Interactive Data Visualization: A Case Study from ENDS Research

Joshua Sinamo

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH | **Institute for Global Tobacco Control**

VCU

Background

The advancement of interactive data visualization has allowed for quicker and more efficient data exploration. Here we present a case study based on the Vaping and Patterns of E-cigarette Use Research (VAPER) Study—a longitudinal investigation of electronic nicotine delivery system (ENDS) use—to support the use of visualization technologies (such as interactive dashboards) in tobacco regulatory science, including for generating hypotheses and enhancing collaboration.

Methods

- 2,668 U.S. adults (21+) frequently (5+ days/week) using ENDS participated in waves 1, 2, 3, and/or 4 of the VAPER Study, between May 2020 and Sep 2022.

- Through an iterative process, variables were identified for inclusion and a data visualization facilitation platform was selected.

- Data was stored dynamically in HIPAA-compliant SharePoint, which was then connected with Power BI for configuration and design in order to visualize the data.

- Due to its simplicity and speed, Star schema was utilized as the underlying data architecture to process the data for visualization.

To **more quickly** share study results and **improve the experience** of data exploration, research teams should consider implementing **scalable** and **interactive data visualization tools**.

◄ *Learn more about the Vaping and Patterns of E-Cigarette Use Research (VAPER) Study*

publichealth.jhu.org/igtc

Results

- Assessing the reliability, availability, scalability, and maintainability of the available data visualization tools was critical in maximizing usability and efficiency of resources used.

- Key variables including nicotine formulation, primary liquid flavor, and device type were selected for descriptive analysis within and between waves, and inclusion in the visualization tool.

- In total, features utilized allowed viewing over 9,000 possible combinations of descriptions of the sample across one or more variables which, on average, took less than one second each to generate after deployment.

- The dashboard supports simultaneous interactive data viewing for study team members/collaborators/Federal partners across different institutions.

Conclusions

- Data and visualization technologies can significantly reduce the time spent generating and distributing descriptions of the fast-evolving e-cigarette market.

- Interactive visualization provides a wide array of flexibility, enhancing the data exploration experience.

Authors

Joshua Sinamo, Jeffrey J. Hardesty, Elizabeth Crespi, Qinghua Nian, Kevin Welding, Ryan David Kennedy, Joanna Cohen