# Trends In Cost of Child Care In Washington State
# Data Science Major Capstone

Motivations and Objectives:

I was part of a research team at MIT's Dept. of Urban Planning and Policy that aimed to estimate the cost of living for the MIT Living Wage Calculator. We used the cost of several necessities as predictors to estimate the cost of living in a county.

I worked on a smaller team that focused on the cost of childcare. For this poster, I will focus on my findings of the state of Washington.

Research Questions:

Does childcare cost less as the child gets older across counties?

Is the cost of overall childcare increasing?

Data Collection:

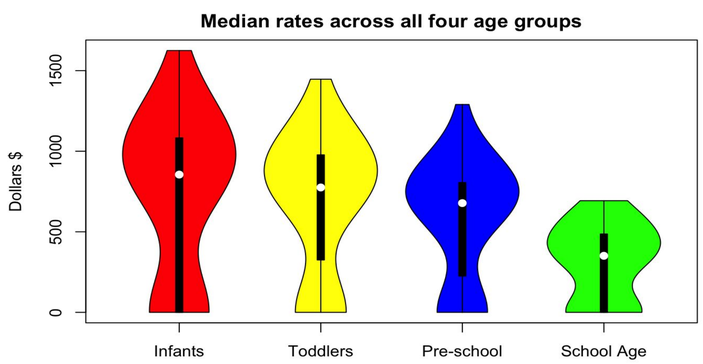
The Washington county wise cost of childcare date was sourced from: https://childcareawarewa.org.

The 2000-2019 childcare data in Washington was collected from: https://datacenter.kidscount.org.

Data Exploration:

The first dataset has variables county, age group (shown in the graph below), subsidy rate, median child care rates, and 75th percentile rates.

The below violin plots show the median, interquartile range, and kernel density of the median child care cost and subsidy ratess across the four age groups respectively. We can infer from the first graph that median costs follow a relatively normal distribution.




Graph 1

Analysis 1:

Does the average county-level subsidy rate differ between age groups? Does the average county-level median childcare rate differ between age groups?

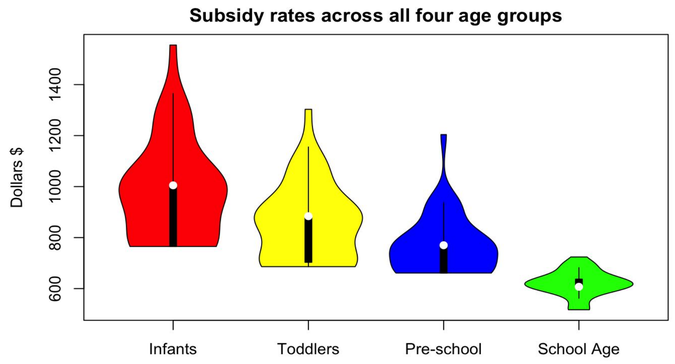
*Results:*

Using the Tukey HSD Test. we observe that there is a significant difference between the subsidy and median child care rates of each age group. Since all the p-values are less than 0.05, there is enough evidence to conclude that the group means are not equal.

| Categories compared | MC Rate Difference ($) | S Rate Difference ($) | Net Change in Cost |
|---|---|---|---|
| Preschool-Infants | -157.49 | -211.36 | 53.87 |
| School Age-Infants | -416.95 | -357.20 | - 59.75 |
| Toddler-Infants | -54.64 | -123.82 | 69.18 |
| School Age-Preschool | -259.46 | -145.85 | -113.61 |
| Toddler-Preschool | 102.85 | 87.54 | 15.31 |
| Toddler-School Age | 362.31 | 233.38 | 128.93 |

Table 1

From the above table, it is clear that the cost of childcare decreases as the child gets older, but the subsidy provided decreases faster.



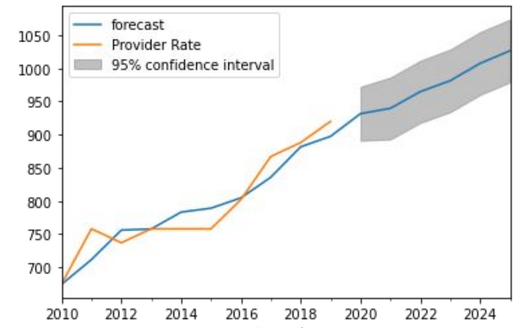

Graph 2

Analysis 2:

Estimate the cost of childcare in the state of Washington for the next 5 years.

*Results:*

A rolling forecast Autoregressive Integrated Moving Average Model (ARIMA) uses a series of averages and standard deviations of different subsets of the dataset to estimate values. I have used this model on my data to predict the cost of childcare in the state of Washington until the year 2025 with a 95% confidence interval.




Graph 3

| Year | Increase from the previous year ($) |
|---|---|
| 2020 | 11. 57 |
| 2021 | 8.03 |
| 2022 | 25.11 |
| 2023 | 16.48 |
| 2024 | 26.14 |
| 2025 | 18.96 |
| **NET 5 YEAR INCREASE** | **106.29** |

Table 2

However, it is important to note that the model may not be accurate as the data it was trained on spans over the pandemic.

Conclusion:

The Tukey HSD test results prove that child care costs decrease as the child gets older, and the ARIMA estimates costs to rise overall by $106.29 over the next 5 years in the state of Washington. As concluded in our research, the cost of living in this state is fast rising.

***- Veeksha Madhu '22***

***Data Science and Economics major***