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MINIMIZING THE IMPACTS OF SEASONAL INFLUENZA

Overview

Each year approximately 2,000 people in New York City (NYC) die of seasonal influenza (flu) and pneumonia, which can develop as a flu complication[1]. The United States (US) Centers for Disease Control (CDC) estimate that, on average, 5-20% of the US population contracts the flu annually. The density, complex infrastructure, and international stature of the city increases the risk of spreading illness[2] and therefore prevention measures such as educational outreach and vaccines are of utmost importance.

The NYC Department of Health and Mental Hygiene (DOHMH) is working with the CDC to monitor current flu rates and collect information on historical incidence of flu-like illnesses in order to minimize flu impacts. In addition, the DOHMH has developed a model to determine vulnerability of certain risks, like pandemic influenza, based on NYC demographics. While these are both significant undertakings, the focus is on collecting information after people are diagnosed or on large-scale (pandemic) outbreaks. At the state level, the Mailman School of Public Health at Columbia University has produced a model predicting vulnerable areas for flu outbreaks[3]. This project will attempt to identify current areas of vulnerability by employing a combination of existing models and adding increased granularity and seasonal flu parameters.

[1] http://www.nyc.gov/html/doh/flu/html/public/general.shtml
[2] http://www1.nyc.gov/assets/em/downloads/pdf/hazard_mitigation/plan_update_2014/final_nyc_hmp.pdf
[3] put link here

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Objectives and Goals

The flu is one of the most common disease outbreaks in NYC[4]. It causes thousands of hours of lost productivity due to work and school days missed. This project seeks to minimize the number of seasonal flu instances by identifying areas of high vulnerability for targeted prevention.

This project will evaluate five years of historical data from 2009 until 2013 and provide, at minimum, descriptive statistics showing historical seasonal flu trends, adaption of city and federal models of neighborhood risk and vulnerability, and prediction of future vulnerable neighborhoods. This project will use the vulnerability model developed by the DOHMH, the Mailman model for statewide predictions, and hazard mitigation planning as a basis for modeling. The project will add to previous work by tailoring the models to seasonal flu parameters in NYC, including consideration for where vaccines are available.

The final product will be a vulnerability map that is available online, indicating which NYC ZIP codes have a high risk population for contracting the flu. Having the map online and available to the public makes it easier for the public to understand their flu risk as well as for the DOHMH to monitor areas that require additional assistance. The map will have a corresponding model that can be updated as new information becomes available, essentially after each flu season to assist with locating the next year's most vulnerable areas. This will assist the DHMH in creating more targeted flu prevention, including measures such as

[4] http://www1.nyc.gov/site/doh/health/health-topics/flu-seasonal-facts.page

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educational materials and adequate distribution of vaccinations, in order to reduce the flu rates citywide.

Data Inventory

Data about flu rates and risks can be found on federal, state, and local levels. All data is publically available through the links provided in the footnotes. Additional data may be utilized as needs arise. Current data sources are:

1. Federal data
    a. CDC[5] data regarding annual vaccine rate and effectiveness
    b. American Community Survey for demographic data, i.e. age, by ZIP code
2. New York State data
    a. Hospital Inpatient Discharge[6] 2009-2013 – diagnosis information for all hospital visits, includes some location and demographic information, record of flu diagnoses
    b. Mailman University Study...
3. NYC data
    a. Hazard Mitigation Plan[7] (2014) – plan to reduce risks from hazards, such as pandemic flu, and identifies areas of high vulnerability

[5] http://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm
[6] https://health.data.ny.gov/browse
[7] http://www1.nyc.gov/assets/em/downloads/pdf/hazard_mitigation/plan_update_2014/final_nyc_hmp.pdf

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b. Public Health Hazard Risk Assessment[8] - this assessment is advised by the CDC because "conducting a risk assessment can substantially increase a public health department's ability to identify and prepare for hazards that may impact its jurisdiction"
c. Seasonal Flu Vaccinations[9] - locations for vaccinations in NYC
d. Pandemic Influenza Preparedness and Response Plan (2006)
e. MTA data

The biggest limitation to the data thus far is that it is difficult, if not improbable, to infer about the population that has not been diagnosed with the flu. There are several scenarios for these individuals, including:

1. They may be healthy/have not contracted flu
2. They may have contracted the flu but not gone to the doctor to receive official diagnosis
3. Individuals in group 1 or 2 may or may not have received a flu shot

Data found to data has been open to the public and any personally identifying information (PII) has been removed. Care will be taken to ensure that no PII is utilized for this project.

[8] http://www1.nyc.gov/assets/doh/downloads/pdf/em/risk_assessment_report_2013.pdf
[9] https://data.cityofnewyork.us/Health/New-York-City-Locations-Providing-Seasonal-Flu-Vac/w9ei-idxz