The impact of COVID-19 on pet adoption rates

"At the beginning of the pandemic, people across the country were trying everything to beat the quarantine blues. Flour and eggs flew off the shelves for baking, workout equipment was out of stock for miles and art supplies orders were backed up for weeks. But who knew the most in demand quarantine find was a new furry friend?"
(Jackson,2020)

Why Covid-19 and Pet Adoption Rates?

Our team looked at available COVID-19 data and cross-referenced it with publicly available data related to pet adoptions to determine if there is an increase in pet adoptions as the pandemic continues.

Null Hypothesis: There is no correlation between COVID positive cases and pet adoption rates.

Alternative Hypothesis: There is a correlation between adoption rates in 2020 (after March) due to more individuals staying at home (as indicated by COVID cases).

Research Questions

1. What is the baseline adoption rate by month/year?
2. Is there an increase in adoption rates after the pandemic hit the US (ie after March 2020)?
3. If there is a correlation to adoptions, does it correlate to documented COVID cases?
4. Extend the analysis to multiple cities. Do correlations to COVID differ between cities?

Data Sources

-   The commonwealth of Virginia has an Open Data set with an API which was used to import the cumulative COVID cases per day in Norfolk, VA.
    https://data.virginia.gov/resource/bre9-aqqr.json
-   The Norfolk, VA pet adoption data was downloaded from this public site:
    https://data.norfolk.gov/Government/Norfolk-Animal-Care-and-Adoption-Center-NACC-/vfm4-5wv6
-   The Dallas, TX COVID-19 dataset was located on Kaggle and downloaded as a csv:
    https://www.kaggle.com/sudalairajkumar/covid19-in-usa
-   The Dallas, TX pet adoption data is downloaded as csv from this public site:
    https://www.dallasopendata.com/City-Services/FY2020-Dallas-Animal-Shelter-Data/7h2m-3um5

Strategy and Metrics

Definitions:

-   COVID cases: confirmed positive COVID cases

- Adoption: pets adopted
- Location: Dallas County, TX and Norfolk, VA
- Timeframe: focus on March – December 2020, and use historical data to baseline

Data Retrieval:

We made a call to the Virginia API and requested the dataset for current COVID cases in Norfolk.

We downloaded the CSV files for Dallas COVID cases and pet adoption cases for Norfolk and Dallas.

We saved the output and built DataFrames using pandas in Jupyter Notebook to select outcome months and outcome years for adoption and outcome months for COVID.

Assemble and Clean the Data:

The clean up process included merging our CSV files with our API data. We noticed that CSV files can sometimes have null values, which are later displayed as NaN in DataFrame. We used the Fillna () function to replace NaN values with a value (0). For each dataset, we had to pull apart the date field and make new columns for Outcome Year and Outcome Month. Also we had to convert our dates to pandas date format in order to present the correct month/year. While assembling the data for Norfolk, VA and COVID cases we realized we should plot and compare deltas in cases, not cumulative, using the diff() function.

Trends and Analysis

Pet Adoption Trends

- Norfolk: In comparing pet adoptions in 2018 through 2020, it appears that pet adoption rates increase over the summer months and pet adoptions are lower in 2020 than in 2018 and 2019. In 2020, there was a sharp decrease in adoptions in March, right after the pandemic started and nationwide lockdown announcement.
- Dallas: Pet adoption drops drastically in March 2020 (which correlates with the lockdown announcements). There was no data available for years 2018 and 2019, so we are unable to compare adoption rates between the three years.

COVID Trends

- Norfolk: COVID cases sharply increase in June and sharply decrease in July
- Dallas: COVID cases spikes multiple times throughout the year; there were spikes in June, September and October

Correlation Analysis

- Pearson's Correlation Coefficient was calculated for each city.

- ○ Norfolk: .05, which indicates there is no or a very weak correlation between COVID cases and pet adoptions
  - ○ Dallas: -.53, which indicates there is a moderate correlation between COVID cases and pet adoptions
- ● Independent t-tests were run, however the assumptions for the datasets (data is normally distributed, independent, and homogenous (the standard deviations are roughly equal)) are not true, so this analysis was inconclusive.

Limitations:

While the Norfolk, VA pet adoption dataset was robust with over 10,000 records, we had a hard time finding another city/region with publicly available data that contained the fields we needed. We looked at Montgomery County, MD, Seattle, Los Angeles and Austin before settling on Dallas for the next step.

The demographics of Norfolk, VA and Dallas, TX are disparate. Other demographic factors such as the unemployment rate could influence the correlation between pet adoptions and COVID-19 cases.

The COVID-19 testing strategy for each city could falsely represent the real number of COVID cases in each region.

Conclusion:

News outlets reported that pet adoptions were up as the COVID-19 lockdown progressed. We analyzed two cities: Norfolk, VA and Dallas, TX to determine if this was a verifiable statement. Analysis indicated that pet adoption rates actually were not correlated to COVID cases in Norfolk, and that they were inversely related in Dallas with correlation coefficients of 0.05 and -0.53, respectively. There could be many reasons for the difference between reality and perception which would make interesting follow-on research topics. For example, there are fewer adoptable pets (intakes) because people are staying home and/or fewer relocations therefore the number of adoptable pets has decreased. Pets are being picked up by rescue organizations and therefore adoptions are not recorded in the public dataset.