

ASTHO Environmental Health Tracking: Peer-to-Peer Fellowship Program

Final Report



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Association of State and Territorial Health Officials
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BACKGROUND

The Rhode Island Department of Health (RIDOH) is the statewide health agency responsible for protecting and promoting the health of Rhode Islanders. The primary mission of RIDOH is to prevent disease and to protect and promote the health and safety of the people of Rhode Island. The RIDOH's three leading priorities are: addressing the social and environmental determinants of health; eliminating health disparities and promoting health equity; and ensuring access to quality health services for all Rhode Islanders, including the state's vulnerable populations.

In November 2015, the RIDOH received accreditation from the Public Health Accreditation Board (PHAB). Accreditation means that RIDOH has demonstrated that it is committed to transparency, accountability, and a culture of continuous quality improvement. Since tracking environmental public health data plays an essential role in fulfilling RIDOH's mission and the commitments in the PHAB accreditation, RIDOH hopes to become a full participant in the Center for Disease Control's (CDC's) Environmental Public Health Tracking Network (EPHTN) in the future.

In the absence of CDC funding, Rhode Island's participation in the EPHTN program to date has, of necessity, been limited. However, RIDOH received a 2014-2015 Environmental Public Health Tracking Fellowship from the Association of State and Territorial Health Officials (ASTHO). That fellowship was designed to facilitate the submittal of data for eight nationally consistent data measures (NCDMs) to the national tracking network. Those NCDMs are: hospitalization and emergency department data for asthma, carbon monoxide poisoning, heat stress illness and heart attacks.

The preparation and submittal of those data did not proceed as smoothly as planned. Rhode Island's metadata were accepted by the national network; however, RIDOH staff were not able to resolve format incompatibilities, and the data were not accepted. Although the final goal of data acceptance was not achieved, participation in the 2014-2015 fellowship enabled RIDOH to better understand the process of preparing and submitting data to the national network and to identify resource issues that hampered that process.

INTRODUCTION

ASTHO's 2015-2016 ASTHO fellowship program does not include data submittal requirements. Instead, that fellowship, which was awarded to RIDOH in December 2015, was designed to strengthen fellows' capacity to conduct and collaborate on tracking program activities. ASTHO fellows were matched with a CDC grantee mentor to learn firsthand planning and capacity building elements for an effective tracking program startup, including such issues as:

- Portal development and standards.
- Metadata creation and submission.
- Challenges surrounding data acquisition.
- Program marketing and risk communication.

Fellows were also required to propose and implement a small tracking project as a new or as part of an existing initiative in their states and to complete a written report on their learning experiences, how tracking could be useful in their states, and the results or projected outcome of their pilot



projects. This document will serve as the final report for RIDOH's 2015-2016 ASTHO Environmental Health Tracking Fellowship.

MENTORSHIP

The Massachusetts Department of Public Health (MDPH) agreed to serve as RIDOH's mentor program and hosted RIDOH at an all-day Environmental Public Health Tracking retreat on April 27, 2016. MDPH was among the first states to be chosen to participate in CDC's EPHTN program and has operated a portal, which provides a public link to environmental and public health data, since 2008.

The retreat began with an introduction to the Massachusetts Environmental Public Health Tracking program (MEPHT). Several sections of MDPH's Bureau of Environmental Health (BEH) participate in that program, including the Community Assessment, Environmental Epidemiology, Environmental Health Education and Outreach, Environmental Toxicology and Indoor Air Quality programs, as well as the GIS Center. In addition, other MDPH offices (the Cancer Registry, Registry of Vital Records, and the Center for Birth Defects) and other Massachusetts state agencies (Center for Health Information and Analysis and the Massachusetts Department of Environmental Protection) serve as data stewards for data included in the MEPHT.

Before developing the portal, MDPH carefully considered such questions as who the portal's audience would be and what messages should be conveyed to that audience. Building relationships with data stewards, information technology (IT), the sections of MDPH that would benefit from the portal and other stakeholders was also an essential part of the planning process.

The MEPHT includes multiple datasets, including both Nationally Consistent Data Measures (NCDMs) and non-NCDMs, which are updated annually. Those measures include health, environmental and inspection data, along with informational content and links. MDPH demonstrated how the portal's query system could be used to produce maps, tables and charts displaying those data. MDPH is also involved in the ongoing development of new NCDMs and non-NCDMs to address additional information needs.

The BEH also presented more detailed discussions about collaborations with data stewards and data users and the MDPH's IT group discussed the architecture of the portal system and demonstrated the reports and maps that can be generated.

At the request of RIDOH, a substantial section of the afternoon discussion centered on submittal of data to CDC. Prior to the retreat, RIDOH sent MDPH an example of the error messages generated during Rhode Island's attempts to submit tracking data and MDPH suggested that RIDOH bring the data to the retreat on a secured flash drive so MDPH staff could provide real time troubleshooting assistance. Due to the unexpected illness of the RIDOH staff member who has access to those data, RIDOH was not able to bring those data. However, MDPH demonstrated the use of Sharepoint tools for finding and resolving formatting issues. Following the meeting, MDPH sent RIDOH a document that provides step by step instructions concerning data processing and submittal.

MDPH also discussed the use of the information on the portal for communications and outreach and testing that the Department is conducting to identify ways that the usability of the tools can



be improved. RIDOH was particularly impressed by the Community Profile Reports generated by the system, which include specific information on demographics, environmental exposures and health for each municipality in comparison to the state as a whole, as well as explanatory information necessary to interpret that information.

MDPH offered to answer questions from RIDOH that may arise in the future concerning data submittal and other tracking issues, and RIDOH is very appreciative of that offer.

PILOT PROJECT

Study Design

As discussed above, the 2015-2016 fellowship requires participants to conduct a pilot study utilizing environmental and public health data. RIDOH's pilot study was designed to investigate the relationship between monitored levels of several air pollutants and emergency department and hospital visits for relevant respiratory and cardiovascular diseases in three contiguous cities in the Providence metropolitan area; Providence, Pawtucket and Central Falls. This tri-city target area is of particular interest to RIDOH because the rate of emergency department visits for childhood asthma in that area (16.2 per thousand children) is substantially higher than that in the State as a whole (9.5 per thousand children). The pediatric asthma hospitalization rate is also elevated in the target area as compared to the State average (2.9 versus 1.9 hospitalizations per thousand children).¹

Note also that the demographic characteristics of the target cities are consistent with known indicators of increased risk of pediatric asthma. Those indicators include:

- Race - 15.5% of the children in the target cities are Black/African American, as compared to 6.4% statewide;
- Ethnicity – 44.4% of children in the target cities identify as Hispanic/Latino, as compared to 20.5% statewide;²
- Education – Mothers of 24.2% of newborns in the target cities have not finished high school; statewide, that number is 14.0%;³ and
- Poverty – 38.8% of children in the target cities live below the poverty line, as compared to 19.5% statewide.⁴

Rhode Island's air quality complies with the Environmental Protection Agency's (EPA's) National Ambient Air Quality Standards (NAAQS) for all criteria air pollutants except for ground level ozone. The levels in the State of three of the criteria pollutants are always (sulfur dioxide, carbon monoxide) or virtually always (nitrogen dioxide) characterized as "good" air quality, according to EPA's Air Quality Index (AQI). Levels of fine particulate matter (PM_{2.5}), however, are frequently

¹ Rhode Island KIDS COUNT, 2015 Rhode Island KIDS COUNT Factbook, Table 24 – "Asthma Emergency Department Visits for Children Underage Age 18, Rhode Island, 2009-2013. Data from the Rhode Island Department of Health, Center for Health Data and Analysis, Hospital Discharge Database.

² Ibid, Table 5 – "Child Population, by Race and Ethnicity, Rhode Island, 2010", data from 2010 US Census.

³ Ibid, Table 4 – "Births by Education Levels of Mother, Rhode Island, 2009-2013", data from Rhode Island Department of Health, Center for Health Data and Analysis, Hospital Discharge Database.

⁴ Ibid, Table 10 – "Children Living Below the Federal Poverty Threshold, Rhode Island, 2000 and 2009-2013. Data from US Census 2000 and Population Reference Bureaus analysis of 2009-2013 American Community Survey data. —



in the “moderate” and occasionally the “unhealthy” range, although they do not violate the NAAQS for that pollutant. Since exposures to both ozone, PM_{2.5} and NO₂ are associated with respiratory and cardiovascular health effects, those pollutants will be included in the study analysis.

In addition to the criteria air pollutants, Rhode Island monitors a number of air toxics, including several pollutants that are associated with respiratory effects. According to the EPA’s National Air Toxics Assessment, the air toxics that pose the greatest respiratory risk in Rhode Island are acrolein, acetaldehyde, formaldehyde and diesel particulate matter. All of those pollutants are monitored at Providence area sites and will be included in the analysis. Note that black carbon is monitored as an indicator of diesel particulate matter. In addition, RIDOH plans to include particle count, an indicator of concentrations of ultrafine particles, in the analysis.

RIDEM’s air pollution monitoring network is largely concentrated in the Providence metropolitan area, the section of the State with the highest population density and the highest density of mobile and stationary air pollution sources. RIDOH is using daily data from the Rhode Island National Air Toxics Trends Site (NATTS), which is located on the roof of the Urban League building in Providence, for the study, supplemented by data from other nearby sites. The NATTS site, which is located in an urban area that is not immediately adjacent to emissions sources, reflects local urban background levels, and thus is appropriate for characterizing air quality in the target area. Data collected during the 2010-2014 period will be used for the study, where available. For pollutants measured continuously, multiple metrics (e.g. maximum daily one-hour and 8-hour concentration and daily average concentration) may be evaluated.

The study will evaluate the association between daily monitored concentrations of the above pollutants and daily hospital admissions and emergency department visits for respiratory and cardiovascular diseases for the 2010- 2014 period⁵. The following respiratory primary diagnoses will be included in the analysis: asthma and chronic obstructive pulmonary disease (COPD). Cardiovascular disease diagnoses will include ischemic heart disease and myocardial infarction. Hospital discharge and emergency department data were obtained from the RIDOH’s Center for Health Data and Analysis via the RIDOH’s Data Use Agreement (see Appendix A).

Note that ambient concentrations of many of the target pollutants are affected by meteorological conditions. Meteorological conditions may also affect the occurrence of some of the target health effects. Therefore, meteorological parameters will be evaluated as possible cofounders.

Study Progress to Date

Emergency department visit (ED) and hospitalization admissions (HA) data for January 1, 2010 to December 31, 2014 for the target cities were obtained from the RIDOH’s Center for Health Data and Analysis. Air pollutant and meteorological data for the same time period, which were collected as described above by the RIDOH and the Rhode Island Department of Environmental Management, were downloaded from the EPA’s Air Quality System.

Working with Nari Sohn, a Brown University MD/ScM student, RIDOH has begun to evaluate the relationships between daily air pollutant levels and health outcomes. To date, this analysis has focused on 8-hour maximum daily ozone levels, 1-hour maximum daily levels of nitrogen dioxide (NO₂) and 24-hour average concentrations of fine particles (PM_{2.5}). The respiratory diseases analyzed have been COPD (ICD-9 codes 491-492, 496) and asthma (ICD-9 code 493). Only visits



with primary diagnosis identified as one of these ICD-9 codes have been included in the study. An analysis of the association between daily counts of EDs or HAs due to COPD or asthma and daily ambient pollutant levels is being conducted using multiple linear regression models. To account for potential lag-time in the effect of pollutants on health, lags of 1-5 days are being analyzed. The regression analyses are being controlled for temperature. Note that, since ozone is formed by photochemical reactions which requires elevated temperature and sunlight levels, ozone levels in Rhode Island tend to be highest the warmer months. Therefore, the analysis of ozone health impacts on COPD focused on the May – September period.

Since the analysis is ongoing and has not yet been reviewed, quantitative results will not be presented here. However, preliminary results show a significant relationship between summer ozone levels and COPD HAs, after controlling for temperature. An analysis of links between summer ozone and COPD ED and asthma ED and HA has not yet been conducted. The data also appear to show a significant effect of NO₂ levels on COPD and asthma HAs and EDs. PM_{2.5} appears to be linked to HAs and EDs for asthma, but a link with COPD was not seen.

A very preliminary analysis of lag time effects was conducted for the effect of summer ozone levels on COPD HAs. In that analysis, the link was strongest on the day of the exposure.

Plans for Continuation of Pilot Study

As discussed above, the pilot study is ongoing data analysis is preliminary at this time. RIDOH plans to continue this study by conducting a more robust analysis that includes:

- Control for all potentially relevant meteorological parameters,
- Seasonal evaluations for all pollutants,
- Analysis of data for additional pollutants, including black carbon and particle count,
- Analysis of lag times and multiday exposures for all pollutants,
- Analysis of concomitant exposures to multiple pollutants, and
- Inclusion of cardiovascular endpoints.

CONCLUSIONS

- The information provided by MDPH about their process and portal, as well as the inter-state relationships formed through this mentorship, will be very helpful if RIDOH receives funding to fully participate in the CDC EPHTN in the future. RIDOH is very interested in developing a data system and portal that can provide information to Rhode Island residents similar to that available in Massachusetts.

- RIDOH will confer with CDC about attempting to resubmit Rhode Island hospitalization and emergency department data for asthma, carbon monoxide poisoning, heat stress illness and heart attacks. The information supplied by MDPH on data preparation and submittal will aid in the success of such a submittal, although additional assistance from the CDC may also be necessary.

- RIDOH did not have sufficient time to finish the conduct and review of the pilot study as proposed. However, the preliminary findings suggest links between ambient levels of air



pollutants and respiratory health. RIDOH is very interested in continuing this study.

- After participating in two ASTHO EPHT fellowships, RIODH has a more holistic understanding of what is involved with operating a fully functioning successful state-wide tracking program.
- Rhode Island has a history of strong regional collaboration with our neighboring states. Through the support of each other's commitment to public health, New England has led the way in public health prevention of disease, morbidity, and mortality. In the future, Rhode Island hopes to join its fellow northeast Environmental Public Health Tracking Programs making New England the first region in the country to have fully implemented EPHT Programs.



Appendix A
Rhode Island Data Use Agreement



Department of Health

Three Capitol Hill
Providence, RI 02908-5097

TTY: 711
www.health.ri.gov

DATA USE AGREEMENT/REQUEST FORM
RHODE ISLAND HOSPITAL DISCHARGE DATA
Center for Health Data & Analysis, R.I. Department of Health

I acknowledge that access to the information from the Rhode Island Hospital Discharge Data described below and provided by the Center for Health Data & Analysis, R.I. Department of Health, is granted solely upon the condition that I agree to abide by the terms set forth in this Release Assurances Form.

Emergency Department data (ED) & HDD (Inpatient) Data public use data file(s) -- Check time periods requested:

Calendar years (January 1 – December 31)

2000 2001 2002 2003 2004 2005
 2006 2007 2008 2009 2010 2011
 2012 2013 2014

Data File (indicate Inpatient and/or Outpatient data):

Inpatient
 ED data (CY2005 – CY2014 only)

Type of file(s) requested:

SAS data file

Proposed use of requested datafile(s): (Attach pages as necessary)

The data will be used to study the possible association between daily monitored concentrations of air pollutants and daily hospital admissions and emergency department visits for respiratory and cardiovascular diseases for the 2010- 2014 period. The following respiratory primary diagnoses will be included in the analysis: asthma, chronic bronchitis, emphysema, chronic obstructive pulmonary disease, and, for children aged 0-4 years, bronchitis and bronchiolitis. Cardiovascular disease diagnoses will include ischemic heart disease and myocardial infarction.

Measurements of air pollutants associated with cardiac and respiratory effects, including nitrogen oxides, sulfur dioxide, ozone, particulate matter, diesel particulate, formaldehyde and acrolein, will be obtained from the USEPA's Air Quality System database and from the RIDEM Office of Air Resources. Meteorological parameters will be evaluated as possible cofounders.

The study area was chosen because the rates of emergency department visits and hospitalizations for childhood asthma are higher in that area than in the State as a whole and because the State's air pollution monitors are concentrated in the Providence metropolitan area.

Nari Sohn, a Brown University MD/MPH student, will be working with me on this project.

I agree to comply with the following conditions:

Confidentiality

1. The confidentiality of the Hospital Discharge Data described above will be maintained as required by Chapter 5-37.3-4 of the General Laws of Rhode Island (Confidentiality of Health Care Information Act) and by all federal and state laws and regulations governing confidentiality of such information, and by requirements specified by the Institutional Review Board of the Rhode Island Department of Health for the protection of human subjects, where applicable.
2. No information from the Hospital Discharge Data described above will be published or disseminated in a form that might permit identification of an individual patient.
3. The Hospital Discharge Data described above will not be transmitted to any other party in a form in which the data are specified at the level of individual hospital discharges, unless the proposed recipient first files a Release Assurances Form with the Center for Health Data & Analysis, R.I. Department of Health, covering the data to be transmitted.
4. If and when disposed of, all information provided under this agreement will be handled as follows:
 - a) Paper records will be shredded or burned; CDs will be destroyed or returned to the Center for Health Data & Analysis, R.I. Department of Health; and
 - b) Computer tapes and diskettes will be completely erased or returned to the Center for Health Data & Analysis, R.I. Department of Health.

Attribution

5. No statement shall be made indicating or suggesting that interpretations drawn from the Hospital Discharge Data are those of the Rhode Island Department of Health or of the State of Rhode Island.
6. If cited in a publication or presentation, the source of the data will be acknowledged as the Rhode Island Hospital Discharge Data, Center for Health Data & Analysis, Rhode Island Department of Health.

Cost of Production and Payment

7. The cost of production of the received data is provided below. Payment must be received prior to release of the data. Money orders or cashier's checks are the only forms of payment accepted, made **Payable to "General Treasurer, State of Rhode Island."** Please mail or bring payment to:

Center for Health Data & Analysis
Department of Health
Cannon Building, Room 407
3 Capitol Hill
Providence, RI 02908

The R.I. Department of Health uses the United States Postal Service. At your request and for an additional charge, the materials can be shipped overnight via the United States Postal Service. See below for charges.

Cost of Production	\$100 x Number of Years Requested = \$ _____ .00
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Regular Mail No additional Cost	\$ 0.00	\$ 0.00
Optional Services Overnight Shipping via United States Postal Service	\$15.00	\$ ____ .00
Total Payment Enclosed*	Total	\$ ____ .00

*Money orders or cashier's checks Payable to "General Treasurer, State of Rhode Island"

Misuse and Penalties

8. I accept responsibility for any misuse of the information provided and agree to hold Rhode Island Department of Health harmless for such misuse.
9. Should I fail to comply with the terms and conditions of this Release Assurances Form, access to the Hospital Discharge Data will be terminated immediately, and all data will be returned to the Center for Health Data & Analysis, R.I. Department of Health. I understand that unauthorized disclosure of information from confidential records may be punishable, upon conviction, by a fine and/or imprisonment or both, and/or civil penalties as prescribed by law.

Signature _____
Date 2/23/16
Name Barbara Morin
Title Princ. Env. Hlth Risk Assessment Toxicologist
Organization RI Department of Health
Address 3 Capitol Hill, Room 206
Providence, RI 02908
Telephone (401) 222-7766
E-Mail barbara.h.morin@health.ri.gov

The information above is maintained by the Center for Health Data & Analysis for the purpose of enforcement of this Data Use Agreement. This information may also be used by the Center for Health Data & Analysis to create a mailing list. The mailing list allows the Center for Health Data & Analysis to send users information such as notices about the release of data and errata when data errors are discovered.

- I do not wish to be included on the Center for Health Data & Analysis mailing list.

Shipping Information

10. Please specify the address to which you would like the Hospital Discharge Data mailed, if different than above.

Name _____
Title _____
Organization _____
Address _____

Telephone _____
E-Mail _____

Approved by: _____ Date _____
Chief, Center for Health Data & Analysis

Revised 12/2014