Flu Near You: Crowdsourcing Influenza-Like Illness Reporting in the United States

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Background

The United States Center for Disease Control and Prevention (CDC) estimates that influenza sickened over 24 million people, and resulted in the deaths of nearly 12,000 in the United States during the 2015-2016 influenza season. While vaccination remains one of the best defenses against it, early detection is crucial to halting its spread. Recognizing symptoms early can allow public health officials, and the communities they serve, to take steps to reduce transmission.

This is why we created **Flu Near You**, a collaboration between the **American Public Health Association** (APHA), **HealthMap** at Boston Children's Hospital and **Ending Pandemics**.

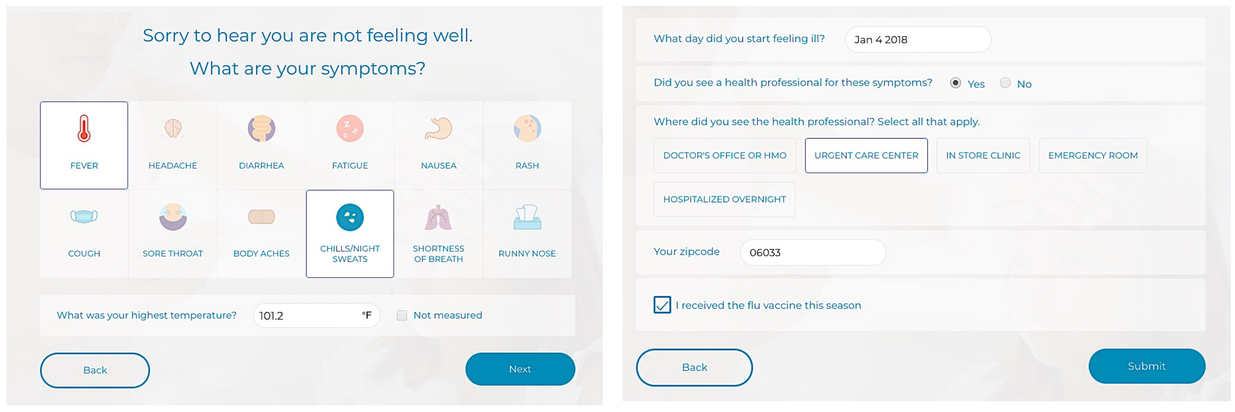

Figure 1. Screenshot of symptom reporting page (A) and illness details page (B)

Methods

Flu Near You (FNY) is an online participatory disease surveillance system that allows volunteers in the United States and Canada to report their health information using a brief weekly survey (Figure 1A, 1B). The system collects symptom data, which it publishes to the website, and offers an interface to compare its data with data from the Centers for Disease Control and Prevention (CDC) sentinel influenza network (Figure 2). Here we compare FNY influenza-like illnesses (ILI) with ILI estimates from CDC over three influenza seasons in the United States.

Participating in Flu Near You is simple – individuals can enroll in the Flu Near You system by signing up at www.flunearyou.org. Weekly reminders are sent to registered Flu Near You users to report on their own symptoms and the symptoms of household members.

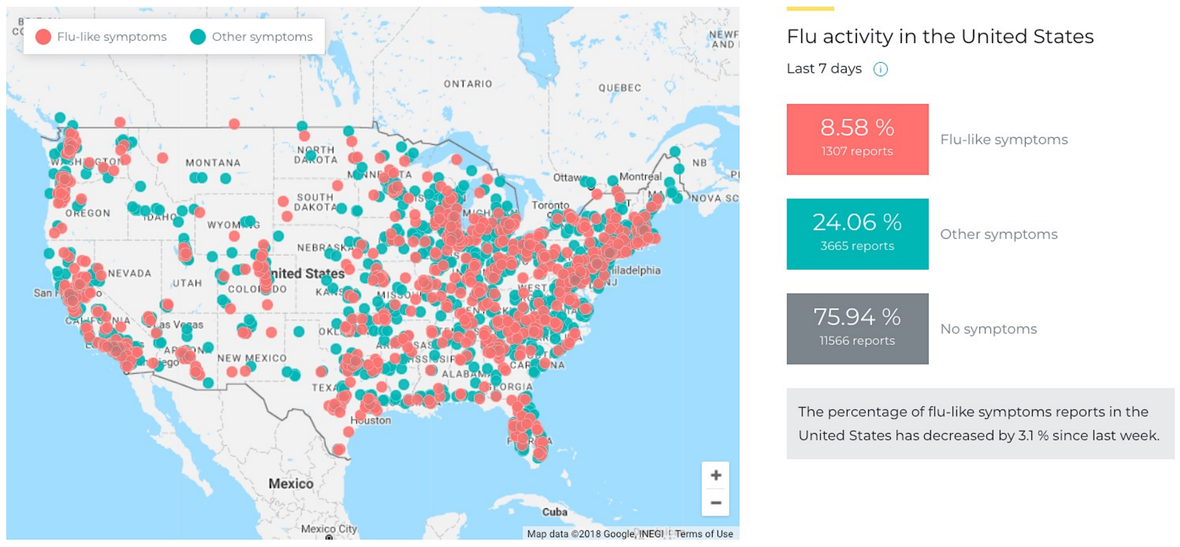

Figure 2. Web-based public interface

Results

Only 35% of Flu Near You users who report flu symptoms seek medical attention. Thus, Flu Near You captures disease activity in populations not accounted for by official surveillance data. As a result Flu Near You can be a valuable complementary surveillance system for assessing community-level disease trends.

A comparison of Flu Near You data to CDC's Influenza-like Illness Network has shown a correlation of up to 0.96 at the national level and correlations ranging from 0.8-0.9 at the regional level depending on the specific flu season (Figure 3). This high degree of correlation shows the Flu Near You successfully captures disease trends in the community.

Flu Near You data from cities and states with at least 200 average weekly user reports display correlations higher than 0.6 with traditional syndromic surveillance systems.

The platform has shown that females were 25% less likely than males to be high-participation users. Additional household members had more than 3 times the odds of being high-participation users. And we've noted a significant difference in participation among age groups, with older age groups (40+) more likely to be high-participation users.

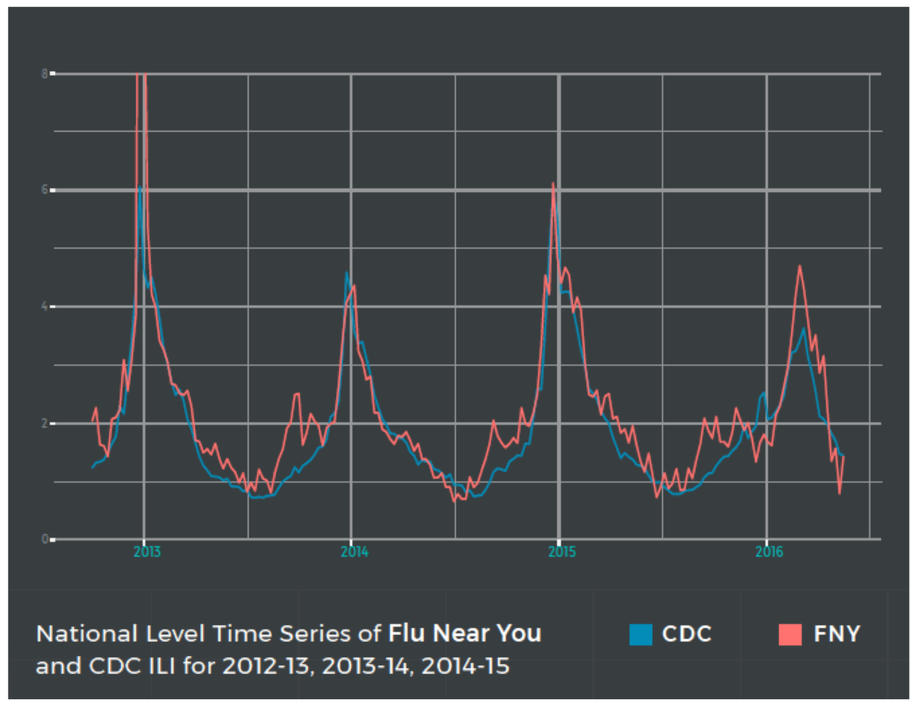

Figure 3. Time Series of FNY and CDC ILI for 2012-13, 2013-14, and 2014-15 Flu Seasons

Discussion

Our research has shown that approximately 200 weekly reports at the city and/or state-level can provide us with a good signal of an influenza season; thus, we aim to recruit 200 users for cities and states across the United States, particularly in areas that tend to be more rural, and where enrollment is currently sparse.

Additionally, we hope to expand and further our collaborations and partnerships with local and state health departments, as these synergistic efforts have helped provide for case studies of Flu Near You in action. We hope to provide an opportunity for the public to engage directly, as well as continue to be the trusted source for community-level disease surveillance.

On a broader scope, while Flu Near You has utilized influenza as a case study for participatory surveillance, the HealthMap team aims to expand symptoms and disease coverage for future application. With the increase in the emergence of infectious diseases over the last few decades, the application of this technology and method may prove useful in broader early disease detection, providing actionable insights for public health stakeholders, be able to account for and track other emergent diseases such as Zika virus and dengue.