Developing a Data Dashboard to Address Health Equity Concerns: Insights from Puerto Rico

Introduction

Social determinants of health (SDOH) data play a crucial role in public health decision-making by offering insights into the factors that influence health outcomes beyond medical care, such as social and economic conditions. It helps in understanding overall population health, identifying disparities, informing policy development, strategically allocating resources, and fostering collaboration.

ASTHO interviewed the Puerto Rico Department of Health's (PRDOH) Health Equity Program to capture and share insights on their comprehensive strategy to develop an SDOH data dashboard, aimed at identifying and addressing health equity concerns in the community. PRDOH leveraged the CDC-funded National Initiative to Address COVID-19 Health Disparities Among Populations at High-Risk and Underserved, Including Racial and Ethnic Minority Populations and Rural Communities (OT21-2103) grant, to support the SDOH dashboard project.

SDOH Data Dashboard Vision

The publicly accessible SDOH data dashboard will align with PRDOH's commitment to health equity, as articulated by their Health Equity Program: "The Puerto Rico Department of Public Health is committed to educating the public on social determinants of health and intersectionality by improving access to public health data, offering a clear picture of current realities faced by vulnerable populations."

It aims to 1) consolidate health data from multiple sources to identify populations in need of care, 2) empower PRDOH leaders to make data-driven decisions, and 3) provide public health partners with data for research, implementing interventions, and developing policies. It is Puerto Rico's first project requiring centralized data and facilitated collaboration among stakeholders such as hospitals, law enforcement, and community health partners. PRDOH plans to refine its data governance practices based on the experiences from this project around sharing and accessing data with external stakeholders.

Initiated in January 2022, this effort prioritizes health equity by defining the concept and employing models of intersectionality and SDOH to plan public health initiatives and understand inequities. Ultimately, the SDOH data dashboard aims to enhance data access and serve as a vital resource for decision-makers across governmental and non-governmental sectors in Puerto Rico.

Project Timeline Overview

A high-level overview of PRDOH's SDOH data dashboard project timeline is as follows:

- January 2022
  - Identified the strategic priority for an SDOH dashboard and started defining health equity data points and high-level scoping of the data dashboard vision.
- January 2023 (Current Phase)
  - Organized the project team and defined staff roles and responsibilities.
  - Began strategic planning for stakeholder identification, data collection, data sources, data analysis, and data visualization.
  - Explored collected data and developed iterations of visualizations and dashboards.
- September 2024
  - Expected public launch of SDOH Data Dashboard version 1.

Planning and Development

Stakeholders

PRDOH is in the process of identifying the official key stakeholders to be involved in future strategic and decision-making processes. They are considering involving partners from other PRDOH offices, community-based organizations, and additional Puerto Rico government agencies. These stakeholders can provide access to other public health data and data sources, and offer feedback on future iterations of the SDOH data dashboard.

Data Sources

PRDOH collaborates with public health partners to integrate databases and sources that reflect SDOH themes and concepts. Key relationships include the U.S. Census Bureau, which provides data from the Puerto Rico Community Survey, and the Puerto Rico Comprehensive Cancer Center, which supplies cancer incidence data. PRDOH also pulls public health-related data from CDC-provided databases such as:

- Behavioral Risk Factor Surveillance System (BRFSS)
- Youth Risk Behavior Surveillance System (YRBSS)
- Agency for Toxic Substances and Disease Registry
- SAMHSA
- U.S. Department of Housing and Urban Development (Continuum of Care 502 and 503 Data)

Supplemental resources from organizations like WHO, Pan American Health Organization, and academic publications will be linked on the dashboard to offer additional context for the data.

Data Collection, Aggregation, and Integration Process

PRDOH established a standard operating procedure (SOP) for collecting, aggregating, and integrating data for the SDOH data dashboard—a key lesson learned and recommendation for other health agencies. The SOP outlined step-by-step guidelines for each stage of data collection, cleaning, and validation, as well as the personnel responsible for each step, to maintain data integrity and adherence to best practices:

Step 1: Identifying Vulnerable Populations

- **Overview**: In collaboration with healthcare specialists, PRDOH compiled a list of data variables that reflect SDOH factors and represent vulnerable populations. PRDOH then identified the relevant public health partners who possess the required data.
- **Key Milestones**: Developed a list of SDOH data to be collected from public health partners.

Step 2: Data Collection

- **Overview**: PRDOH's health equity program sent data requests to both public health partners and its own partners for access to both public and restricted databases. The project team reviewed, identified, and downloaded variables of interest from publicly available downloadable data. For restricted databases, PRDOH sent formal letters and data requests to the organizations owning the data.
- **Key Milestones**: Secured access to public databases and executed data sharing agreements for restricted databases.

Step 3: Data Cleaning

- **Overview**: PRDOH referenced codebooks from both public and restricted databases to support data cleaning. Datasets such as the American Community Survey, CDC Puerto Rico data, and Social Vulnerability Index (SVI) tables were already analyzed and organized. Online analysis tools facilitated the collection and organization of data from YRBSS, while PRDOH employed software tools like Stata and IBM's Statistical Package for the Social Sciences (SPSS) to clean and re-code data from datasets such as the BRFSS and Treatment Episode Data Set (TEDS). When necessary, PRDOH utilized Microsoft Excel for manual cleaning.
- **Key Milestones:** Obtained licenses for and provided resources to train staff on Stata, SPSS, and ArcGIS.

Step 4: Data Validation

- **Overview**: PRDOH developed a standardized format to report the syntax and commands used in statistical analysis programs, facilitating replication of data analysis.

- **Key Milestones:** Created project plans and SOPs that outline standard processes for data management and validation across this project.

Step 5: Data Storage and Analysis

- **Overview**: PRDOH securely stored the downloaded data in a shared digital folder, ensuring confidentiality by excluding personally identifiable information. PRDOH analyzed the collected data using Stata, SPSS, and ArcGIS.
- **Key Milestones**: PRDOH stored and organized data across key themes that addressed health equity and SDOH questions of interest. This included SVI in Puerto Rico and representation of the population's functional diversity by breaking down data by age group, sex, and poverty level. This approach enabled PRDOH to not only understand the community's functional diversity but also develop interventions, allocate resources, and address health disparities. PRDOH is developing an updated version of the SDOH data dashboard that will leverage BRFSS and TEDS data to analyze and visualize the prevalence of chronic diseases and substance use/misuse.

SDOH Data Dashboard Build

During the COVID-19 pandemic, PRDOH contracted a third-party developer to create and manage their COVID-19 dashboard. While PRDOH participated in the initial planning, they lacked full control as modifications required contractor involvement and after the contract ended, they temporarily lost access to the dashboard.

Drawing on lessons learned from the COVID-19 dashboard, PRDOH is taking the lead on developing and maintaining the SDOH data dashboard internally. PRDOH is using Esri's ArcGIS Dashboards online software to develop the SDOH data dashboard and ArcGIS StoryMaps to strategically organize the dashboard with captions, references, and images, which will help to summarize insights and cite data sources—ensuring transparency and aiding in audience comprehension.

Esri ArcGIS aligns with PRDOH's vision of transforming data into compelling narratives. It also offers a user-friendly interface for building, designing, and viewing StoryMaps. Additionally, the platform simplifies the overall dashboard management process. Since other PRDOH teams already use ArcGIS, they can leverage existing ArcGIS licenses and expertise within the PRDOH Office of Planning and Development, gaining valuable access to existing data dashboard templates and technical support.

Challenges and Mitigation Strategies

PRDOH has encountered challenges in the development process that have required mitigation strategies, including:

- During the **planning phase**, internally defining "vulnerable populations" was difficult, necessitating a comprehensive literature review.
- When **obtaining and publishing** data, requesting data was time-consuming, there were limitations in databases (such as LGBTQIA+ data), national databases lacked comprehensive Puerto Rico population health data and internal data request protocols caused delays. In the interim, PRDOH relies on open-source data.
- In the **data analysis** phase, insufficient sample sizes led to inaccurate or statistically insignificant analyses, and understanding and preparing data across multiple sources was time intensive. PRDOH used tools like STATA and SPSS to reveal descriptive statistics supporting the data's understanding and to test the statistical significance of the data and analyses. If certain data and findings were not statistically significant, PRDOH re-examined the data and discussed potential strategies to increase the sample size and improve data quality (such as identifying additional data sources and applying additional data cleaning steps).
- Throughout **data and image visualization**, PRDOH needed to take additional steps to develop visualizations beyond ArcGIS's geospatial approach. For example, before ArcGIS StoryMaps can accurately read and display data in a table visualization, the developer must format the table headers and raw data in Excel correctly. Additionally, limited text box, image, and data visualization positioning options in StoryMaps hindered presentation suitability. While Esri's briefings feature helps transform StoryMaps to presentation slides, formatting issues occur, requiring Microsoft PowerPoint for final touches. Lastly, there are limitations in using online images due to copyright licenses. This requires PRDOH to find high-quality free images, which can be challenging.

Maintenance Plan

Establishing a plan to maintain the quality of the SDOH dashboard is crucial once it is developed. PRDOH has outlined a database update schedule, where each agency partner will publish or share updated databases/files for PRDOH to add to the SDOH data dashboard.

PRDOH has assigned staff roles and key responsibilities for the development and maintenance of the dashboard:

- The **team lead** spearheads the overall vision of the dashboard, outlines the required statistical analyses, and provides guidance on the design and organization of the StoryMap.
- The **data analyst** prepares master templates and generates maps, graphs, and tables.
- The **epidemiologist** and **demographer** provide the explanatory content, identify images, and review the data calculations.
- The **director** and the **project manager** provide the analyzed data.

- The **entire team** identifies external audiovisual resources and references, participates in internal quality control, and integrates recommendations from specialists and academic partners during content evaluations.

Though each team member has a unique role, the project is structured to foster collaboration. All members support each other and work collaboratively across all stages of the project.

Conclusion and Recommendations

The first version of the SDOH data dashboard is expected to be published by **September 2024**. As the OT21-2103 grant concludes, PRDOH believes that the investments and progress of this project demonstrate the value and impact the SDOH dashboard will have on public health decision-making, thereby supporting their effort to advocate for sustained funding or identify strategies to braid and layer funding. Alternatively, other teams within the PRDOH Office of Planning and Development could be potential candidates to continue this effort, given their resources, expertise, and existing licenses to use statistical programs and ArcGIS.

SDOH data plays a crucial role in public health decision-making and advancing health equity. Insights from data dashboards enable public health leaders to engage stakeholders in prioritizing initiatives that enhance community health outcomes. PRDOH's efforts in developing their SDOH data dashboard demonstrate the required strategic planning and considerations to develop a public health data dashboard. For public health agencies considering a similar initiative, PRDOH recommends first scheduling a series of internal strategic meetings to discuss the dashboard's purpose and themes and establishing quality control protocols. In addition, involve stakeholders in all stages, from planning to development, review, and presentation.

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