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EPIDEMICS 10

San Diego, CA

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Demographic Disparities and Vaccine Coverage: Predictors of SARS-CoV-2 Test Positivity in Orange County, California

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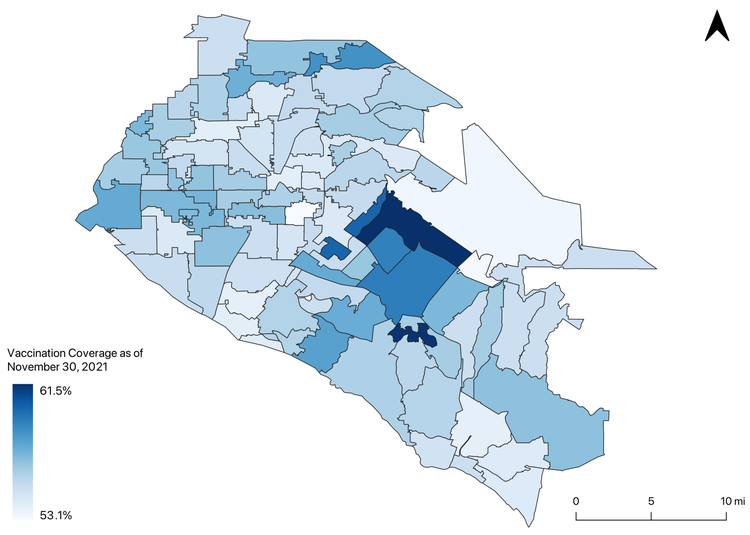
BACKGROUND

MARCH 2020: COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), declared a pandemic by the World Health Organization

DECEMBER 2020: Vaccines against SARS-CoV-2 become available to residents in Orange County, California, in phases

Figure 1: *Orange County ZIP Code Vaccination Coverage*



Gender, age, race, and place of residence have previously been identified as potential risk factors for infection.

OBJECTIVE

Using surveillance data, vaccination rates, and Census data, we assessed how demographic risk factors, neighborhood characteristics, and vaccination coverage influenced odds of SARS-CoV-2 infection in Orange County.

HYPOTHESIS: Men, racially minoritized individuals, and individuals living in communities with greater population density to have higher odds of testing positive for COVID-19.

METHODS

DATA SOURCES: We linked daily reported test records collated by OCHCA from **March 2020 - November 2021** with SARS-CoV-2 vaccination data from the California Open Data Portal and ZIP-code-level attributes from the U.S. Census Bureau **(n=1,799,693)**.

We fit **generalized additive models with binomial family distributions** to model test positivity as a function of individuals' gender, age, race/ethnicity, ZIP-code population density, ZIP-code household density, the proportion of residents aged ≥65 years in each ZIP code, and age-group-specific vaccination rates – while accounting for time and location (ZIP-code geographic centroids).

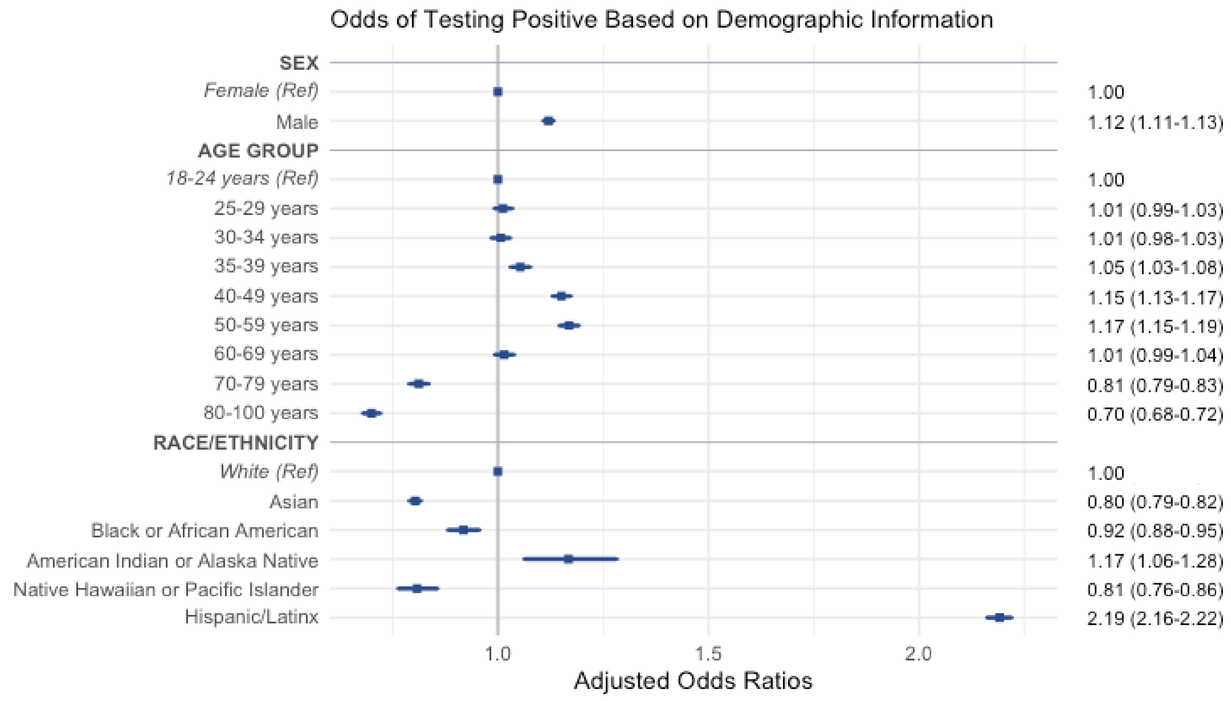
RESULTS

Men had 12% increased odds of testing positive for COVID-19 compared to women

Those aged 80-100 years had 30% decreased odds compared to those aged 18-24

Hispanic/Latinx individuals had over twice the odds of infection as Non-Hispanic White individuals

Figure 2: *Forest Plot of Adjusted Odds of Testing Positive for Different Demographic Groups*



Vaccination coverage became protective once approximately 46% of an individual's age group had been fully vaccinated

Age-stratified analyses indicated that this protective effect differed by age group, with those <65 seeing protective effects earlier than those ≥65

Persistent spatial and temporal patterns in test positivity remained even after adjusting for vaccination, demographics, and household factors

Figure 3: *Spline Functions and Heat Map for Non-Linear Variables: Vaccination Coverage, Week, and ZIP Code Attributes*

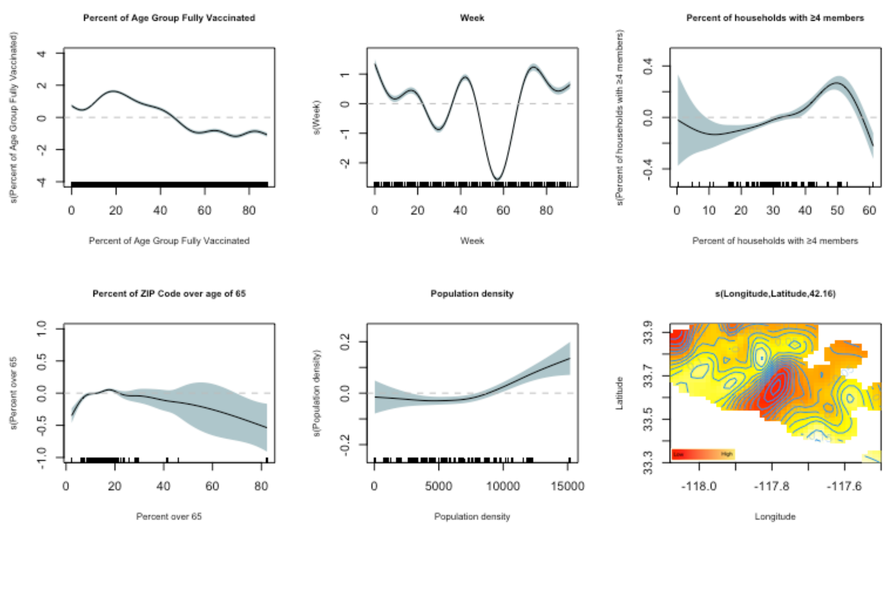
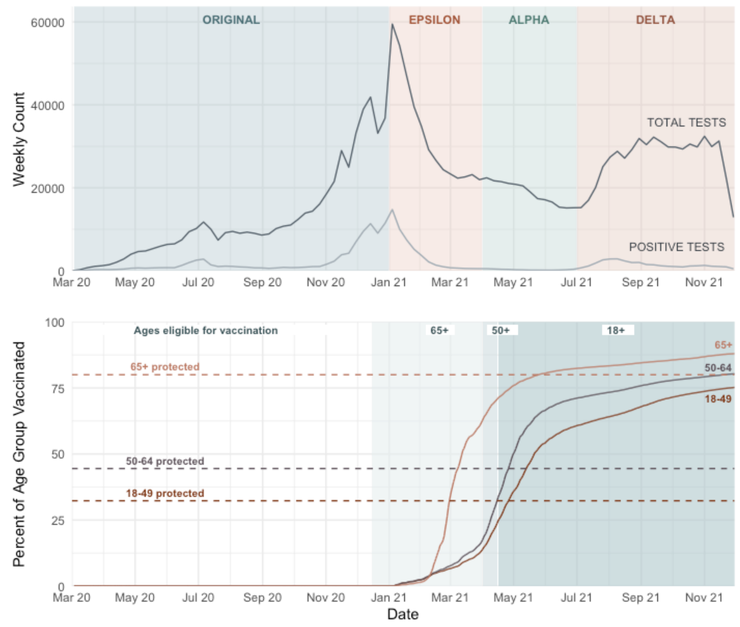


Figure 4: *Weekly Test Counts and Positive Tests Results, and Age-Specific Vaccination Coverage from March 2020 - November 2021*



DISCUSSION

Male sex and Hispanic/Latinx ethnicity were risk factors for COVID-19 infection

Even relatively moderate levels of vaccination coverage could be indirectly protective against infection

Despite earlier vaccination access, adults over 65 saw delayed protective effects, suggesting age-related differences in herd immunity and/or differences in contact patterns by age

ACKNOWLEDGEMENTS

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