

# **Geographic Variation in Breastfeeding Rates in the US**

**Secretary's Advisory Committee on Infant Mortality  
November 30, 2006**

**Michael Kogan, Ph.D.**

**U.S. Department of Health and Human Services (DHHS)  
Health Resources and Services Administration (HRSA)  
Maternal and Child Health Bureau (MCHB)  
Director, Office of Data and Program Development**

**Gopal Singh, PhD (HRSA/MCHB)**

**Deborah Dee, MPH (University of North Carolina)**

**Laurence Grummer-Strawn (Centers for Disease Control)**



# Background: Breastfeeding and Infant Mortality

- In developed countries, breastfeeding has been associated with:
  - Lower risks of neonatal and post-neonatal mortality.
  - Specifically, a lower risk of SIDS.
- In developing countries, breastfeeding has been used as a child survival strategy, due to:
  - Reduced risks for diarrheal disease and acute respiratory infections.

# Background

- Breastfeeding has been associated with numerous benefits, including:
  - Reduced risks of respiratory tract infections, gross motor, language and developmental delays
- Exclusive breastfeeding for six months has been recommended by organizations such as the American Academy of Pediatrics, the American College of Obstetricians and Gynecologists, and the World Health Organization.

# Background (cont)

- Breastfeeding rates vary by demographic and sociodemographic factors.
- Two sources of state-level data, the Ross Labs Mothers' Survey and the National Immunization Survey, have indicated fairly wide variations in breastfeeding rates among States.
- However, neither survey has examined whether these State variations are diminished after multivariate adjustment.

# STUDY QUESTIONS

- Are geographic disparities in breastfeeding reduced after multivariate adjustment for sociodemographic and behavioral factors?
- Is there a possible influence of breastfeeding promotion legislation on rates of breastfeeding, even after adjustment?

# HISTORY:

## EARLIEST STUDY ON BREASTFEEDING

*I see the sleeping babe  
Nestling the breast of its mother,  
The sleeping mother and babe—  
Hushed, I study them long and long.*

***Walt Whitman***

# NEXT IMPORTANT QUESTION

- ***Walt Whitman: Early Maternal and Child Health Epidemiologist  
or  
Sickie?***

*I see the sleeping babe  
Nestling the breast of its mother,  
The sleeping mother and babe—  
Hushed, I study them long and long.*

***For O' America, we don't have state-  
level estimates on breastfeeding.***



# Data Sources

- The 2003 National Survey of Children's Health (NSCH) was conducted by the Maternal and Child Health Bureau and the Centers for Disease Control and Prevention using the State and Local Area Integrated Telephone System mechanism (SLAITS)
- Its purpose was to produce national and state-based estimates on the health and well-being of children, their families, and their communities
- There were 102,353 completed interviews (about 2000 per state)

# Data Sources (cont)

- Independent random-digit-dial samples for all 50 states plus D.C.
- Screened households for children under 18 years of age
- One child under 18 years of age was randomly selected to be the target of the interview
- Sampling weights are adjusted for potential non-response biases
- Sampling weights are adjusted to account for non-coverage of non-telephone households
- Interview completion rate of 68.7%
- This study is limited to children 6 months to 5 years

# Data Sources (cont)

- We examined breastfeeding promotion legislation in each of the 50 States and Washington, DC.

# Dependent Variables

- Adjusted State prevalences of breastfeeding initiation and duration of at least six months
- Rate of breastfeeding initiation
- Rate of being breastfed at least six months

# Independent Variable and Covariates

- State
- Poverty level
- Race/ethnicity
- Gender
- Family structure
- Primary language spoken at home and immigrant status
- Maternal assessment of her general health status
- Maternal mental health
- Maternal exercise behavior
- Household smoking

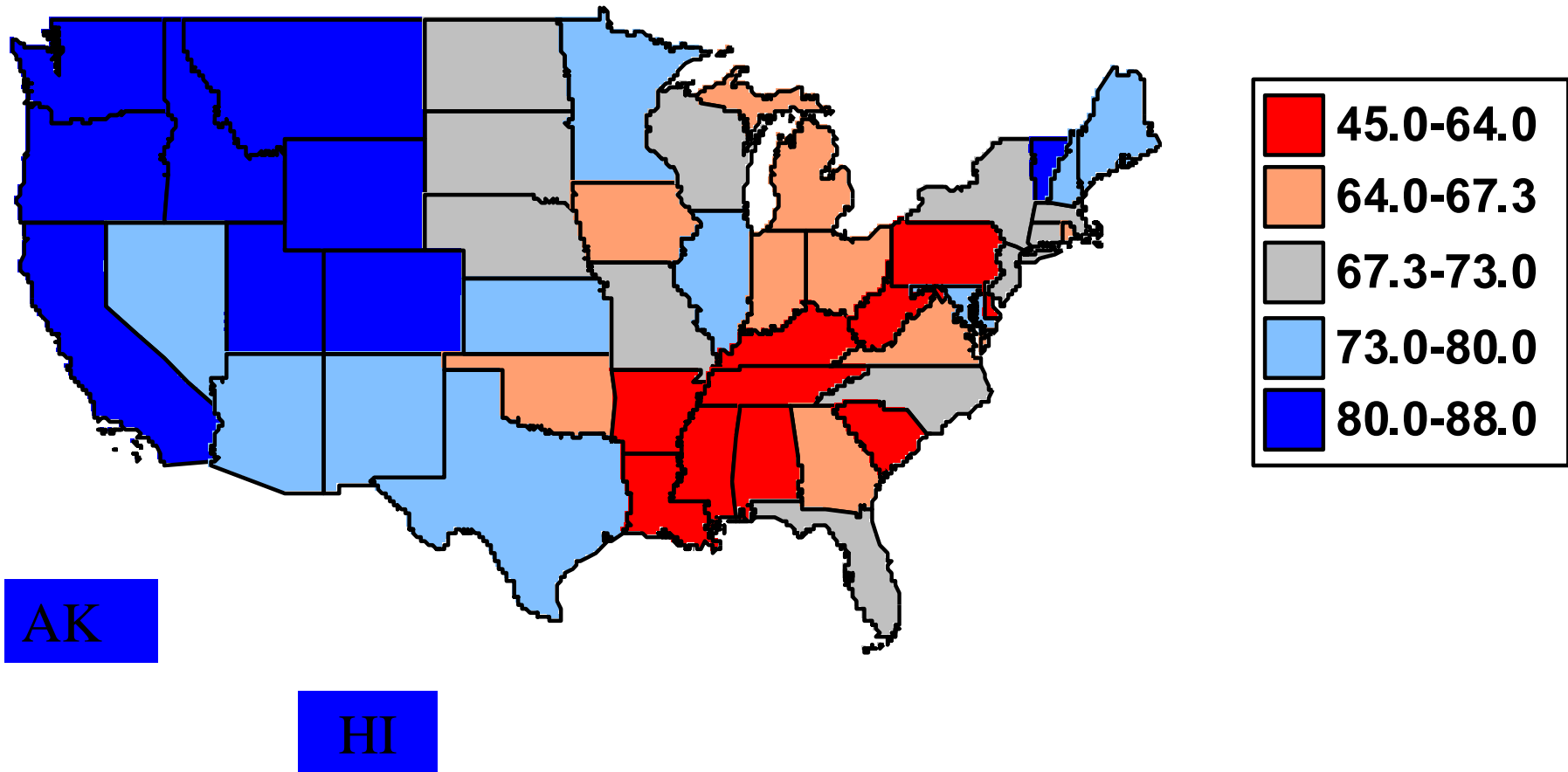
# Analysis

- Adjusted prevalences were derived from the predicted marginals using logistic regressions in SUDAAN.
  - The predicted marginals were based on the Peters-Belson approach
- Logistic regression was then used to examine the odds of not being breastfed, and the odds of not breastfeeding the child at least six months.

# Analysis

- We then conducted a multilevel analysis, examining the possible role of breastfeeding promotion legislation

# Percentage Ever Breastfed by State, NSCH, 2003





# Unadjusted Prevalences for Breastfeeding Initiation

- Five highest States
  - Washington State – 87.9%
  - Oregon – 87.7%
  - California – 86.5%
  - Colorado – 85.2%
  - Utah – 84.9%
- Five lowest States
  - Louisiana – 45.1%
  - Mississippi – 51.9%
  - West Virginia – 53.0%
  - Arkansas – 54.8%
  - Kentucky – 55%

# Adjusted Prevalences for Breastfeeding Initiation

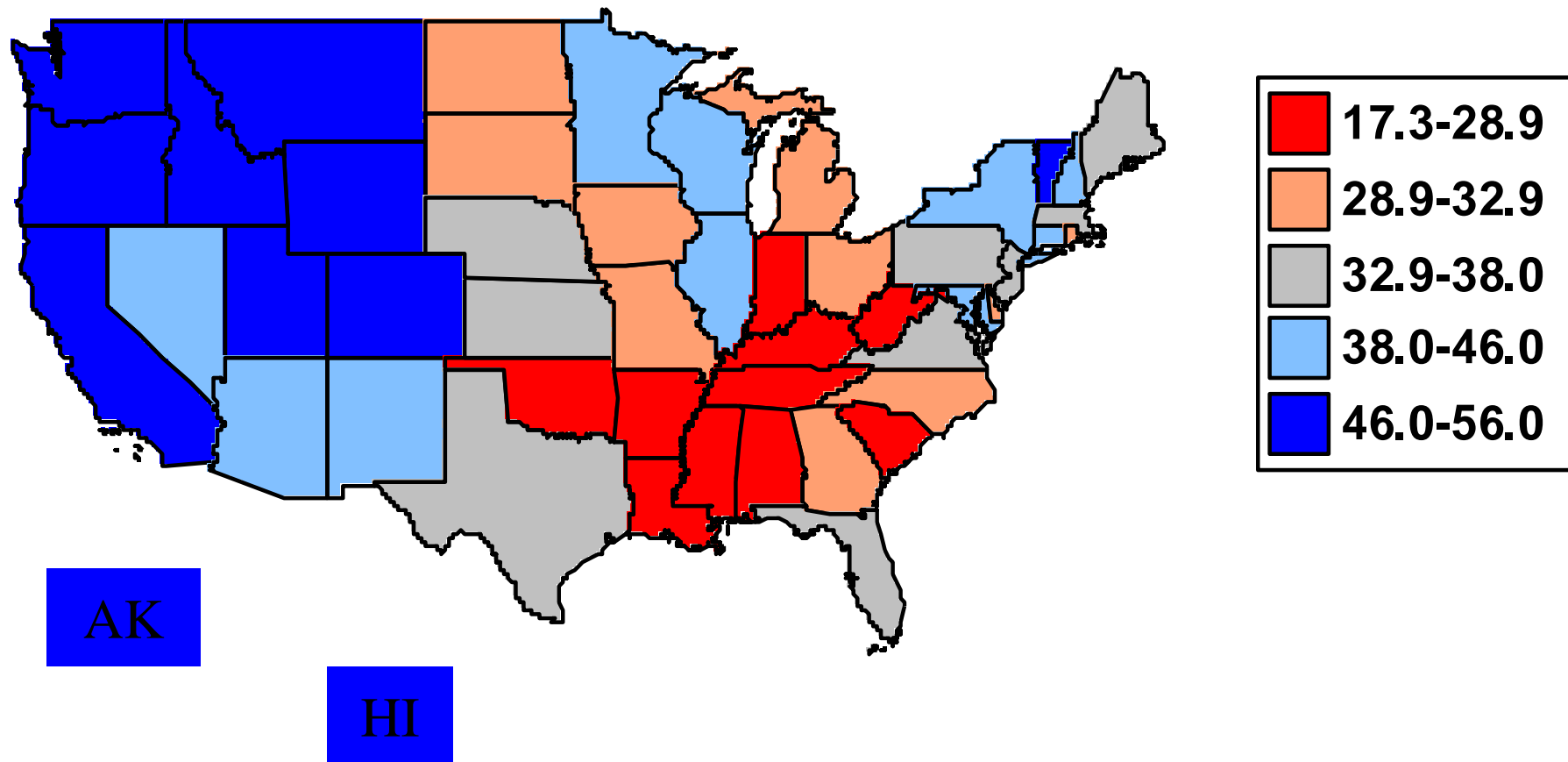
## ■ Five highest States

- Alaska – 86%
- Washington State – 85%
- Oregon – 84%
- California – 84%
- Colorado / Idaho – 82%

## ■ Five lowest States

- Louisiana – 54%
- West Virginia – 54%
- Kentucky – 57%
- Arkansas – 59%
- Mississippi / Pennsylvania / Rhode Island – 61%

# Percentage Breastfeeding for At least 6 Months, NSCH, 2001



# Unadjusted Prevalences for Breastfeeding at Least Six Months

- Five highest States
  - Oregon – 55.8%
  - Utah – 54.6%
  - Idaho – 54.3%
  - Washington State – 51.0%
  - California – 50.6%
- Five lowest States
  - Louisiana – 17.3%
  - Mississippi – 20.4%
  - Arkansas – 22.9%
  - Alabama – 22.9%
  - West Virginia – 23.2%

# Adjusted Prevalences for Breastfeeding at Least Six Months

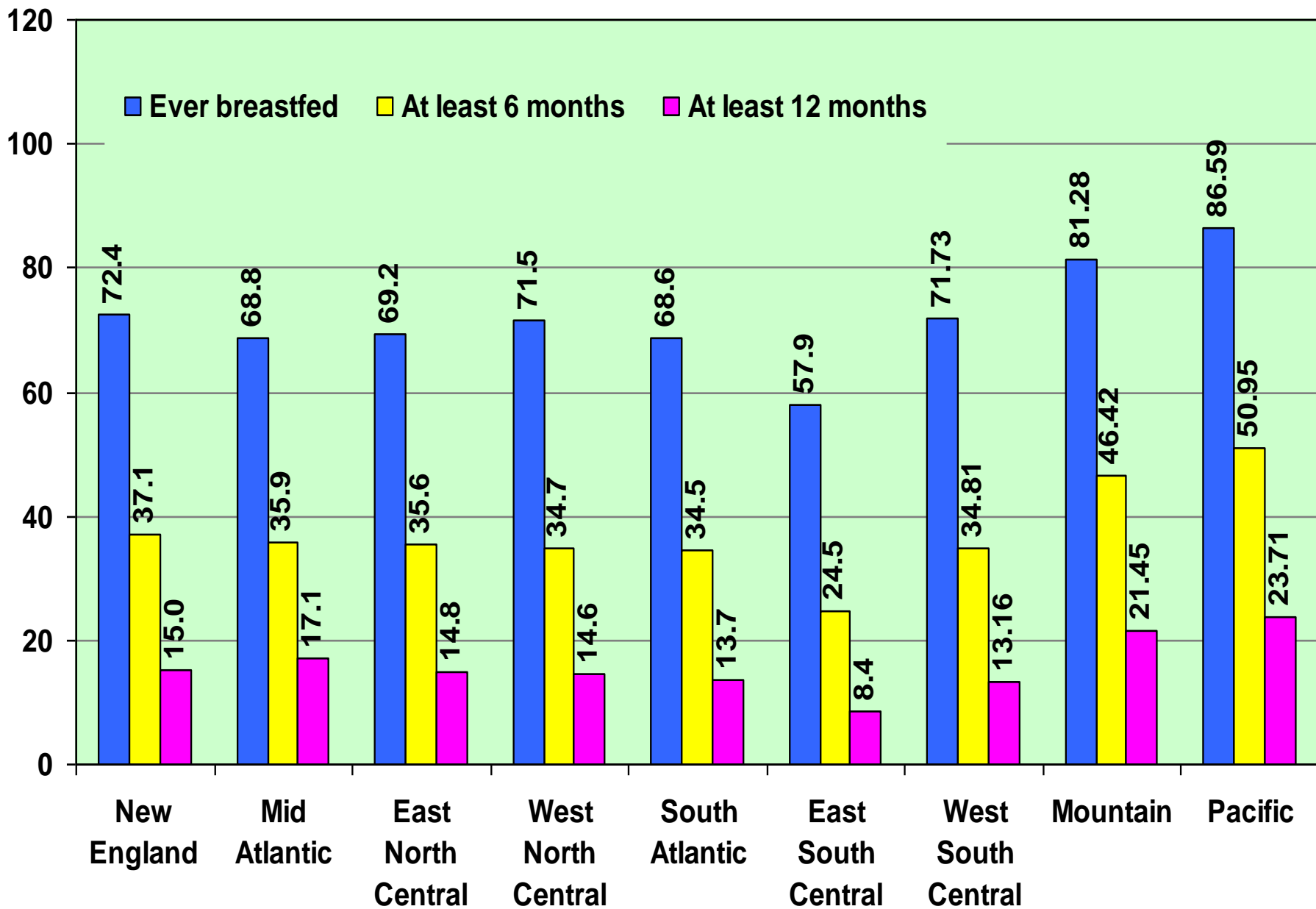
## ■ Five highest States

- Oregon – 54%
- Idaho – 54%
- Utah – 51%
- Alaska – 51%
- Washington State / California – 50%

## ■ Five lowest States

- Louisiana – 22%
- Mississippi – 25%
- West Virginia – 25%
- Kentucky – 25%
- Arkansas / Alabama – 26%

# Breastfeeding rates by duration and geographic region, United States, 2003



# Logistic Regressions for Unadjusted and Adjusted Associations between Never Breastfeeding and Five Lowest Prevalence States

	Unadjusted	Adjusted - All Covariates
Louisiana (Oregon - ref)	8.36 (6.0, 11.7)	5.29 (3.7,7.5)
Mississippi (Oregon)	6.17 (4.3, 8.8)	3.78 (2.6, 5.5)
West Virginia (Oregon)	5.97 (4.2, 8.4)	5.13 (3.6,7.3)
Arkansas (Oregon)	5.55 (3.9, 7.9)	4.19 (2.9, 6.0)
Kentucky (Oregon)	5.49 (3.9, 7.7)	4.74 (3.3, 6.8)

# Other Factors Significantly Associated with Never Breastfeeding

	Adjusted Odds Ratio
Hispanic (White non-Hisp)	1.45 (1.2, 1.7)
Black non-Hispanic (White non-Hisp)	2.06 (1.8, 2.4)
Poverty 0-99% (>300%)	1.79 (1.5, 2.1)
Poverty 100-199% (>300%)	1.62 (1.4, 1.8)
Poverty 200-299% (>300%)	1.27 (1.1, 1.4)
Two Parent Step Family (Two Biological Parents)	1.75 (1.4, 2.3)
Spanish Primary Language Spoken at Home (English)	0.59 (0.5, 0.8)
Household Smoker (No Smokers)	1.60 (1.4, 1.8)
Mother Doesn't Exercise (Exercises)	1.16 (1.1, 1.3)
Child is US-Born/Parents Foreign-Born (Child and Parents are US-Born)	0.65 (0.5, 0.8)



# Logistic Regressions for Unadjusted and Adjusted Associations between Not Breastfeeding at Least Six Months and Five Lowest Prevalence States

	Unadjusted	Adjusted - All Covariates
Louisiana (Oregon - ref)	6.05 (4.5, 8.1)	4.49 (3.3,6.1)
Mississippi (Oregon)	4.93 (3.6, 6.8)	3.65 (2.6, 5.1)
Arkansas (Oregon)	4.26 (3.2, 5.7)	3.59 (2.7,4.9)
Alabama (Oregon)	4.24 (3.1, 5.7)	3.69 (2.7, 5.0)
West Virginia (Oregon)	4.17 (3.1, 5.6)	3.78 (2.8, 5.1)

# Other Factors Significantly Associated with Not Breastfeeding at Least Six Months

	Adjusted Odds Ratio
<b>Hispanic (White non-Hisp)</b>	<b>1.72 (1.4, 2.1)</b>
<b>Black non-Hispanic (White non-Hisp)</b>	<b>1.60 (1.4, 1.9)</b>
<b>Poverty 0-99% (&gt;300%)</b>	<b>1.48 (1.3, 1.7)</b>
<b>Poverty 100-199% (&gt;300%)</b>	<b>1.35 (1.2, 1.5)</b>
<b>Poverty 200-299% (&gt;300%)</b>	<b>1.26 (1.1, 1.4)</b>
<b>Spanish Primary Language Spoken at Home (English)</b>	<b>.58 (.5, .7)</b>
<b>Household Smoker (No Smokers)</b>	<b>2.00 (1.8, 2.3)</b>
<b>Mother Doesn't Exercise (Exercises)</b>	<b>1.21 (1.1, 1.3)</b>
<b>Child is Foreign-Born (Child and Parents are US-Born)</b>	<b>.52 (.4, .8)</b>

# Breastfeeding Legislation in the United States by State

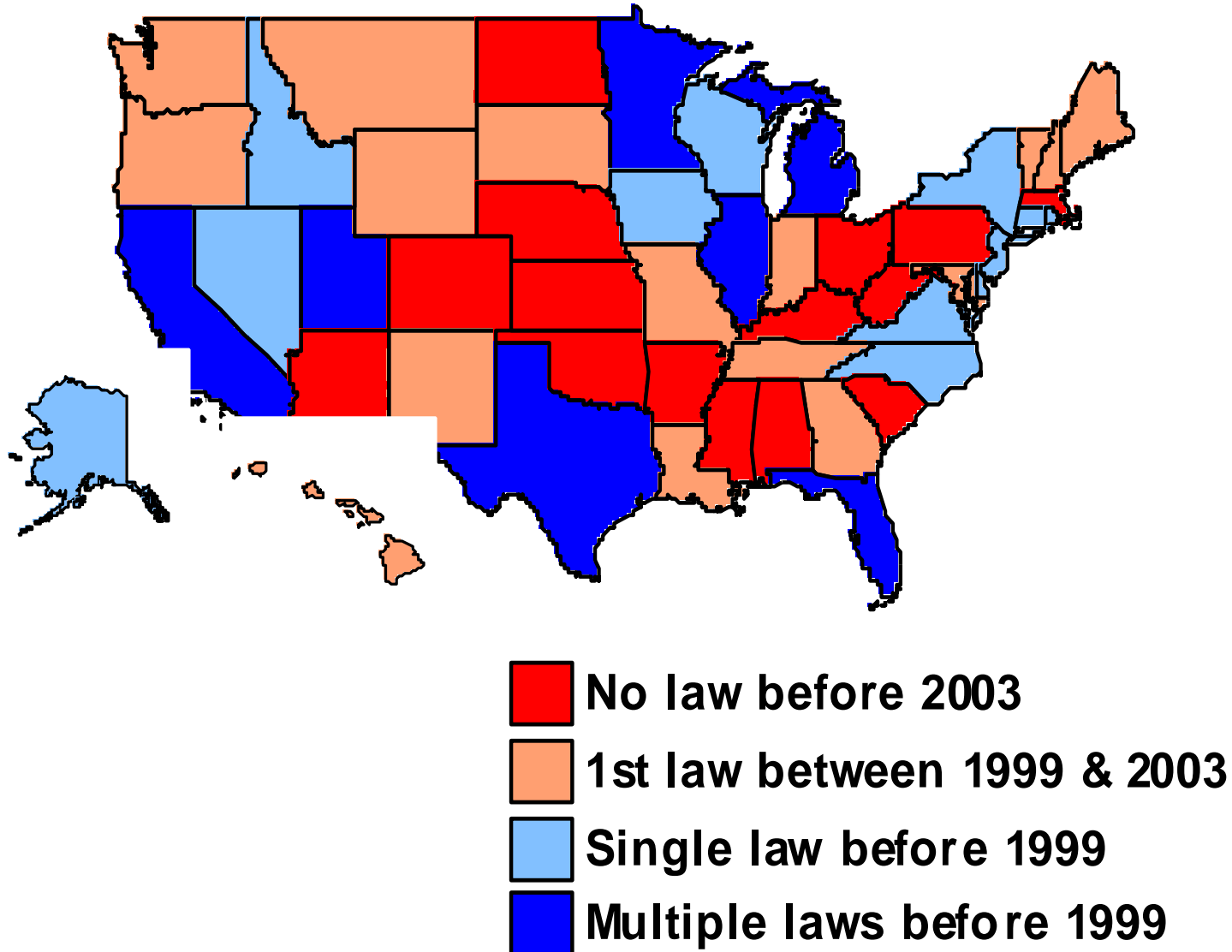
(from [www.lalecheleague.org](http://www.lalecheleague.org))

	Breastfeeding Initiation	Breastfeeding at Six Months
No Law in 2003	63.72%	32.11%
First Law between 1999 and 2003	69.28%	35.82%
Single Law before 1999	69.59%	36.48%
Multiple Laws before 1999	76.22%	42.37%

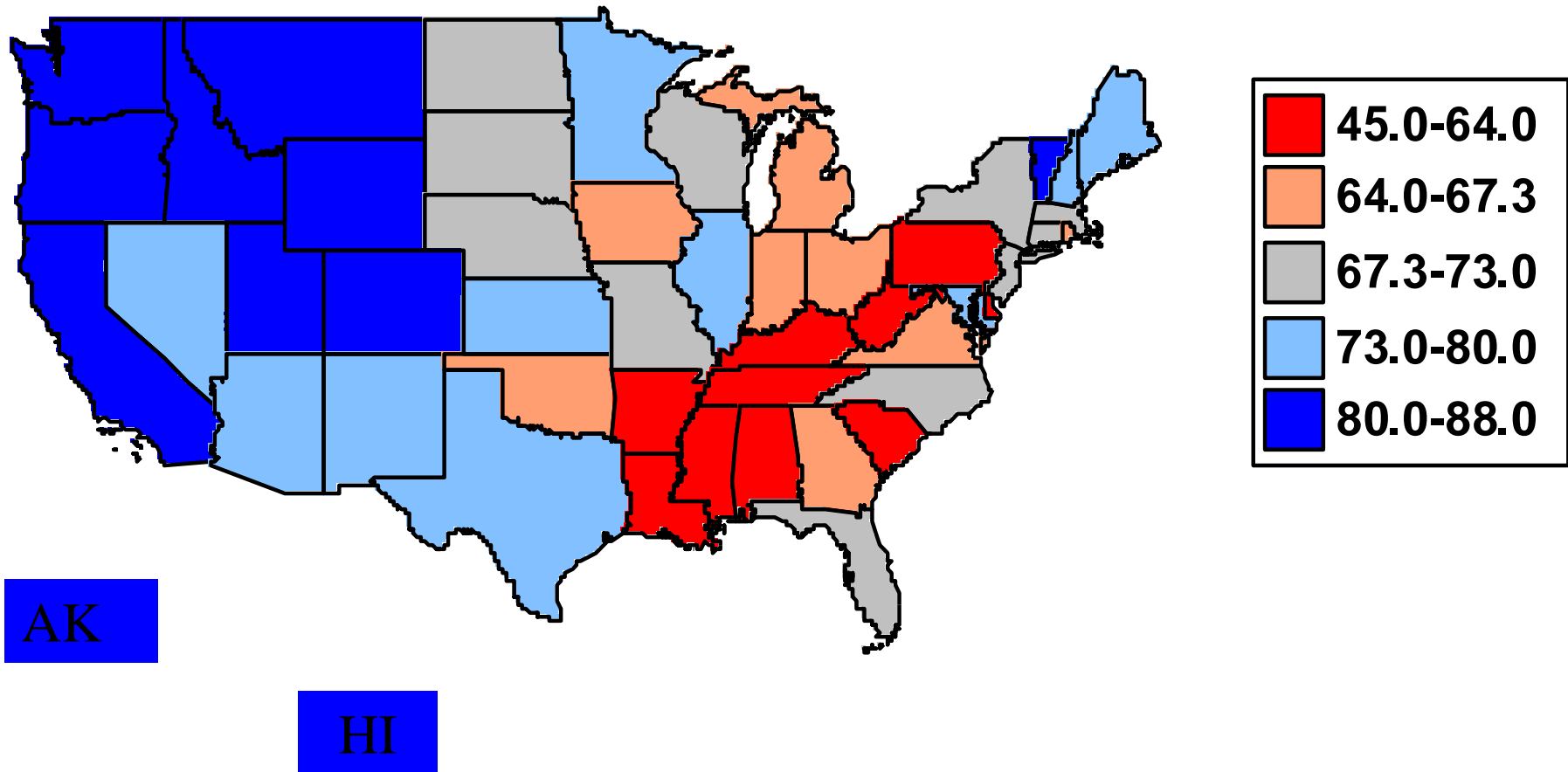
# Adjusted Odds Ratios for Association between Breastfeeding Legislation and Measures of Breastfeeding

	Never Breastfed	Did Not Breastfeed at Least 6 Months
No Law in 2003	1.63 (1.44, 1.82)	1.45 (1.30, 1.62)
First Law between 1999 and 2003	1.27 (1.12, 1.43)	1.21 (1.09, 1.35)
Single Law before 1999	1.43 (1.25, 1.64)	1.26 (1.12, 1.42)
Multiple Laws before 1999	1.00	1.00

# Breastfeeding Legislation by State



# Percentage Ever Breastfed by State, NSCH, 2003



# Limitations

- Cross-sectional survey
- No information on survey for support for breastfeeding in workplace, in hospital, through legislation
- No information on WIC eligibility and use
- No information on when women returned to work
- No information on whether children were exclusively breastfed

# Summary of Findings

- There is significant variation in both breastfeeding initiation and breastfeeding at six months by state of residence.
- While sociodemographic and behavioral characteristics are significant determinants of breastfeeding, these characteristics do not explain most of the state-to-state variation in breastfeeding rates.
- There appears to be an acculturation effect. When either the parents or children were foreign-born, the infants were more likely to be breastfed.
- Breastfeeding laws may have some effect on state variation



# Public Health Significance

- The prevalence rates for breastfeeding in this study are similar to results from other surveys.
- However, given the many reduced health risks associated with breastfeeding for both the mother and the child, it is important to eliminate disparities in breastfeeding initiation and duration.
- This study points to geographic areas to target for intervention and perhaps identifies places to study to figure out why their rates are so good and try to apply some of their promotion/support/structural-level efforts in areas with low initiation and duration rates.

# Contact Information

Michael Kogan, Ph.D.

HRSA/MCHB

Director, Office of Data and Program Development

5600 Fishers Lane, Room 18-41

Rockville, MD 20857

301-443-3145

[mkogan@hrsa.gov](mailto:mkogan@hrsa.gov)