Project Name: Bacterial contamination in Long Island Sound: improving beach closure policy and assessing the effects of climate change

Organization Name: East Shore District Health Department

Preceptor Name(s) and Contact Information:

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East Shore District Health Department will be the lead organization; however the Directors of Health for the Towns of Madison and Guilford will be actively assisting and providing supervision/support to the Interns within their jurisdictions.

As a regional health agency, East Short District Health Department collaborates and has mutual agreements with surrounding local health departments, and will be actively working with the Towns of Guilford and Madison on this water quality research project.

Brief Description of Organization:

The East Shore District Health Department (ESDHD) is committed to improving the health and well-being of the residents of Branford, East Haven and North Branford. The Health District uses the framework of the Ten Essential Functions of Public Health in its planning and service delivery to member towns. We strive to meet and provide the ten nationally recognized services expected of a local public health agency.

ESDHD works with the state of Connecticut and the Connecticut shoreline communities to carry out the state mandated responsibilities and fulfill the essential services of a local public health system.

Our main responsibilities consist of:

- Assuring the conditions in which people can be healthy
- Promoting physical and mental health
- Preventing disease, injury and disability

Our environmental programs enable every resident to have healthy living conditions. Our health promotion programs educate and encourage the community to adopt healthy behaviors and prevent adverse behaviors. Our philosophy is that we can improve personal health as well as the health of the community as a whole. Disease control and prevention activities include vaccinations and education, as well as environmental work.
**Project Description:**

The East Shore District Health Department performs weekly bacterial testing in Long Island Sound bathing water during the bathing season. In addition, since water quality is known to decrease after a heavy rainstorm, the department performs testing after rain events of 1 inches or greater. Beaches are closed or re-opened based on results of bacterial testing. However, a limitation of this policy is that during the time interval between when a water sample is taken and when a test result with a high bacterial count becomes available (within a 24 hour period), the beach remains open and bathers continue to swim in potentially contaminated water. Development of a valid prediction model for bacterial contamination would facilitate conversion to a policy of preemptive closure based on the model.

Furthermore, climate change models predict increased temperature and precipitation for Connecticut, as well as increased in intensity of coastal storms. These changes are already occurring, and an assessment of their implications for beach contamination and closures is needed.

The project will have two aims:

**Aim 1: Based on retrospective data, to examine the relationship between weather-related and other variables and level of bacterial contamination in Long Island Sound bathing water. Level of bacterial contamination in Long Island Sound shellfish beds will serve as a secondary endpoint.**

Aim 1 will retrospectively examine data from 2004 to 2016, including data from East Haven, Branford, Guilford, and Madison. Potential predictors will include rainfall amount, air temperature, water temperature, humidity, wind speed, and tide. The primary endpoint (bathing water) will be enterococcal organisms per 100 ml and the secondary endpoint (shellfish beds) will be fecal coliform organisms per 100 ml. To help evaluate causality, results for bathing water and shellfish beds will be compared. Effect modification by beach and shellfish bed location and temporal trends in predictors will also be examined.

**Aim 2: To perform a critical review of saltwater beach closing policies in Connecticut and nationally, examining pros and cons of various policy options and making a policy recommendation for Connecticut beaches. The report should include an assessment of the effect of climate change on bacterial contamination and beach closure policy.**

The team will collect and review beach closure policies from around the country.

**Expected Work-Product and Deliverables:**

The project will include the following steps:

1. Data management: identify and organize the existing data into a coherent dataset for Aim 1 analysis
2. Simple descriptive analyses
3. Model development, including consideration of lags
4. Report, including results of model development, critical review with recommendations, and discussion of implications of climate change
5. Presentation of report at May 2017 Connecticut Department of Public Health Shoreline Bathing Water Meeting.