Teacher Salary Trends & State Education Spending

Analysis of the relationship between per-pupil spending and teacher salaries (2009, 2019-2021)

M. Henry (linkedin.com/in/micole-henry-205310370**)**

Teacher Salary Trends and State Spending Overview (2009 - 2021)

Objective/Problem Statement

This analysis examines the relationship between school district per-pupil spending and average teacher salaries in the United States over the past five years. By exploring whether districts with higher spending also offer higher teacher pay, the project aims to identify trends that can inform policy decisions, budget allocation, and advocacy for teacher compensation.

Datasets Used & Years Covered

- **Raw Data Sources:**
  - National Center for Education Statistics (NCES) – Digest of Education Statistics (1969 - 2022)
  - School Finance Indicators Database - State Indicators Database (seventh release 1993 - 2022)

- **Processed Data:** Combined and cleaned in Google BigQuery into tables: combined_state_data, spending_by_state, and teacher_salaries_by_state.

- **Years Covered in Analysis:** 2009, 2019–2021 (limited by data availability in both datasets).

Methods

1. **Data Acquisition:** Downloaded raw datasets from the National Center for Education Statistics (NCES) and the National Education Association (NEA) and converted to CSV files.

2. **Data Cleaning:**

   - Standardized column names, removed extraneous fields, and corrected inconsistent state naming.

   - Converted all numeric fields (salary, per-pupil spending) to a consistent format.

   - Verified data types and handled missing values using imputation for visualization purposes only (linear interpolation in charts).

3. **Data Integration:**

   ○ Uploaded cleaned CSVs into Google BigQuery.

   ○ Created combined tables (combined_state_data, spending_by_state, teacher_salaries_by_state) through SQL joins and aggregations.

4. **Analysis:**

   ○ Calculated Pearson correlation coefficient between per-pupil district spending and average teacher salary.

   ○ Calculated Pearson correlation coefficient between per-pupil district spending and adjusted average teacher salary.

5. **Visualization:**

   ○ Built KPI scorecards, trend line charts, and top-10 state comparisons in Looker Studio.

   ○ Applied professional color schemes, clear labeling, and consistent formatting for portfolio presentation.

Results / Visualizations

1. **Key Metrics:**

Correlation: Spending vs. Salary	Correlation: Spending vs. Adjusted Salary
0.815	0.666

Figure 1: Correlation metrics between per-pupil spending and teacher salaries

Correlation: A moderate-to-strong positive correlation (0.815) was found between district per-pupil spending and average teacher salaries, suggesting that districts investing more in students tend to offer higher teacher pay.

Figure 2: Top 10 States by average teacher salary (2021) with corresponding district spending

Top 10 States by Average Teacher Salary and Per-Pupil District Spending (2021)
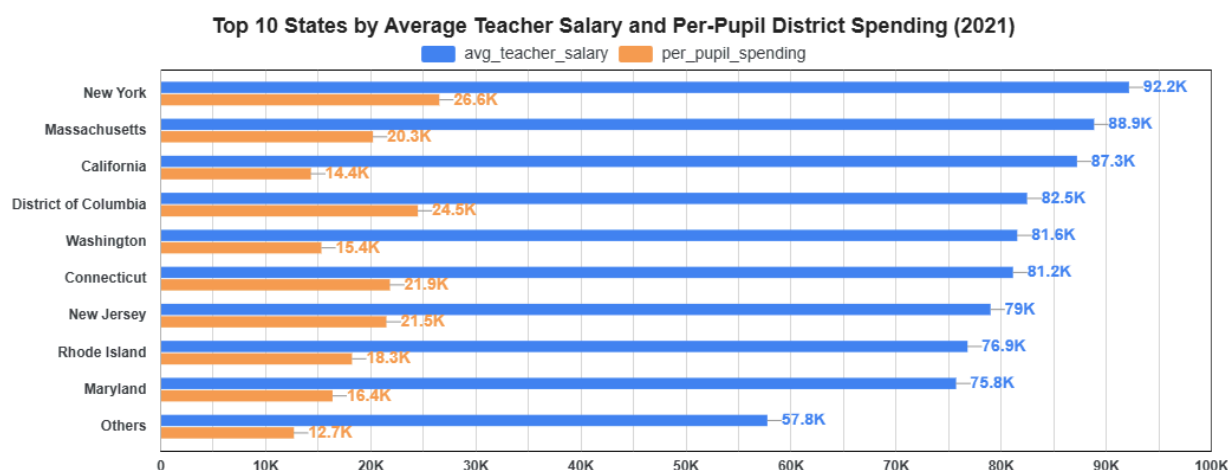

Figure 2: Top 10 States by average teacher salary (2021) with corresponding district spending

- **Highest Average Teacher Salary (2021):** New York (92.2K).

- **Highest Per-Pupil District Spending (2021):** New York (26.6K)

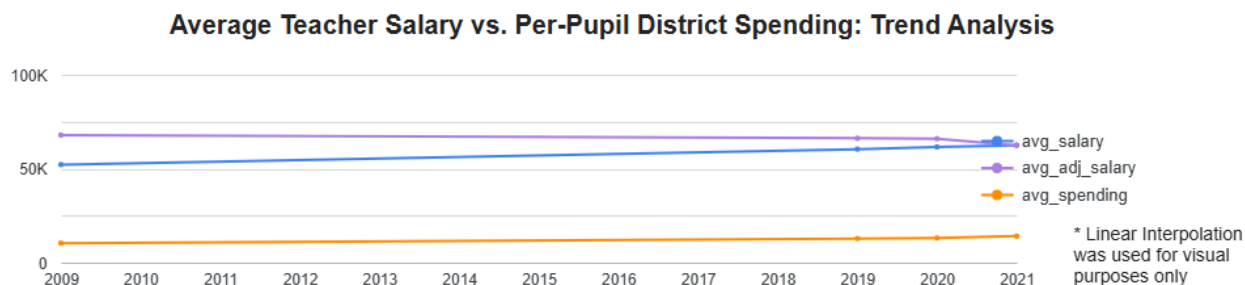2. **Trend Analysis (2009–2021):**

Figure 3: Top 10 states by average teacher salary (2021) with corresponding district spending

- Average teacher salaries and per-pupil district spending have generally increased over the observed years, with notable fluctuations during economic downturns and the COVID-19 pandemic years (2020–2021).

- Interpolation was applied for missing years between data points for visualization purposes only; underlying raw data was not altered.

3. **State Comparisons:**

   ○ Top 10 states by teacher salary in 2021 also tend to rank high in per-pupil spending, though exceptions exist where high spending does not directly translate to the highest salaries.

Conclusion

The analysis demonstrates a clear positive relationship between district per-pupil spending and average teacher salaries, indicating that states investing more in education tend to compensate teachers more generously. While higher spending generally correlates with higher salaries, variations exist, highlighting that spending alone does not guarantee the highest teacher pay. This dashboard provides actionable insights for policymakers and education stakeholders, emphasizing the importance of strategic allocation of resources to support teacher compensation and retain quality educators.

Footnote / References

● Raw data: NCES *Digest of Education Statistics* (1969–2022), School Finance Indicators Database – *State Indicators Database, 7th Release* (1993–2022).

● Processed and analyzed in Google BigQuery; visualized in Looker Studio.