

The background features a dark blue world map with teal hexagonal overlays. These hexagons contain various medical icons: a first aid kit, a pill, a DNA helix, a syringe, a clipboard with three plus signs, and a heart. A white rectangular box is centered over the map, containing the title text.

The Economic Impacts on Healthcare Administration during COVID-19

Goals and Introduction to Our Findings

- Studying the Economic impacts specifically on financial state of hospitals and reasons why they occurred
- Here we will primarily focus on the annual averages of data from 2018 and 2020:
 - Net income
 - Total operating expenses of a hospital
 - Outpatients visits to the hospital
 - Expenses purchased Outpatient services
 - Visits to the E.R.

DOCUMENTATION

- Data came from California Health and Human services Open Data Portal
- Joined the two datasets from 2018 and 2020 on the unique identifier ('FAC_NO'), to compare the same hospitals' data from 2018 and 2020
- Cleaned data (removed ', ' from numbers and then making all attributes numeric)
- Once attribute is selected, removed rows with null or default values to prevent skewed data

Created a function in python to ask for a user-inputted attribute (Check attribute documentation for Hospital database) which then:

Displayed histograms of distributions of data from joined table

Output general analysis statements

Perform a two-sided one-sample t-test to confirm if there was a significant difference between the difference in corresponding 2018 and 2020 attributes

Why a one sample t-test?

- Find statistical conclusions/ evidence for evaluating population means, in this case we are using a **single sample on the difference between a 2018 attribute and 2020** testing these null and alternative hypotheses:

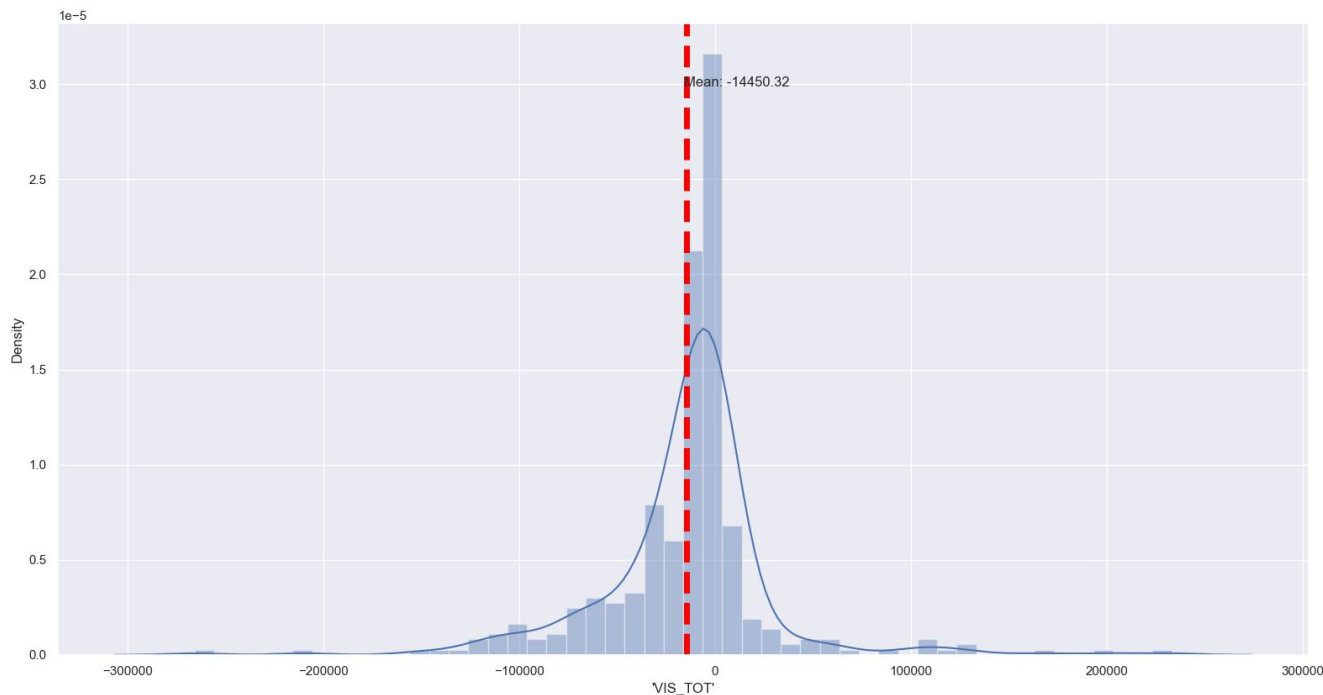
$$H_0 = 0$$

$$H_A \neq 0$$

We made sure we met the conditions for a t-test.

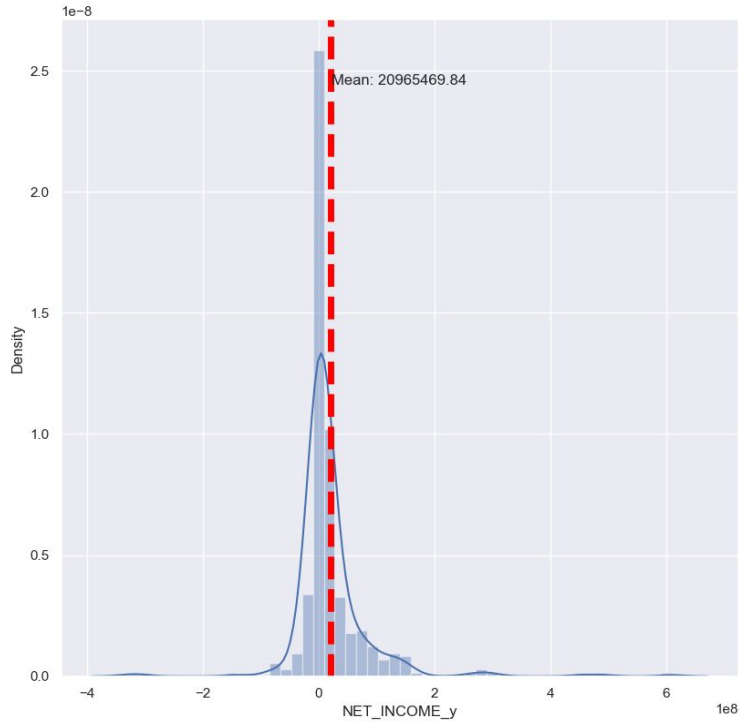
These conditions are as follows: Homogeneity of variance, each data point is independent, and is approximately normally distributed.

Histogram of difference between 2018 and 2020 attr.

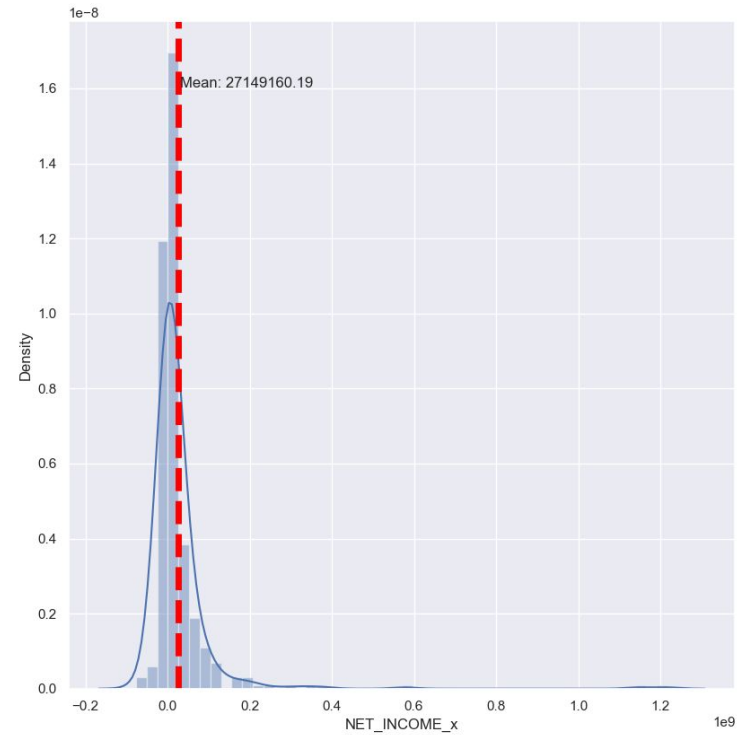


Net Income

2020



2018



Net Income

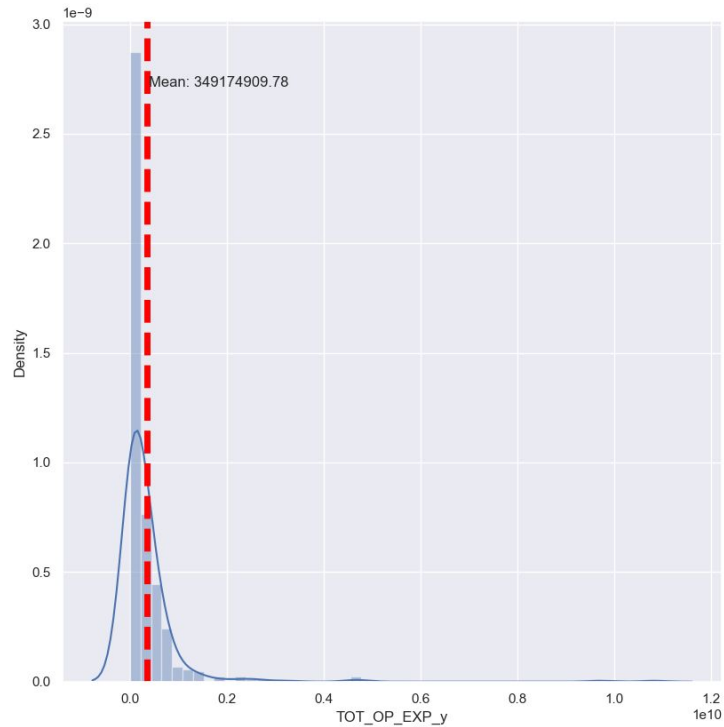
Average change in 2020 from 2018 for NET_INCOME is -6183690.35, this is a -22.78% change from 2018.

Test statistic=-1.720, p-value=0.086

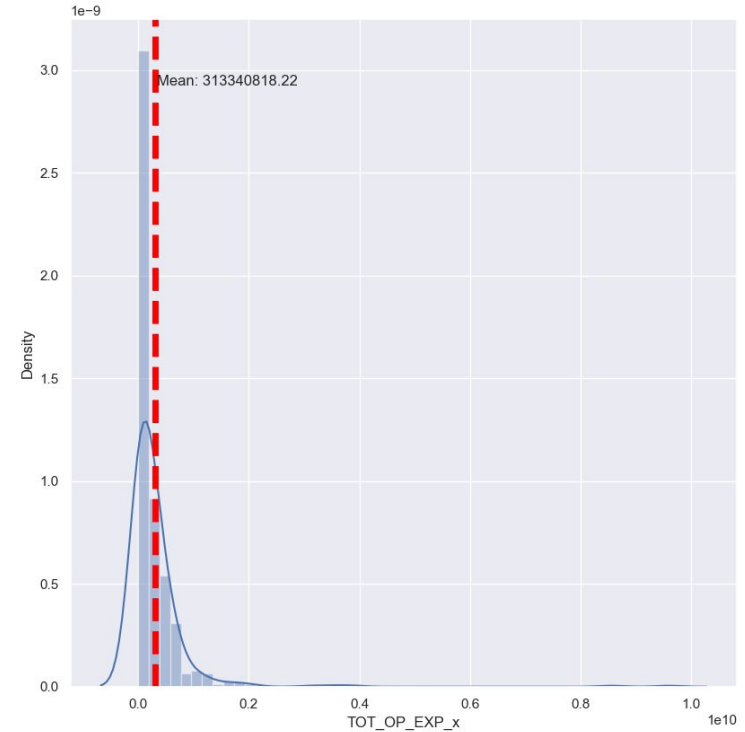
For $\alpha = .10$, there is sufficient evidence to conclude that there is an effect on NET_INCOME between 2018 and 2020.

Total Operating Expenses of a Hospital

2020



2018



Total Operating Expenses of a Hospital

Average change in 2020 from 2018 for TOT_OP_EXP is 35834091.57, this is a 11.44% change from 2018.

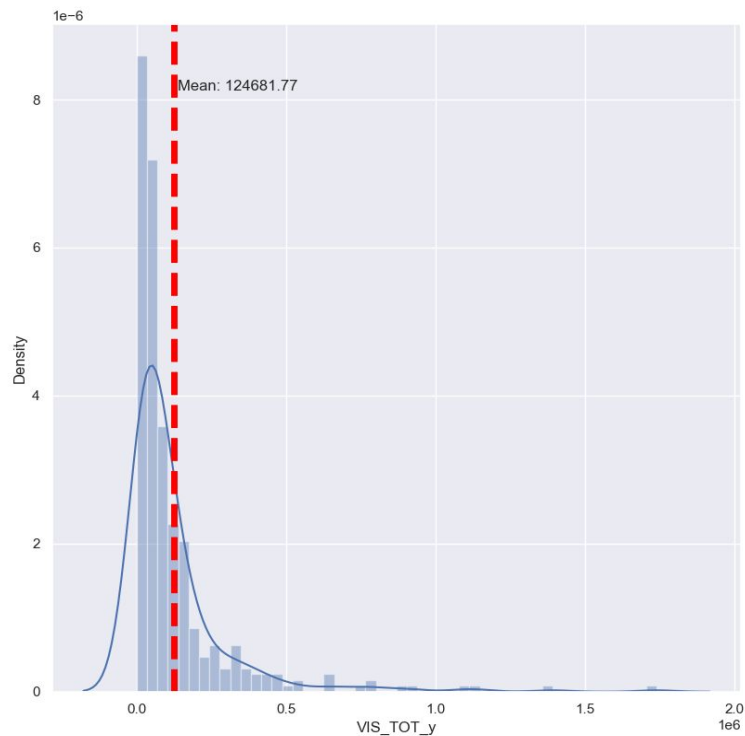
Test statistic=5.454, p-value=0.000

For $\alpha = .10$, there is sufficient evidence to conclude that there is an effect on TOT_OP_EXP between 2018 and 2020.

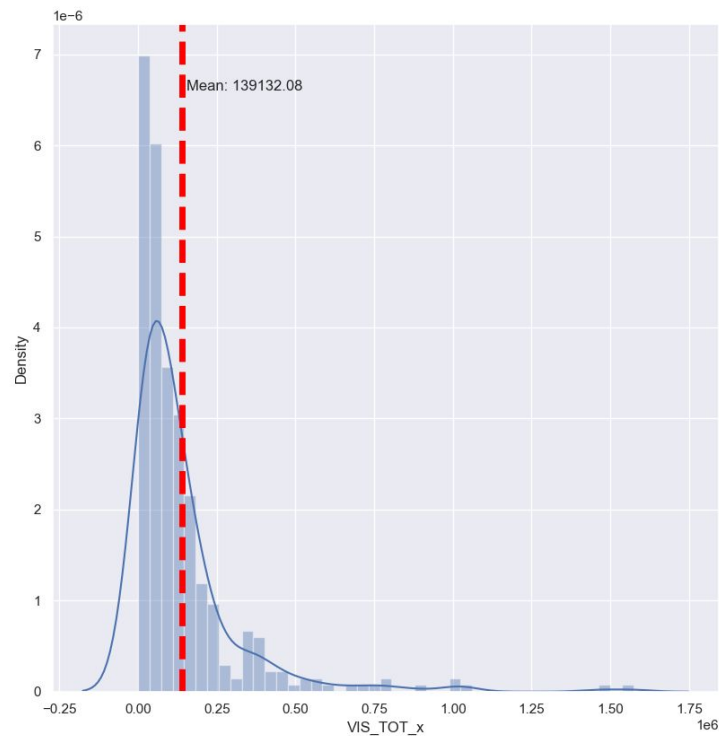
***Note:** I limited the decimal places of the p-value to 3

Outpatients Visits to the Hospital

2020



2018



Outpatients Visits to the Hospital

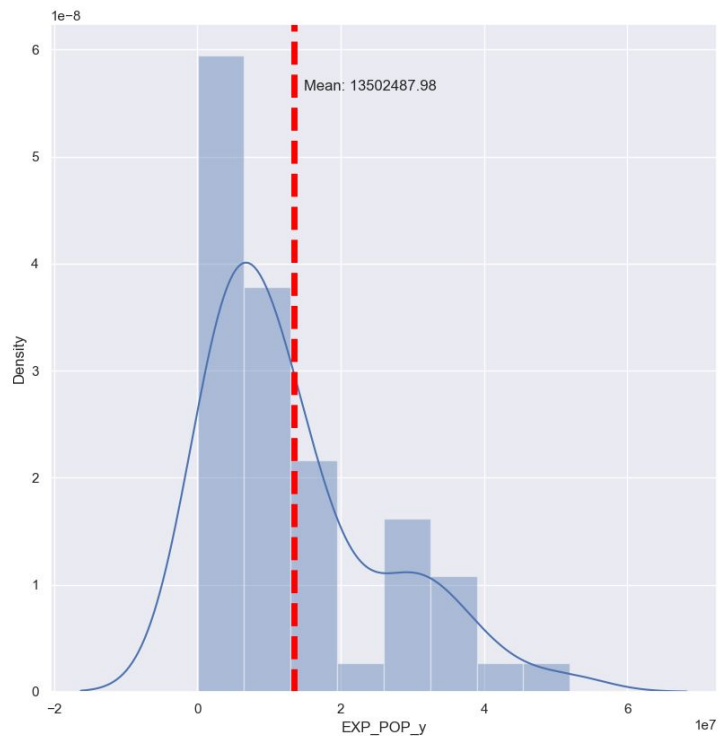
Average change in 2020 from 2018 for VIS_TOT is -14450.32, this is a -10.39% change from 2018.

Test statistic = -6.228, p-value = 0.000

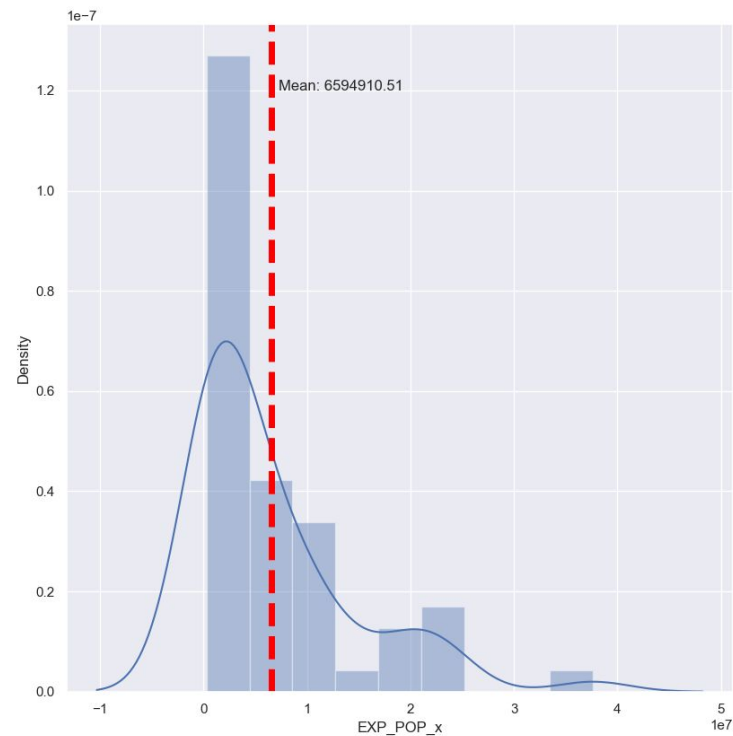
For $\alpha = .10$, there is sufficient evidence to conclude that there is an effect on VIS_TOT between 2018 and 2020.

Expenses Purchased Outpatient Services

2020



2018



Expenses Purchased Outpatient Services

Average change in 2020 from 2018 for EXP__POP is **6907577.47**, this is a **104.74%** change from 2018.

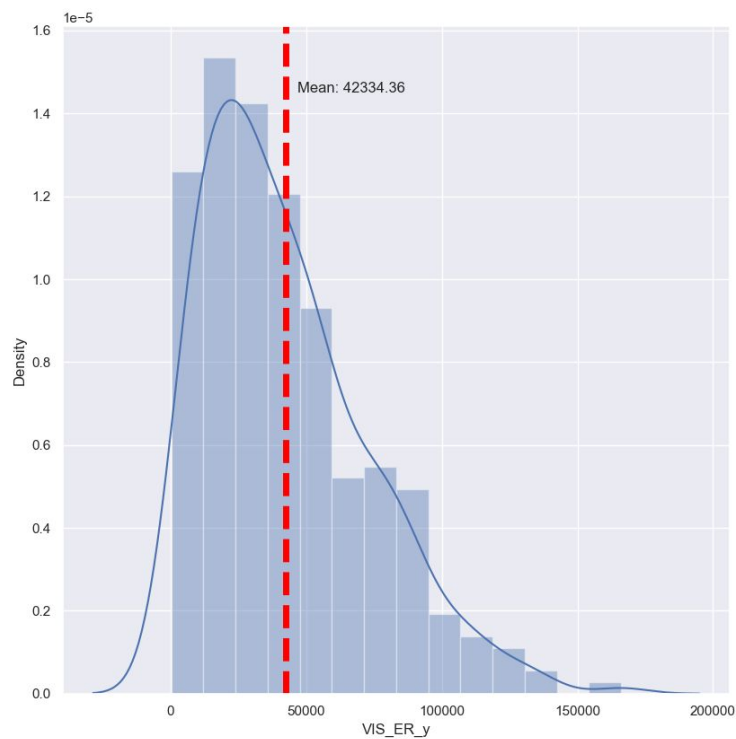
Test statistic=6.865, p-value=0.000

For $\alpha = .10$, there is sufficient evidence to conclude that there is an effect on EXP__POP between 2018 and 2020.

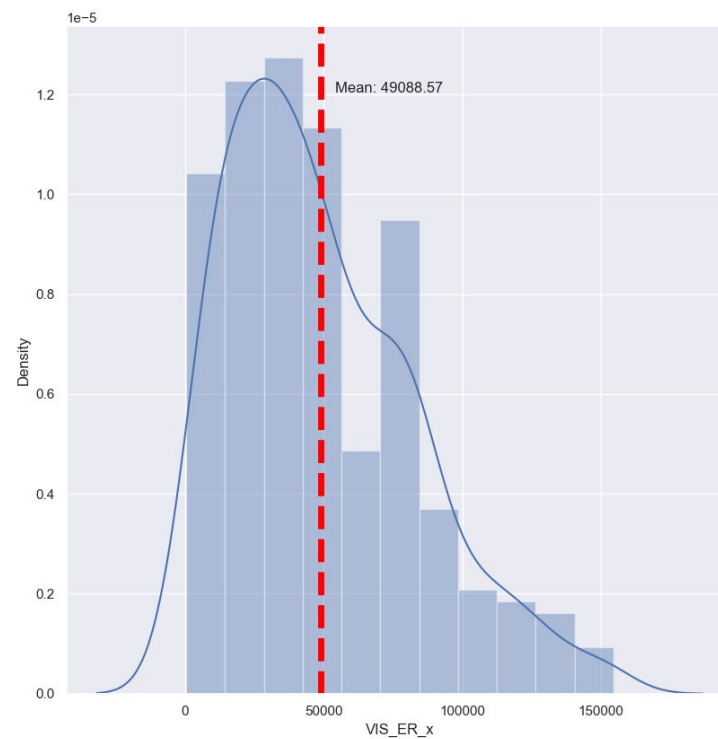
PURCHASES FOR VACCINES, NEED FOR TRAVEL NURSES, ETC.

Visits to the E.R.

2020



2018



Visits to the E.R.

Average change in 2020 from 2018 for VIS_ER is **-6754.21**, this is a **-13.76%** change from 2018.

Test statistic = -9.820, p-value = 0.000

For $\alpha = .10$, there is sufficient evidence to conclude that there is an effect on VIS_ER between 2018 and 2020.

Limitations

- Contains all counties in California, some counties affected more than others, thus causes variance in certain attributes (Example: OCC_LIC, or occupancy rate, although on average it shows an increase, because hospitals in a certain county (Let's say Santa Clara) doesn't have as much of an increase as Los Angeles, the mean is heavily affected by the more affected areas, and thus shows insignificance in a population test
- Account for other externalities in financial factors, such as inflation, etc.

Conclusions

- Decreased Emergency Department (ED) Visits and Patients Delaying Emergency Care
- Outpatient purchases increased (need for vaccines, services requiring travel nurses and at-home care)
- Increase of purchases for personal protective equipment, some medications, medical supplies and equipment, and disinfection and hygiene products
- Although revenue for Outpatient care and Inpatient care increased, it didn't cover the increases in expenses
- Shortage of Healthcare Professionals
- Surge in Out-of-Hospital Care

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