National Health Security Preparedness Index

Analytic Methodology & Model Design Work Group Meeting

May 16, 2017

NHSPI Program Management Office
University of Kentucky
Agenda

- Release of the 2017 Index
- Data linkage and analysis efforts to stimulate (provoke?) dialogue and discussion about improving health security
  - Analyses to uncover causes and consequences of change in health security
Tackling Inequality in Health Protections Using the National Health Security Preparedness Index

Glen Mays, PhD, MPH
University of Kentucky
www.nhspi.org
Why a Health Security Index?

Increase awareness of health security as a shared responsibility of multiple sectors

- Identify strengths and vulnerabilities
- Track progress
- Encourage coordination & collaboration
- Facilitate planning & policy development
- Support benchmarking & quality improvement
- Stimulate research & innovation
A Brief History

2012
- Collaborative Development: 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
  - Measures: 119 retained + 75 new = 194 measures

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 active subdomains
  - Measures: 65% retained, 12% respecified, 8 new = 135 total
  - Valid comparisons over time + confidence intervals

4/2017
- 4th Release: Refined model and results
  - Added District of Columbia
  - Measures: 4 dropped, 7 respecified, 8 new = 139 total
What the Index measures
Enhanced Methodology

- 139 individual measures
- Normalized to 0-10 scale using min-max scaling to preserve distributions
- 19 subdomains
- Imputations based on multivariate longitudinal models
- 6 domains
- Empirical weights based on Delphi expert panels
- State overall values
- Bootstrapped confidence intervals reflect sampling and measurement error
- National overall values
- Annual estimates for 2013-2016

<table>
<thead>
<tr>
<th>Reliability by Domain</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health security surveillance</td>
<td>0.712</td>
</tr>
<tr>
<td>Community planning &amp; engagement</td>
<td>0.631</td>
</tr>
<tr>
<td>Incident &amp; information management</td>
<td>0.734</td>
</tr>
<tr>
<td>Healthcare delivery</td>
<td>0.596</td>
</tr>
<tr>
<td>Countermeasure management</td>
<td>0.654</td>
</tr>
<tr>
<td>Environmental/occupational health</td>
<td>0.749</td>
</tr>
</tbody>
</table>
Steady but slow progress

*statistically significant change
The U.S. improved in most domains during 2013-16, except healthcare delivery and environmental health

*statistically significant change
Geographic disparities in health security are large and persistent

2013

2014

2016

2015

Above average
Within average
Below average
%Increase in year
%Decrease in year

[Maps showing geographic disparities in health security from 2013 to 2017]
2017 Results

Improvements occurred across the U.S., but 12 states trailed or lost ground

Below national average  Within national average  Above national average

% Change from 2015

2016 Index Value

Above national average

Below national average

Within national average
## 2017 Results

Changes vary widely across states and domains

<table>
<thead>
<tr>
<th>Lowest State</th>
<th>US Average</th>
<th>Highest State</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Security Surveillance</strong></td>
<td>US +9.7%</td>
<td>VT +11.1%</td>
</tr>
<tr>
<td></td>
<td>CO +10.2%</td>
<td>VT +32.1%</td>
</tr>
<tr>
<td><strong>Community Planning &amp; Engagement</strong></td>
<td>US +16.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Incident &amp; Information Management</strong></td>
<td>US +2.5%</td>
<td>VA +7.9%</td>
</tr>
<tr>
<td></td>
<td>HI -2.9%</td>
<td></td>
</tr>
<tr>
<td><strong>Healthcare Delivery</strong></td>
<td>US +3.9%</td>
<td>NH +0.0%</td>
</tr>
<tr>
<td></td>
<td>LA -2.9%</td>
<td></td>
</tr>
<tr>
<td><strong>Countermeasure Management</strong></td>
<td>US +7.7%</td>
<td>CO +8.0%</td>
</tr>
<tr>
<td></td>
<td>AK +7.5%</td>
<td></td>
</tr>
<tr>
<td><strong>Environmental &amp; Occupational Health</strong></td>
<td>US -1.4%</td>
<td>VA +1.1%</td>
</tr>
<tr>
<td></td>
<td>OK -51.9%</td>
<td></td>
</tr>
</tbody>
</table>

Index Values in 2013 and 2016
2017 Results

Health security tracks closely with social & economic determinants of health

- Percent of population below federal poverty threshold
- Percent of population with health insurance coverage

2016 Index Value

Poverty Rate

Uninsured Rate

2016 Index Value
Racial and ethnic inequities in health security

Percent of population residing in a state with below-average health security

2017 Results

Relative Risk: 21%* 8% 38%*

*statistically significant difference
Rural-Urban differences in health security

Percent of population residing in a state with below-average health security

Relative Risk: 23%*

*statistically significant difference
2017 Results

Underlying drivers: occupational

Percent of workers with paid sick leave and telecommuting opportunities

*statistically significant change
2017 Results

Underlying drivers: organizational
Participation in Healthcare Preparedness Coalitions

- Hospitals
- EMS
- Emergency management
- Public health

Percentage: 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%
Underlying drivers: community and systems

Communities with Strong Multi-Sector Networks
(Comprehensive Public Health Systems)

*statistically significant difference
Closing gaps and inequities: Insights from the Index

- Build & connect existing networks and coalitions
- Engage the private sector
- Focus on low-resource states & settings
- Focus on stagnant and declining domains: healthcare & environmental systems
- Include insurance coverage as a security strategy
- Allow for flexibility in allocation and use of resources
Caveats and cautions

- Imperfect measures & latent constructs
- Missing capabilities
- Timing and accuracy of underlying data sources
Agenda

- Release of the 2017 Index
- Data linkage and analysis efforts to stimulate (provoke?) dialogue and discussion about improving health security
  - Analyses to uncover causes and consequences of change in health security
Workplace Practices & Health Security

- Social distancing policies are efficacious
- Paid time off (PTO), Telecommuting, and broadband
- For prime working-age adults between 25 and 54 years old
  - an estimated 81 percent have broadband access at home
  - approximately 62 percent have some form of PTO
  - about 30 percent can telecommute when they are away from their usual workplace
- Analysis of Census data reveal important equity issues
  - Controlling for income, education, race, residence, age, and gender
Independent Effect of Income

Figure 1: Estimated Relationship Between Income and Paid Time Off, Broadband at Home, & Telecommuting
(net effect of income, ages 25 to 54 years)
Independent Effect of Education

Figure 2: Estimated Relationship Between Education and Paid Time Off, Broadband at Home, & Telecommuting
(net effect of educational attainment, ages 25 to 54 years)
Workplace Practices & Health Security

This analysis illustrates how the less advantaged can be affected differently by disease outbreaks, disasters, and large-scale emergencies—and how workplace practices can either exacerbate or ameliorate health security.

See blog at: http://nhspi.org/blog/a-potentially-unhealthy-mix-how-workplace-practices-can-either-enhance-or-exacerbate-health-preparedness/
Evidence-Based Planning & Health Security

- Planning is integral to the Index
  - By item measure, subdomain, and domain

- What about a wider culture of planning at the state level?
  - Assess state-level EBP and categorize states into one of four groups: Trailing (7), Modest (28), Established (11), Leading (5)

- To what extent is a culture of planning related to increased health security?
2017 Index Overall

2017 Preparedness Index Score by Evidence-Based Policy Category
(percentage of states and district of columbia in each category)

Preparedness Index Category
- Below US
- Same as US
- Above US

Evidence-Based Policymaking Category
- Trailing (7)
- Modest (28)
- Established (11)
- Leading (5)

Source: Author’s analysis of data from the National Health Security Preparedness Index (www.nhspi.org) and How States Engage in Evidence-Based Policymaking: A National Assessment, The Pew Charitable Trusts and the MacArthur Foundation (http://www.pewtrusts.org)
Incident & Information Management Domain

![Bar chart showing 2017 NHSPI Incident and Information Management Domain Value by Evidence-Based Policy Category.](chart)

**Source:** Author's analysis of data from the National Health Security Preparedness Index (www.nhsip.org) and How States Engage in Evidence-Based Policymaking: A National Assessment, The PEW Charitable Trusts and the MacArthur Foundation (http://www.pewtrusts.org)
Community Planning & Engagement Domain

2017 NHSPI Community Planning & Engagement by Evidence-Based Policy Category

(percentage of states and district of columbia in each category)

Preparedness Index Category
- Below US
- Same as US
- Above US

Evidence-Based Policymaking Category
- Trailing (7)
- Modest (28)
- Established (11)
- Leading (5)

Source: Author’s analysis of data from the National Health Security Preparedness Index (www.nhspi.org) and How States Engage in Evidence-Based Policymaking: A National Assessment, The Pew Charitable Trusts and the MacArthur Foundation (http://www.pewtrusts.org)
Community Planning & Engagement Domain

Estimated Health Security Index Score in the Community Planning & Engagement Domain by the Use of Evidence-Based Policymaking in a State

Prevalence of Evidence-Based Policymaking Across the States
Scores based on the total number of minimum and advanced actions

EBP Categories
- CPE Domain Below U.S.
- CPE Domain Within U.S.
- CPE Domain Above U.S.
Evidence-Based Planning & Health Security

- The independent effect of EBP on Community Planning and Engagement is substantively and statistically significant
  - CPE = f(EBP, PCIncome, Long-term Financial Obligations)
  - More EBP = Higher CPE
- Building support for evidence-based policymaking (source: Pew & MacArthur)
  - Facilitating dialogue
  - Creating strong data infrastructure
  - Building analytical and technical capacity
For More Information

National Program Office

Supported by The Robert Wood Johnson Foundation

Glen P. Mays, Ph.D., M.P.H.  glen.mays@uky.edu

Email:    NHSPI@uky.edu
Web:       www.nhspi.org
           www.systemsforaction.org
Journal:  www.FrontiersinPHSSR.org
Archive:  works.bepress.com/glen_mays
Blog:       publichealtheconomics.org

Systems for Action

National Coordinating Center
Systems and Services Research to Build a Culture of Health