Regional Dynamics and Prevalence of COVID-19 Variants in US Health and Human Services Regions

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BACKGROUND

- The COVID-19 pandemic emerged in 2019, leading to widespread illness, overwhelmed healthcare systems, and extensive social and economic disruption globally[1]
- COVID-19 variants, with genetic alterations, pose concerns for increased transmission and potential vaccine evasion, impacting public health efforts[1]

OBJECTIVE

The purpose of this study is to determine the proportion of COVID-19 variants in different Health and Human Service (HHS) regions, analyze the prevalence of specific variants in these regions, and provide new insights into the regional distribution and trends of COVID-19 variants

STUDY DATASET

We used the National COVID Cohort Collaborative (N3C) database, which provided the share of variants in each HHS region on a weekly basis **(Figure 1)**

METHODS

- We monitored the progression of four prevalent COVID-19 variants (Delta, Alpha, Omicron subvariant BA.5, and Omicron subvariant XBB.1.5) across various U.S. HHS regions at three-month intervals **(Figure 1)**

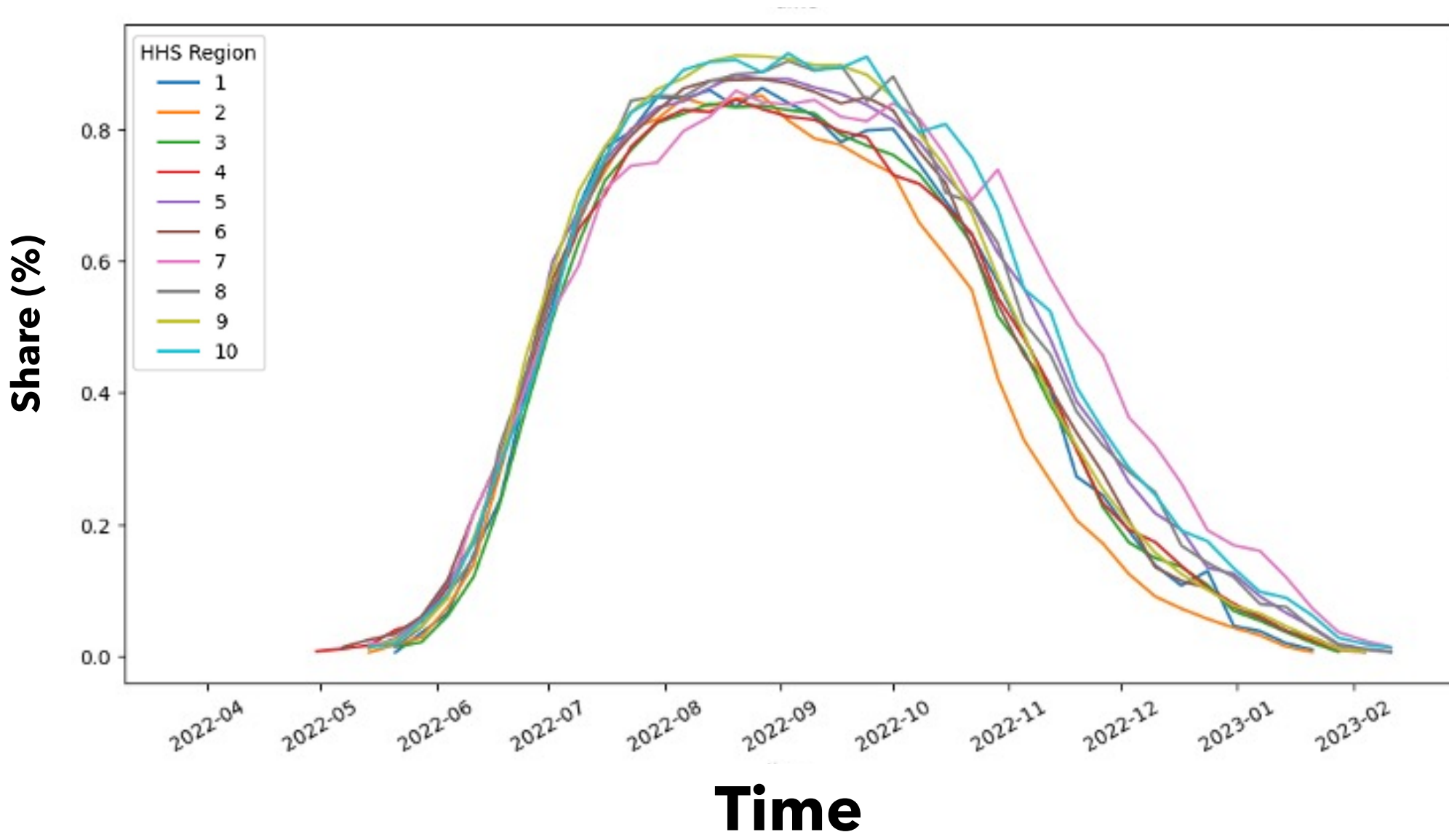- This approach has given way to a comprehensive analysis of regional trends and variant prevalence

Figure 1. Regional Map of HHS 10 Regions[2]

Region 1 - Boston
- Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont

Region 2 - New York
- New Jersey, New York, Puerto Rico, and the Virgin Islands

Region 3 - Philadelphia
- Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia

Region 4 - Atlanta
- Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee

Region 5 - Chicago
- Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin

Region 6 - Dallas
- Arkansas, Louisiana, New Mexico, Oklahoma, and Texas

Region 7 - Kansas City
- Iowa, Kansas, Missouri, and Nebraska

Region 8 - Denver
- Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming

Region 9 - San Francisco
- Arizona, California, Hawaii, Nevada, American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Marshall Islands, and Republic of Palau

Region 10 - Seattle
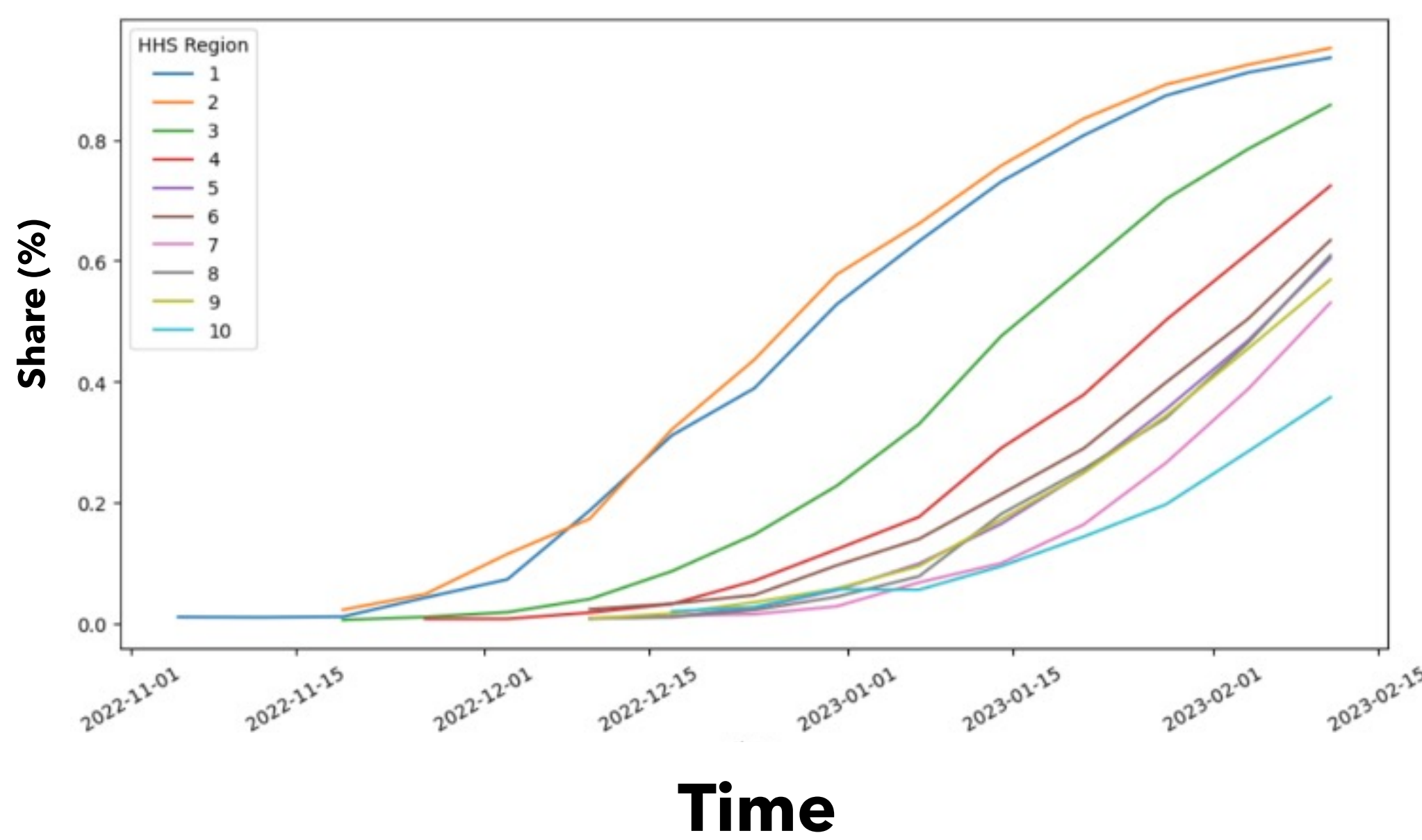- Alaska, Idaho, Oregon, and Washington

RESULTS

- We found clear regional patterns of the distribution of COVID-19 variants of concern:

  ○ The Omicron subvariant BA.5 exhibited a unique nationwide spread **(Figure 2)**

  ○ The Omicron subvariant XBB.1.5 variant showed a higher concentration in the Northeast **(Figure 3)**

  ○ The Alpha variant predominantly surfaced in the Southeast **(Figure 4)**

  ○ The Delta variant initially surged in the Kansas City region **(Figure 5)**

- These findings provide a detailed map of variant distribution across the U.S., highlighting the diverse regional characteristics
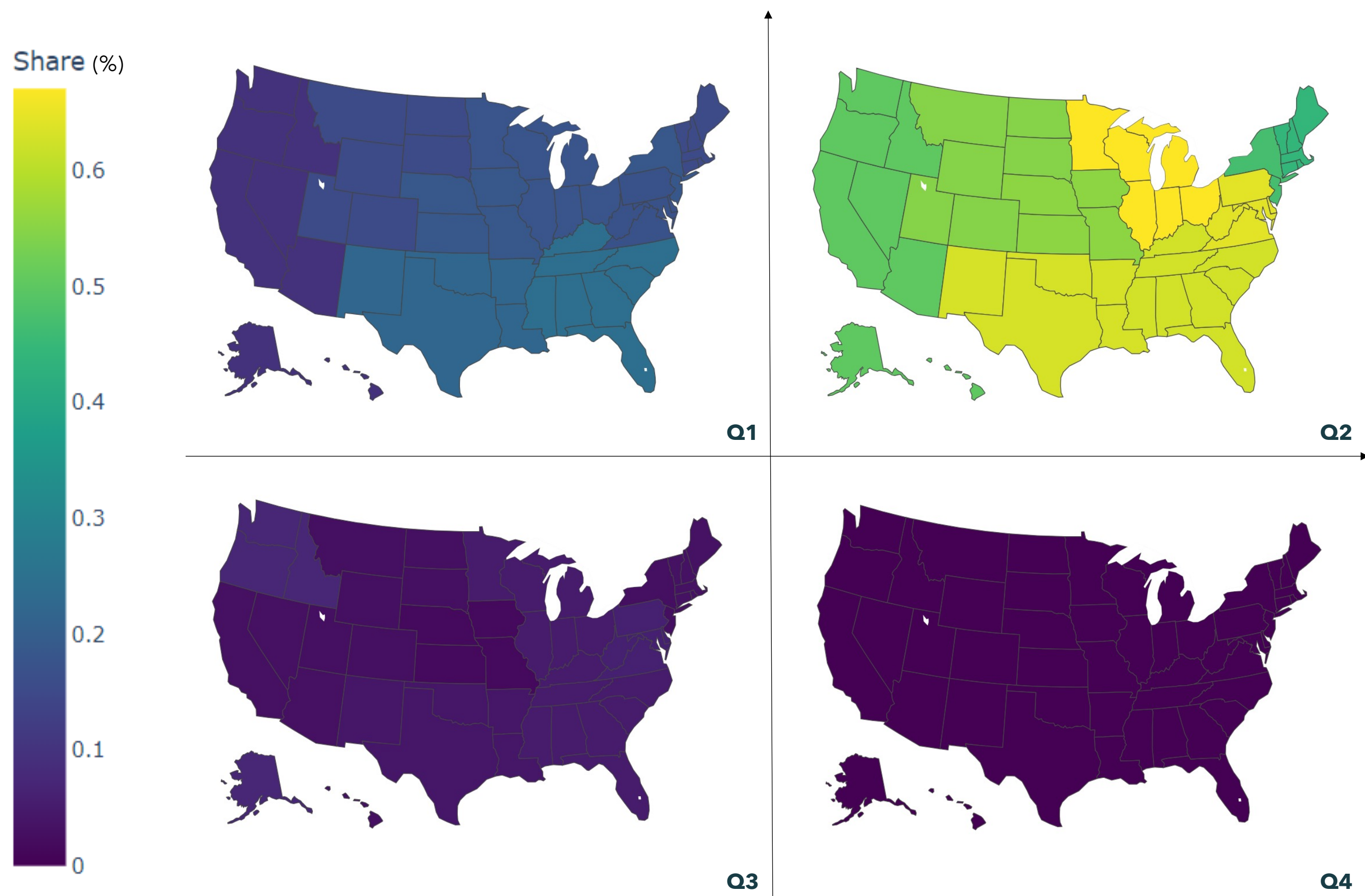
Figure 2. Share of BA.5 in Each HHS Region

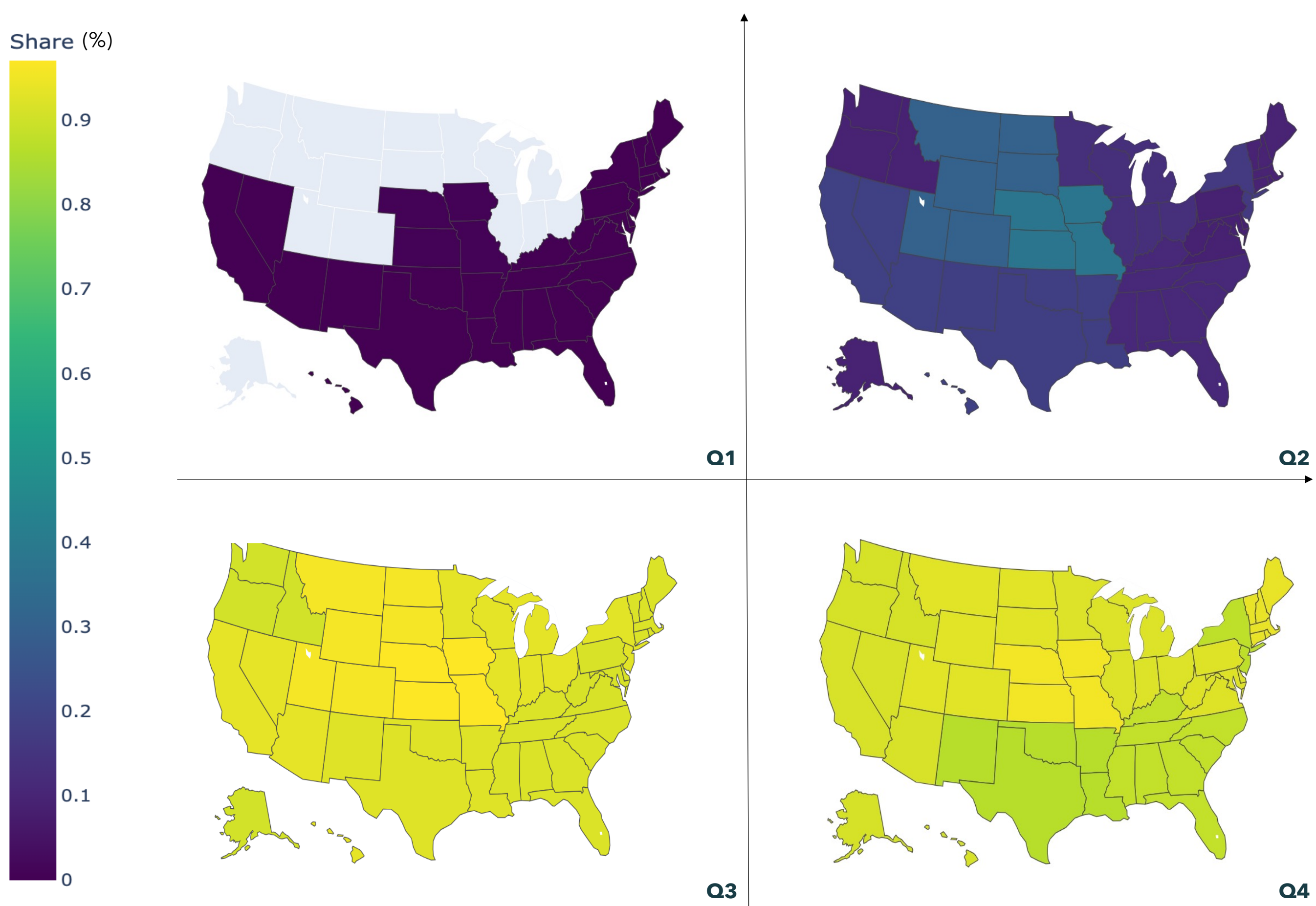**Figure 3.** Share of XBB.1.5 in Each HHS Region

CONCLUSIONS

This research addresses a significant knowledge gap regarding the regional dynamics of COVID-19 variant distribution, offering detailed insights into geographical prevalence. Our findings provide valuable information for informing targeted public health strategies and policies in the future.

Figure 4. How Alpha Variant Spread and Grew Over Its Lifespan (2021 Q1-Q4)

Figure 5. How Delta Variant Spread and Grew Over Its Lifespan (2021 Q1-Q4)

REFERENCES

1. World Health Organization 2023 data.who.int, WHO Coronavirus (COVID-19) dashboard > Cases [Dashboard]. https://data.who.int/dashboards/covid19/cases
2. U.S. Department of Health and Human Services. (n.d.). Regional offices. Retrieved from: https://www.hhs.gov/about/agencies/iea/regional-offices/index.html