

Week 3

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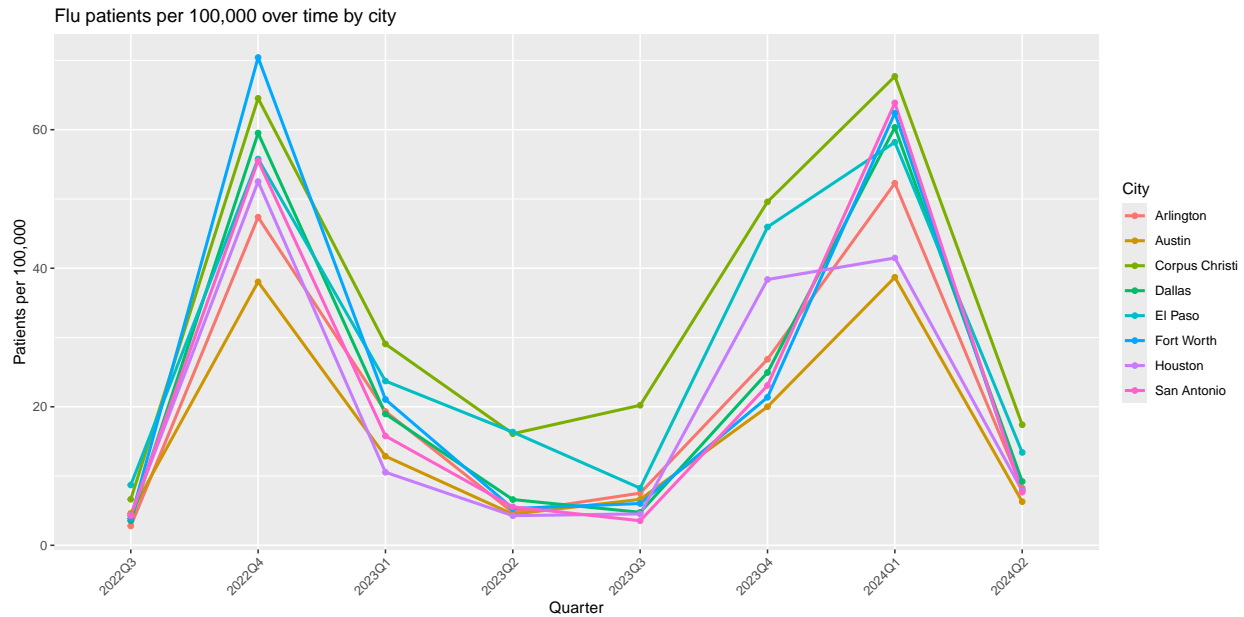
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Introduction

This week, we want to understand disparities in flu patients by city with the help of normalization. From our very helpful population dataset, we'll take a look at major Texas cities and identify any trends. Perhaps, we can investigate flu season by flu season in time-series data as well as looking at qualitative explanations for the rise in flu patients. I'll also look at temperature data and try to graph that data over time and space (<https://www.weather.gov/wrh/climate?wfo=ewx>) and I'll also take a look at healthcare metrics like one from the City Health Dashboard and I also want to maybe find a dataset that holds Texas flu vaccinations by city.

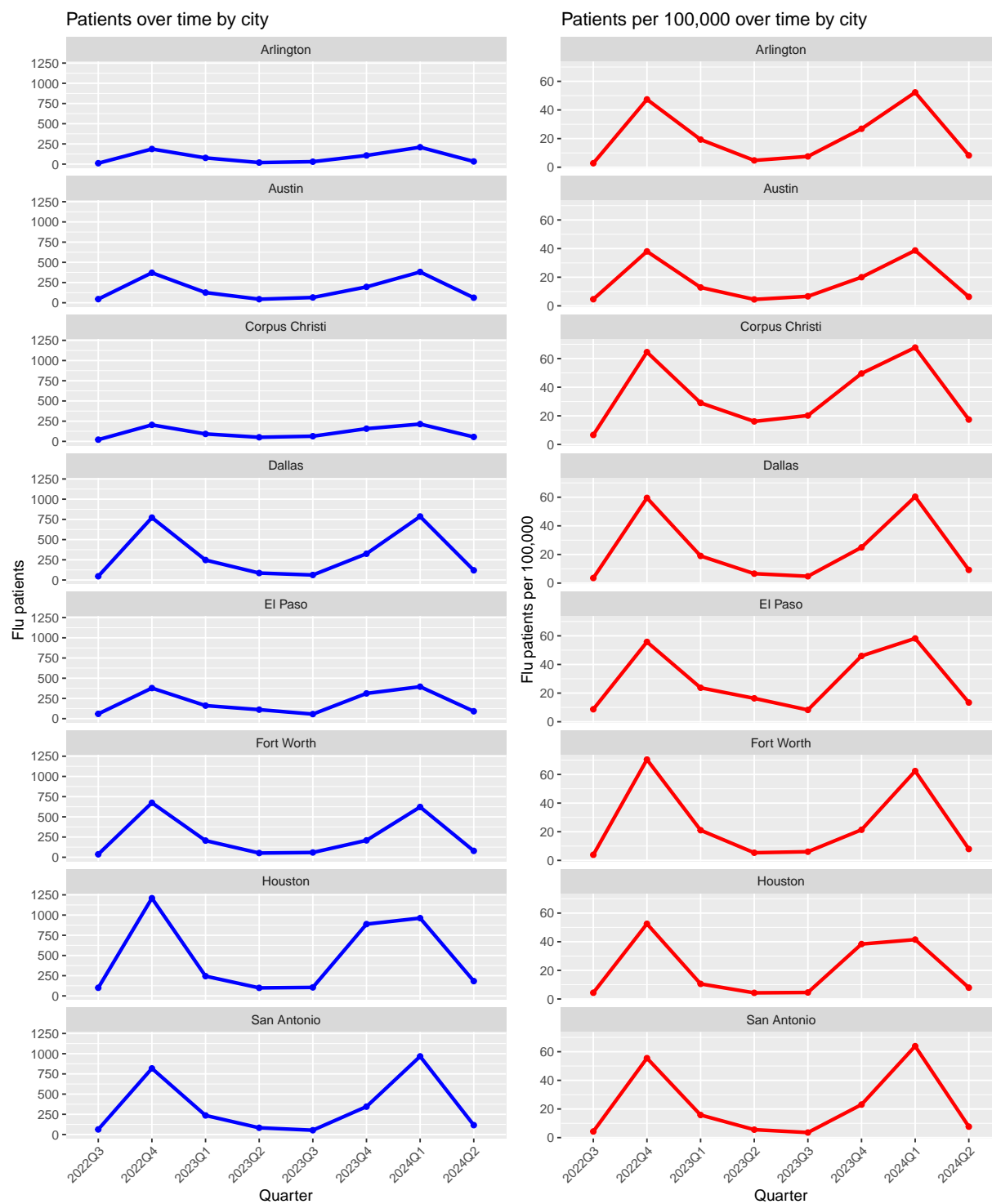
Normalizing flu data by population

Analyzing the extreme cities



I mainly created this graph so that I could look at these two flu seasons and examine the highest and lowest flu patients per 100,000. For the first flu cycle, we can see that Fort Worth and Corpus Christi had the highest patients per 100,000 while Austin clearly had the lowest each season, followed by Arlington in the first and Houston in the second cycle. I'm not sure why Austin has these low values but Corpus Christi might be a hot tourist spot during the holidays, which would raise flu cases without raising population, so that could be a contributing factor.

Comparing regular counts and normalized counts



As for the normalized metrics, this is pretty similar to the last graph but we see that places like Corpus Christi, El Paso, and Fort Worth are much more accurately represented by the normalized values. Looks like most major Texas cities share this same pattern and similar spike heights as well.

City Health Dashboard

The City Health Dashboard compiles a various set of metrics yearly (the most recent being 2022) and I have selected three of those metrics that seemed the most relevant: **Percentage of Children in Poverty**, **Uninsured Percentage**, and **Routine Checkup Percentage**

Percentage of Children in Poverty

Table 1: Cities by % of Children in Poverty in 2022

City	Children in Poverty (%)
Austin	16.1
Arlington	18.4
Fort Worth	19.0
Corpus Christi	25.3
San Antonio	25.9
Dallas	26.2
El Paso	26.3
Houston	30.0

I don't think this has a large amount of correlation with flu patient counts, but Austin does seem to have the lowest percentage of children in poverty,

Uninsured Percentage

Table 2: Cities by % Uninsured in 2022

City	Uninsured (%)
Austin	13.9
San Antonio	20.0
Fort Worth	21.0
Corpus Christi	21.2
Arlington	21.6
El Paso	23.8
Dallas	26.1
Houston	26.9

I think this metric might have a greater effect because insurance does decrease the cost of a flu vaccine. I think Austin being at the top of the list again is very telling because even though this is only 2022 data.

Routine Checkup Percentage

Table 3: Cities by % that get Routine Checkups in 2022

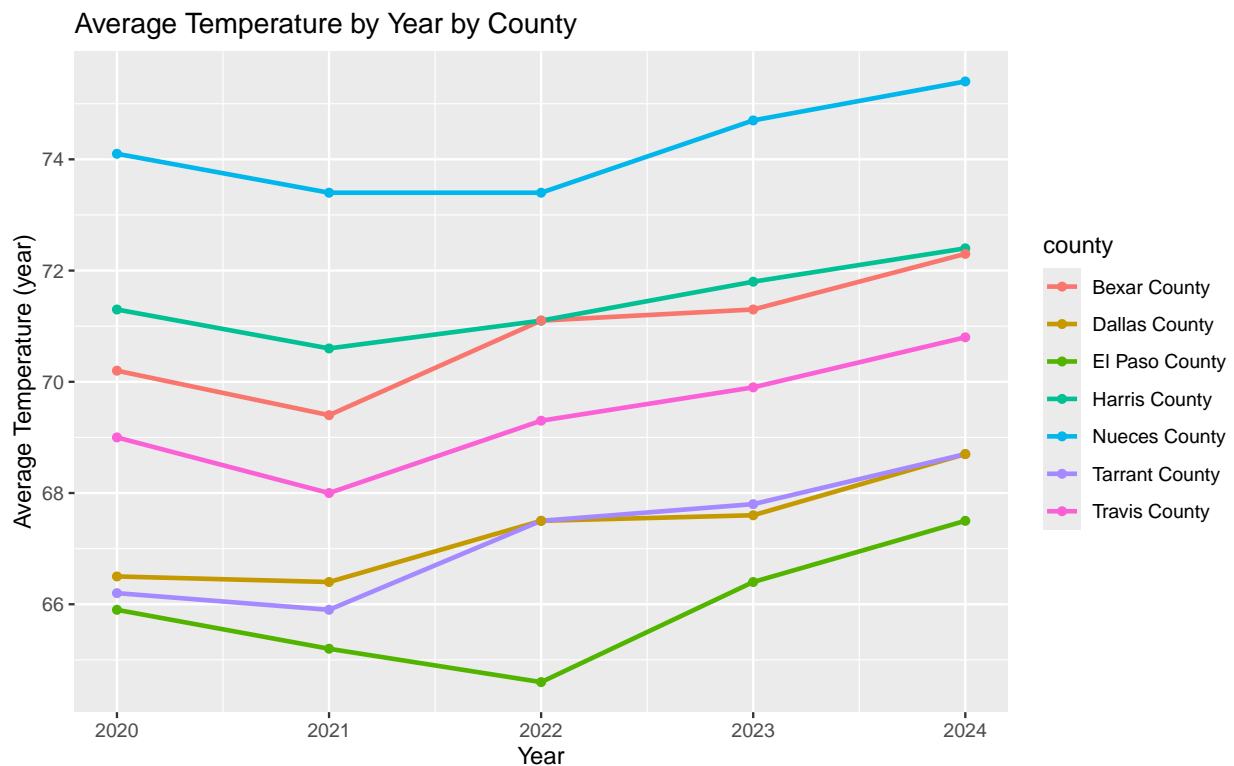
City	Routine Checkup (%)
San Antonio	73.5

City	Routine Checkup (%)
El Paso	72.9
Arlington	72.8
Corpus Christi	72.5
Houston	72.2
Dallas	71.8
Fort Worth	71.8
Austin	68.5

Lastly, this seems like a metric that might decrease total flu patients when the flu is in full force, but not so much for vaccination. Regardless, Austin hits the bottom of this list while San Antonio takes a surprising spot at the top of the table.

Temperature

Temperature by county

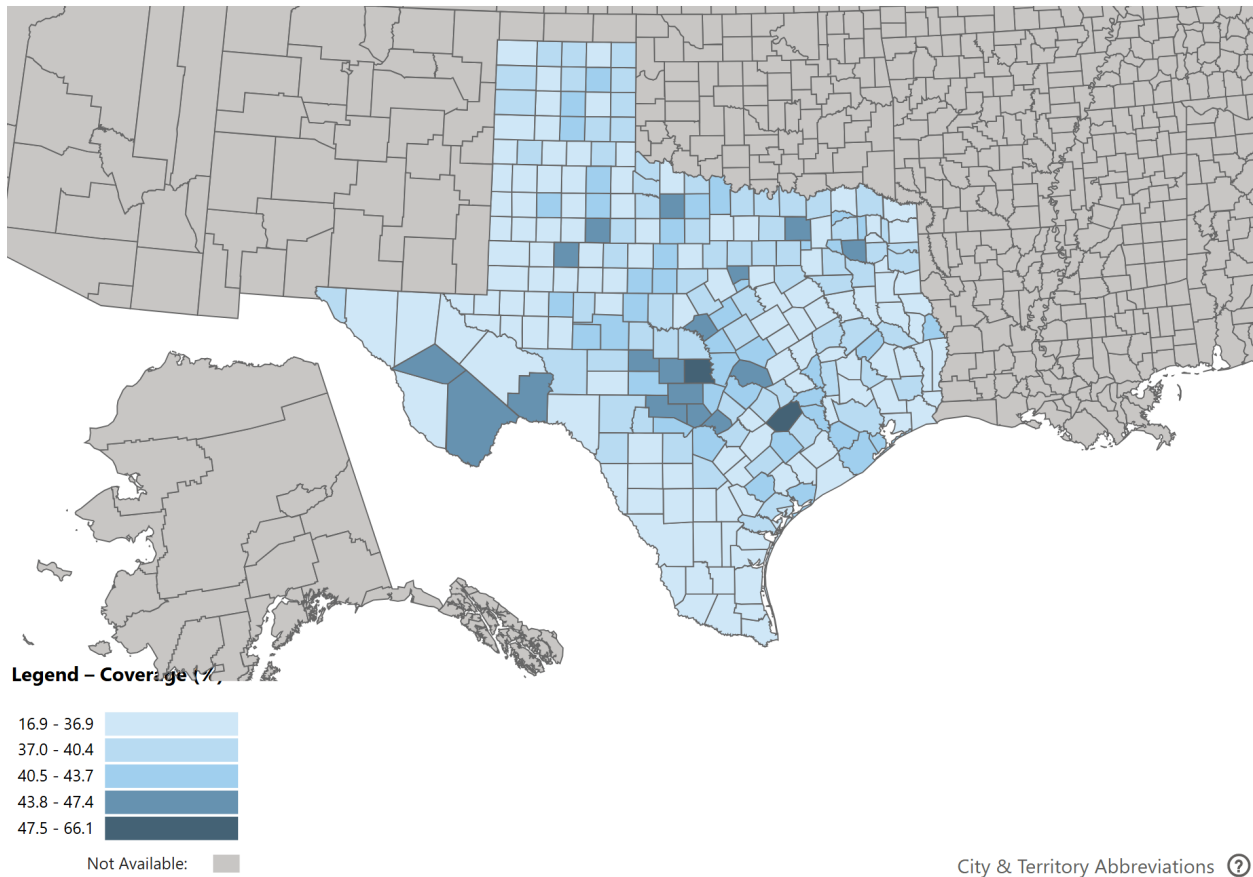


How flu and temperature are related

Generally, the influenza virus thrives in cooler, drier environments while warmer, humid environments weaken the virus. Nueces County is the highest in terms of heat and Corpus Christi does not follow the general trend. The average temperature over the year probably doesn't make that much of an effect but it might explain northern cities having more flu patients than southern cities like Tarrant County (Arlington/Ft. Worth) vs Bexar County (San Antonio).

Flu vaccination coverage

Influenza Vaccination Coverage among Persons Age ≥ 18 Years by County, 2022, BRFSS



The above image is a flu vaccination coverage map of Texas, shaded by the county's flu vaccination coverage (darker is better).

Coverage data

Table 4: Flu Vaccination Coverage Estimates by County in 2022

County	Corresponding Cities	Coverage Rate
Travis County	Austin	42.5
Bexar County	San Antonio	41.4
Dallas County	Dallas	39.9
Tarrant County	Fort Worth & Arlington	39.4
Harris County	Houston	38.4
El Paso County	El Paso	38.0
Nueces County	Corpus Christi	34.1

Analysis

Aha! Looks like this is our magic weapon! Corpus Christi sits at the bottom of the table with cities like El Paso and Houston while Austin rests comfortably at the top with cities like San Antonio. If you reference

the first figure in this week's report, you'll find this is the most accurate predictor we've examined so far.

Conclusion

We found the normalized versions of flu patients, compared them across cities, and then attempted to find predictors for the trends we saw. We looked at 3 City Health Dashboard metrics, temperature, and flu vaccination coverage. I think they all had some weak/mid correlation but flu vaccination coverage had the clearest trends by far (which makes sense). Next week, we might look at more predictors or dig further into health insurance prevalence and flu vaccination coverage.