Short Summary of Demographics versus COVID-19 Cases and Deaths

The table below is depicts a summary that examined eight (8) of South Carolina demographics across the state's 46 counties and their relationship to the number of COVID-19 cases and deaths.

Table 1. Summary of the cumulative effect of COVID-19 by demographics.

Input	**Analysis***	**COVID-19 Cases/100k**		**COVID-19 Deaths/100k**	
Parameter Examined	**Smaller to Larger Entity per County**	**Statistical Results**	**Conclusion**	**Statistical Results**	**Conclusion**
Population Size	Size of county population	$F(1, 44) = 3.04$ $p = 0.088$ No slope	No change	$F(1,44) = 8.24$ $p = 0.006$ Negative slope	Fewer deaths
Population Density	Density of county population	$F(1, 44) = 4.46$ $p = 0.040$ Negative slope	Fewer cases	$F(1, 44) = 9.54$ $p = 0.003$ Negative slope	Fewer deaths
Median Household Annual Income	Median household income	$F(1, 44) = 19.21$ $p < 0.001$ Negative slope	Fewer cases	$F(1, 44) = 19.84$ $p < 0.001$ Negative slope	Fewer deaths
Family Poverty**	Percentage of county family poverty	$F(1, 44) = 19.08$ $p < 0.001$ Positive slope	More cases	$F(1, 44) = 14.50$ $p < 0.001$ Positive slope	More deaths
Caucasian or White Population	Percentage of county population	$F(1, 44) = 49.68$ $p < 0.001$ Negative slope	Fewer cases	$F(1, 44) = 19.54$ $p < 0.001$ Negative slope	Fewer deaths
African American or Black Population**	Percentage of county population	$F(1, 44) = 59.93$ $p < 0.001$ Positive slope	More cases	$F(1, 44) = 30.15$ $p < 0.001$ Positive slope	More deaths
Hispanic / Latino	Percentage of county population	$F(1, 44) = 2.41$ $p = 0.1275$ No slope	No change	$F(1, 44) = 3.36$ $p = 0.073$ No slope	No change
White, Black, and Hispanic / Latino (combined)	Percentage of county population	$F(3, 42) = 21.21$ $p < 0.001$ White, $p = 0.260$ Black, $p = 0.011$ Hispanic, $p = 0.108$	More cases: Blacks had the greatest impact on more cases.	$F(3, 42) = 10.84$ $p < 0.001$ White, $p = 0.209$ Black, $p = 0.028$ Hispanic, $p = 0.306$	More deaths: Blacks had the greatest impact on more deaths.

Source: South Carolina Department of Health and Environmental Control

*The regression analysis model was used on these data. See page 2 for a short tutorial on the regression analysis model.
**Further analysis most likely will show a strong relationship between these two demographics and COVID-19.

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A short tutorial on the regression analysis model

In the process of examining the trend in COVID-19-positive cases and deaths, I determined the best statistical model fitting a long-term examination of the cumulative data was the regression analysis model. Regression analysis is a set of statistical processes used to estimate the relationships between a dependent variable (often called the outcome variable) and one or more independent variable (often called predictors, covariates, or features). In this summary, the number of positive COVID-19 cases/100k and COVID-19 deaths/100k were used as the dependent variables. The independent variables such as population density, median income, race/ethnicity, and so on served as the input or independent variables. Choosing the regression model for analysis accomplishes several things: (1) it explains a phenomenon, (2) it predicts factors about the future, or (3) it enables decision-making. To that end, the use of the regression model in this summary should be interpreted only as a way of examining the current phenomenon relative to the virus. I used regression analysis to analyze the cumulative COVID-19 positive test cases and deaths for the entire 46 counties in South Carolina.

A negative coefficient (slope) suggests that as the independent variable increases, the dependent variable tends to decrease. A $p > 0.05$ is the probability that the null hypothesis is true. A statistically significant test result ($p \leq 0.05$) means that the test hypothesis is false or not true. The null hypothesis assumes that there is no relationship between the independent variables and dependent variables (No slope or slope = 0). The R-squared value (regression analysis model) is not discussed here; furthermore, any additional discussion about the regression model is beyond the scope of this tutorial.

Thank you.
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