

**ABSTRACT**

# Map application to the New York state electronic syndromic surveillance system

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**Objective**

The objective of this paper is to describe a map application added to the New York state Electronic Syndromic Surveillance system (ESSS). The application allows system users to display the geographic distributions, and trends of fever syndrome that was used to monitor seasonal and H1N1 influenza activities.

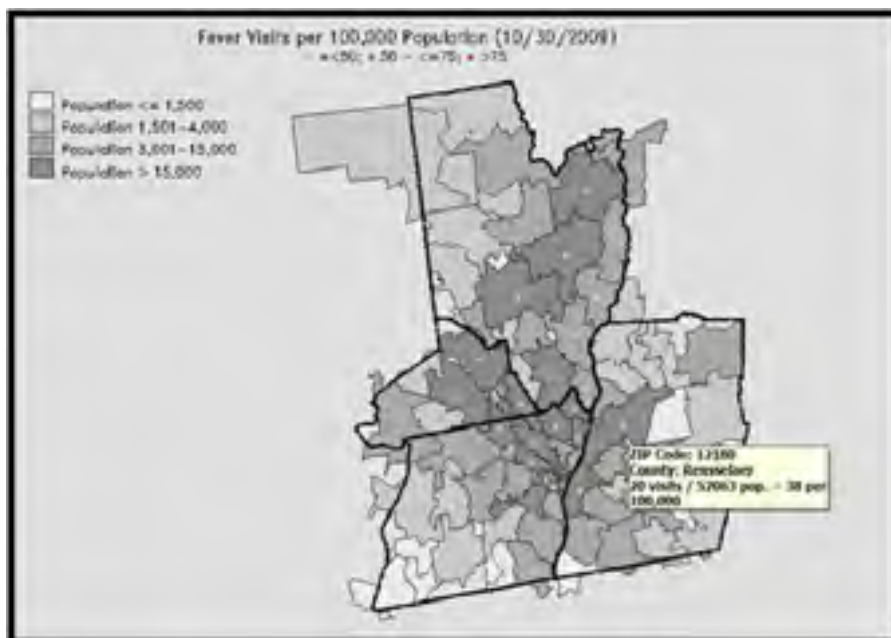
**Introduction**

The primary goal of the Electronic Syndromic Surveillance system (ESSS) is to monitor trends in non-specific symptoms of illness at the community level in real time. The ESSS includes emergency department chief complaint data that are categorized into eight syndromes: respiratory, gastro-

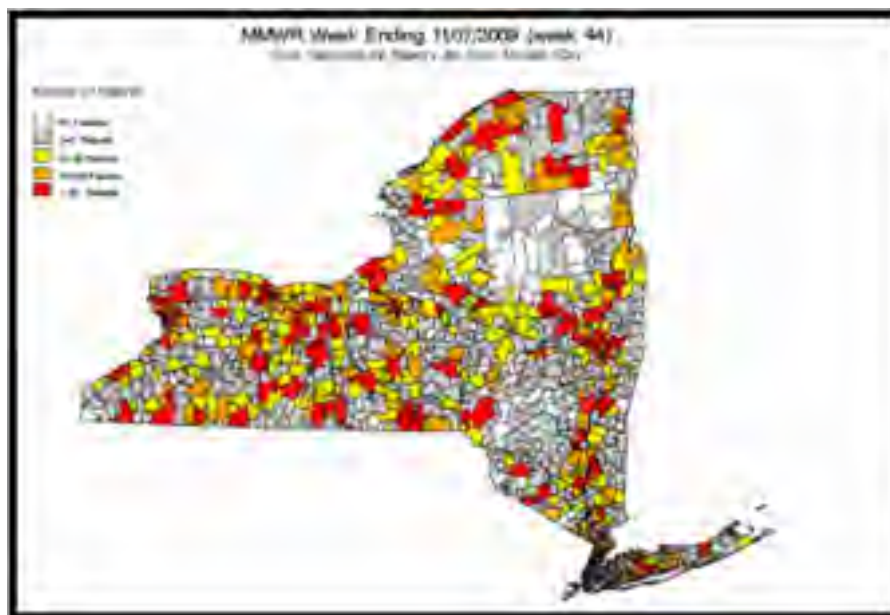
intestinal, fever, asthma, neurological, rash, carbon monoxide, and hypothermia. Since the onset of H1N1, fever syndrome has been used to monitor flu activity. As H1N1 spread nationwide, the need of visualizing flu activity geographically became clear, and urgent.

**Methods**

SAS software (SAS Institute Inc., Cary, NC, USA) is used to generate the maps. Once the users log on to the ESSS, enter map-generating parameters via an HTML screen, a Java-based web application is developed to run SAS codes to produce the maps. As this is a web application, the backend systems will respond with the data back to the client within five minutes, which allows for on demand display of the resultant maps.



**Figure 1** A snapshot of the user-generated map with pop-up label.



**Figure 2** A snapshot of the statewide fever syndrome map.

To reduce the SAS running time for the end users, a separate SAS program was scheduled to run every morning before business hours that creates a small-sized sub-dataset for query. The SAS output is constrained to HTML and GIF images to meet the system requirement.

## Results

The map application was implemented in August 2010. It contains two components. The first component is a user-generated geographic syndrome display. With this component, users input three parameters, which are where (that is, the geographic level by county, or counties), when (that is, one day in the past seven days that the users want to study), and what to generate (fever syndrome). On each resultant map, counts of emergency department fever syndrome visits are aggregated, and displayed as a rate (per 100,000 population) by patients' ZIP Codes. The ZIP Code population is represented with color shading in the resultant maps; the darker the color, the larger the population in that ZIP Code. The fever syndrome visit rates are denoted by three levels of colored dots. In addition, if users hover their cursor over a ZIP Code, a pop-up label will also appear, identifying the ZIP Code, county name, number of emergency department fever syndrome visits, population in that ZIP Code, and the fever syndrome visit rate (Figure 1). The second component of the application is a weekly statewide display of the fever syndrome visit counts. When requested, statewide fever syndrome maps of the most current four weeks will display

to show the trend. Each map represents one of the CDC Morbidity and Mortality Weekly Report (MMWR) week. On the maps, emergency department fever syndrome visits are aggregated by patients' ZIP Codes. The maps are shaded by fever syndrome visit counts; the darker the color, the higher the fever syndrome visit counts (Figure 2). Users can also zoom in the maps or view the historical weekly maps for the past twelve months.

## Conclusions

The map application is a new data visualization tool for the ESSS users. It provides hospital, local health department, region, and state users a user-friendly platform to monitor H1N1 and seasonal flu activities of their own jurisdiction, and the neighboring areas. The two components of the application enable users to generate informative local maps of fever syndrome visits, as well as to see the statewide trends over time. The map application does not require user-end software, or risk data security. It can be easily adapted for surveillance of other syndromic indicators.

## Acknowledgements

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