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# National Health Security Preparedness Index Joint Workgroup Meeting on Model Design and Analytic Methodology

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# National Health Security Preparedness Index

## Joint Workgroup Meeting on Model Design and Analytic Methodology


Santa Monica, CA • 25 July 2016

UK UNIVERSITY OF KENTUCKY
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# Agenda

- Introductions
- Review of 2016 Index release
- New or revised constructs & measures for 2017
- Methods to account for uncertainty
- Generating estimates for territories
- Generating estimates for local areas
- Aligning with national frameworks
- New approaches for data visualization and display
- Next steps: workgroup structure and process

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# A Brief History

**2012**
- **Collaborative Development**: Partnership led by CDC, ASTHO and >25 collaborating organizations

**12/2013**
- **1st Release:** Initial model structure and results
  - 5 domains and 14 subdomains
  - 128 measures

**12/2014**
- **2nd Release**: Revised model and results
  - 6 domains and 18 active subdomains
  - 119 retained + 75 new = 194 measures
  - 75% of retained measures have updated data

**1/2015**
- **Transition to Robert Wood Johnson Foundation**
  - Validation studies and revision to methodology & measures

**4/2016**
- **3rd Release:** Revised model and results
  - 6 domains & 19 subdomains
  - 65% measures retained, 12% respecified, 8 new additions =134
  - 90% of retained measures have updated data from 2nd release

# 2016 Index Release

- >19,000 pageviews from >7000 website visits
- Average duration of 3 minutes
- >200 earned media hits, including 30 national and over 170 state and local media
- Highlights have included stories by Forbes, Politico, Health Affairs, The Hill, Public Health Newswire, Kaiser Health News, Emergency and Disaster Management Digest, CIDRAP News, *New Orleans Times Picayune*, *St. Louis Post-Dispatch*, *The Denver Post*, *Las Vegas Review-Journal*, PennLive, numerous NPR stations along with many others.

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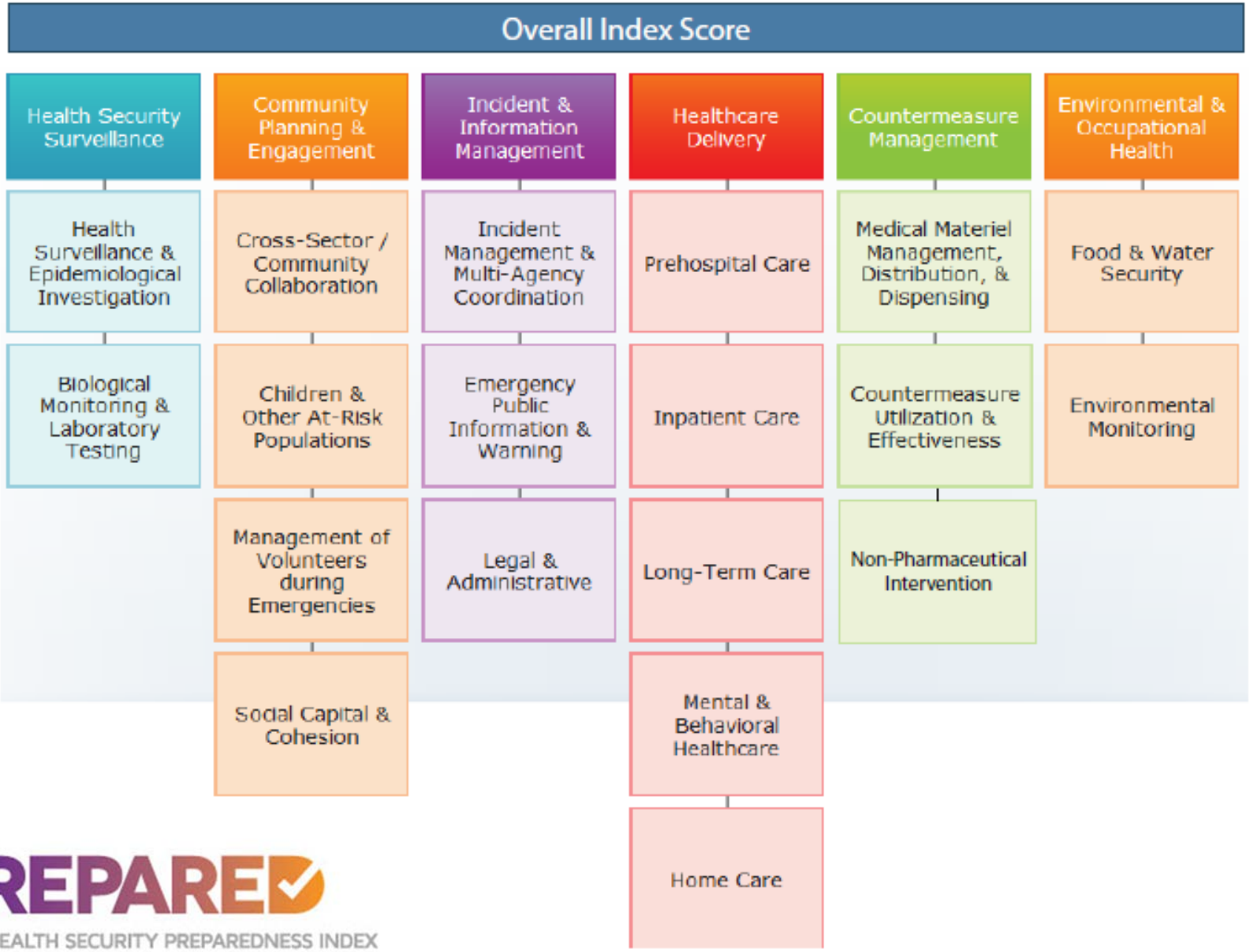
# Current Index Structure

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# 2016 Methodological Enhancements

- ***Consolidation***: reduce correlated, redundant & noisy measures
- ***Composition***: expand social, environmental economic indicators of preparedness & resiliency
- ***Grouping & weighting:*** use empirical methods for internal consistency, discriminant power
- ***Scaling:*** reflect distributional properties
- ***Comparisons:*** address accuracy and uncertainty
- ***Trending***: apply new methods/measures retrospectively

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# 2016 Changes in Measure Set

- 42 measures eliminated due to data periodicity >3 years
- 29 measures eliminated due to poor construct validity
- 22 measures respecified to improve construct validity
- 8 newly added measures

**Construct Validity**

| Domain | 2014 Alpha | 2016 Alpha |
|---|---|---|
| Health security surveillance | 0.377 | 0.712 |
| Community planning & engagement | 0.382 | 0.631 |
| Incident & information management | 0.455 | 0.734 |
| Healthcare delivery | 0.354 | 0.596 |
| Countermeasure management | 0.231 | 0.654 |
| Environmental/occupational health | 0.546 | 0.749 |

Staiger D, Dimick JB, Baser O, Fan Z and Birkmeyer JD. Empirically derived composite measures of surgical performance. Medical Care 2009;47: 226- 233. Hays RD, Hayashi T. Beyond internal consistency reliability: rationale and user's guide for multitrait analysis program on the microcomputer. Behavioral Research Methods 1990;22(2):167-75.

# Current Index Structure and Methodology

- **134 individual measures**

  Weighted average

- **19 subdomains**

  Weighted average

- **6 domains**

  Weighted average

- **State overall values**

  Unweighted average

- **National overall values**

- Normalized to 0-10 scale using min-max scaling to preserve distributions
- Imputations based on multivariate longitudinal models
- Empirical weights based on Delphi expert panels
- Confidence intervals reflect sampling and measurement error
- Annual estimates for 2013, 2014 and 2015

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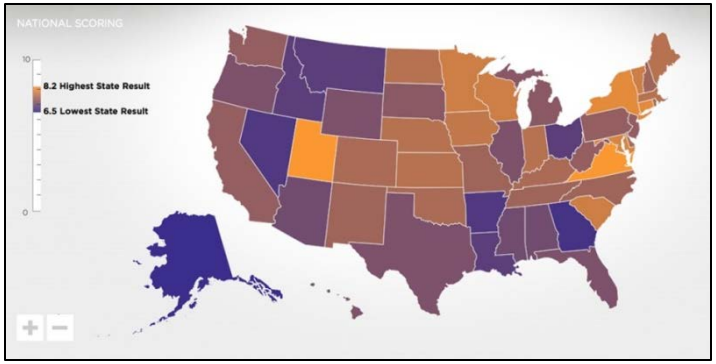
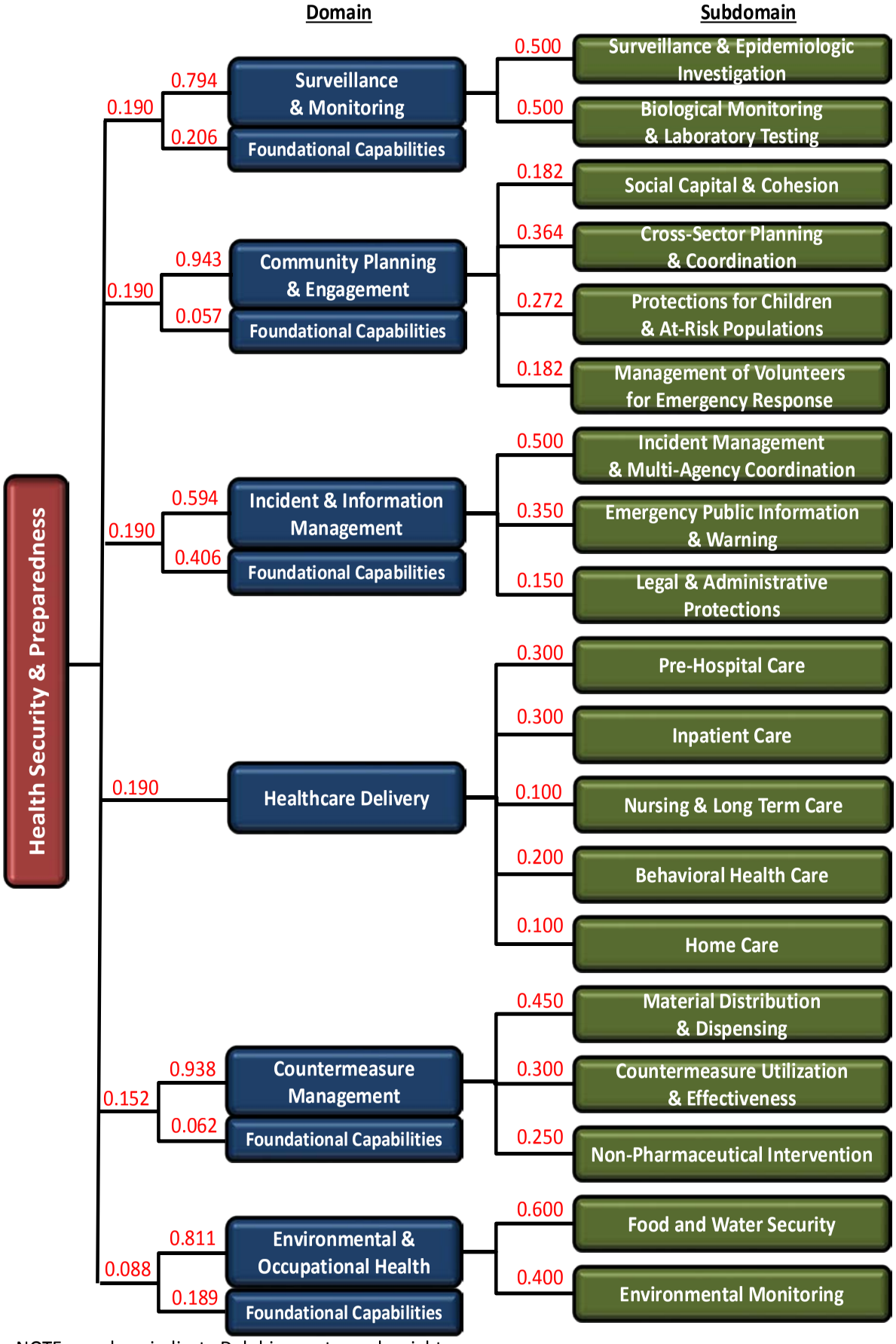
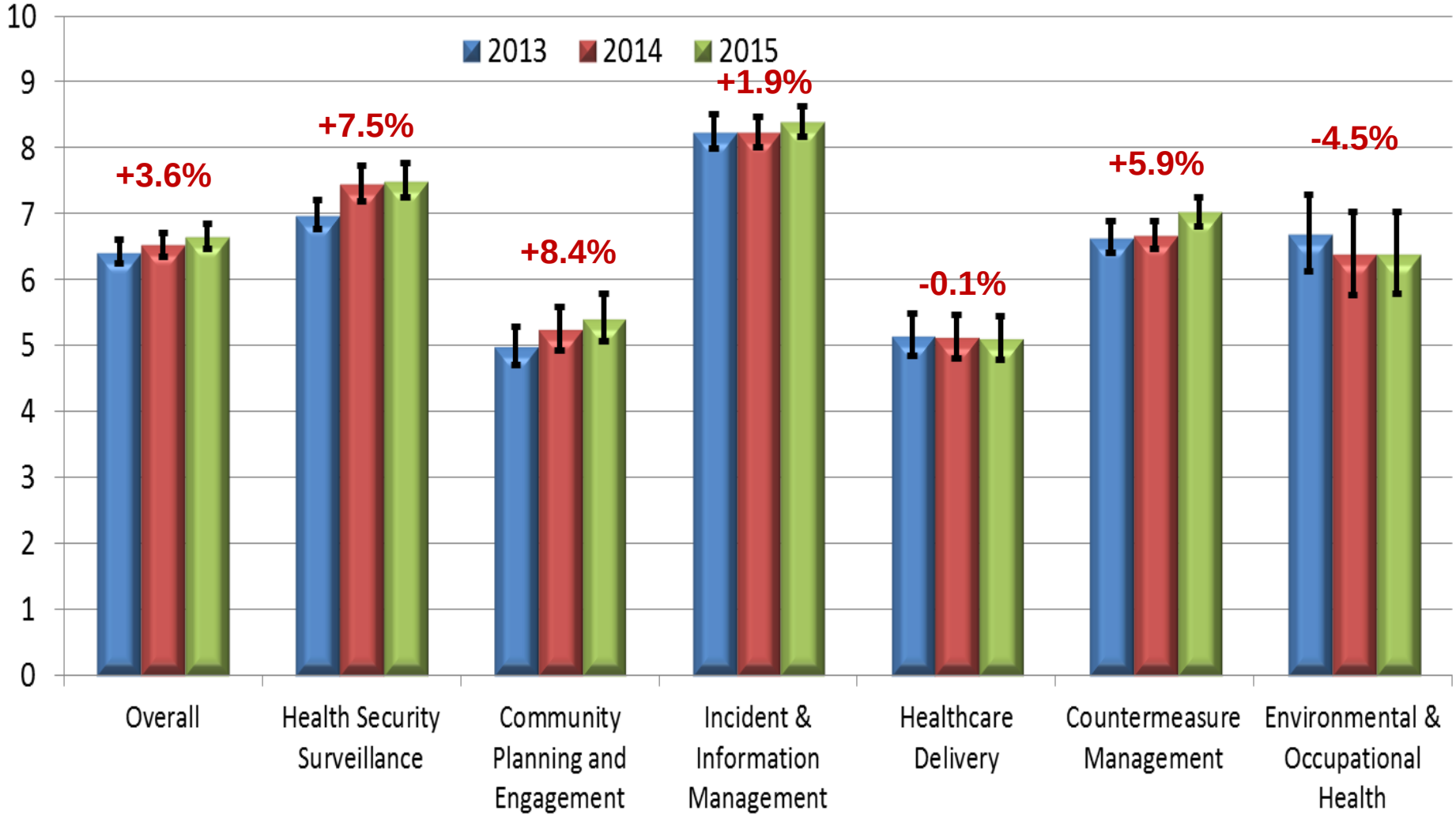


# Index Delphi Weights & Foundational Capabilities

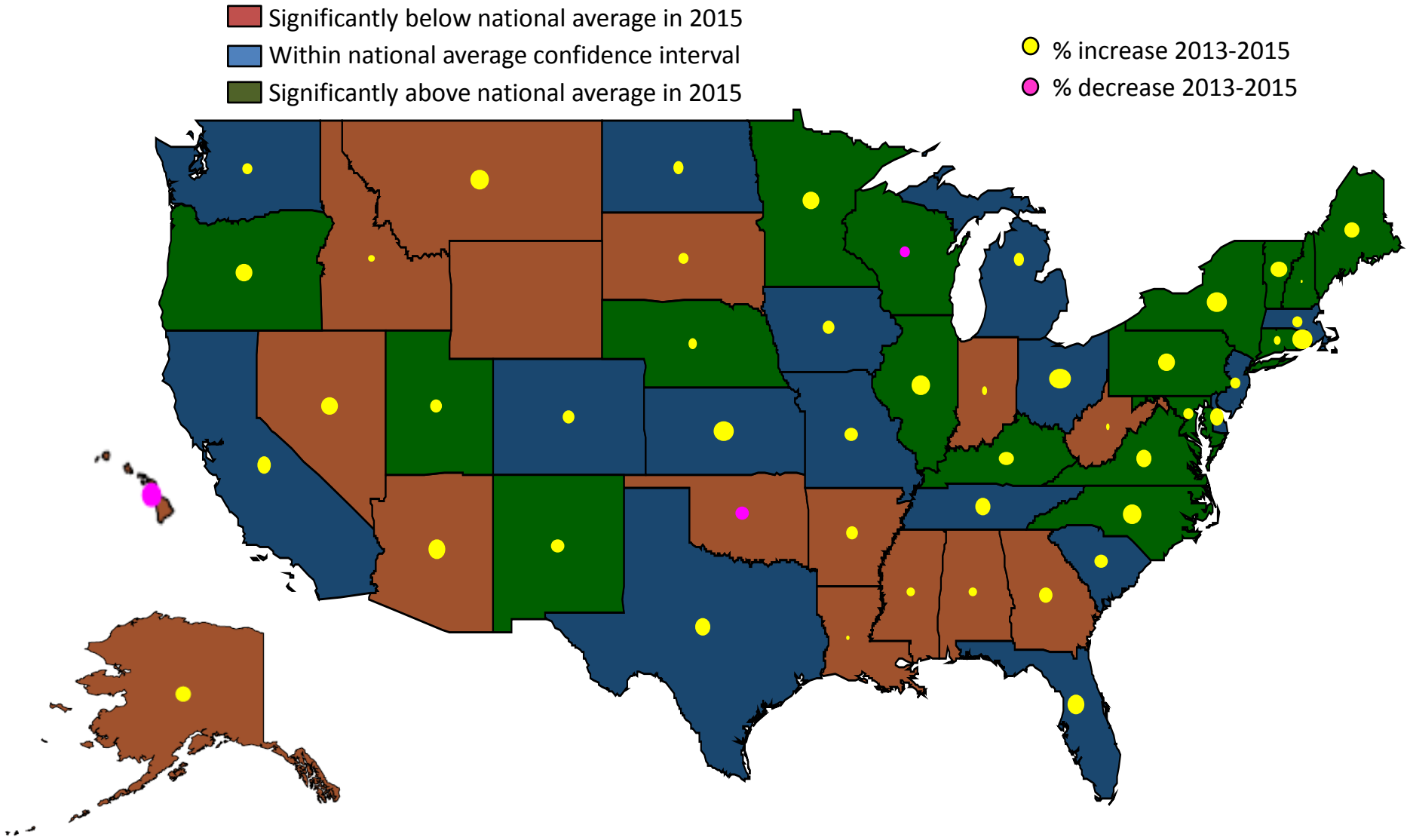



NOTE: numbers indicate Delphi expert panel weights

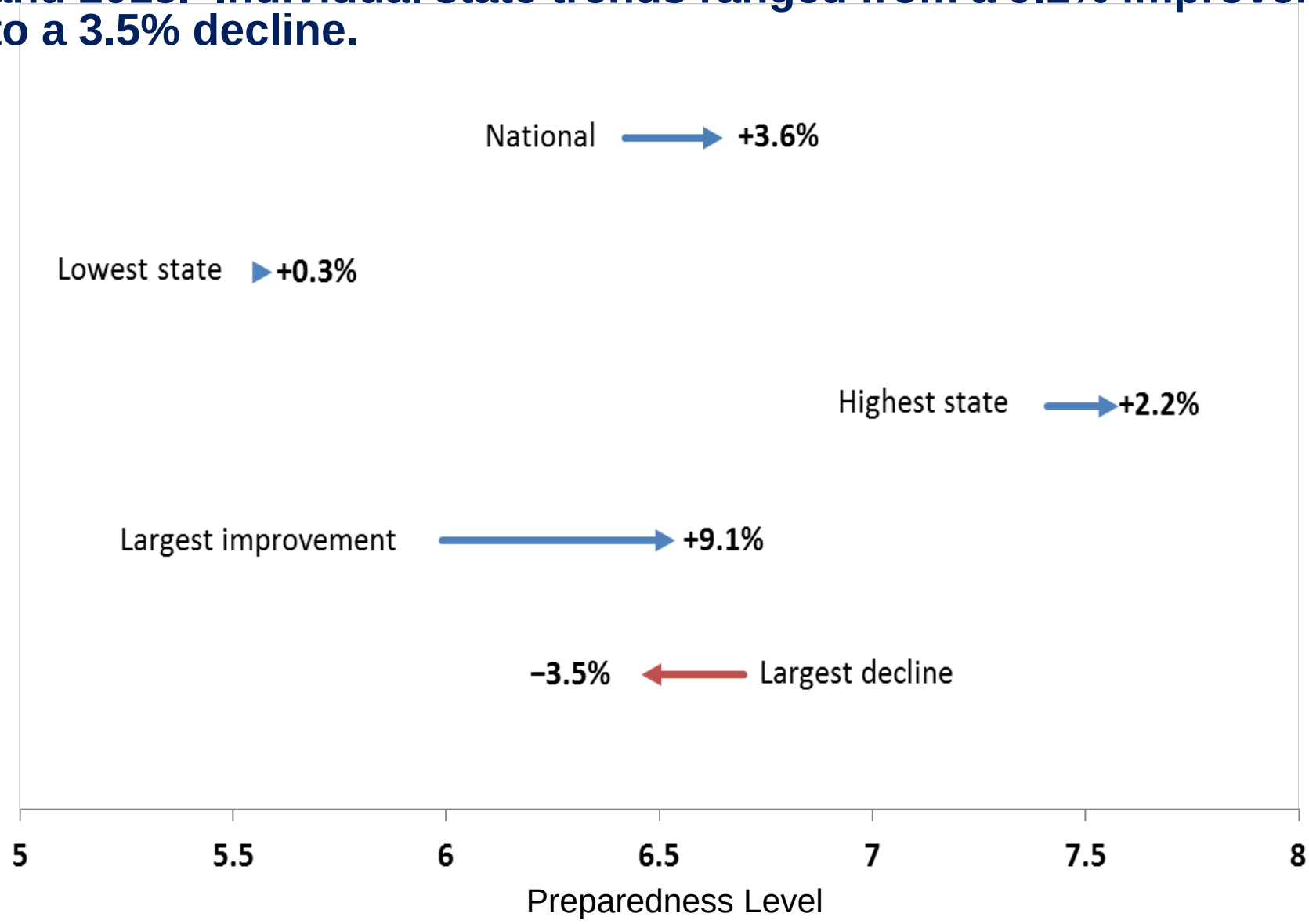
# 1. National preparedness trended upward in most functional areas during 2013-15, except in environmental health and healthcare delivery



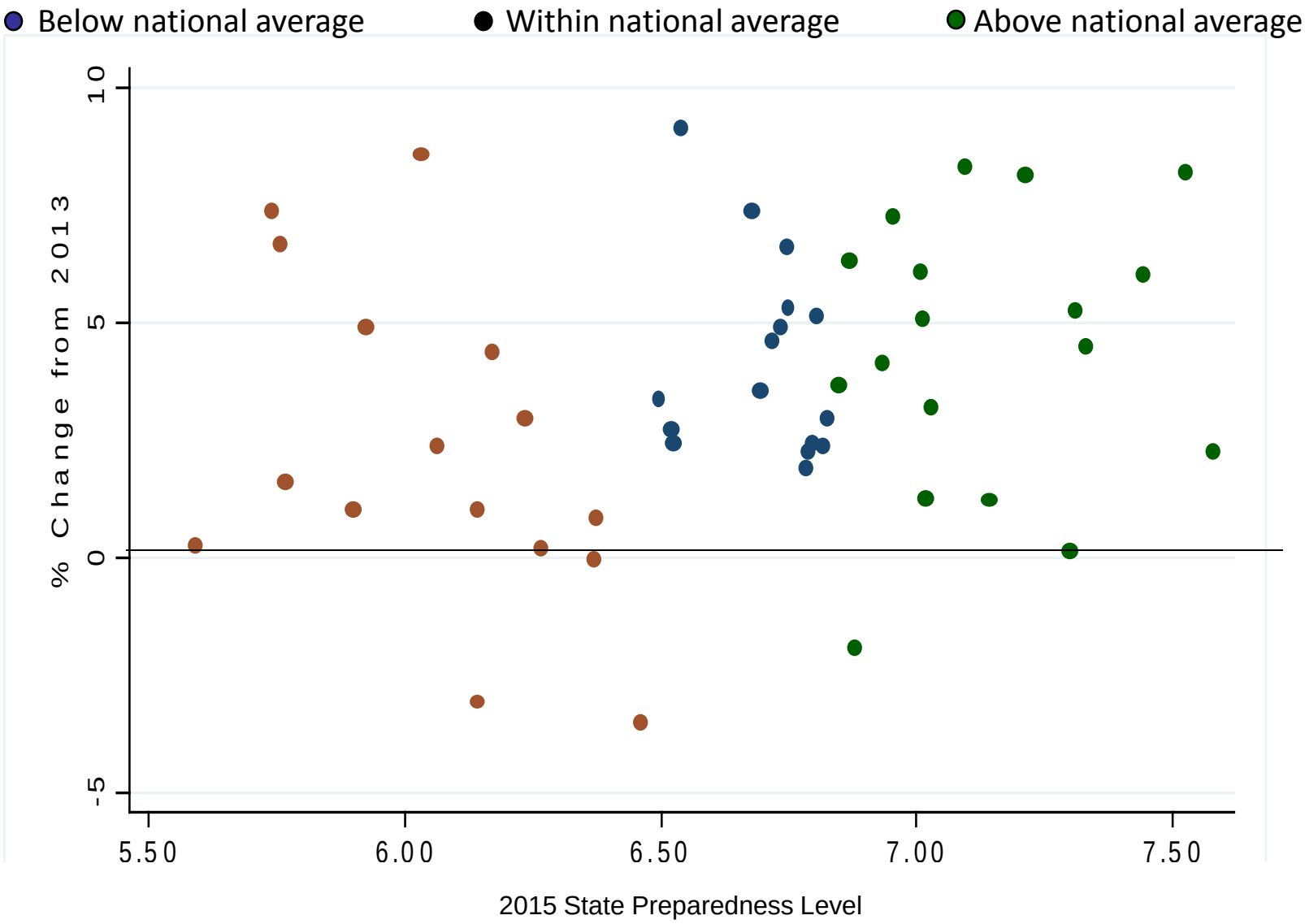
# 2. Preparedness improved in most states during 2013-15, but significant geographic differences remain.



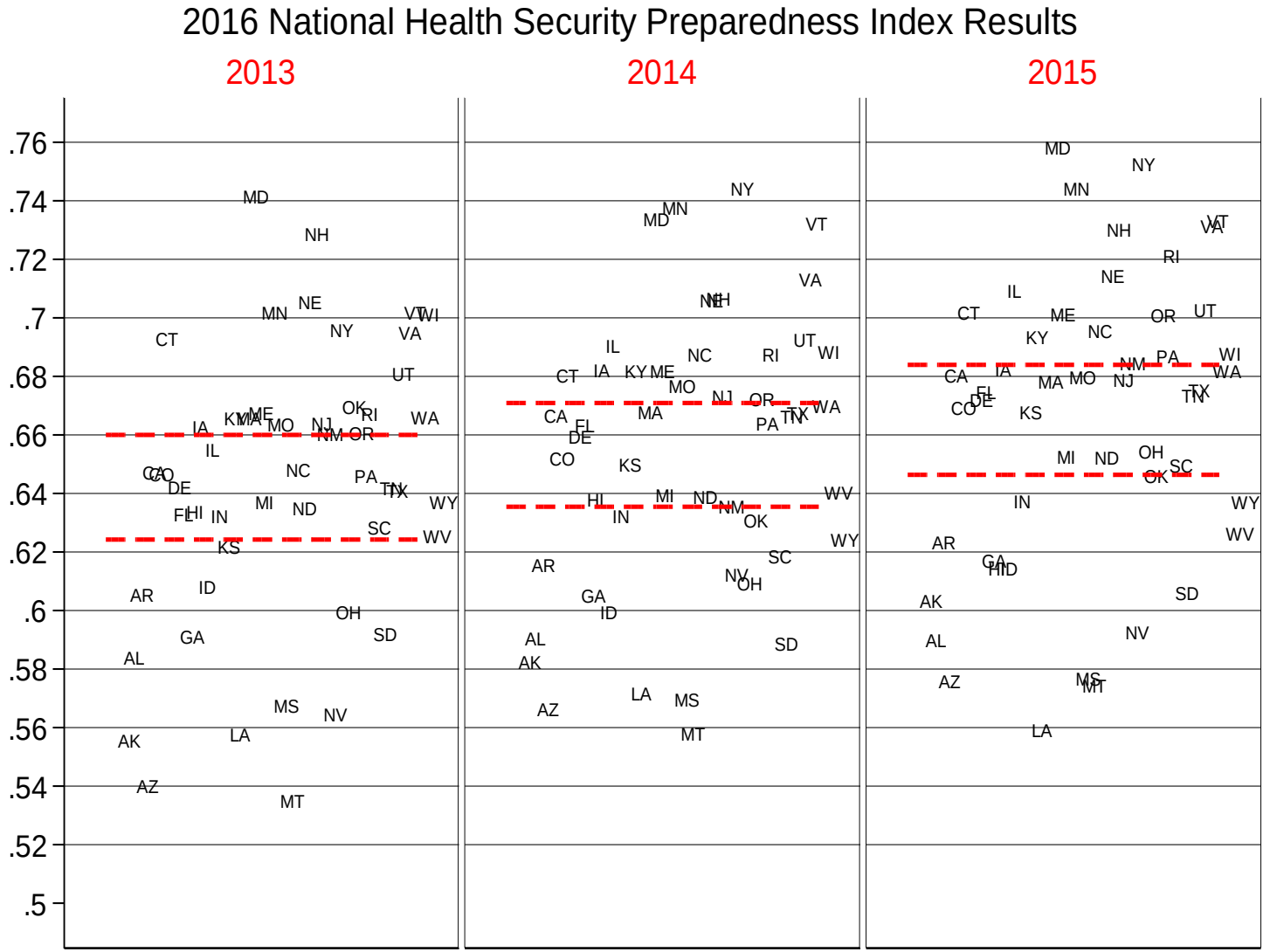
# 3. Preparedness levels improved by an average of 3.6% between 2013 and 2015. Individual state trends ranged from a 9.1% improvement to a 3.5% decline.



# 4. Improvements in preparedness occurred across the U.S. in both above-average and below-average states. However, some below-average states continued to lose ground.

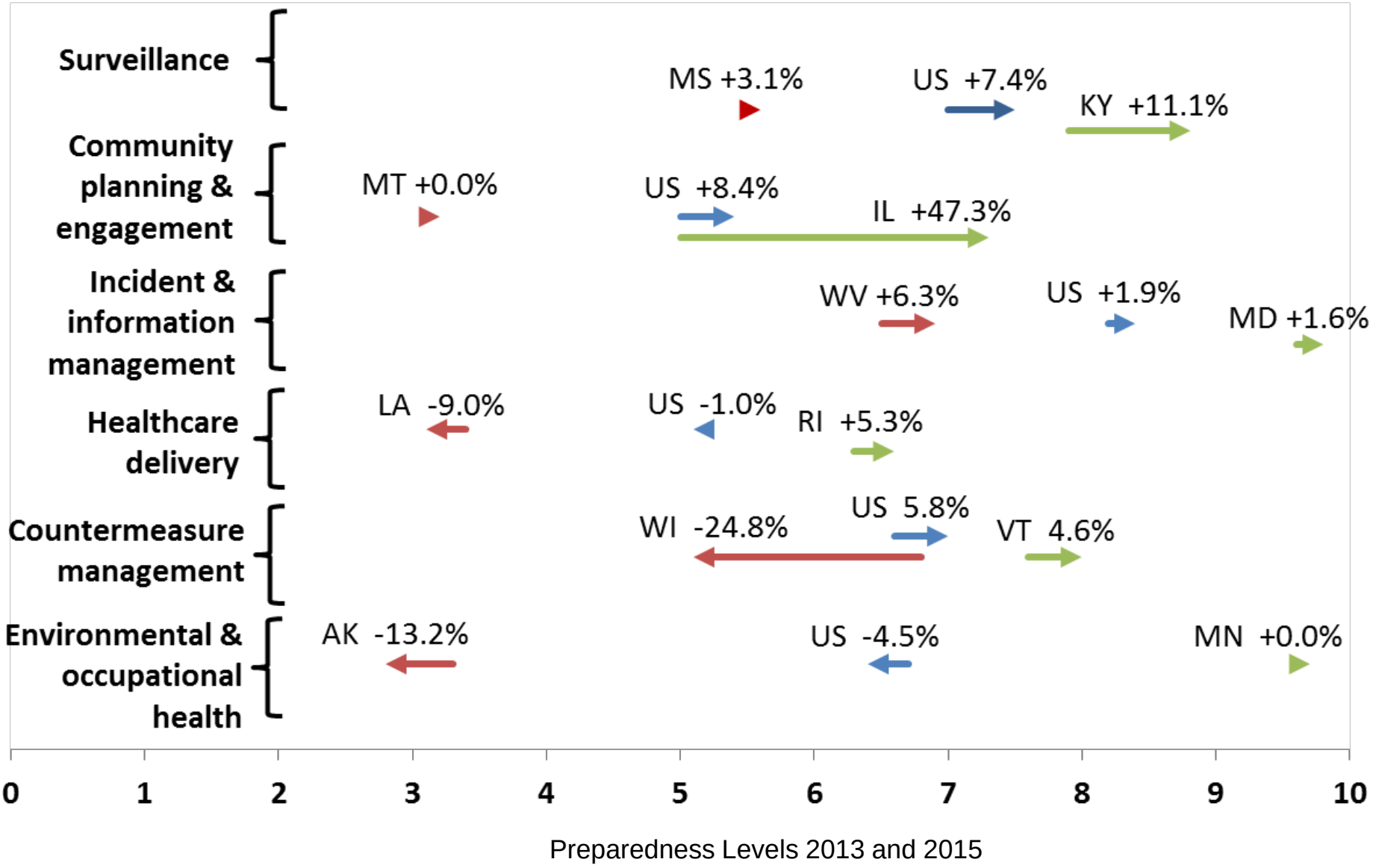


# 5. An increasing number of states score above the national average preparedness level.



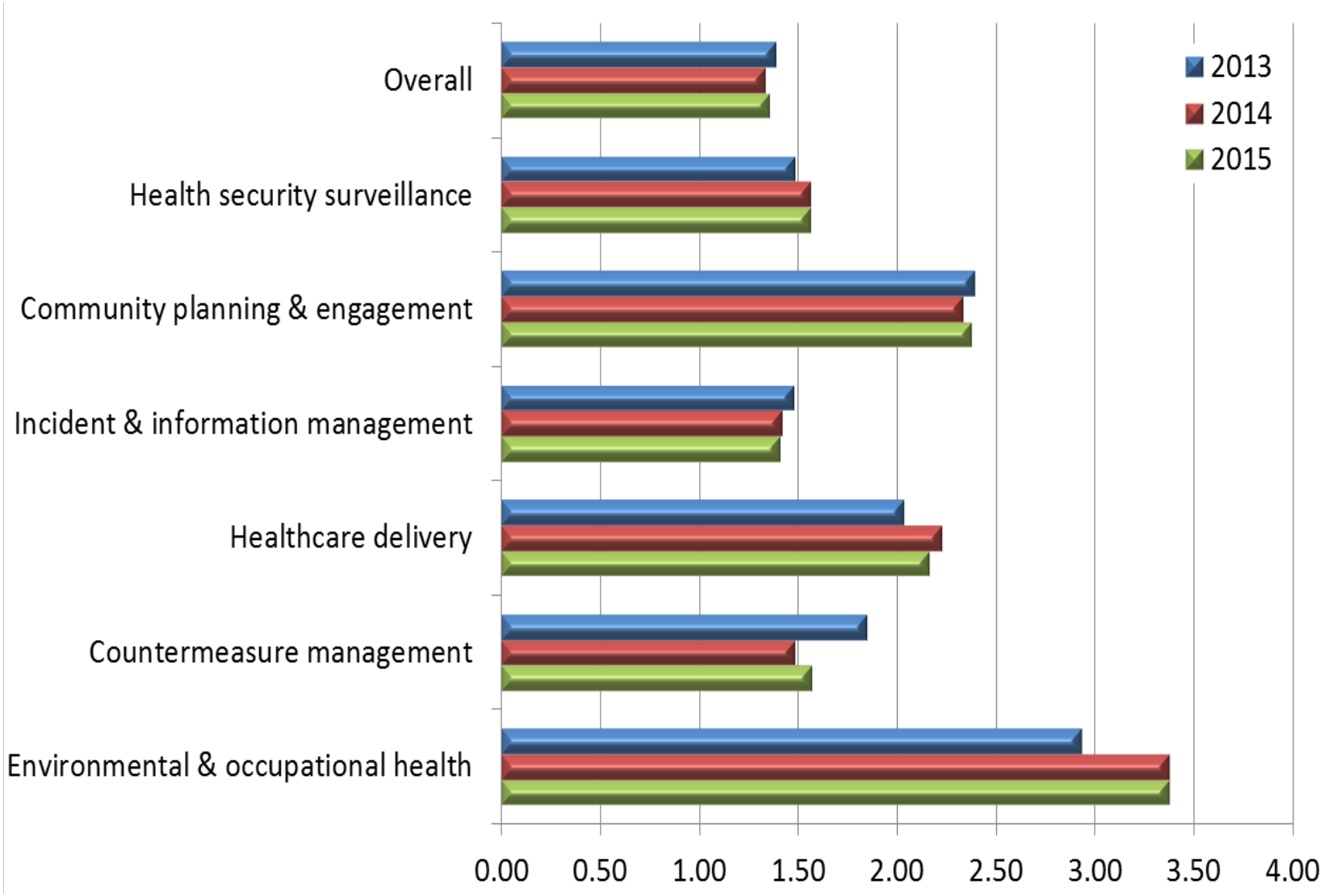

NOTE: Dotted lines represent statistical confidence intervals for the national average Index score.

# 6. Changes in preparedness levels varied widely across states and domains.

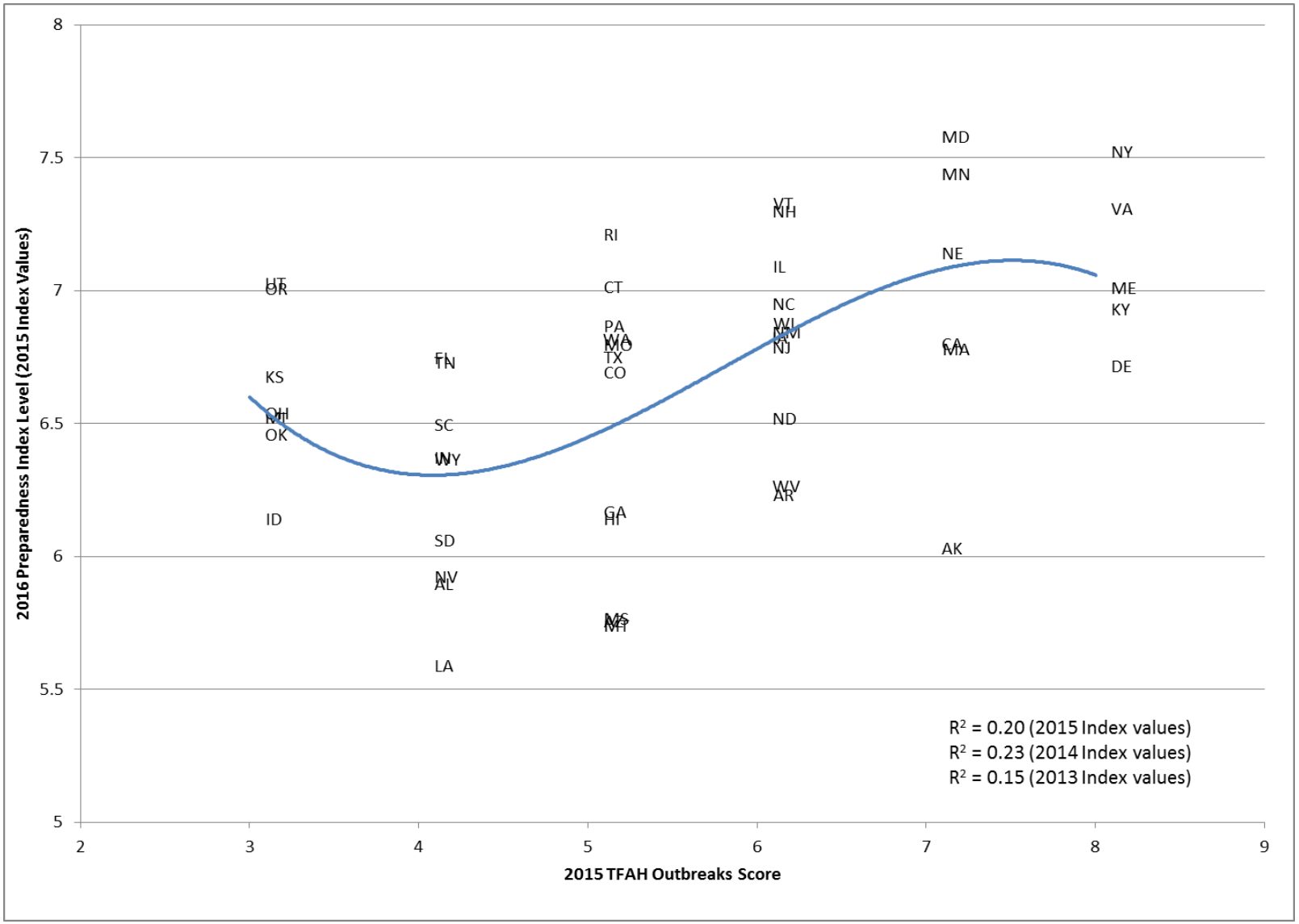



Preparedness Levels 2013 and 2015

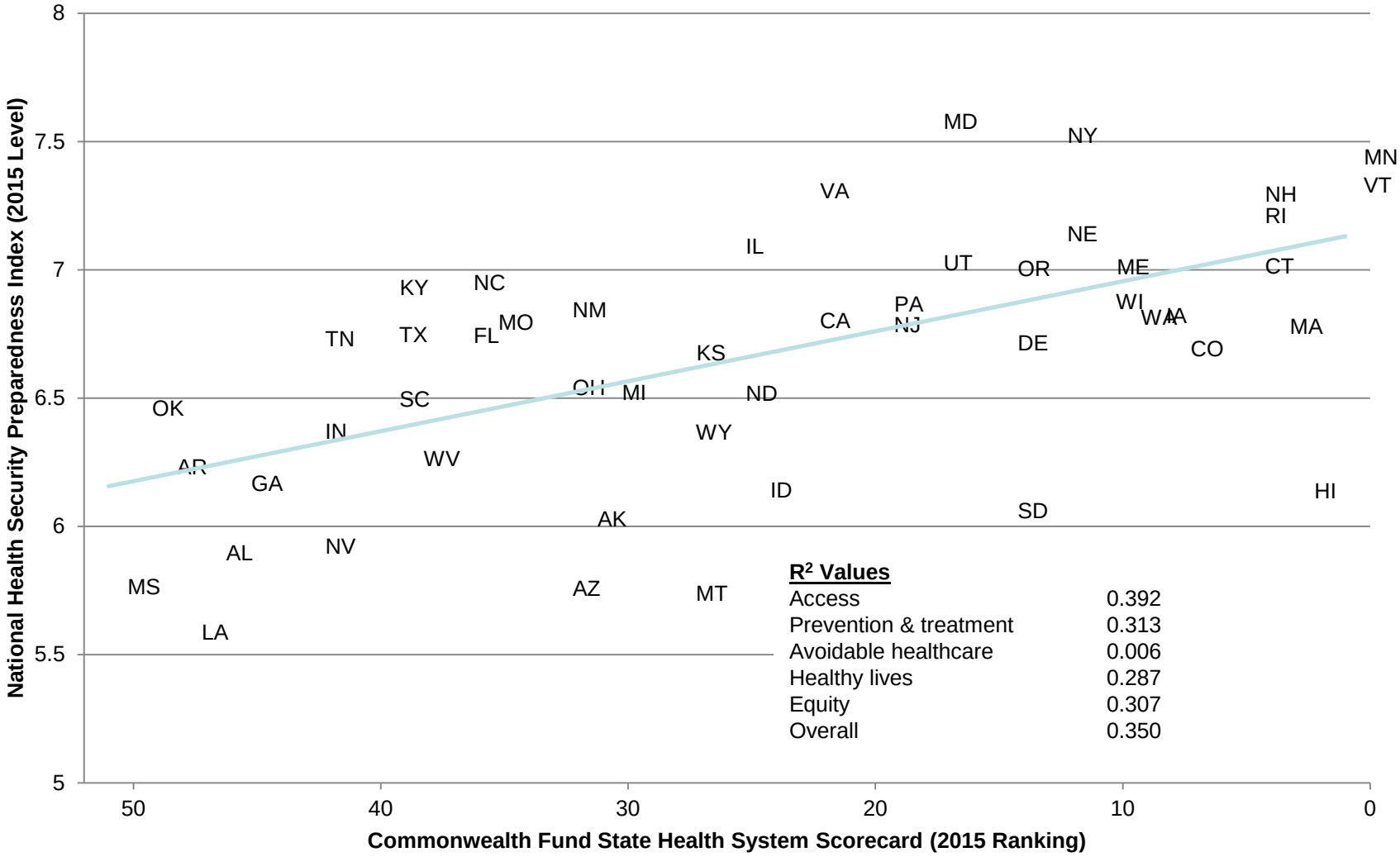
# 7. Gaps in preparedness between the highest and lowest states are large and persistent, and they have increased in environmental health and in healthcare delivery.



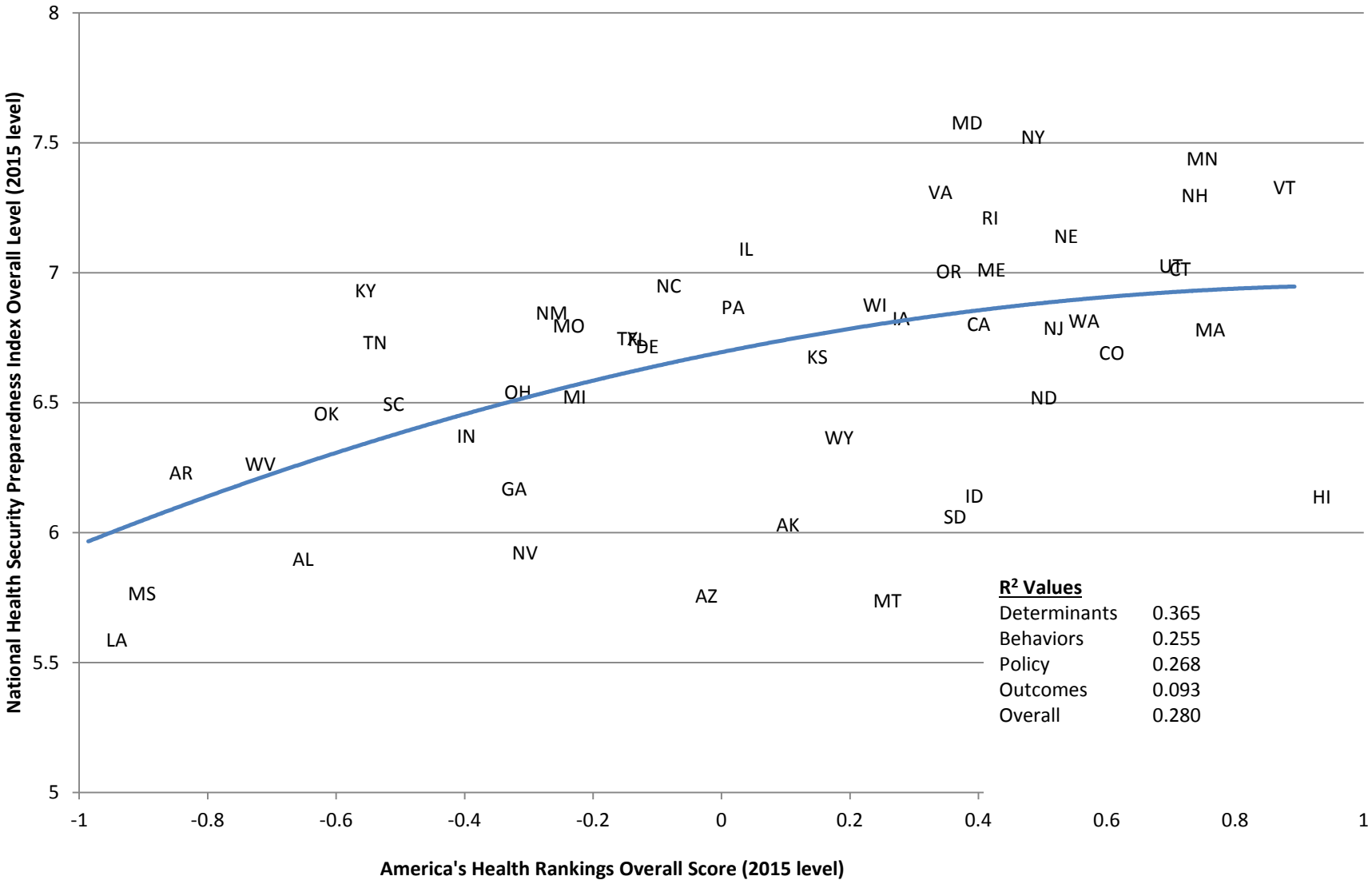
# 8. 20-23% of the variation in state preparedness levels can be explained by differences in infectious disease protections.



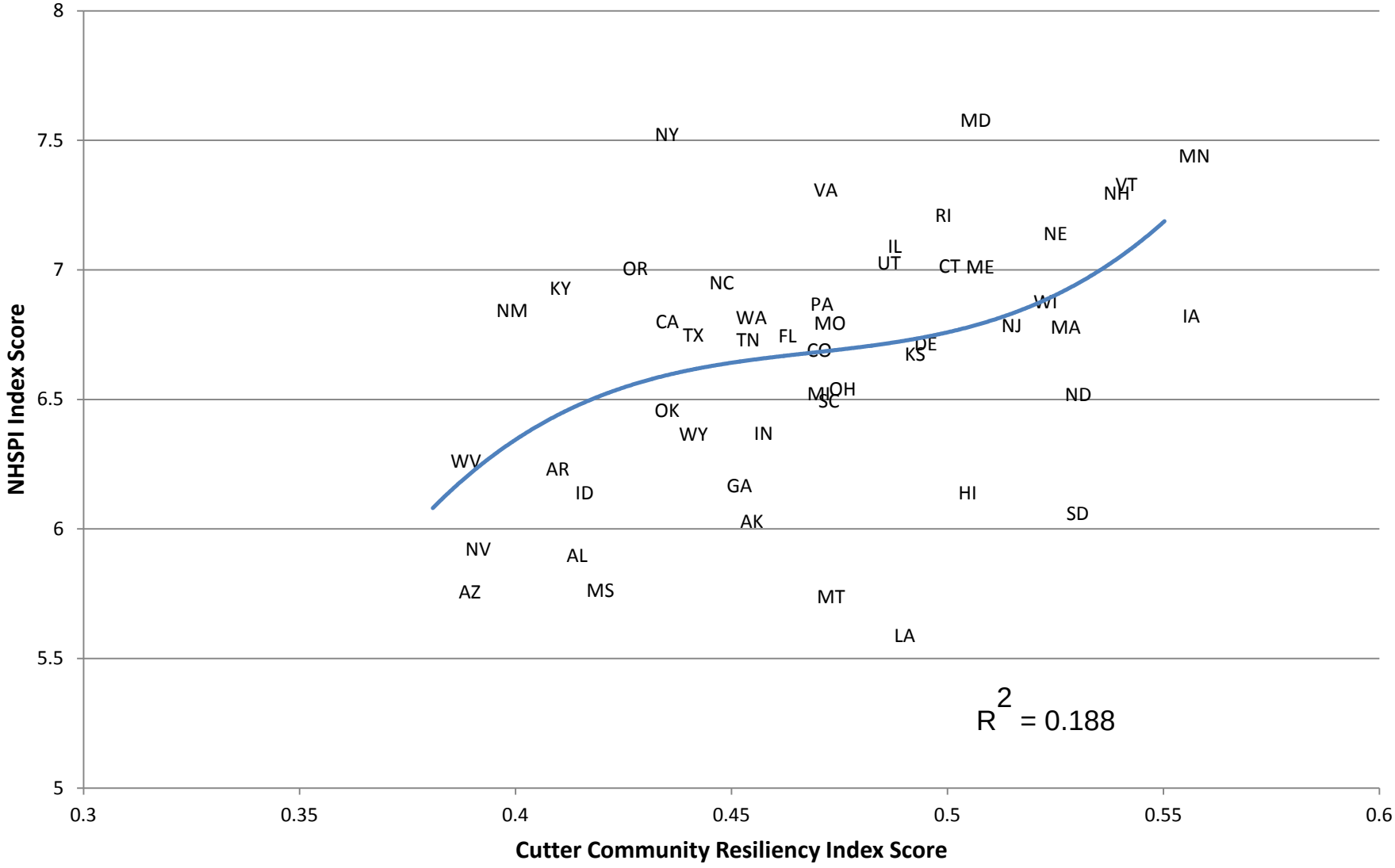
# 9. Health system performance measures track closely with state preparedness levels, indicating complementary relationships.



# 10. Public health performance measures track closely with state preparedness levels.



# 11. Preparedness levels track closely with Cutter's community disaster resiliency index.



# Discussion Item #1: Ideas for new and revised constructs and measures for 2017

- Infrastructure resilience: power, water, transportation, communication, housing, public facilities, cybersecurity
- Preparedness spending/funding
- Direct federal contributions to preparedness
- Responder safety and health
- Healthcare preparedness coalitions: size, composition, effectiveness

# Discussion Item #2: Addressing uncertainty in measures

- Use of Bayesian shrinkage estimator to generate composite measures and confidence intervals

# Discussion Item #3-4: Calculating Index values for other geographies

- Territories
- Metropolitan areas
- All counties
- Other

# Discussion Item #5: Aligning with other national preparedness frameworks

- Healthy People 2030
- National Health Security Strategy
- PHEP and HPP capabilities
- RWJF Culture of Health Action Framework
- Other?

# Discussion Item #6: Data visualization and display

- Comparisons across domains/subdomains
- Comparisons across geographies
- Comparisons over time
- Comparisons with other metrics
- Other?

# Discussion Item #7: Next steps in Workgroup discussions

- Workgroup composition
- Process for workgroup virtual meetings

# National Advisory Committee Members | 2015-16

1. Tom Inglesby, (Chair) UPMC Center for Health Security
2. Robert Burhans, Emergency Management Consultant
3. Anita Chandra, RAND
4. Ana-Marie Jones, Collaborating Agencies Responding to Disasters
5. Eric Klinenberg, New York University
6. Jeff Levi/Dara Lieberman, Trust for America's Health
7. Nicole Lurie, Assistant Secretary for Preparedness and Response
8. Stephanie Lynch, Caddo Parish (LA) Commissioner
9. Suzet McKinney, Chicago Department of Public Health
10. Stephen Redd, CDC Office of Public Health Preparedness & Response
11. Richard Reed, American Red Cross (through 2/2016)
12. Martin Jose Sepulveda, IBM Corporation
13. Claudia Thompson, NIH National Institute of Environmental Health Sci.
14. John Wiesman, Washington State Secretary of Health

# For More Information

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**National Program Office**

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