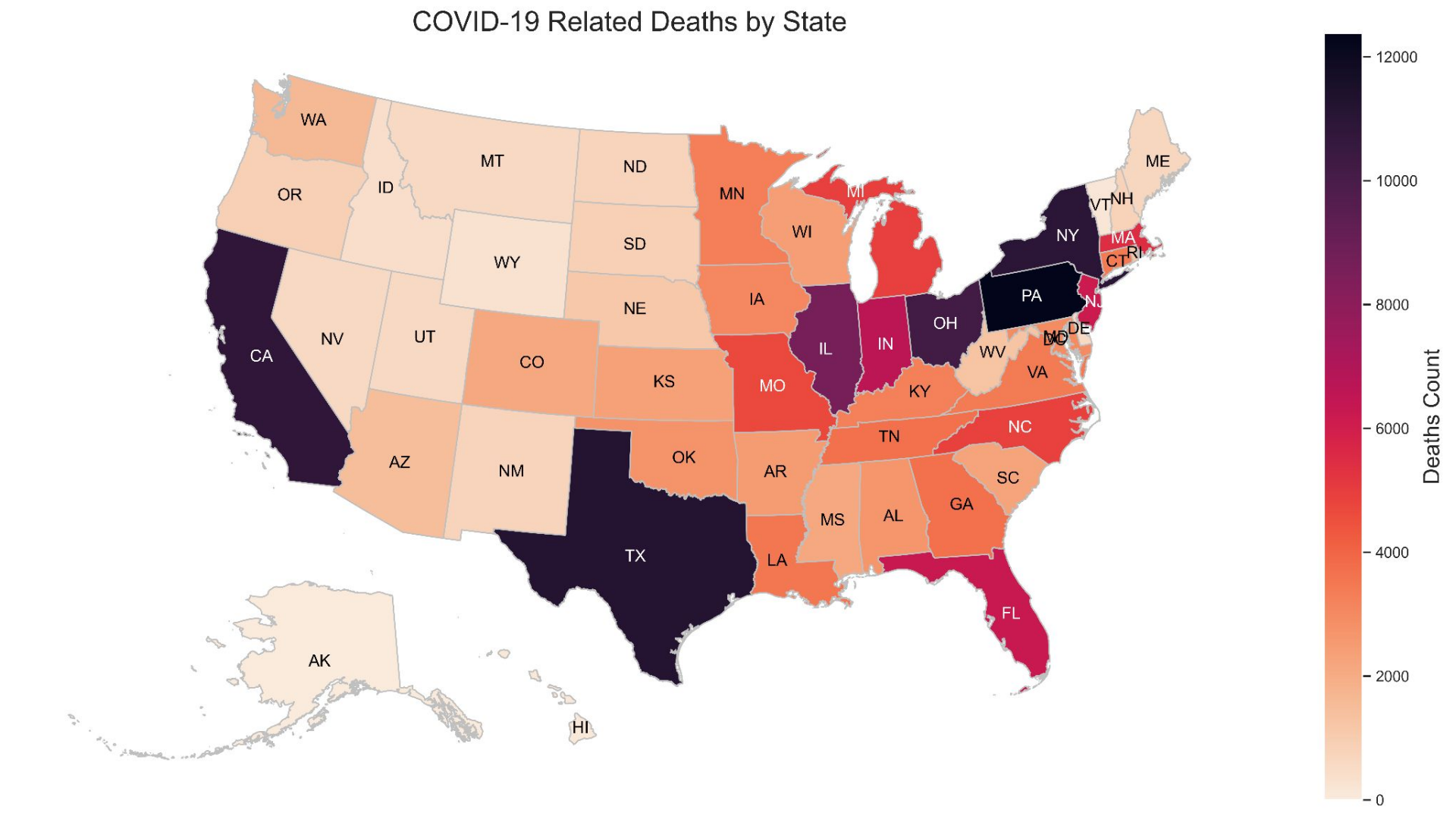
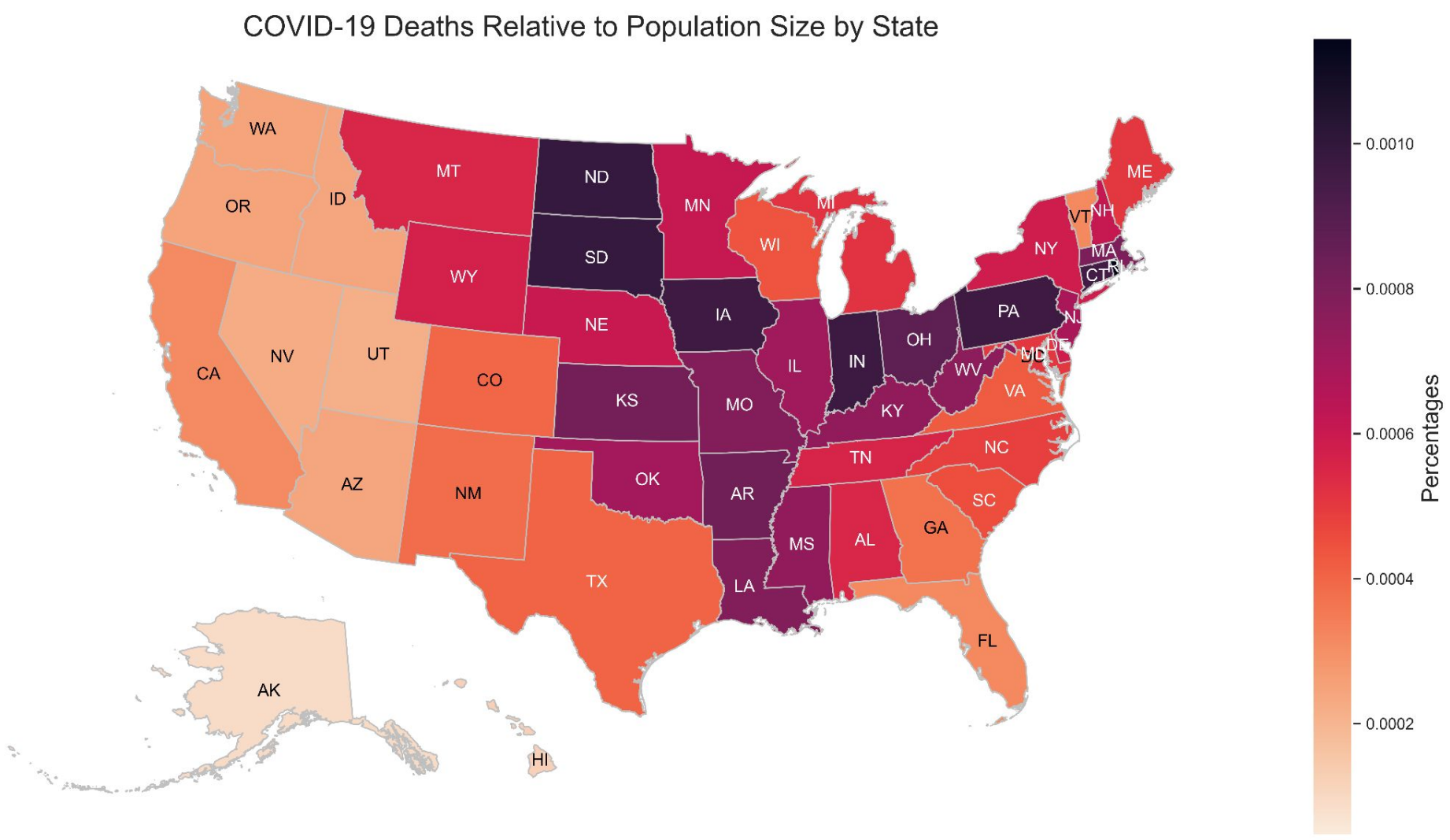
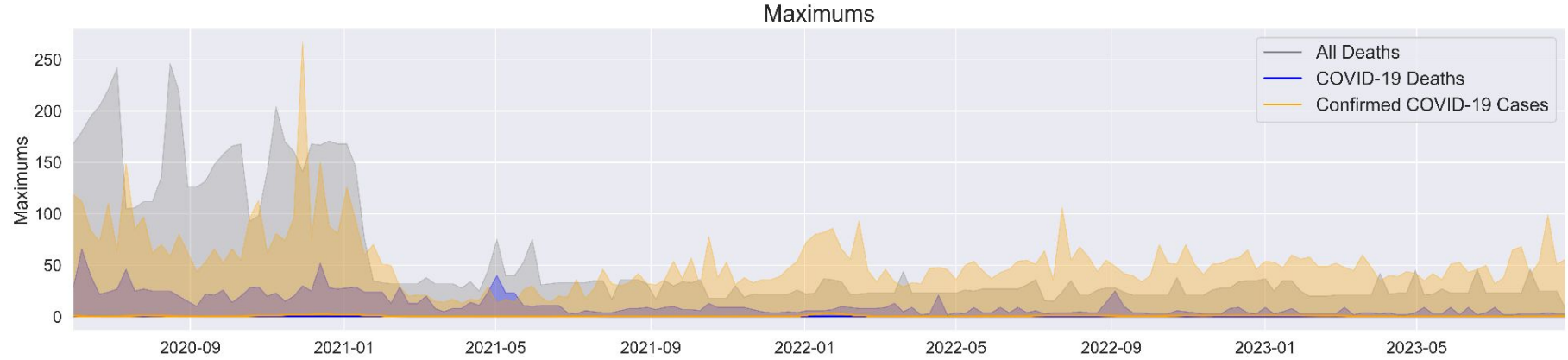
Analyzing COVID-19 Impact:
Did Vaccination Affect Elderly Mortality in US?

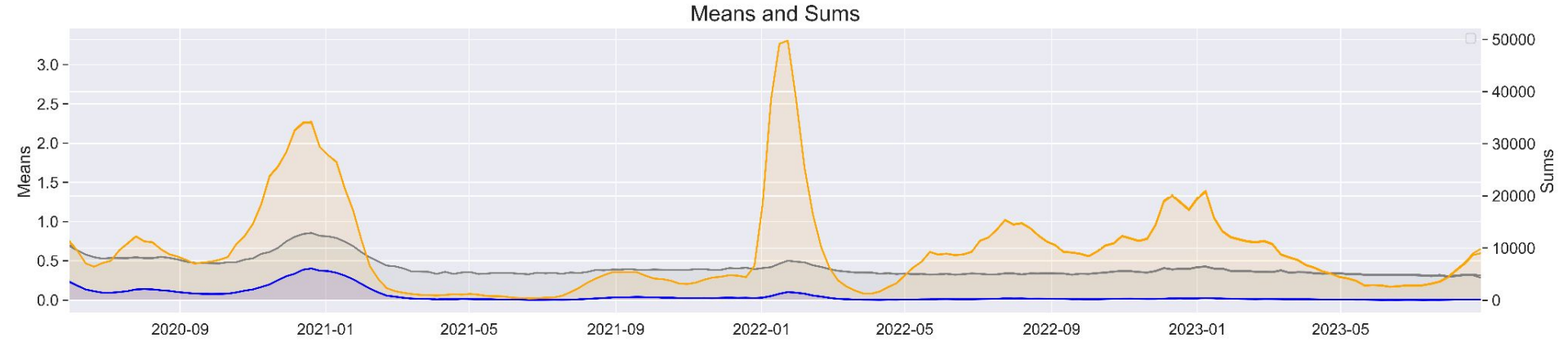
- **Objective:** analyze if COVID-19 vaccination affected **elderly mortality**.
- **Source:** data.CMS.gov.
- **Data:** COVID-19 reports from **nursing homes** to CDC's NHSN COVID-19 Facility Module.
- **Volume:** over 2.5 million data points.
- **Coverage:** multiple nursing homes across U.S. states and some islands.
- **Period:** May 24, 2020, to August 27, 2023.


COVID-19 Related Deaths by State
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
MD
DC
DE
NJ
CT
RI
MA
VT
NH
ME
AK
HI
Deaths Count
12000
10000
8000
6000
4000
2000
0

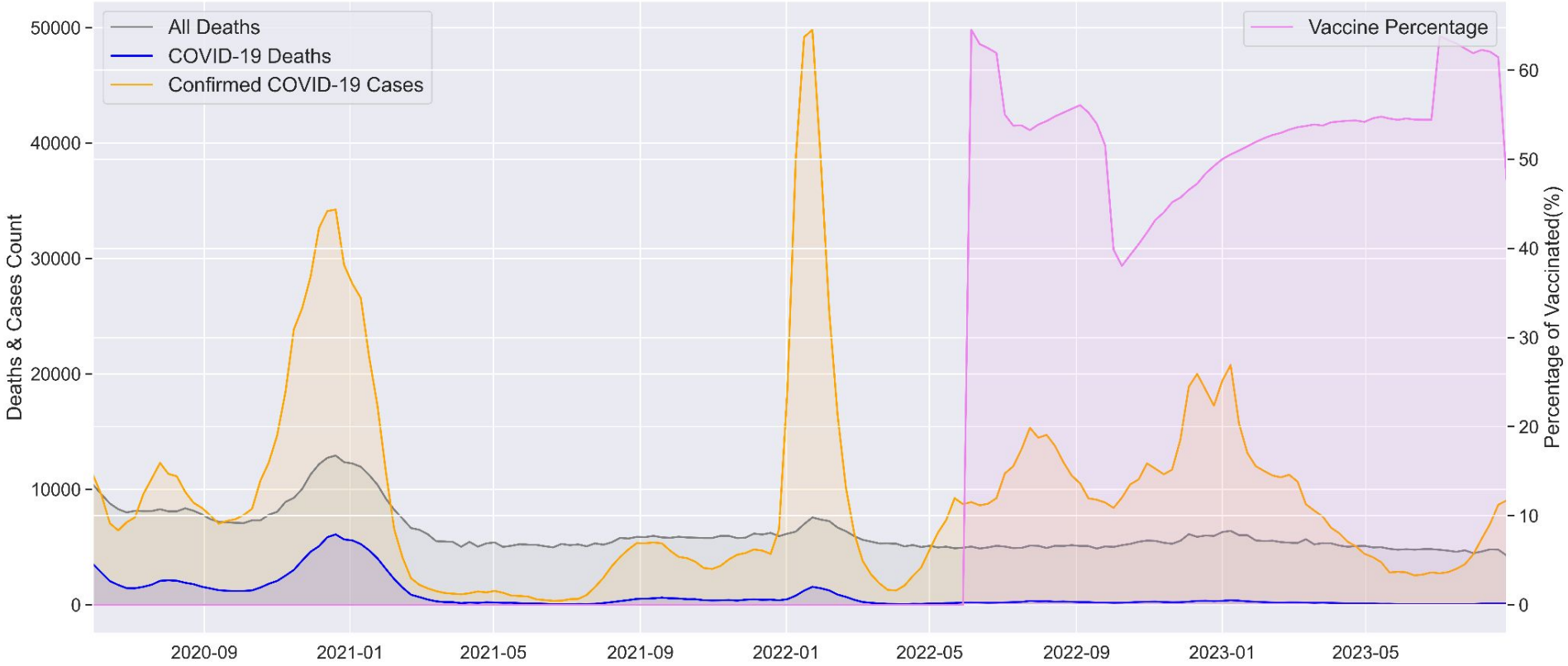

COVID-19 Deaths Relative to Population Size by State
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
MD
DE
NJ
CT
RI
MA
VT
NH
ME
AK
HI
Percentages
0.0010
0.0008
0.0006
0.0004
0.0002

COVID-19 Deaths vs All Deaths and Cases Stats

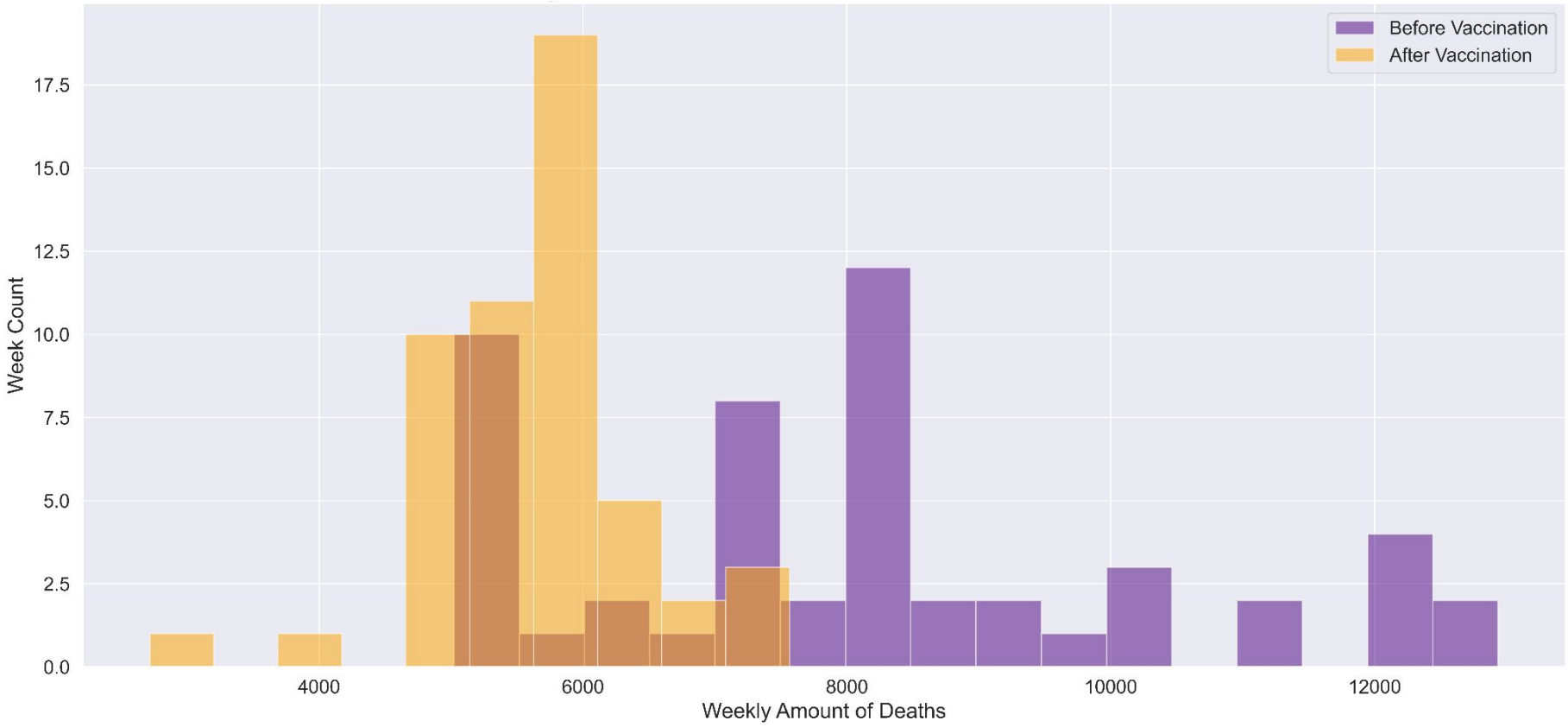




COVID-19 Cases, Deaths and Vaccinations Stats



Weekly Distribution of All Deaths Before and After Vaccination



T-test

Analysis Objective: check if the **number of deaths changed significantly** after COVID-19 vaxs.

Data: mean number of weekly deaths before and after vax across nursing homes in US.

Test type: two-tailed, Paired/Dependent 2-sample t-test.

- **Null Hypothesis (H_0)**: There is **no** difference in deaths before and after vax.
- **Alternative Hypothesis (H_1)**: There is a difference in deaths before and after vax.

Significance Level: 1% ($\alpha = 0.01$) - conservative significance level to minimize Type I errors.

Conclusion

- **T-Statistic: 7.57(SE) > 1%** significance threshold.
- Evidence of significant difference between sample and expected means.
- Confident null hypothesis rejection.

Which means:

- **Vaccination appears to have significantly reduced the number of death cases.**

However:

- **Possible contributions:** proper staff rotation, medication supply, reduced COVID-19 strain severity.