Additional File 1: Data Notes

1 ILI case data calibration

Tables of percent of people experiencing ILI who seek healthcare and regional weights are derived from the FNY survey tables in [1].

Data Calibration Tables

Table S1. Percent ILI seeking healthcare regional weights, calculated for each of four Flu Near You (FNY) survey seasons by dividing regional percents (from FNY S1, column 5) by overall percents (from FNY S1, column 5), and the mean weights over four seasons.

U.S. Census Region	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**Mean over 4 seasons**
Northeast (NE)	1.0132	1.0309	1.0035	1.0894	**1.0343**
Midwest (MW)	0.9825	1.0112	0.9654	0.9603	**0.9799**
South (S)	1.1712	1.1938	1.2249	1.2219	**1.2030**
West (W)	0.8816	0.7612	0.8478	0.7914	**0.8205**

Table S2. Percent of ILI seeking healthcare, stratified by age group for each of four seasons, averaged over 4 seasons, and weighted by U.S. Census Region

		2015-16	**2016-17**	**2017-18**	**2018-19**	**Mean over 4 seasons SHC***	**Regionally Weighted Values**			
FNY Age Group	ILINet Age Group						**NE (1.0343)**	**MW (0.9799)**	**S (1.2030)**	**W (0.8205)**
< 18	0-4	29.6	40.4	33.7	37.7	**35.4**	36.6	34.7	42.6	29.0
< 18	5-24	29.6	40.4	33.7	37.7	**35.4**	36.6	34.7	42.6	29.0
18-49	25-49	20.8	35.0	27.7	29.2	**28.2**	29.2	27.6	33.9	23.1
50-64	50-64	21.9	33.2	28.6	26.9	**27.7**	28.7	27.1	33.3	22.7
65+	65+	27.7	38.1	29.1	29.8	**31.2**	32.3	30.6	37.5	25.6

*SHC = Percent ILI Seeking Healthcare

Fig. 1

For each age group and season,

$$EC = a + a\left(\frac{1-bw}{bw}\right) \tag{1}$$

where EC represents Estimated Total Cases, a represents weekly ILI cases counted in healthcare settings (see Figure 1), b represents the proportion of the total population experiencing ILI who seek healthcare (i.e., counted)(Table S2, Column 7), $1-b$ represents the proportion of the total population who do NOT seek healthcare (i.e., not counted), w represents the weight assigned to each U.S. Census Region for the ILI population seeking healthcare (Table S1, Column 6), and $a\left(\frac{1-bw}{bw}\right)$ represents the additive term used to calibrate the cases.

2 Monthly coverage data preparation

Coverage data is reported as monthly cumulative percentages, and thus information reported in May are the total percentage of people vaccinated for the season. Vaccine coverage for July were only reported for some seasons and if reported, they were generally very low (e.g., below 1% for all adult groups). For simplicity, if July coverage were not reported, they were set to be zero in our analysis. Some states are missing vaccine coverage for certain seasons. If these states have total coverage data from May, we used a back-fill method to estimate the coverage for the missing months. Specifically, we multiplied the following month's coverage by the mean coverage ratio between this month and the following month from all states that have coverage data for both months in that season. We started from the mean April to May coverage ratio to estimate missing coverage data for April, and then back-filled coverage data for all months that have missing values until the month of August. For states that still have missing coverage data (i.e., coverage data are not reported for May or not reported for the whole season), we used the mean coverage across all other seasons to estimate coverage for the that month. For example, in the 2013-14 season, California

only had coverage data for September and October. To calculate coverage data for each of the other months, we used the mean coverage from all other seasons where there was coverage data for that month.

3 Note on data consistency, for example, Mississippi's influenza vaccine coverage for the age group of 18 to 49 in 2017-18

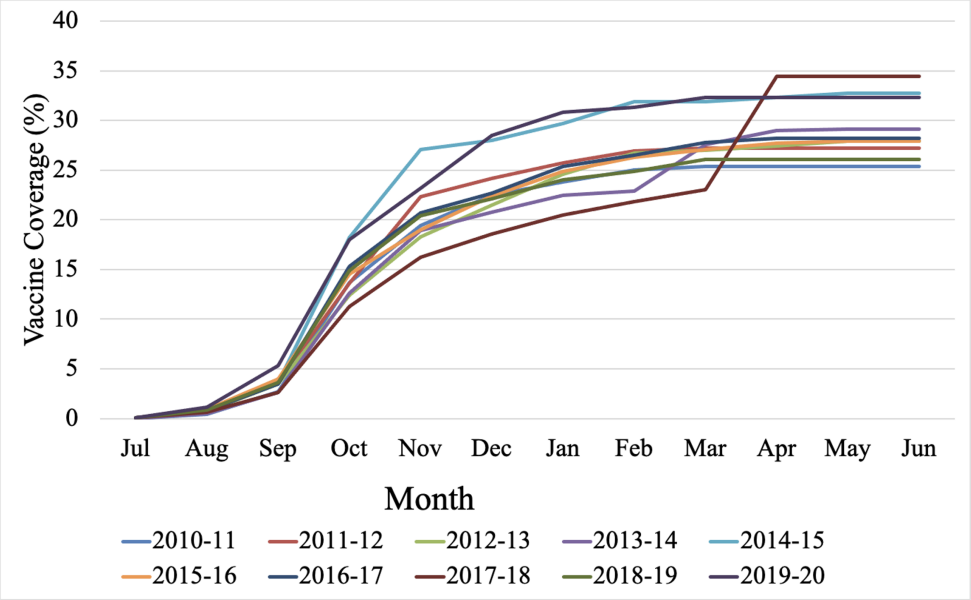

Fig. 2

An assumption implicit in our analysis is that the vaccine coverage data exhibit continuous, consistent, S-shaped curves that approach asymptote near the end of the influenza season. However, behavioral, reporting, and other anomalies may exist. For example, vaccine coverage in Mississippi for the age group of 18-49 years was recorded to have an abrupt increase from March to April in the season of 2017-18 which is unlikely to generalize to other state/seasons. However, since this increase occurred for

one state in one season, it is unlikely that on average, it would impact our results. Still, favorable vaccination schedule shifts reported here that reflect such anomalies may be less generalizable.

References

[1] Baltrusaitis K, Reed C, Sewalk K, Brownstein JS, Crawley AW, Biggerstaff M. Healthcare-Seeking Behavior for Respiratory Illness Among Flu Near You Participants in the United States During the 2015–2016 Through 2018–2019 Influenza Seasons. The Journal of Infectious Diseases. 2022;226(2):270–277.