	-0.039	0.036
<b>Rural</b>	<b>-0.091*</b>	0.034
<b>Hours worked for workers - male</b>	<b>-0.057***</b>	0.015
Hours worked for workers - female	0.016	0.018
<b>Did not work - male</b>	<b>-0.010*</b>	0.005
Did not work - female	0.000	0.005
Single-parent households	0.331	0.273
Intercept	2.312***	0.546
N=72 counties		
*p<0.05, ***p<0.001		



# Key Findings

- Rural counties had fewer child care slots than urban and micropolitan counties.
- This association remained after adjusting for labor force participation and household structure
- Men's labor force participation was significantly associated with child care availability. Women's was not.



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# Implications

- In order to recruit and retain health care workforce who have families (or want families), rural areas will need more robust child care options.
  - Important both for relocating professionals and building a “home-grown” workforce.
- Policy options should include strengthening funding for child care and early-childhood education.



# Thank You!



**Questions/comments:**

Katy Kozhimannil: [kbk@umn.edu](mailto:kbk@umn.edu)

Carrie Henning-Smith: [henn0239@umn.edu](mailto:henn0239@umn.edu)



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