Using the WASL data in the homework directory, write a data analysis report following the guidelines below.

1. **Introduction:** In one or two paragraphs, describe in words the dataset you are analyzing, the scientific questions you will address in your analysis and a brief summary of your data analysis conclusions.

2. **Study Design:** Give a detailed description of the study design to the best of your knowledge, including information on sample size(s), macro and micro explanatory variables, and any other relevant features of how the data were gathered.

3. **Data description:** Describe with plots and tables the main sources of heterogeneity in the dataset, such as grouping factors and explanatory variables. You may include preliminary modeling output from ANOVAs and t-tests.

4. **Model fitting and diagnostics:** Propose a “full” hierarchical model for the data that includes all of your explanatory variables and grouping factors. Using either hypothesis tests or model selection criteria, compare this model to simpler models and choose a model that describes all major sources of variation in your dataset. Evaluate any modeling assumptions that you can. Interpret any fixed effects parameters that are in your final model, including confidence intervals for any continuous or binary explanatory variables, and across-level comparisons for categorical factor variables.

5. **Ranking:** Use your hierarchical model to measure of the performance of each county, after controlling for any fixed effects. Identify the names of the top 5 overperforming counties and the bottom 5 underperforming counties. Compare these to the top and bottom 5 counties in terms of raw sample means. Which ranking do you prefer to evaluate educational effectiveness, and why?

6. **Conclusions:** Describe the scientific conclusions of your data analysis, including a qualitative, non-numerical summary of your hypothesis tests, model selection and parameter estimates.