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ENHANCING ACTIONABILITY OF FEDERAL AND STATE HEALTH DATA DASHBOARDS FOR SUPPORTING EVIDENCE-BASED HEALTH POLICIES AND PRACTICES

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BACKGROUND

Timely access to credible, relevant, and actionable data is essential to making evidence-informed decisions regarding public health policy and practices and data dashboards are increasingly used to this end. Dashboards afford timely, convenient, and near-universal access to public health data, transform complex data into intuitive visualizations and information displays, and allow users the flexibility of exploring data on their own to answer questions of relevance to them.

The current landscape of public health data dashboards is rapidly expanding to encompass a broad range of domains, applications, and stakeholders. As use of these tools in public health decision-making becomes more ubiquitous, it is imperative to map and analyze the current landscape of public health dashboards and to proactively consider how they may be optimally designed to be usable and useful to a range of users.

METHODS

A cluster probability sample of current U.S. federal and state public health dashboards (N=210) was analyzed for actionability using an inventory of usability and usefulness indicators. The theory-grounded coding instrument was developed and validated iteratively with input from the literature and experts and then fine-tuned via intercoder reliability tests. Dashboards sampled were accessed multiple times over a year (2024-2025) to ensure they are active. Data analyses focused on assessing and comparing actionability of federal and state dashboards and identifying areas of improvement.

Characteristics of Data Used in U.S. Federal and State Public Health Data Dashboards, 2024-2025

	All Dashboards (N=210)	Federal Dashboards (N=58)	State Dashboards (N=152)
Data Source			
Federal agency*	54.3%	98.3%	37.5%
State agency*	65.7%	0%	90.8%
Local agency*	4.3%	1.7%	5.2%
Data Type			
Epidemiological*	44.3%	29.3%	50%
Emergency care*	17.1%	6.9%	21.1%
Health services*	32.9%	25.4%	35.5%
Environmental hazard*	8.6%	5.2%	9.9%
Socioeconomic	5.2%	3.4%	5.9%
Behavioral*	12.4%	6.9%	14.5%
Health outcomes*	11.4%	8.6%	12.5%
Performance/preparedness*	12.4%	20.7%	9.2%
Social determinants of health	2.9%	3.4%	2.6%
Data Granularity			
Local*	64.8%	17.2%	82.9%
State*	86.7%	63.8%	95.4%
Regional	17.6%	17.2%	12.8%
National*	31%	100%	4.6%
Population			
General population*	53.8%	41.4%	58.6%
Patient population	12.9%	12.1%	13.2%
Provider population*	3.8%	12.1%	0.7%
Health care organizations	4.3%	6.9%	3.3%
Health services*	8.6%	15.5%	5.9%
Health records or claims*	11%	15.5%	9.2%
Health incidents or events*	7.6%	5.2%	8.6%
Vulnerable population**	22.3%	8.6%	27.6%

* $p<.05$ ** $p<.001$

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CURRENT LANDSCAPE OF FEDERAL AND STATE HEALTH DASHBOARDS

- Federal and state data dashboards are predominantly used for epidemiological/ risk surveillance, but also for tracking use of health services, and assessing system performance or preparedness.
- A smaller percentage of dashboards track trends in health policy, public health workforce, and social determinants of health.
- Dashboards are primarily designed to document and assess health-related disparities but not also for mapping and tracking assets that could be leveraged to improve public health outcomes.
- Data collected by the federal government is used in over half of all dashboards sampled, including 98% of all national dashboards and 37% of all state dashboards. Most state dashboards (91%) use in addition or exclusively data collected by state health departments.
- Only about a quarter of all dashboards utilize data that adequately represent vulnerable populations. State dashboards were significantly more likely than federal dashboards to incorporate such data, mostly data on infant and child health indicators and Medicaid recipients.

ACTIONABILITY ASSESSMENT

- Dashboard actionability is a function of **usability** (accessibility, ease of navigation, interactivity, and availability of technical support) and **usefulness** (credibility and relevance, data affordances, analytical affordances, and interpretation/inference affordances)

	Federal Dashboards (N=58)	State Dashboards (N=152)
Accessibility and Ease of Navigation		
ADA-compliant website**	55.20%	9.20%
Standalone web page**	69%	52.60%
Parent or main landing page**	31%	46.10%
Multi-dashboard hub**	46.50%	67.70%
Interactivity		
Visualization download option	55.20%	46.10%
Data download option**	82.90%	40.10%
User feedback option**	43.10%	27%
Technical Support		
Use instruction on website**	86.20%	65.80%
Illustrations or examples of use**	34.50%	9.20%
Link to available training*	10.30%	5.30%
Contact info for inquires	29.30%	32.90%
Credibility and Relevance		
Trust certificate included**	96.60%	42.10%
Intended users not specified	86.20%	84.90%
Researchers**	6.90%	1.30%
Health professionals**	3.40%	6.60%
Data Affordances		
Epidemiological surveillance**	43.10%	66.90%
Risk surveillance**	8.60%	19.90%
System performance monitoring**	27.60%	7.30%
Analytical Affordances		
Descriptive analysis	100%	100%
Trend analysis	94.80%	92.10%
Multivariate analysis**	22.40%	6.60%
Choice analysis**	19%	3.90%
Interpretation Affordances		
Brief explanation/disclaimer	100%	98.70%
Data storytelling*	0%	3.90%
Link to additional information**	93.10%	68.40%

* $p < 0.05$, ** $p < 0.001$.

- Only 22% of dashboards are ADA-compliant (55% of federal dashboards and 9% of state dashboards) and most (57%) are accessible via a standalone webpage that may be difficult for users to find. State dashboards often utilize multi-dashboard hubs that are easier for users to find and use.
- Federal dashboards are generally more interactive than state dashboards and offer more robust technical support. However, none of the dashboards analyzed offers users the option to generate visualizations tailored to their specific questions or information needs.
- Most federal and state dashboards (85%) do not explicitly identify intended users or explain how and for what purpose they may use this tool.
- State dashboards appear to be skewed toward using dashboards primarily for epidemiological and risk surveillance whereas federal dashboards use dashboards in addition to track and assess health systems' performance.
- While both levels provide descriptive and trend analysis, federal dashboards offer higher-level analytical affordances. They are more likely to feature multivariate analysis (22.4% vs. 6.6%) and choice analysis (19% vs. 3.9%).

IMPROVING DESIGN AND IMPLEMENTATION

- **Actionability by design**: A primary challenge is lack of a standard approach to design and implementation of usable and useful dashboards. There are significant differences in how, for whom, and for what purpose public health dashboards are created as well as in their relative ease of access and use to different users. Dashboards created by federal agencies are more likely to conform to uniform design standards than dashboards created by state public health departments, but the process of designing and implementing dashboards does not appear to follow systematic strategy focused on maximizing usability and usefulness. This likely reflects the current state of research and evidence to guide optimal design and implementation of dashboards, which remains mostly disjointed, lacking firm grounding in theories or frameworks that logically link usability and usefulness affordances to user experience and learning, and is limited to insights obtained from descriptive case studies as opposed to rigorous evaluations.
- **Routine, reliable, and sustained access**: Access to both federal and state public health data dashboards may be disrupted and become unreliable, but for different reasons: state dashboards rely heavily on third-party platforms for designing and hosting dashboards and are susceptible to disruptions caused by licensing or technical issues, whereas federal dashboards are susceptible to disruptions due to changes in federal policies and mandates regarding data collection and sharing. Public health data are critical public good, and federal government dashboards are especially susceptible to impacts of disappearing or altered public health data.
- **Data in context**: data indicators most frequently used in dashboards emphasize infectious disease, chronic conditions, mortality, and risk factor exposures, with less attention to upstream factors that impact population health such as social determinants of health. Dashboards may be further perpetuating chronic underrepresentation of socially vulnerable populations in public health data without acknowledging inequitable representation.

RESEARCH AND PRACTICE IMPLICATIONS

- Realizing the full potential of dashboards to provide timely, relevant, credible, and actionable insights for informing sound policy and practice requires convergence on a common set of standards and best-practices at the federal and state levels for guiding design and implementation of usable and useful dashboards.
- It is critical that such standards and best-practices be evidence-based and emerge from collaborations between designers, users, and intermediaries, which calls for additional investments in theoretically grounded and methodologically rigorous research to clarify and advance the science underlying dashboard design.
- Additional investments are also needed to support all users of these tools by providing adequate training, technical assistance, and improved customer support.
- Beyond that, greater consideration ought to be paid in the design and implementation process to ensuring data equity, interoperability, transparency, and governance.

To learn more about the project , please visit the project website: https://ph3d.rutgers.edu/ or scan the QR Code below.