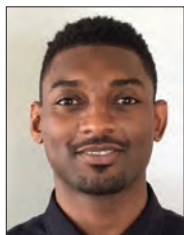
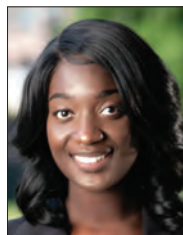


▶ DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES

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Leveraging Informatics to Improve Environmental Health Practice and Innovation

Editor's Note: The National Environmental Health Association (NEHA) strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, NEHA features this column on environmental health services from the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In these columns, authors from CDC's Water, Food, and Environmental Health Services Branch, as well as guest authors, will share tools, resources, and guidance for environmental health practitioners. The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC.

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Environmental health professionals are embracing informatics as a tool to improve the health of populations across the nation (Choucair et al., 2015). It is essential to ensure the public has access to environmental health-related data, such as restaurant and recreational water inspections, to help make informed decisions about health and safety. While many environmental health programs across the country share their data using online platforms, this practice is not universal and the timeliness, ease of access, and extent of data sharing vary across programs.

The Centers for Disease Control and Prevention (CDC) partnered with the Public Health Informatics Institute (PHII) to better understand how environmental health programs collect and share data. The project included:

- an environmental scan of food safety, restaurant inspection, and recreational water data collection and sharing;
- key informant interviews; and
- the PHII business process analysis workshop.

The environmental scan provided baseline information for the key informant interviews and inventoried important literature and web resources related to restaurant and recreational water inspections.

Representatives from three state agencies (Georgia Department of Public Health, Maryland Department of Health, and Virginia Department of Health) and two local agencies (Riverside County Department of Public Health and Southern Nevada Health District) participated in key informant interviews and a 2-day business process analysis workshop

(Table 1). Workshop activities informed key business processes (Table 2), identified phases that might categorize data processes and systems (Table 3), and provided insight for possible practices for standardizing data.

Suggested Practices for Standardizing Data

The information gathered from the key informants provided insight into data standardization (Table 2). A standardized approach to food and water inspection data collection starts with an electronic data collection system. Inspection data are most effective if collected and stored in a standardized, electronic format that is timely, accessible, and compatible with other technology platforms, and that allows for the user to query the data. This approach can significantly increase data accuracy and data access, reduce human error, and improve reporting capabilities.

Standardizing Data Collection

The best practice for food and water inspection data collection is to have an electronic data system with automatic synchronization from an electronic field collection to a database (Table 3). In addition, the use of input controls to help standardize data entry is crucial. Data collection should be complete, accurate, consistent, and timely.

Validating Data

As jurisdictions adopt model codes, such as the Food and Drug Administration model *Food Code* (www.fda.gov/food/retail-food-protection/fda-food-code) and the CDC Model Aquatic Health Code (www.cdc.gov/mahc/index.html), a standardized inspection form can be developed. Additionally, the version of

TABLE 1

Inspection Availability for the Five Key Informants

Jurisdiction	Website for Inspections	Comments and Details
Georgia Department of Public Health	https://ga.healthinspections.us/stateofgeorgia	Online portal
Maryland Department of Health	–	Inspection data available on request
Riverside County Department of Public Health	http://restaurantgrading.rivcoeh.org	Online portal
Southern Nevada Health District	www.southernnevadahealthdistrict.org/permits-and-regulations/restaurant-inspections/restaurant-inspection-search	Online complaint system and mobile application
Virginia Department of Health	https://inspections.myhealthdepartment.com/virginia/districts	Inspections separated by health district

TABLE 2

Common Challenges Discussed Among the Key Informants

Inspection Processes	Data Collection	COVID-19 Pandemic
<ul style="list-style-type: none"> Distance of inspection facility from the office Lack of standardization across inspectors and inspections Potential data quality and timeliness issues due to manual data entry of paper inspections 	<ul style="list-style-type: none"> Poor connectivity and other internet issues that increase the time to synchronize data after entry Information system that is outdated or not user-friendly; difficulty in implementing a new system Lack of standardization across data entry (e.g., electronic versus paper) 	<ul style="list-style-type: none"> Loss in revenue (inspection and violation fees) Inspectors being asked to enforce COVID-19 guidelines that are out of their scope Loss of staff members Inability to capture point of contact signatures on inspection reports (must utilize email responses) COVID-19 guidance and training needs for inspectors

the code can be noted in the data dictionary along with the acceptable ranges for each field. This process will help eliminate confusion when comparing data over time and as ranges change. The electronic inspection data collection system should be aligned with this form (and a paper form should be available). Use the code for the inspection form and ensure there is a consistent scoring methodology for the inspection data collection.

Storing Data

To provide access to inspection data for consumers, regulators, industry, and other stakeholders, the platform in which data are stored plays a critical role. Jurisdictions want to develop a centralized electronic database, whether web-based or cloud-based, with controlled access for inspection data. Ideally, the

electronic data system will update when there is a new entry from a field application (e.g., tablet) and conduct automated updates and uploads on a regular basis. Jurisdictions need to maximize the workflow for inputting the inspection data in the system, setting timelines and deadlines for data uploads or data entry, and identifying a person responsible. A data dictionary is an absolute necessity as it contains information vital to understanding the database, including what is in it, who has access, and where it is stored. Data should be stored in a safe and secure location, whether they are electronic or paper.

Analyzing Data

The primary analysis of inspection data is used to gather metrics for such things as the type of inspection, number of violations,

type of violations, number of inspections conducted, and other counts of interest to a jurisdiction. These data are often reported to leadership, used for performance metrics, and used to determine staff needs.

Using Data to Make Decisions

Using data to drive decisions is tied strongly to the quality of the data collected, the accessibility of the data, and the data analyses conducted. Data-driven decisions based on inspection data have an impact on the facility owner as well as on regulatory practices. Real-time communication of inspection results increases the awareness of facilities of the results so they can remediate critical violations and other inspection outcomes promptly. For jurisdictions, inspection data can be used to decide how to allocate resources, optimize the quality of inspections, better manage poor performing establishments, and improve public health. These uses align with the CDC Data Modernization Initiative introduced in 2021 to advance core data and surveillance infrastructure across the federal and state public health landscape. This initiative is about not only technology but also putting the right people, processes, and policies in place to help solve problems before they happen and to reduce the harm caused by the problems that do happen.

Sharing Data With Consumers

Many of the best practices for data sharing among internal and external local, state, and national agencies also apply to sharing data with consumers. Data file formats should meet the same recommendations for nonproprietary, machine readable formats described in the previous section to support data sharing with consumers. This formatting is essential to link health departments to their communities, increase communication, and encourage transparency. Data sharing also enables the public to make informed decisions.

Environmental health programs are gradually adopting innovative informatics and big data tools and strategies. This trend is being led by pioneering jurisdictions that are piecing together standards, policy frameworks, and business processes fundamental to the effective use of data analytics. These groundbreaking initiatives provide jurisdictions across the country with an enticing glimpse of the potential of technology and a sense of

the challenges we must overcome to be able to use data safely and effectively in the service of environmental health practice.

To view the final project report, visit <https://phii.org/wp-content/uploads/2021/09/Environmental-Health-Final-Project-Report-Final-August-2021-V5.pdf>. 🌸

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Reference

Choucair, B., Bhatt, J., & Mansour, R. (2015). A bright future: Innovation transforming public health in Chicago. *Journal of Public Health Management & Practice*, 21(Suppl. 1), S49–S55. <https://doi.org/10.1097/PHH.0000000000000140>

TABLE 3

Phases Toward Standardized Data Processes and Systems

Phase 1	Phase 2	Phase 3
<ul style="list-style-type: none"> • Paper and pencil field data collection, multiple points of data transfer • Minimal data entry quality controls • Manual cleaning of data • Multiple points of data collection, entry, and transfer • Data fields not yet standardized 	<ul style="list-style-type: none"> • Electronic field data collection • Defined data fields and data types, including a data dictionary (i.e., a set of information describing the contents, format, and structure of a database and the relationship between its elements) • Data required to be synchronized or uploaded into the system database once an inspector reaches their office or home office • Reports available to the public • Data systems siloed and restricted data sharing • Some analysis of the data 	<ul style="list-style-type: none"> • Automatic synchronization from electronic field collection to database • Integration of data from other sources (e.g., pictures, GIS information, etc.) • Automated data cleaning and reconciliation • Custom reports available to the public, the ability for the public to query data • Share data across systems • Data sharing agreements with other agencies • Use of data to analyze, interpret, and drive actions and provide real-time insights

Did You Know?

NEHA is excited to announce that we have received federal investments to strengthen environmental health practice and workforce capacity aimed at reducing lead exposures in tribal and territorial communities.

Lead exposures in Newark, New Jersey, and Flint, Michigan, illustrate how communities of color are disproportionately affected. Children living in those communities already experience barriers associated with low socioeconomic status or racial disparities and suffer yet another systemic challenge of lead exposure where they live and play. These contemporary illustrations serve as a grim reminder of the work ahead to address disparities that are evident throughout the U.S. We remain committed to the notion that we can eliminate environmental lead exposures in our lifetime so that every resident can reach their full human potential, free from the harm of this insidious heavy metal.

Through our cooperative agreement with the Centers for Disease Control and Prevention, we will focus on addressing lead-related issues within tribal and territorial communities. Our activities will include hosting and providing travel scholarships for a 2.5-day lead workshop in Guam for members of the Northern Pacific Environmental Health Association. We aim to provide education, encourage the development of strategies, and build partnerships to provide regional support to reduce childhood lead poisoning. Additionally, support will be given to provide equipment necessary in lead detection.

We will also work to address lead-related needs in tribal communities by creating training materials and resources, as well as introducing a lead mini grant to strengthen the tribal environmental health workforce.

Grant award information: Federal Award Number NU38OT000300, award amount of \$323,083.