

COVID-19 Vaccination and Decreased Death Rates: A County-Level Study in Pennsylvania

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Abstract

Introduction: In this paper we examine the relationship between vaccination against COVID-19 and both the death rate from COVID-19 and the rate of COVID-19 spread. Our goal is determine if vaccination is associated with reduced death and/or spread of disease at the local level. Methods: This analysis was conducted at the county level in the state of Pennsylvania, United States of America, with data that were collected during the first half of 2022 from the state of Pennsylvania's Covid Dashboard ([COVID-19 Data for Pennsylvania (pa.gov)](<https://www.health.pa.gov/topics/disease/coronavirus/pages/cases.aspx>) . Result s: Given that, during this time period, the vaccines being used were not geared specifically toward the common variants at that time, we found no statistically significant relationship between disease spread and vaccination rate at the county level. That said, we did find a highly statistically significant relationship between death rate and vaccination rate ($p\text{-value} = 0.006$). Specifically, a 1% increase in vaccination rate was found to correspond to a 0.751% decrease in death rate (95% confidence interval (0.236%, 1.266%)). Conclusions: These results support previous findings from across the world that Covid vaccination is highly efficacious in preventing death from the disease. Even during a time when vaccine design was not optimally matched with the prevailing strains, vaccination was found to reduce death rate. Hence, improving global vaccine availability is vitally important, in order to achieve necessary outcomes.

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