Looking for evidence of a high burden of 2019-nCoV in the United States from influenza-like illness data

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Introduction

In December 2019, an outbreak of a novel, SARS-like coronavirus was detected in Wuhan, China. In the intervening few weeks, case counts have grown substantially. As of this writing, there are over 1200 confirmed cases and at least 41 deaths of what is currently named 2019-nCoV [1]. It is now understood that the virus is likely capable of person to person spread, with a preliminary R0 estimate of 1.2 - 2.5 [2].

Although very little sustained human to human transmission has been observed outside of China, the possibility of unrecognized spread in other countries cannot be ruled out at this stage. As an early effort to explore this scenario in the United States, we compare the proportion of weighted influenza like illness (wILI) that tests negative for influenza during the 2019-2020 flu season to trends from previous seasons. If it were the case that 2019-nCoV were circulating unobserved in the United States, we might expect to see in recent weeks a higher fraction of ILI specimens that test negative for influenza compared to the same time in past seasons.

Methods

Data

We downloaded publicly available ILINet and WHO-NREVSS data for the national and regional levels.

From the ILINet dataset, we downloaded weighted influenza-like illness (wILI), which measures the percentage of doctor's office visits at sentinel providers that had the primary complaint of fever plus an additional influenza-like symptom (cough, sore throat, etc. . .). For the WHO-NREVSS data, we obtained the total number of specimens tested by participating clinical laboratories, as well as the percent of those specimens that tested positive for influenza. These data have been aggregated into a single reporting system since the 2015/2016 season, so we use data since that time. Both data sources are available at the weekly time-scale, defined as using the MMWR week standard used by the CDC.

The code used to produce this report is available on GitHub at https://github.com/reichlab/ncov.

Influenza-like illness not attributable to influenza

One possible measure of influenza illness not attributable to influenza (ILI-) can be calculated as follows:

$$\text{ILI-} = (1 - \text{proportion of tests positive for influenza}) \times \text{wILI}$$

It is important to note that reported wILI can vary substantially due to differences in the types of health care providers reporting into ILINet. Therefore, some increases in reported wILI from one season to another may be driven in part by changes in provider type make up. An approximate way to adjust for this is by dividing reported wILI by the baseline for a given region and season. Baselines are provided by the CDC. This results in the following calculation of a **r**elative ILI-.

$$\text{rILI-} = (1 - \text{proportion of tests positive for influenza}) \times \frac{\text{wILI}}{\text{baseline level for ILI}}$$

Results

We plotted ILI- and rILI- as a function of the week within each flu season and stratified by region (Figure 1). We do not observe a strong signal of anomalous patterns of ILI rates that are not due to influenza. In several regions, the fraction of ILI not attributable to influenza is near or above the highest observed rates in previous seasons, although qualitatively it does not appear to be substantially higher than previous years. In recent weeks, there is a trend of a lower fraction of clinical specimens testing negative for influenza relative to wILI, but these changes cannot be described as sustained at this time and are still within historical norms.

Although these findings are far from conclusive, these preliminary observations do not support a scenario of a high burden of 2019-nCoV in the United States as of mid-January 2020.

Works Cited

[1] http://www.nhc.gov.cn/xcs/yqfkdt/202001/a7cf0437d1324aed9cc1b890b8ee29e6.shtml

[2] https://www.who.int/news-room/detail/23-01-2020-statement-on-t

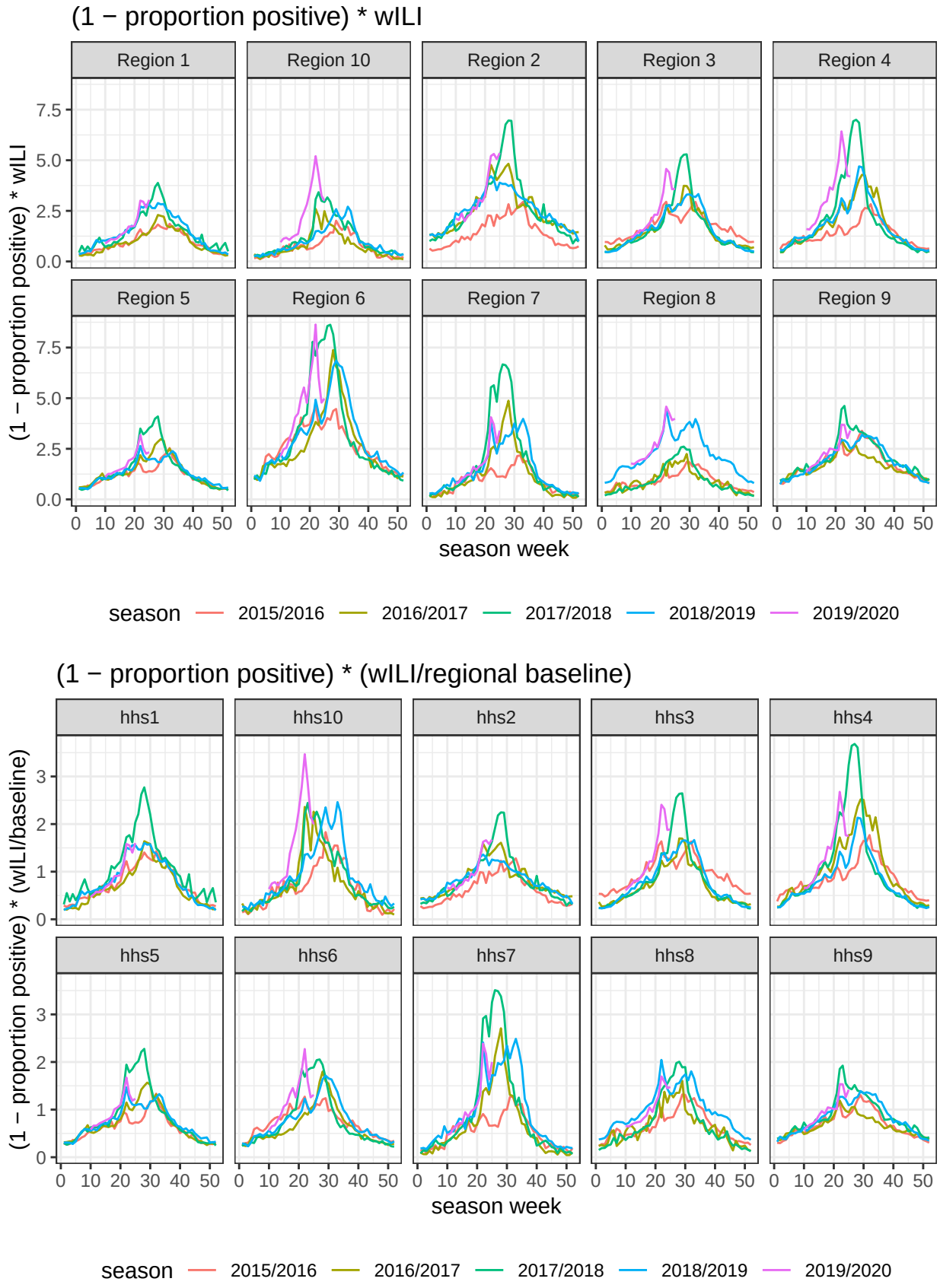

Figure 1: US HHS Regions plots showing ILI- values since the 2015/2016 season (top), and rILI- values (bottom).