Unlock Actionable Insights with User-Focused Data Visualization Solutions

JULY 17, 2024
Janell Kochevar, UXC
Lisa Lines, PhD, MPH
Patrick Brown, MS
David Birchfield, PhD, MA
Darigg Brown, PhD, MPH
Webinar Overview

The importance of user-centered design in promoting data accessibility and usability among target audiences

How fit-for-purpose visualization solutions can make complex data more actionable

Processes for applying user-centered design principles across a variety of digital data solutions to quickly produce valuable insights
Today’s Presenters

Lisa Lines
Senior Health Services Researcher
RTI International

Patrick Brown
Technical Director
RTI International

David Birchfield
Senior Director
RTI International

Darigg Brown
Program Manager
RTI International
CASE STUDY

The RTI Rarity™ Project
RTI Rarity

Award-Winning RTI Solution

200+ Measures in 16 Domains

Research-Ready, Validated Data Library

Improve Health Equity through Targeted Interventions

Understand and Account for SDOH and Other Community Context

Identify Communities in Need of Extra Resources

RTI Rarity.io
RTI.org/Rarity
Internal Query Engine

Filter

Classification
- COVID
- Community
- Composite

Demographics
- Education
- Environment
- Food

Geography
- Healthcare
- Housing
- Illness
- Justice
- Policy

Poverty
- SRH
- Stress

Transportation
- Wellbeing

Data Resolution
- County
- Tract
- ZCTA

State Availability
- Nationwide

Data Contributor

RTI GeoMetrix

Search Variables

4-year HS graduation rate
- Years: 2011 - 2018
- Contributor: RTI Rarh
- Source: Robert Wood Johnson Foundation (RWJF) County Health Rankings

ACSC hospitalization rate
- Years: 2010
- Contributor: RTI Rarh
- Source: Robert Wood Johnson Foundation (RWJF) County Health Rankings

ADI Percentile
- Years: 2019
- Contributor: RTI Rarh
- Source: Neighborhood Atlas

Adult incarceration rate
- Years: 2010
- Contributor: RTI Rarh
- Source: Prison Policy Institute (PPI)

AIAN, non-Hispanic
- Years: 2014 - 2019
- Contributor: RTI Rarh
- Source: American Community Survey (ACS) 5-year Estimates

183 variables in your current filter settings
How We Create Local Social Inequity Scores

- Conceptual model
- Data curation
- Random forests, XGBoost, etc.
- Ranked percentile scores
- Validation
Local Social Inequity Scores

- Life Expectancy, 2010-15 (V1 released)
- Cancer Mortality, 2018 (V1 released)
- Sexual & Reproductive Health, 2019 (V1 released)
- Drug Overdose Mortality, 2015-19 (V1 released)
- Excess Mortality, 2020-22 (V1 released)
- Opioid Overdose Quality of Life
- ADRD
- Child Welfare
- Local Climate Impact
- Violence
- Asthma/COPD
- Diabetes/Renal Disease

Coming soon
## Validation

### Variance Explained (Adjusted R²)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>ADI</td>
<td>29.0%</td>
<td>31.0%</td>
<td>1.1%</td>
<td>7.0%</td>
<td>21.0%</td>
<td>44.7%</td>
<td>6.5%</td>
</tr>
<tr>
<td>SDI</td>
<td>34.0%</td>
<td>2.0%</td>
<td>2.6%</td>
<td>2.0%</td>
<td>23.0%</td>
<td>54.0%</td>
<td>2.8%</td>
</tr>
<tr>
<td>SVI</td>
<td>30.0%</td>
<td>2.0%</td>
<td>1.7%</td>
<td>2.0%</td>
<td>19.0%</td>
<td>63.4%</td>
<td>3.3%</td>
</tr>
<tr>
<td>LSI</td>
<td>70.0%</td>
<td>98.0%</td>
<td>99.5%</td>
<td>99.0%</td>
<td>81.0%</td>
<td>98.4%</td>
<td>98.2%</td>
</tr>
</tbody>
</table>
RTI Rarity™

Where are the biggest local social inequities in health outcomes across the US?

The RTI Rarity dashboard answers this question using data science and machine learning to analyze a vast data library of more than 200 measures in multiple domains of social, and behavioral determinants of health. Use this tool to explore your own community’s risk for inequities in life expectancy, cancer mortality, drug overdoses, and more. See where the resources are relative to the areas with the greatest need.

Begin Exploring
Cumulative Excess Mortality Rate per 100k Residents, 2020-2022
CASE STUDY

U.S. Department of Education College Scorecard
Project Background

Flagship product from the Department of Education Office of Planning, Evaluation and Policy Development (OPEPD)

Under iterative development since 2015

Receives ~100K visitors per month
* more traffic during college application times

A free public resource

http://collegescorecard.ed.gov
Data Sources

- Department of Education
- IPEDS
- FSA
- NSLDS
- OPE
- Labor
- Treasury
Scorecard Application

Data / API

1996 to 2023
3,305 Institution-level Variables
174 Field of Study Variables
35 CSV files, 390MB
Limited to individuals who received Student Aid

Consumer Website

Search, Filter, and Sorting
Institution Profiles
Fields of Study
Comparison Tool
Data Visualizations
Data Downloads
User Testing

You’ve built it, but will they come?

Moderated vs. Unmoderated

User Personas

- High school students seeking a 2- or 4-year degree
- Community College transfer students
- Adults going back to school
- Veterans
- Students seeking certificates
- Traditionally underrepresented populations
- Parents
- School counselors
- Media
Example Persona: High School Counselor

“I want to support all my students in choosing their next steps after high school.”

Attitude:
- I’m here to help students understand the college application process and help them consider all relevant factors when making a decision about where to attend.
- I have to support students from all different backgrounds pursuing all different types of higher education.

Goal: Support high school students find the right higher education option for them.

General Description:
- High school counselor serving upwards of 200 students in one school
- Helps guide students in the process for preparing and applying to college.
- For college, high school counselors guide students to apply for schools that are the best fit for their students. Factors they may consider include:
  ✓ Type of degrees offered
  ✓ Academic programs offered
  ✓ Price/aid offers
  ✓ Location
  ✓ Entry requirements

“I want to support all my students in choosing their next steps after high school.”
Search Options
Compare Institutions and Fields of Study

Compare Schools and Fields of Study

**SCHOOLS (2)**
- University of Michigan-Ann Arbor
- Michigan State University

**FIELDS OF STUDY (0)**

**Average Annual Cost**
Cost includes tuition, living costs, books and supplies, and fees minus the average grants and scholarships for federal financial aid recipients.

**4-YEAR SCHOOLS**
- University of Michigan-Ann Arbor: $16,792
- Michigan State University: $10,000

National 4-year Midpoint: $16,555

Ready to Compare: 2 Schools 0 Fields of Study
CASE STUDY

NSF Research Community Dashboard
The Research Community Dashboard, sponsored by NSF Evaluation and Assessment Capability (EAC), provides internal staff visualizations and interactive tools to better understand underrepresented groups (people and institutions) in NSF’s portfolio of investments.

* Note all data displayed in these slides is simulated for presentation purposes only. Access is restricted to internal NSF users.
Human-Centered Design | NSF Personas

Adesh
The Strategist

Caleb
The Architect

Devon
The Communicator

Elizabeth
The Analyst
Dashboard Goals

1. Support strategic leaders with a range of innovative visualizations and interactive tools to advance understanding to broaden participation.

2. Enable deep-dive questions and investigations.

3. Integrate external benchmark data across the NSF portfolio.
Proposal Flow

How is funding flowing from proposals to awards across PIs, institutions, and regions?

Overview

Explore

Flow of proposals and awards

*T Chart data is simulated for presentation purposes only.*
Participation

What are the participation patterns and where are the opportunities to engage PIs and Institutions?

Overview

* Chart data is simulated for presentation purposes only.
Indicators

What are the factors and benchmarks that reveal NSF submission and funding patterns from an equity perspective?

* Chart data is simulated for presentation purposes only.
Why visit the NSF Research Community Dashboard?

Engage Key and Emerging Topics for the NSF
Analyze Outliers

Landscape of Post-Secondary Institutions by Submissions and Awards

XYX University
Awards: 15
Submissions: 37
Funding Rate: 41%

State College ABC
Awards: 2
Submissions: 12
Funding Rate: 17%

* Chart data is simulated for presentation purposes only.
Examine Intersectionality

Intersectional characteristics of PIs and Co-PIs

* Chart data is simulated for presentation purposes only.
Identify Gaps & Opportunities

Postsecondary Institutional proposers and non-proposers

- Proposers
- Non-Proposers

4-year or above
- Public
- Private not-for-profit
- Private for profit

2-year
- Public
- Private not-for-profit
- Private for profit

Less than 2-year
- Public
- Private not-for-profit
- Private for profit

Administrative Unit
Sector unknown

* Chart data is simulated for presentation purposes only.
Assess NSF Trends in National Context

Identify states that are trending in the SAME direction or OPPOSITE directions

* Chart data is simulated for presentation purposes only.
Explore Other Emerging Topics

Proposals and Awards from Rural Locales

* Chart data is simulated for presentation purposes only.
NSF Access Indicators Framework

Over 40 demographic, institutional, and geographic indicators of diversity

User can select relevant indicators for customized reports

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CASE STUDY

The Georgia Prevention Data Hub
What is the Georgia Prevention Data Hub?

http://gapreventionhub.org
Prevention Hub: A Centralized System

Custom Prevention Hub website: https://gapreventionhub.org

Content
- Training
- Media
- Services
- Data Warehouse

🔗 http://gapreventionhub.org
Gathering and Synthesizing Data

- Created a foundation from which stories can be unearthed
- Built framework for identifying data sources and materials
- Identified data gaps
- Employed strategies for collecting, organizing, processing, storing, and synthesizing datasets
Custom data warehouse website: http://www.gaspsdata.net/

Content

- Reports
- Fact Sheets
- Maps
- Publications
- Interactive Dashboards

http://www.gaspsdata.net
Goal: Make 25+ datasets available to public

Public data can be difficult
- to find
- to use
- to make compare

Curating data can be time consuming
- Every dataset is unique

Goal: Create a process to efficiently collect, visualize and share these datasets
Advantages of Using Tableau for Data Visualization

User-friendly interface

Interactive visualizations
  - Mouse over to show additional information

No coding required

Easily embed dashboard on a website

Attractive standard visualization options

http://www.gaspsdata.net/data/georgia-student-health-survey
Limitations and Challenges of Tableau

Tableau Public
- Free, public dashboard hosting
- Data publicly accessible

Tableau Cloud
- Private dashboard hosting & collaboration
- Data security
- Expensive

Learning curve

Limited to visualization types available in Tableau
Using the Data Visualization Tool

Anticipated Users

- Prevention Practitioners
- Researchers in Various Domains
- Public Health Professionals
- Board of Education Members
- Medical Professionals
- Elected Officials
- Parents & Community Members

Potential Use Cases

- Understand populations & the challenges they face
- Influence research, healthcare, public policy, educational policies
Using the Data Visualization Tool

**Indicators**
- Substance Abuse
- Mental Health
- Suicide

**Geographies**
- County
- Regional
- State
- National

**Demographics**
- Age
- Grade Level
- Race
- Ethnicity
- Gender

**Time Scale**
- Single Year
- Multi-Year
NEW DIGITIZED DATA INVENTORY

Explore our data inventory on the Get Sources page! This inventory was developed with input from our State Epidemiology Outcomes Workgroup members.

DATA INVENTORY

http://www.gaspsdata.net
http://www.gaspsdata.net
# Georgia Student Health Survey

**2015-2022**

## Single Year View

<table>
<thead>
<tr>
<th>View Settings</th>
<th>Filter Gender</th>
<th>Filter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Select School Year</strong></td>
<td>(All)</td>
<td>(All)</td>
</tr>
<tr>
<td>2022</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Select Measure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Abuse: Painkillers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Single Year View**

Number of days in the past month in which the respondent reported using prescription painkillers (e.g., Oxycontin, Vicodin) without a doctor’s prescription

[http://www.gaspsdata.net/data/georgia-student-health-survey](http://www.gaspsdata.net/data/georgia-student-health-survey)
Reported Painkillers in Past 30 Days by Gender
Georgia (Statewide), 2022
Among Gender (All) and Grade (6, 7, 8 and 4 more)

<table>
<thead>
<tr>
<th>Measure Binary Sum</th>
<th>Measure Binary Count</th>
<th>Measure Binary Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,452</td>
<td>386,703</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

- 1-5 days: 1.6%
- 6-10 days: 0.7%
- 11-20 days: 0.4%
- More than 20 days: 0.9%

奇特链接: [http://www.gaspsdata.net/data/georgia-student-health-survey](http://www.gaspsdata.net/data/georgia-student-health-survey)
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http://www.gaspsdata.net/data/georgia-student-health-survey
State View

Reported Painkillers in Past 30 Days, Georgia, 2015 to 2022
Among Gender (All) and Grade (6, 7, 8 and 4 more)

<table>
<thead>
<tr>
<th>Year</th>
<th>Measure Binary Sum</th>
<th>Measure Binary Count</th>
<th>Measure Binary Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>12,621</td>
<td>602,388</td>
<td>2.1%</td>
</tr>
<tr>
<td>2016</td>
<td>11,144</td>
<td>633,731</td>
<td>1.8%</td>
</tr>
<tr>
<td>2017</td>
<td>10,617</td>
<td>643,225</td>
<td>1.7%</td>
</tr>
<tr>
<td>2018</td>
<td>19,079</td>
<td>643,493</td>
<td>3.0%</td>
</tr>
<tr>
<td>2019</td>
<td>19,315</td>
<td>648,540</td>
<td>3.0%</td>
</tr>
<tr>
<td>2020</td>
<td>19,274</td>
<td>725,229</td>
<td>2.7%</td>
</tr>
<tr>
<td>2022</td>
<td>14,452</td>
<td>386,703</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

School Year

Ratio

<table>
<thead>
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<th>Year</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>2.1%</td>
</tr>
<tr>
<td>2016</td>
<td>1.8%</td>
</tr>
<tr>
<td>2017</td>
<td>1.7%</td>
</tr>
<tr>
<td>2018</td>
<td>3.0%</td>
</tr>
<tr>
<td>2019</td>
<td>3.0%</td>
</tr>
<tr>
<td>2020</td>
<td>2.7%</td>
</tr>
<tr>
<td>2022</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

🔗 http://www.gaspsdata.net/data/georgia-student-health-survey
### Reported Painkillers in Past 30 Days
**Georgia (Fulton County), 2015 to 2022**
Among Gender (All) and Grade (6, 7, 8 and 4 more)

<table>
<thead>
<tr>
<th>Year</th>
<th>Measure Binary Sum</th>
<th>Measure Binary Count</th>
<th>Measure Binary Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>880</td>
<td>48,182</td>
<td>1.8%</td>
</tr>
<tr>
<td>2016</td>
<td>844</td>
<td>53,782</td>
<td>1.6%</td>
</tr>
<tr>
<td>2017</td>
<td>805</td>
<td>57,952</td>
<td>1.4%</td>
</tr>
<tr>
<td>2018</td>
<td>1,648</td>
<td>55,997</td>
<td>2.9%</td>
</tr>
<tr>
<td>2019</td>
<td>1,732</td>
<td>56,665</td>
<td>3.1%</td>
</tr>
<tr>
<td>2020</td>
<td>1,649</td>
<td>59,469</td>
<td>2.8%</td>
</tr>
<tr>
<td>2022</td>
<td>953</td>
<td>21,055</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

[Graph showing school year data with ratios: 2015: 1.8%, 2016: 1.6%, 2017: 1.4%, 2018: 2.9%, 2019: 3.1%, 2020: 2.8%, 2022: 4.5%]

[Link: http://www.gaspsdata.net/data/georgia-student-health-survey]
Thank You!

Lisa Lines •  llines@rti.org
Patrick Brown •  patrickbrown@rti.org
David Birchfield •  dbirchfield@rti.org
Darigg Brown •  dcbrown@rti.org
Janell Kochevar •  janellscott@rti.org
Questions and Discussion