



Spatial Analysis of COVID-19 Incidence During the Delta (July 17- November 13, 2021) and Omicron (November 27- March 26, 2022) Waves, Central Virginia Health District

**Presented by: Cali Anderson, MPH, COVID-19 Epidemiologist
& Victoria W Nichols, MPH, Epi Intern**

In Collaboration with: Zachary Unger, MPH, Epi Intern &
Alex Telionis, PhD, MPH, Public Health Modeling Coordinator

Introduction

- Central Virginia Health District
 - Lynchburg City
 - Amherst
 - Appomattox
 - Bedford
 - Campbell
- Demographics vary widely from Lynchburg City to the surrounding counties
- Multiple factors influence health outcomes and vary from the City to the counties
 - Access to healthcare
 - Poverty
 - Racial disparities
 - Environmental influences
 - Social factors ^{1-2,4-5}

Demographic Breakdown

- Lynchburg City
 - Urban
 - Younger population
 - Large African American population
 - Median household income \$20,000 less than counties
 - Higher vaccination rates^{3,4,6}
- Amherst, Appomattox, Bedford, Campbell
 - Rural
 - Senior citizens and middle-aged adults
 - Majority white
 - Higher income
 - Lower vaccination rates^{3,5,6}

Methods

- Reported COVID-19 cases pulled from the Virginia Electronic Disease Surveillance System (VEDSS)
 - Date range based on Central Virginia epidemiologic curve
- Latitude/longitude of addresses obtained via the US Census Bureau's *Census Geocoder* ©^{7,8}
- Block group data obtained from the US Census Bureau and spatially joined to the address data in ArcGIS Pro 2.9.2 ©⁹
- Incidence calculated for both variant waves and compared using Global Moran's I and Incremental Moran's I
- Generated graduated color heat maps to illustrate incidence across the district's block groups

Results

- Delta (incidence range: 0-8,158 per 100,000)
 - 12,208 cases
 - High burden areas:
 - Goodview, Goode, Brookneal, Huddleston, Altavista, Central Appomattox, North Amherst, South/East Lynchburg
- Omicron (incidence range: 15,930-21,699 per 100,000)
 - 22,159 cases
 - High burden areas:
 - Goodview, Goode, Brookneal, Huddleston, Altavista, Central Appomattox, North Amherst, South/East Lynchburg
 - West Bedford, Central Lynchburg

Figure 1: Delta Heat Map, Central Virginia Health District, July 17, 2021- November 13, 2021

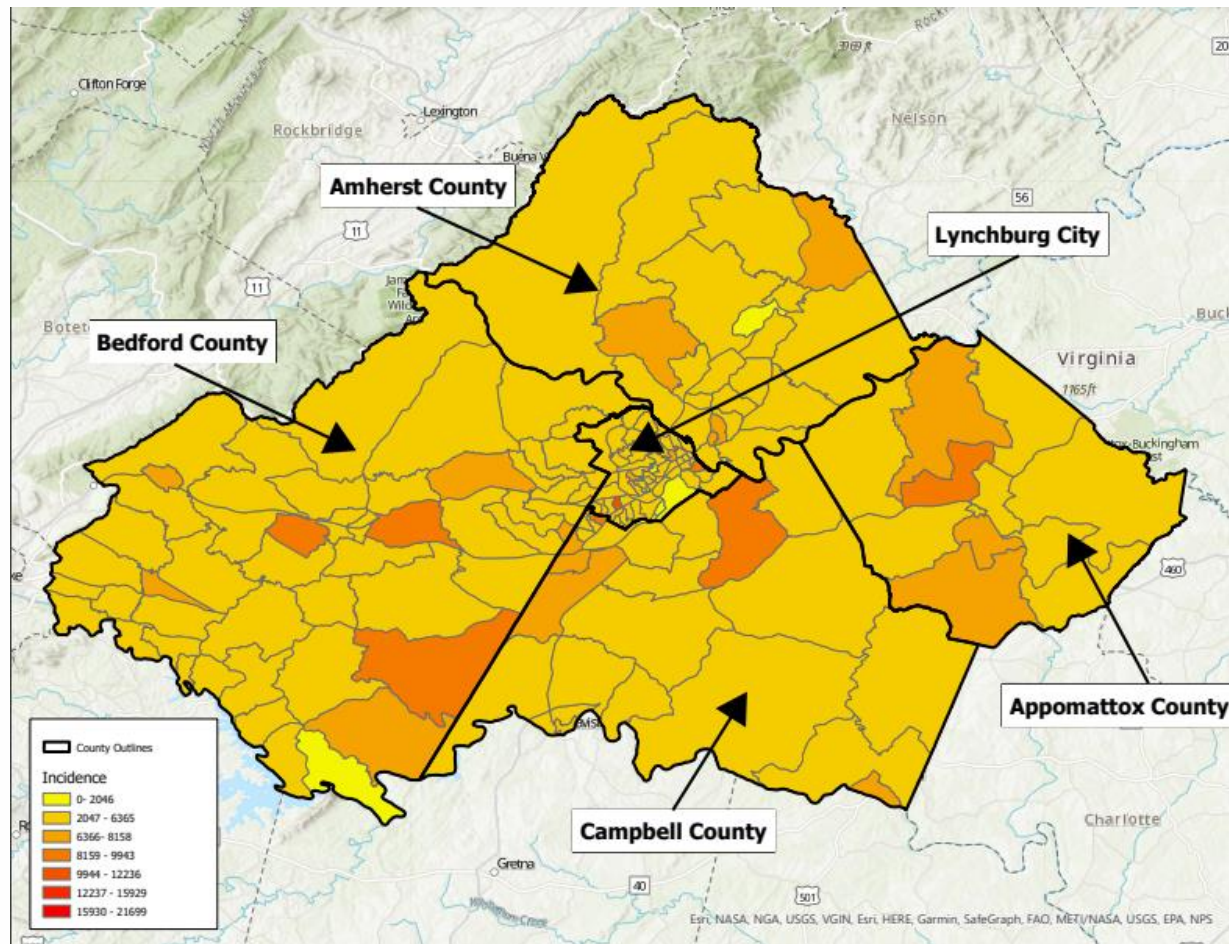
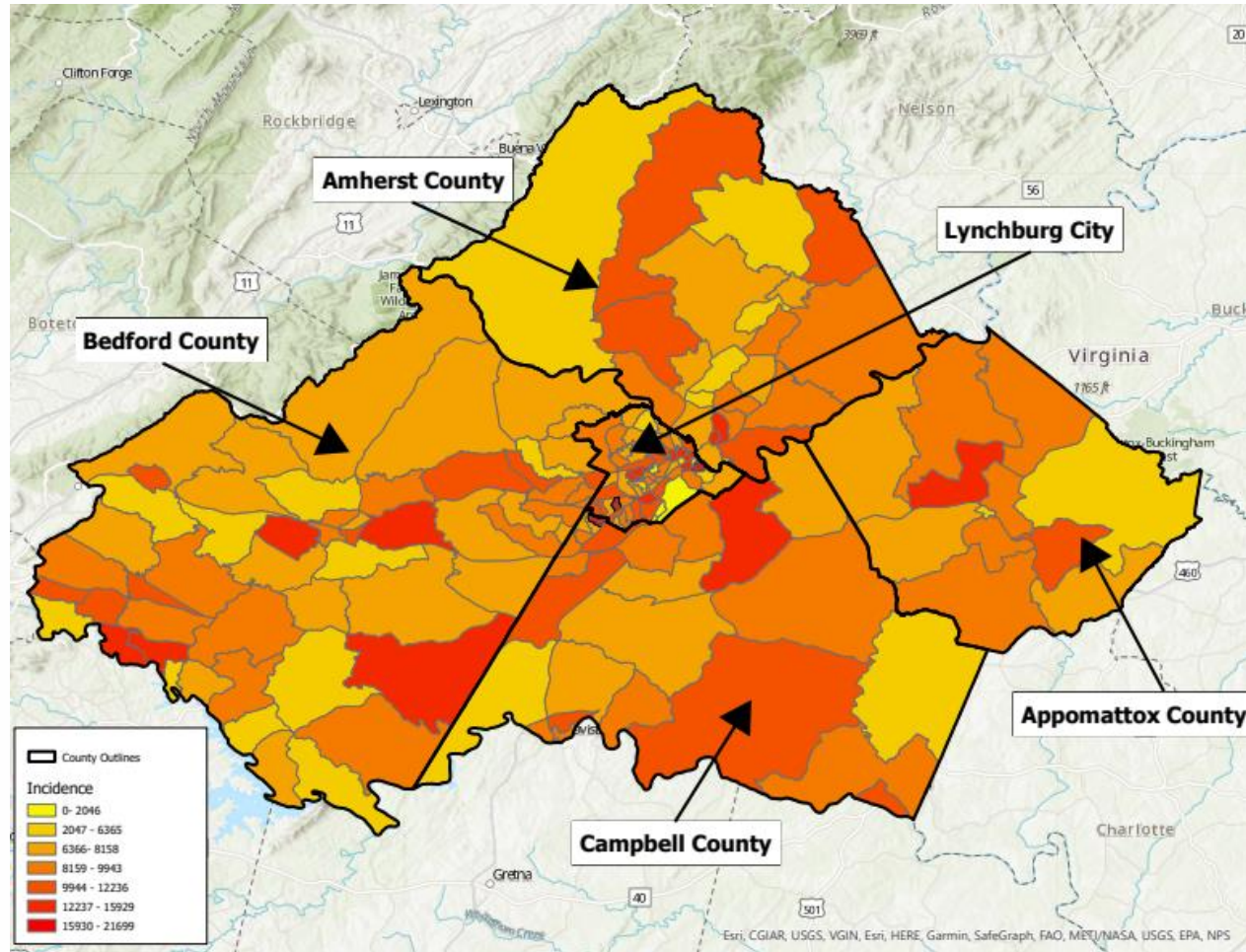


Figure 2: Omicron Heat Map, Central Virginia Health District, November 27, 2021-March 26, 2022



Discussion & Limitations

- Several block groups disproportionately affected during both Delta and Omicron waves
- Majority of these block groups located in the rural counties with several on the outskirts of Lynchburg
- Limitations
 - Differences in reporting from Delta to Omicron as home tests became more widely available
 - Lack of testing
 - Missing/inaccurate data entries from VEDSS
 - Congregate living facilities where large numbers of cases share same address
 - Nursing homes/other senior care centers, correctional facilities, group homes, colleges/universities

Future Outreach

- Community-specific mitigation messaging (including vaccination efforts)
 - Rural block groups: targeted towards older, white, conservative, higher income population
 - Inner city block groups: targeted toward younger, mixed-racial, lower income population
- Delivery of COVID-19 care kits to these vulnerable populations

References

1. Virginia.gov. Accessed June 21, 2022. <https://www.vdh.virginia.gov/coronavirus/see-the-numbers/covid-19-in-virginia/>
2. Wang Q, Dong W, Yang K, Ren Z, Huang D, Zhang P, Wang J. Temporal and spatial analysis of COVID-19 transmission in China and its influencing factors. *Int J Infect Dis*. 2021; 105: 675–685. doi:10.1016/j.ijid.2021.03.014
3. CDC. COVID data tracker. Centers for Disease Control and Prevention. Published March 28, 2020. Accessed June 20, 2022. <https://covid.cdc.gov/covid-data-tracker/>
4. Centra Health. 2021. *2021-2024 Lynchburg Area Community Health Needs Assessment*. Available at: https://www.centrahealth.com/sites/default/files/2021_centra_hospital_chna_compiled_final.pdf
5. Centra Health. 2021. *2021-2024 Bedford Area Community Health Needs Assessment*. Available at: https://www.centrahealth.com/sites/default/files/2021_cbmh_chna_compiled_final.pdf
6. Virginia Department of Health. 2022. *People Vaccinated by Locality of Residence and Vaccination Status*. Available at: <https://www.vdh.virginia.gov/coronavirus/see-the-numbers/covid-19-in-virginia/covid-19-vaccine-summary/>
7. United States Zip Codes. 2022. U.S. ZIP Codes: Free ZIP code map and zip code lookup. Available at: <https://www.unitedstateszipcodes.org/>
8. Geocoding.geo.census.gov. 2022. *Census Geocoder*. Available at: <https://geocoding.geo.census.gov/geocoder/geographies/addressbatch?form>
9. United States Census Bureau, 2021. *2020 TIGER/Line Shapefiles*. Available at: <https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.2020.html>