TRACKING CLIMATE-RELATED HEALTH OUTCOMES IN VIRGINIA

ENVIRONMENTAL PUBLIC HEALTH TRACKING
ASTHO FELLOWSHIP REPORT

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Introduction

The U.S. Centers for Disease Control and Prevention Environmental Public Health Tracking (CDC EPHT) program provides a framework from which states can work to track exposures and health effects related to hazards and contaminants in the environment. CDC currently provides funding support to approximately 25 state health departments and 1 city health department to build and implement a tracking network at the local level. The program allows states to track and present data on 14 environmental health topics, known as content areas. EPHT content areas encompass a wide range of issues, from disease statistics on asthma to environmental indicators on drinking water quality. The various CDC grantees use their respective tracking program to distribute salient messages and data that communities can, in turn, use to improve their overall health. In order to build capacity to conduct tracking among non-funded states and territories, the Association of State and Territorial Health Officials, offers a tracking fellowship program whereby states can learn more about the EPHT program and receive guidance for developing a customized approach to EPHT that meets the individual needs of each state.

In January 2011, the Division Director of Environmental Epidemiology at the Virginia Department of Health (VDH) was awarded funds through the State-to-State Peer Fellowship by ASTHO to conduct a pilot tracking-related project; visit a mentor tracking state; and attend and participate in a national EPHT workshop. These activities were completed in the spring and summer of 2011.

The mission of the Virginia Department of Health (VDH) is to protect and promote the health of all Virginians. Although VDH is not a current EPHT grantee, we have a considerable amount of interest in a program that champions a similar goal – to learn about how agents in our environment (in water, soil, air, and other mediums) affect and interact with our health. An emerging area of study in environmental health is climate change, and as such, CDC is in the process of evaluating the feasibility of incorporating climate change related indicators into the national EPHT program. Accordingly, Virginia's pilot project is focused on the growing demand for new tracking-related knowledge about a rising worldwide issue: climate change and human health.

Learning Experience

In the spring of 2011, Virginia participated in the Association of State and Territorial Health Officials (ASTHO) Tracking Fellowship Program. This fellowship provides funding support for a state or territorial public health official to learn about tracking at a national workshop and visit a mentor state site to gain a better understanding of CDC's Environmental Public Health Tracking EPHT (EPHT) program. The goals of Virginia's project were to pilot test an environmental health indicator of climate change that might be considered for adaptation by other states in the EPHT network and to also demonstrate that VDH has the capacity to effectively select, test, and measure and indicator of environmental health for a state-specific population. Key to accomplishing this goal was the mentorship and guidance received during a two day site visit to a currently funded EPHT grantee, the New York State Department of Health. The EPHT Workshop was also attended by the fellowship investigator to learn the basic tenants of building and implementing a tracking network at the state level. An overview of the site visit and EPHT workshop, as well as lessons learned, is presented below.

Host State Site Visit– New York State Department of Health – February 2011

The host state site visit took place at the New York State (NYS) Department of Health on February 24-25 in Troy, New York. The EPHT program in New York is led by Dr. Syni-An Hwang, Bureau Director of the Bureau of Environmental and Occupational Epidemiology in New York's Center for Environmental Health. The Bureau of Environmental and Occupational Epidemiology is comprised of approximately 80 staff members and over 10 staff members contribute to the EPHT program. NYS EPHT investigators and project contributors present at the time of the site visit included Steve Forand, Gena Gallinger, Kathryn Schmit, Sanjaya Kumar, Phil Cross, Kevin Gleason, Neil Muscatiello, Shao Lin, and Syni-An Hwang. All NYS EPHT staff members play an important role in the success of the program as demonstrated by their knowledge and expertise in each of their respective subprogram activities. The developers, Steve Forand and Tom Talbot (in absentia), provided a comprehensive overview of the information technology (IT) infrastructure; metadata creation and submission; data management and security; and data sharing. A demonstration of NYS's secure and public tracking portal was also presented followed by a question and answer session. The Virginia investigator, in turn, gave an overview of current climate related surveillance systems housed in Virginia, with a focus on Virginia's harmful algal bloom surveillance system and beach monitoring database. An overview of NYS's outreach and risk communication tools, including actions and policies for communicating environmental public health tracking data, was presented and discussed amount staff members present. Marketing techniques were also explored during discussion. Rounding out the first day was an in-depth look at some of NYS's research oriented tracking projects related to climate change and health. On the second day of the site visit, indicator development was discussed at length; draft indicators of climate-related health outcomes were the main focal point of discussion. Lastly, the Bureau Director and the Virginia investigator participated in a one-on-one meeting to discuss a customized tracking approach in Virginia by modeling the EPHT architecture around Virginia's needs and existing infrastructure.

Lessons Learned during site visit:
First, tracking is a partnership program. Data must be acquired from a variety of partners within the hospital, public health, and environmental sectors. An issue that was raised regarding data acquisition was the degree of difficulty with obtaining certain datasets, and more specifically, gaining access to the appropriate level of datasets (zip code, county, etc). Building and cultivating partnerships is imperative; unless state law dictates otherwise, sharing of data is voluntary. Building a partnership with the appropriate data steward is the first step of data acquisition and this process alone can be extensive and prolonged. Of note, NYS partnered with their Cancer Registry to develop a mapping tool whereby users and decision makers can access environmental facilities and cancer incidence by county, zip code, census tract, and street level. This is a novel approach to tracking cancer incidence. The project is designed to answer questions many New Yorkers have about cancer and environmental facilities in their communities.

Second, information technology is the foundation of tracking. A strong and robust information technology and development team is imperative to the success of any state-wide tracking program. NYS has in-house developers than can respond to various tracking issues as they arise; this arrangement works well in NYS as developers and IT staff are available to coordinate with CDC staff and NYS staff alike; manage data securely; and develop, maintain, and update metadata. In contrast, Virginia has a sole source state contractor for IT and as such, would need to adapt a tailored approach to IT and development activities. To augment contractual services offered by the sole source state contractor, existing staff may need to be trained in the appropriate programming language and/or software required by tracking. Choosing the right mapping software and having the appropriate in-house expertise also play a critical role in a state's tracking program. Existing mapping capacity within Virginia would need to be strengthened and better integrated within various VDH divisions prior to implementing EPHT at the state level. Current EPHT grantees are quite adept at geographic information systems and have in-house staff to support grant needs. NYS's mapping structure includes rates maps, smoothed and aggregated rate maps, tools to protect confidentiality, cluster and probability maps, interactive components, regression models to detect unusual geographic patterns, and the ability to identify data quality problems.

Third, sound public health messages should always accompany the state's tracking data. NYS's public portal is focused on education and outreach but still offers the ability for the use to perform simple yet robust queries. A number of public health terms, such as exposure, surveillance, rate, etc., are clearly defined for a public audience. NYS's data displays are always compatible for persons with blindness. The importance of engaging stakeholder groups and clinician groups prior to releasing data on the public portal was discussed. These particular groups can serve as beta testers of each content area on the public portal. Even if more time consuming, a team approach for message development should be taken rather than a generic or targeted approach. By embracing a team approach, end users will be more acceptable and energized by the final product or result, thus encouraging other stakeholders and members of the public to utilize the tracking tools made available to them by the state.

National Environmental Public Health Tracking Conference – April 2011

The EPHT conference allows public health professionals from tracking and non-tracking states, cities, territories, industry, and academia to share experiences and lessons learned. The EPHT conference also serves as a networking tool by fostering new collaborations among its attendees.

Lessons Learned during conference:

The first lesson learned from the National EPHT workshop was the amount of flexibility offered to the states in terms of portal development, content areas, and information systems. Although parallels exist, no two state portals are alike. Every state has varying environmental health concerns that require a tailored approach to tracking them. By offering the states the flexibility to conceptualize, design, and implement their own tracking portal, states indicated that they feel a great deal of "ownership" and pride in the work undertaken in their respective state. States are also able to prioritize tracking activities and milestones as new environmental health concerns are raised or are elevated to a greater degree of concern. For instance, drinking water is an EPHT content area that garners a great deal of attention and public interest in every state. However, each state has a uniquely complex drinking water distribution system and environmental health concerns vary considerably from state to state. The EPHT cooperative agreement allows states to prioritize the development of content areas based on a state's individual needs and data availability.

The second lesson learned was the high value of the content workgroups (CWGs) and motivated members of same. CWGs are comprised of a content group leader, which are from either CDC or from a tracking state/territory. The workgroup operates as collaborative project team that takes necessary actions to meet the goals set forth by the group members themselves. These working groups helped to define the scope and complexity needed to implement various indicators and the workgroup recommendations are forwarded to the

Tracking Program for consideration. At the 2011 conference, the climate change CWG meeting attracted much interest, as evidenced by the number of participants standing in aisles and peering in from the entryway. A number of updates were presented during the climate change CWG deliberations, including environmental indicators of temperature change as well as indicators of harmful algal blooms. The climate change CWG will continue to meet regularly and deliberate as they work toward defining the appropriate core data and measures to track environmental health indicators for climate change.

Small Pilot Project

Abstract

Climate change is an emerging public health issue that will likely impact disease burden in Virginia. EPHT will have a significant role in monitoring climate change trends and its effects on mortality and morbidity. Even though Virginia is not a funded EPHT grantee, tracking environmental health indicators of climate change as a tool to protect the health of Virginians should be considered. By tracking indicators now, Virginia will be better equipped to plan and respond to climate change effects in the future. The purpose of this pilot tracking project was to evaluate the use of two developing environmental health indicators for use at a local geographic scale. To carry out this project, asthma hospitalization data for the Richmond metro region from 2005 to 2009 was assessed in relation to weather data during this same time period. Various indicators of asthma and climate change were explored for feasibility of incorporation into the national EPHT program.

Introduction

The U.S. Centers for Disease Control and Prevention Environmental Public Health Tracking (CDC EPHT) program provides a framework from which states can work to track exposures and health effects related to environmental hazards and contaminants. Several environmental public health indicators established by EPHT program were identified through epidemiologic analytic studies and surveys such as the National Health and Nutrition and Examination Survey (NHANES). Exemplary public health indicators are systematically and routinely collected by data stewards who are often trained in epidemiology or public health informatics. All public health indicators are subject to change; however, environmental health indicators are even more apt to change as technology advances or analytic studies reveal novel sources of disease in the environment. Climate change, defined as significant ecologic, climatic, and changes in weather patterns over time, is but one example of how a changing environment can impact long term trends and patterns of disease.

The CDC and the Council of State and Territorial Epidemiologists (CSTE) acknowledges that climate related events such as heat waves, waterborne and vector-borne disease outbreaks, ecosystem change, and extreme weather, will considerably impact our nation's health. In 2009, CDC formally established its Climate Change Program to coordinate agency efforts, to anticipate the health effects of climate change, to assure that systems are in place to detect and track these effects, and to respond to and manage associated risks. The Association of State and Territorial Health Officials (ASTHO) also acknowledges that continued climate change will have significant ramifications on public health. ASTHO is tackling this issue by helping states prepare for the possibility of health effects related to climate change through the ASTHO Climate Change Collaborative (CCC). The CCC is comprised of representatives from varied disciplines that play a role in improving the ability of state and territorial health agencies to prepare for, mitigate and respond to the potential effects of climate change.

The two primary goals of tracking environmental health (EH) indicators are to use a collection of information to prevent and reduce exposures to existing hazards and to minimize population risk for developing new diseases and conditions caused by an environmental hazard. Developing appropriate EH indicators of climate change involves a paradigm shift, moving away, for example, from annual and 5-year trends to much longer durations such as 10, 20, 50, or even 100-year trends. Choosing the appropriate ecological and health outcome indicators is a complex process but one with remarkable importance. Indicators are widely used by public health officials to provide information for evidence-based decision making. Many of these decision-making efforts, such as issuing warnings on excessive heat days, have relied upon several indicators of the status of various components of the environment. Several currently funded tracking states (e.g., New York, Oregon, California, and others) have already either begun or are currently considering incorporating environmental health outcome indicators of climate change into their EPHT programs. In recent years, it has become apparent that greater emphasis and attention to climate change is being raised by the public heath arena. In addition, increased focus and funding opportunities at the federal level area have created a rather urgent need for state, local, and territorial governments to respond. To meet this demand, governments at all levels have begun to initiate climate-related tracking activities in their environmental health or public health surveillance programs.

There is scientific consensus that significant changes in our climate, ecosystems, and weather are occurring. In late December 2007, former Virginia Governor Timothy Kaine issued Executive Order 59 which established the Virginia Commission on Climate Change and recognized that, "over the long term, climate change will affect Virginia's population, wildlife and economy." The Commission found that from 2000 to 2099, the average warming for Virginia and the adjoining areas would be 5.6°F and that precipitation would increase by about 10%.

The coastal zone of Virginia has been identified as the second most vulnerable region in the United States, surpassed only by the New Orleans region, to the projected impacts from climate change. According to the Virginia Institute of Marine Science, this projection is in part due to the large areal extent Chesapeake Bay watershed in Virginia. Communities located in the Accomack and Northampton counties of the Eastern Shore are likely to be more impacted by the effects of climate change than other, more inland, communities. Not only are these counties situated in areas that are more susceptible to coastal flooding but they also have a significant portion of their population living below the poverty line.

In the long-term, the burden of certain diseases and conditions is expected to increase due to the impact of climate change in Virginia. The Center for Health and the Global Environment at Harvard Medical School concludes that heat waves, coupled with higher humidity and disproportionate nighttime warming, can cause illness and death from heart disease, diabetes, stroke, respiratory disease and also accidents, homicide and suicide. As a result, health risks due to heat stress and higher humidity are likely to increase in Virginia. Studies have shown that waterborne disease activity will likely increase as more frequent precipitation events flushes more pollution and sediment into rivers, degrading water quality around the state. Decreased water availability due to warming and drought, coupled with increasing societal demands, can increase water contaminants and affect many sectors of the Southeast's economy including that of Virginia. It is thought that rainfall will occur in heavier downpours, which can trigger harmful algal blooms and precipitate outbreaks. Over 37 harmful algal taxa have been detected in Virginia's Chesapeake Bay waters. Major downpours can bring harmful blooms into recreational areas which have potential for human exposure. In the area of vector-borne disease, climate change will lead to the alteration or disruption of natural systems, making it possible for diseases (e.g., arthropod-borne diseases such as West Nile virus and Lyme disease) to spread or emerge in areas where they previously had been limited or non-existent in Virginia. Even though climate change might affect the exposure of Virginia residents to pathogens such as the West Nile virus, prevention, education, and treatment could offset this greater risk. However, the extent of the impact on vector-borne disease distribution is still largely unknown.

The global science community has established that changing weather patterns have occurred and that extreme weather events are becoming more frequent. These changes are rarely linked by the public and the medical community to changes in human health; yet, climate change has significant implications for health and well-being. In addition, public health professionals are on the front lines and can be influential in guiding the public and the medical community on health issues associated with climate change, particularly during extreme weather events. As such, Virginia requires the capacity to track and respond to the public health consequences of a changing climate.

Climate change is expected to increase the incidence of diseases associated with air pollutants and aeroallergens and exacerbate other respiratory and cardiovascular conditions. An increasing abundance of pollen and mold spores in the air, due to higher levels of carbon dioxide plus higher ozone and particulate levels, may lead to a larger burden of allergies and asthma. Virginia can expect to see a shift where spring temperatures come earlier in the calendar year and, in turn, a shift in the pattern of asthma related hospital admissions occurs. Given current climate change projections and scenarios, increases in temperature, precipitation events, and humidity are expected. Because these factors may influence severity of symptoms in individuals with allergic disease such as asthma, negative effects on respiratory diseases may occur. Climate change may affect respiratory illnesses through a variety of ways, some of which may interact to magnify the effect. Warmer days, particularly in urban settings, are associated with a greater presence of ground-level ozone. Exposure to ozone is associated with higher hospitalization rates for many respiratory illnesses, such as asthma and chronic obstructive pulmonary disease, and with increased mortality. The effect of ozone on health outcomes may be modified by temperature; higher temperatures coupled with ozone exposure may have a stronger effect on the health outcome. The presence and concentration level of other air pollutants with known respiratory health effects, such as particulate matter 2.5, are also affected by temperature. However, the association between meteorological factors and asthma is especially unclear. While some studies have shown that temperature fluctuation is associated with an increased risk of hospitalization for asthma, other studies have failed to detect effects of weather conditions on the incidence of asthma.

Tracking climate change indicators, specifically related to respiratory or allergic disease, is an area currently being researched and considered by EPHT on a national level. To support the national effort to develop and test indicators, NYS staff worked with other states to develop two measures of a climate related disease: allergic disease related hospital admissions (number, rate) and allergic disease related to emergency discharges (number, rate). Three measures of tracking temperature for public health purposes have also been proposed among EPHT grantee. These are: maximum temperature, minimum temperature, and diurnal temperature range.

In Virginia, Richmond city's asthma hospitalization rate has historically outweighed asthma hospitalization rates in every Virginia county. However, weather data in relation to respiratory disease outcomes have never before been tracked by Virginia Department of Health.

Therefore, the purposes of this project are:

- Describe asthma hospitalizations in Virginia in the Richmond metro region;
- Describe weather data during asthma hospitalizations in the Richmond metro region;
- Explore indicators of asthma and climate change to help determine the feasibility of incorporation into the EPHT program.

Methods

Data on asthma hospitalizations from four hospitals located in the Richmond metro region were obtained from Virginia Health Information System via the Virginia Department of Health Data Warehouse. The Richmond metro region includes hospitals located in the city of Richmond, Henrico county, and Chesterfield county. Only hospital admissions due to asthma as a primary diagnosis were included in the analysis; other asthma-related hospitalizations were excluded from the analysis. Population-bases rates were calculated to provide a measure of hospitalization frequency in the population and to allow for comparisons between years. In calculating rates, population estimates for 2005, 2006, 2007, 2008, 2009 prepared by the United States Census Bureau for the state’s cities and counties located in the Richmond metro region were used.

Weather data for the Richmond metro region was obtained from the National Weather Service. Data for the time period May 2006 through December 2009 was retained. Weather parameters collected daily maximum temperature in degrees Fahrenheit (F); daily minimum temperature in degrees F; the average temperature for the day in degrees F, computed by finding the average of the minimum and maximum daily temperatures; the departure from normal, computed by finding the difference between the average daily temperature and the 30 year normal daily temperature; total precipitation for the day to the nearest hundredth of an inch; average wind speed in mph averaged over a 2 minute period; and maximum wind speed in mph averaged over a 2 minute period. Diurnal temperature was calculated by computing the difference between the maximum daily temperature and the minimum daily temperature.

Descriptive statistics for asthma hospitalization and weather data were derived and presented. Data on race/ethnicity and gender was not available at the time of this report’s submission. A logistic regression model incorporating weather data as a function of asthma hospitalization will be developed for potential future data use will be submitted to ASTHO once this data is available.

Results (PRELIMINARY ONLY, DATA ANALYSIS TO BE SUBMITTED BY NOV 2012)

There were 546,819 hospitalizations in the Richmond metro region hospital from January 1, 2005 to December 31, 2009. Of this cohort, 8,379 were admitted primarily for asthma, accounting for 1.5% of all hospital admissions during this time period The annualized hospitalization rate during this time period ranged from 200.0 to 984.5 hospitalizations per 100,000 residents of the Richmond metro region (Table 1).

Table 1: No. of Asthma Hospitalizations and Rate per 100,000, Richmond metro

	2005	2006	2007	2008	2009
Population	763,234	774,030	789,634	798,070	807,536
N	1,668	1,620	1,722	1,596	1,773
Rate	218.5	984.5	218.1	200.0	219.6

Overall, children aged 4 and under accounted for the most asthma hospitalizations (n=1,984) during this time period, followed by children between the ages of 5 and 9 (n=1,073) (Table 2). The greatest number asthma hospitalizations among children aged 4 and under occurred in 2005. Asthma hospitalizations among children aged 4 and under decreased slightly from 2005 to 2009. Asthma hospitalizations among adults aged 45-54 increased slightly from 2005 to 2009.

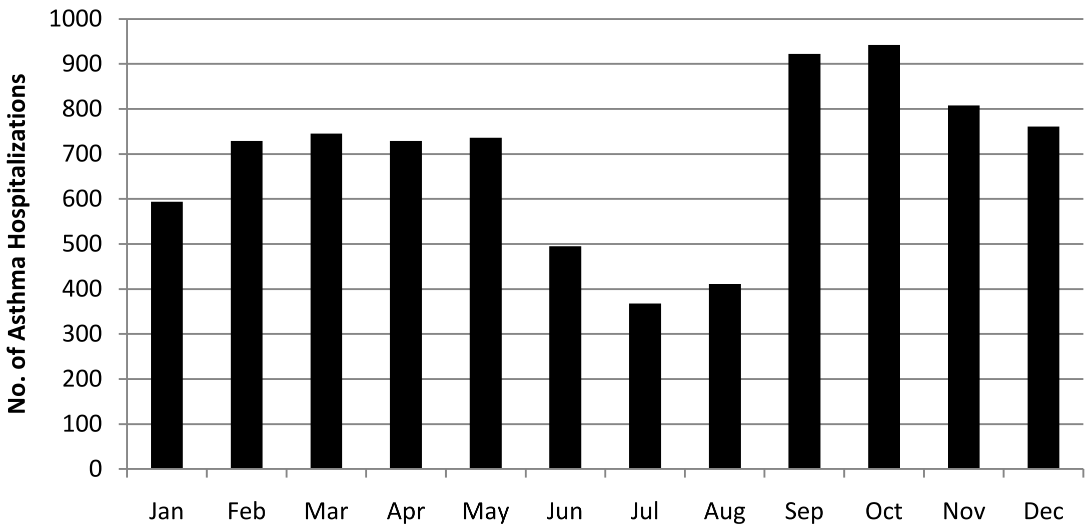
Table 2: No. of Asthma Hospitalizations and Rate per 100,000 by Age Group, Richmond metro

	2005		2006		2007		2008		2009		Total
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate	N
0-4 year(s)	446	850.3	412	789.7	434	795.9	366	664.5	327	588.6	1,985
5-9 years	222	448.9	218	439.3	274	536.3	142	274.3	217	409.8	1,073
10-14 years	115	213.8	123	235.0	129	244.8	110	211.7	124	240.8	601
15-19 years	41	74.6	41	73.8	55	96.9	41	71.8	49	85.8	227
20-24 years	26	48.2	32	59.7	25	45.1	22	39.6	29	51.8	134
25-29 years	24	49.2	28	54.1	39	72.0	31	55.4	35	56.4	157
30-34 years	51	97.8	34	64.4	49	93.0	39	74.0	43	75.3	216
35-39 years	81	145.7	50	86.0	60	102.1	68	115.7	92	162.8	351
40-44 years	82	133.3	115	189.4	96	160.3	101	171.9	92	161.9	486
45-49 years	72	117.2	91	145.8	88	142.4	108	174.9	147	244.0	506
50-54 years	79	140.3	99	173.9	92	158.3	111	188.0	130	223.1	511
55-59 years	70	146.2	84	167.7	77	154.2	81	159.3	89	175.7	401
60-64 years	58	179.2	49	148.3	66	179.1	82	209.7	92	227.6	347
65-69 years	62	275.4	47	199.7	55	221.6	55	205.3	78	281.9	297
70-74 years	56	296.5	53	280.4	52	273.8	61	317.8	70	349.5	292
75-79 years	65	396.6	60	355.8	44	261.6	67	402.5	55	323.6	291
80-84 years	58	433.8	45	336.9	41	303.3	44	322.0	53	372.4	241
85 and over	60	523.7	39	318.2	46	361.1	67	501.5	51	381.7	263

*Population by age group provided by U.S. Census Bureau

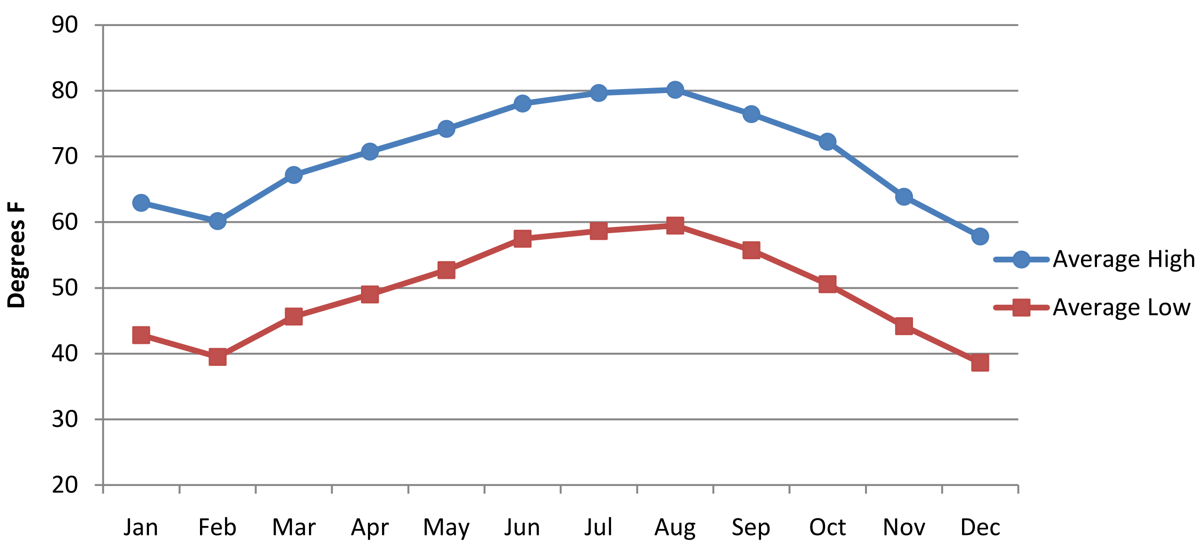
In the Richmond metro region, hospitalizations for asthma were most likely to occur during the months of September and October and less likely to occur during July and August (Figure 1).

Figure 1: No. of Asthma Hospitalizations by Month, Richmond metro, 2005-2009



From May 1, 2006 to December 31, 2009, temperature in the Richmond metro region ranged from 4 °F to 104 °F. At the time of this report's submission, certain weather data was not available for the Richmond metro region from January 1, 2005 to June 30, 2006.

Figure 2: Average Temperature (°F) by Month, Richmond metro, 2005-2009



To initially assess linear correlation between meteorological variables (maximum daily temperature, minimum daily temperature, average daily temperature, daily departure from normal temperature, daily precipitation, average daily wind speed, maximum daily wind speed, and diurnal daily temperature) and hospitalization for asthma, pearson correlation coefficients were calculated. Same day correlation with meteorological data on same day of asthma hospitalization was calculated (lag 0), followed by meteorological data on the day before asthma hospitalization (lag 1), and meteorological data three days before asthma hospitalization (lag 3). The greatest linear correlation between a meteorological factor and asthma hospitalization occurred among diurnal temperature (lag 0). [To assess association between meteorological data and hospitalization, a logistic regression model will be developed in the final report in order to adjust for age, race, and gender].

Table 3: Pearson Correlation Coefficients (r) relative to Daily No. of Asthma Hospital Admissions, unadjusted

	r, lag 0	r, lag 1	r, lag 3
Maximum Daily Temp	-0.178	-0.193	-0.208
Minimum Daily Temp	-0.201	-0.225	-0.219
Average Daily Temp	-0.193	-0.213	-0.218
Departure from Normal Temp	0.064	0.014	-0.007
Daily Precipitation	-0.031	-0.067	-0.041
Daily Average Wind Speed	0.111	0.023	0.047
Daily Maximum Wind Speed	0.057	-0.056	0.009
Daily Diurnal Temp	-0.450	0.047	-0.004

[FINAL DATA ANALYSIS PENDING]

Discussion

Data acquisition was prolonged and difficult to achieve.

Virginia is a geographically diverse state with several climate zones.

[FINAL DISCUSSION PENDING]

Limitations

Other environmental factors potentially affecting asthma such as particular matter, ozone, and other air pollutants were not assessed in this pilot project.

Confounding factors such as age, income, gender, and race were not included in preliminary data analysis.

Conclusions of Pilot Project

This project evaluated the potential feasibility of using asthma hospitalization data to track a climate-related health outcome on a local geographic scale. While results derived from querying and presenting temperature data alongside asthma hospitalization data are susceptible to ecologic bias and possible misinterpretation, these climate related indicators can be useful in identifying areas where asthma hospitalization data and environmental data can be further evaluated and explored. The preliminary results suggest that temperature fluctuation (measured by diurnal temperature) may be slightly associated with asthma hospitalization; however, further study of this hypothesis should be tested.

This pilot project additionally demonstrated that the tracking program can be used to identify data quality issues and improve data, explore relationships among asthma hospitalization and weather, generate hypotheses for research, and provide data for future study or environmental epidemiological investigations. The basic tracking data contained in this report cannot be used to tell us why asthma hospitalizations occurred or why they were more likely to occur among certain age groups. To further explore these questions, additional tracking activities and subsequent investigation are needed.

Planned Activities

Virginia EPHT Ad Hoc Working Group

In preparation for the next CDC EPHT funding opportunity, we plan to convene an ad hoc working group to identify IT needs, identify key data stewards, and build collaborations among salient divisions and programs within VDH. The meeting will take place in late fall 2011.

The goals of the ad hoc workgroup are as follows:

- Initiate a dialogue among VDH staff who already collect, manage, and track data relevant to EPHT
- Discuss and weight pros and cons of applying for a CDC EPHT funding opportunity, partly based on lessons learned as part of this fellowship opportunity
- Discuss existing opportunities to share relevant data across divisions
- Discuss value of implementing an ongoing EPHT Working Group at VDH

Conclusion

Virginia's participation in the ASTHO Fellowship program was successful in that:

1. The ASTHO Fellowship helped us build and evaluate the capacity to conduct a tracking activity (asthma hospitalizations).
2. The ASTHO Fellowship program helped us identify strengths and weaknesses of VDH's existing tracking capacity through the use of a host site visit.
3. The ASTHO Fellowship program helped us identify strengths and weaknesses of VDH's existing tracking capacity by participating in a national tracking workshop.
4. The ASTHO Fellowship program provided us with a better vision on how a tracking program might be fashioned in Virginia.

In the future, VDH staff will continue to work with existing tracking states, localities, and researchers to evaluate the utility of implementing a customized EPHT program in Virginia.

[FINAL CONCLUSION PENDING]

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