



# Exploration of Flu Near You Data for Influenza Surveillance Use in California, 2012-2015

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## Background

- Flu Near You (FNY) is an online participatory syndromic surveillance system in which volunteers report whether they've experienced influenza-like-illness (ILI) symptoms each week
- In addition to reporting symptoms for themselves, users may also report syndromic data for household members
- Reports are analyzed and mapped by zip code to generate local and national views of FNY ILI that provide the public, public health officials, and researchers with up to date information on ILI in the United States
- Traditional measures of ILI rely upon the sentinel provider (SP) outpatient network which can be delayed by one or two weeks
- Nationally, FNY ILI data had a high correlation ( $r = 0.91$ ) with SP ILI data during the 2013-2014 season<sup>1</sup>

## Objectives

- Evaluate the association between California FNY ILI data compared to California SP ILI data and laboratory data
- Determine the minimum number of weekly participants needed to maintain accurate ILI activity estimates

## Methods

### Study design

- Retrospective review of FNY ILI data compared to SP ILI data and laboratory data for influenza seasons 2012-2013 through 2014-2015
- Performed bootstrap analysis (1000 re-samples of 10 to 300 weekly FNY participants in increments of 10) to estimate correlation of FNY ILI data and SP ILI data as the number of FNY participants increases

### Study endpoints

- Pearson correlation coefficient and root-mean-square-error (RMSE) calculated between FNY ILI and SP ILI data
- Pearson correlation coefficient between FNY ILI and respiratory virus laboratory data
- Number of weekly FNY participants needed to obtain a 0.60 correlation coefficient with SP ILI data

### Data sources

- FNY public health data portal
- California Department of Public Health (CDPH) influenza surveillance data: SP program and public health/clinical laboratory network

### SP ILI definition

- Healthcare provider report of fever (temperature of  $\geq 100^{\circ}\text{F}$ ) and a cough and/or a sore throat without a known cause other than influenza<sup>2</sup>

### FNY ILI definition

- User report of fever and a cough and/or sore throat

### Influenza season definition

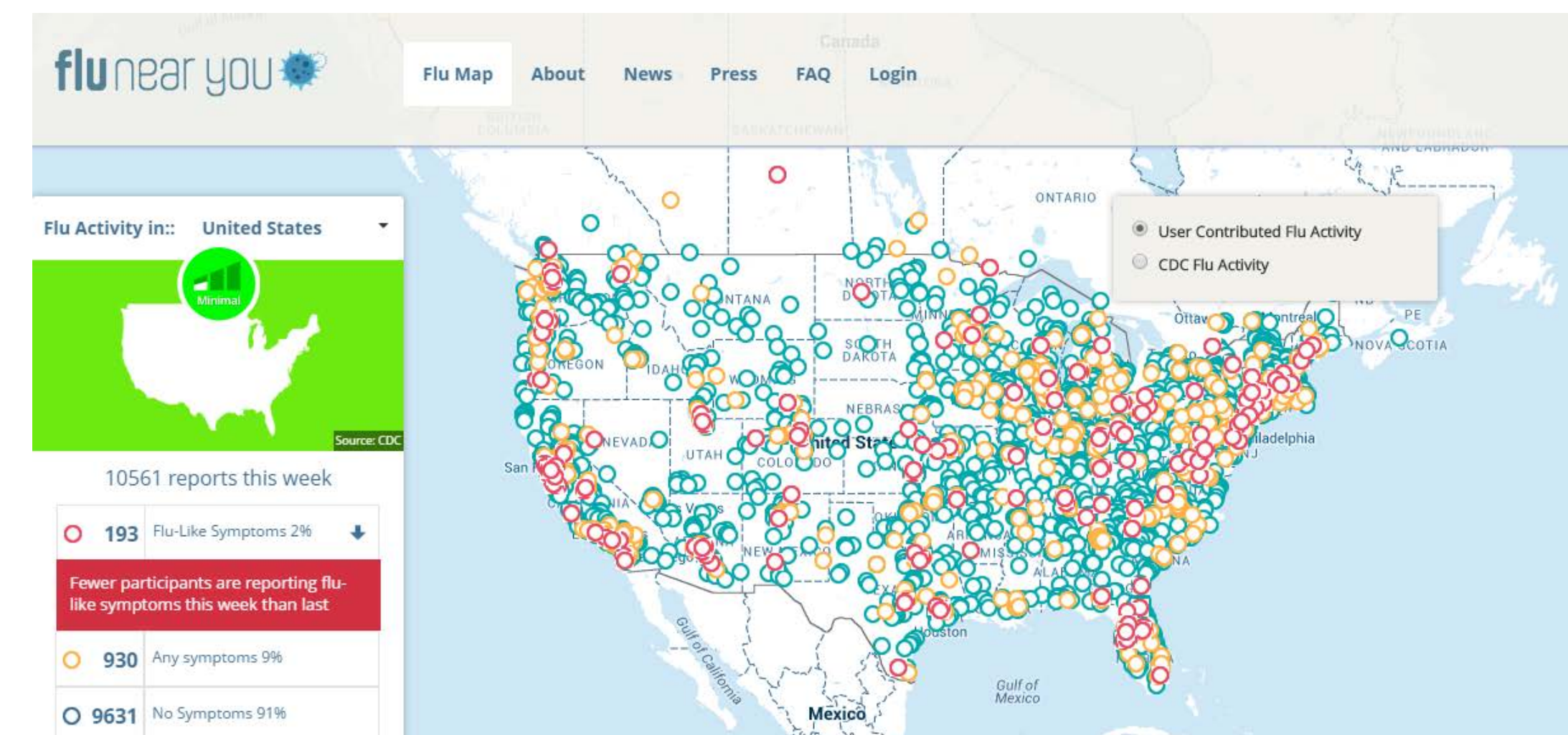
- Week 40 through Week 20 (approximately October through May of the following year)

### Statistical software

- Analyses and graphics generated in SAS 9.4 and R 3.2.3.

## Results

Figure 1. Overview of Flu Near You map for week ending May 7, 2016



Source: <https://flunearyou.org/home#map>. Accessed May 15, 2016

Figure 2. Number of FNY participants, California, 2012-2015

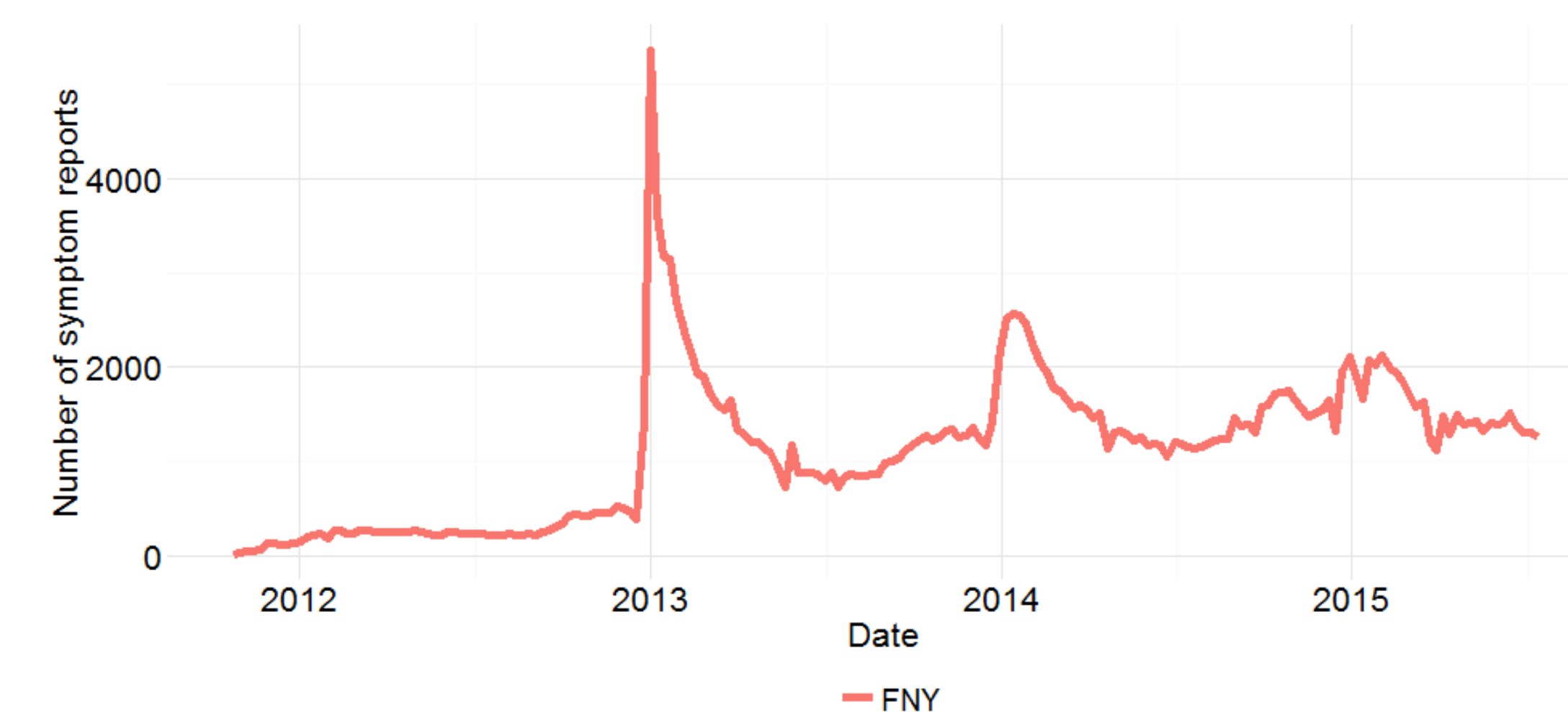


Figure 3. Time series of FNY and SP ILI data, California, 2012-2015

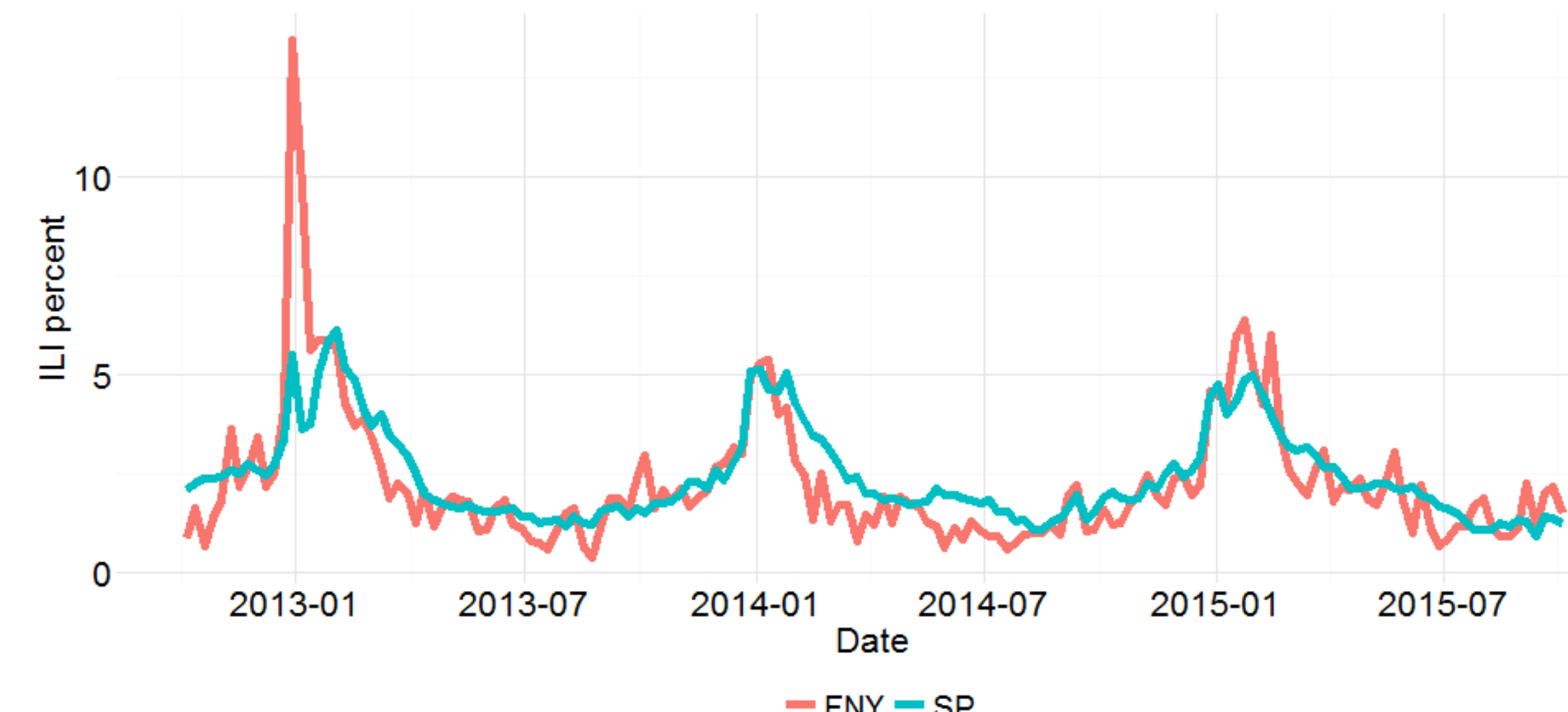


Figure 4. Bootstrap results: Correlation between FNY and SP ILI data by Number of Weekly Participants, California, 2014-2015 season

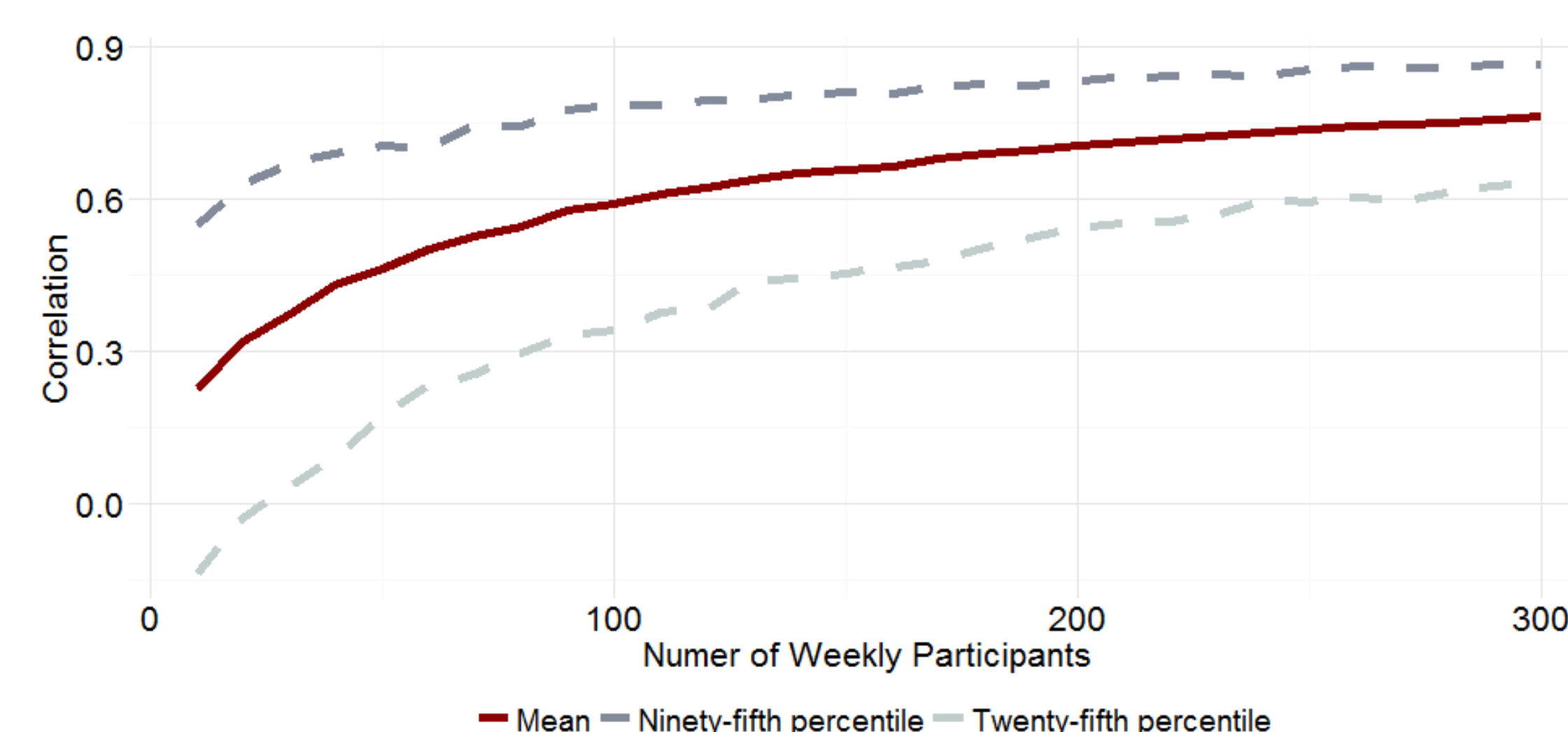


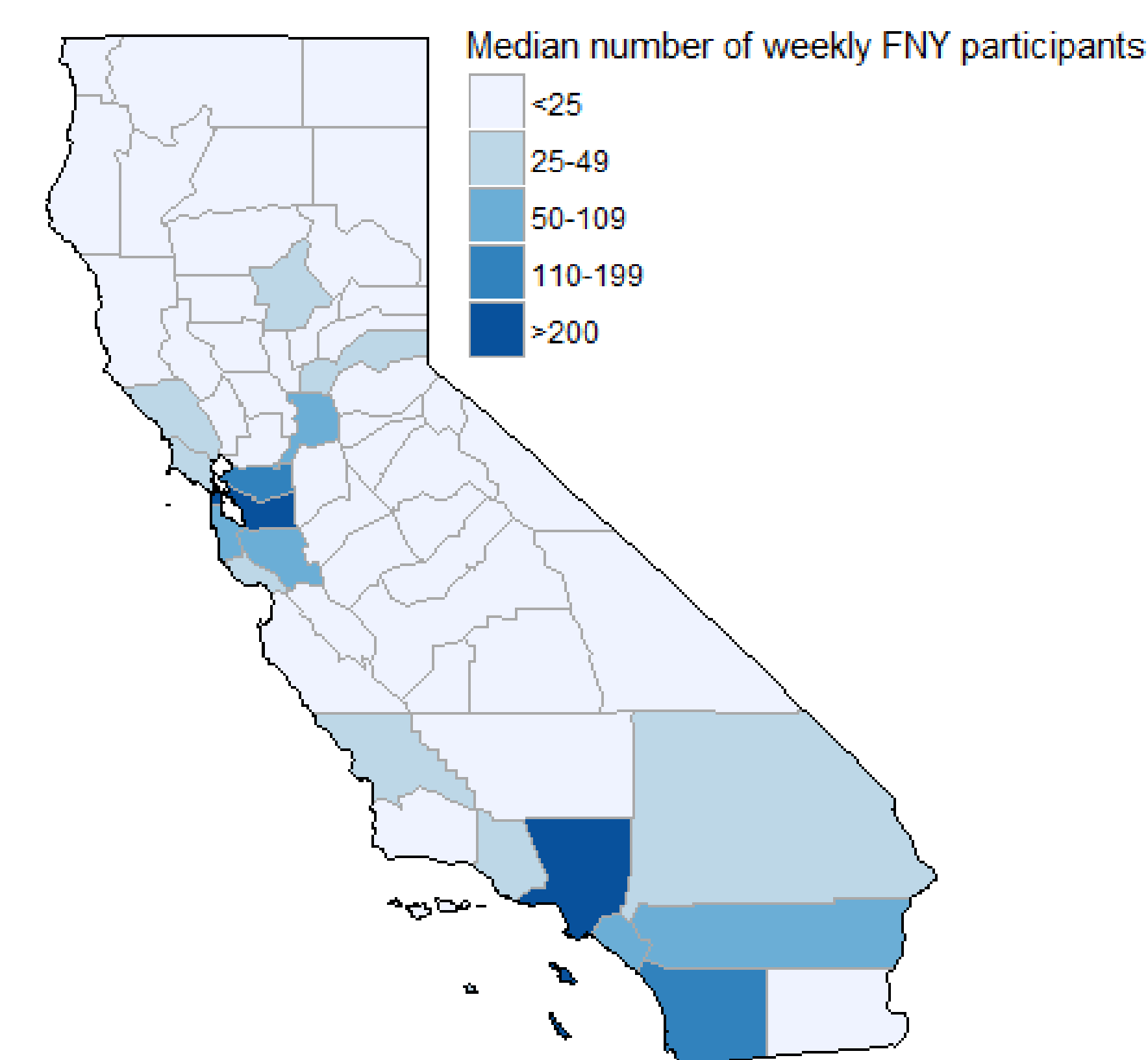
Table 1. Correlation and RMSE between FNY and SP ILI data, California, 2012-2015

	2012-13 season	2013-14 season	2014-15 season
Pearson correlation	0.69	0.79	0.89
RMSE	1.95	0.84	0.71

Table 2. Pearson correlation between FNY ILI and respiratory virus laboratory data, 2012-2015

	2012-13 season	2013-14 season	2014-15 season
Influenza percent positivity	0.41	0.81	0.90
Respiratory Syncytial Virus percent positivity	0.79	-0.17	0.75
Rhinovirus percent positivity	N/A	-0.22	-0.75
Adenovirus percent positivity	N/A	-0.05	-0.30
Parainfluenza percent positivity	-0.34	-0.12	-0.55

Figure 5. Median number of FNY participants, California, 2014-2015



## Summary

- The number of FNY user reports increased from 47,890 to 55,866 between the 2012-2013 and 2014-2015 influenza seasons
- FNY ILI data had a high correlation with SP ILI data and laboratory influenza positivity, which increased from the 2012-2013 to the 2014-2015 season
- The change in RMSE between FNY ILI data and SP ILI data from the 2012-2013 to the 2014-2015 season indicates the average error per week decreased steadily
- FNY ILI data had a weak or negative correlation to non-influenza respiratory viruses except RSV during the 2012-2013 season and 2014-2015 season (in which RSV and influenza coincided).
- At least 110 weekly FNY participants were needed to reach a mean ILI correlation of 0.60
- During the 2014-2015 season, only Los Angeles, Alameda, San Francisco, and San Diego counties had  $\geq 110$  median weekly FNY participants
- California FNY ILI and SP ILI correlation was less than the national average for the 2013-2014 season

## Limitations

- Unable to obtain individual level laboratory data or outpatient status of FNY users experiencing ILI
- Unable to exclude first-time user reports, which biases FNY ILI percentage upwards<sup>1</sup>
- FNY reported ILI does not require clinician or laboratory confirmation
- FNY user population likely differs from SP population in terms of demographics which may affect ILI rate
- FNY differs by one day in weekly reporting (e.g. Monday to Sunday vs Sunday to Saturday)

## Recommendations

- FNY ILI may serve as a complement to SP ILI data particularly for geographic regions not meeting CDC's SP goals
- In the future, a complete surveillance evaluation of FNY using CDC's guidelines is warranted
- Continue public outreach to increase the number of weekly users in all areas of the state
- Explore possibilities of how FNY communications can improve health behaviors
- More information is needed about California FNY participants and how to fully integrate FNY data into other influenza surveillance systems

## References

- Smolinski MS, Crawley AW, Baltusaitis K, et al. Flu Near You: Crowdsourced Symptom Reporting Spanning 2 Influenza Seasons. Am J Public Health. 2015; 105(10): 2124-2130.
- CDC. Overview of Influenza Surveillance in the United States. <http://www.cdc.gov/flu/weekly/overview.htm>

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## Acknowledgments

- Special thanks to the Skoll Global Threat Fund, California local health departments, California Department of Public Health Microbial Disease Laboratory, and California public, and clinical laboratories for their influenza surveillance efforts