Five Years of Measuring Health Security: Steady but Uneven Progress

Glen Mays, PhD, MPH
Professor of Health Services and Systems Research
University of Kentucky

glen.mays@uky.edu
@GlenMays
www.nhsdpi.org
Health security requires collective actions across many activities and sectors

- Surveillance
- Environmental monitoring
- Laboratory testing
- Communication systems
- Response planning
- Incident management
- Emergency response
- Surge capacity
- Management & distribution of countermeasures
- Continuity of healthcare delivery
- Community engagement
- Workforce protection
- Volunteer management
- Education & training
- Drills & exercises
- Information exchange
- Evacuation & relocation
- Infrastructure resiliency
- Protections for vulnerable populations
Why a Health Security Index?

Track national progress in health security as a shared responsibility across sectors

- Raise public awareness
- Identify strengths and vulnerabilities
- Detect gains and losses
- Encourage coordination & collaboration
- Facilitate planning & policy development
- Support benchmarking & quality improvement
- Stimulate research & innovation
Measurement: National Health Security Index

- 140 individual measures, 59 data sources
  - 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
- Bootstrapped confidence intervals reflect sampling and measurement error
- 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 progress, uneven pace

*statistically significant change
The U.S. improved in most domains during 2013-17, except healthcare delivery.
Geographic differences in health security are large and growing

Results

% increase from prior year
% decrease from prior year
Above national average
Within national average
Below national average
A growing share of US residents live in regions with below-average health security.
Gains in health security far surpassed losses

- National: +2.9%
- Lowest state (AK): +1.6%
- Highest state (MD): +3.9%
- Largest gain (NM): +7.8%
- Largest loss (WV): -1.5%

Index Value in 2016 and 2017
Improvements occurred across the U.S., but 12 states were steady or lost ground

Results

Below national average  Within national average  Above national average

% Change from 2016

2017 Index Value
Changes in health security varied widely by domain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Lowest state</th>
<th>National average</th>
<th>Highest state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Security Surveillance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Planning &amp; Engagement</td>
<td>IA +0.0%</td>
<td></td>
<td>VT +0.0%</td>
</tr>
<tr>
<td>Incident &amp; Information Management</td>
<td></td>
<td></td>
<td>US +6.0%</td>
</tr>
<tr>
<td>Healthcare Delivery</td>
<td>AZ −2.7%</td>
<td></td>
<td>DC −1.4%</td>
</tr>
<tr>
<td>Countermeasure Management</td>
<td></td>
<td></td>
<td>RI +0.0%</td>
</tr>
<tr>
<td>Environmental &amp; Occupational Health</td>
<td>WY +4.2%</td>
<td></td>
<td>VA +1.2%</td>
</tr>
</tbody>
</table>

Index Value in 2016 and 2017
State transitions health security levels are common & bidirectional
Health security tracks closely with social & economic determinants of health

Percent of population below federal poverty threshold

Percent of population without health insurance coverage

Results
Health security levels vary inversely with the economic impact of past disasters.
Results

Rural-Urban differences in health security

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

Relative Risk: 23%*

*statistically significant difference
Underlying drivers: organizational

Participation in Healthcare Preparedness Coalitions
Underlying drivers: community and systems

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

Results

*statistically significant difference
Underlying drivers: occupational

Percent of workers with paid sick leave and telecommuting opportunities

*statistically significant change
Conclusions & Implications

- National progress is clear, can we accelerate & spread?
- Geographic stratification is a vulnerability -- address geographic differences with regional partnerships
- Networks and coalitions are key drivers
- Private sector contributions are important
- Social determinants matter
- Strengths & weaknesses are state-specific, flexibility and tailoring are key
- Better data & measures are needed
Caveats and cautions

- Imperfect measures & latent constructs
- Timing and accuracy of underlying data sources
- Unobserved within-state heterogeneity
- Observational, not causal, estimates
- Trends limited to 5 years
National Advisory Committee Members | 2017-18

Supported by the Robert Wood Johnson Foundation

Thomas Inglesby, MD (Chair), Johns Hopkins University
Robert Burhans, Health Emergency Management Consultant
Anita Chandra, DrPH, RAND
Mark DeCourcey, U.S. Chamber of Commerce Foundation
Eric Holdeman, Emergency Management Consultant
Harvey E. Johnson, Jr., American Red Cross
Ana Marie Jones, Interpro
Dara Lieberman, MPP, Trust for America’s Health
Nicole Lurie, MD, MSPH, ASPR (through 1/2017)
Suzet McKinney, DrPH, MPH, Illinois Medical District Commission
Stephen Redd, MD, CDC Office of Public Health Preparedness & Response
John Wiesman, DrPH, MPH, Washington State Secretary of Health

Special appreciation to Index collaborators at CDC, ASPR, ASTHO, APHL, NACCHO, RAND, members of the Model Design and Analytic Methodology Workgroup, and the Stakeholder Engagement and Communications Workgroup.

Visit or join an Index workgroup at http://nhspi.org/get-involved/
For More Information

National Program Office

Supported by The Robert Wood Johnson Foundation

Glen P. Mays, Ph.D., M.P.H.

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

To receive updates from the Health Security Index, email listserv@lsv.uky.edu with “Subscribe NHSPIIndex” in the body