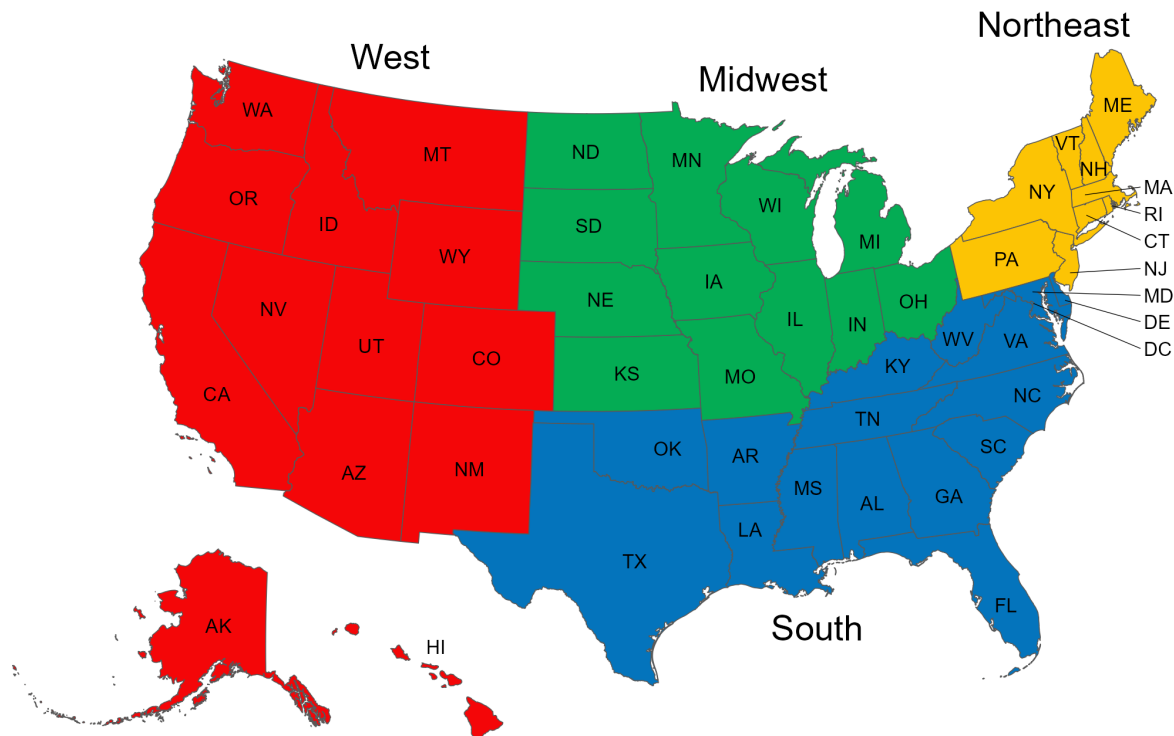


Patterns, causes and policy implications of regional differences in COVID-19 mortality in the United States: A secondary analysis of excess mortality estimates

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Supplemental Material

Figure S-1. Map of the United States illustrating the four standard Census regions.



The U.S. COVID-19 Trends and Impact Survey (CTIS)

The Delphi Group at Carnegie Mellon University U.S. COVID-19 Trends and Impact Survey in partnership with Facebook¹ as deployed in 13 waves from April 6, 2020, to June 25, 2022. The survey asked participants questions about COVID-like symptoms, vaccine acceptance, their behavior, mental health, and economic and health impacts of the pandemic on their life. Here we use the survey data to calculate behavior indicators (mask use, social distancing).

For mask use, we combine questions C14 “In the past 5 days, how often did you wear a mask when in public?” (Waves 4:7), and C14a “In the past 7 days, how often did you wear a mask when in public?” (Waves 8:13). For each of the Census regions we then calculate the weekly proportion of individuals wearing a mask in public all or most of the time (answers “1: All the time” and “2: Most of the time”.) from September 8, 2020 (period 2) to June 25, 2022 (period 6).

For social distancing, we consider both working from home and avoiding contact with other people. Specifically:

- We combine questions C3 “Have you gone to work outside of your home?” (Waves 1:3), C13 “In the last 24 hours, have you done any of the following?” (Waves 4:8), and C13b “In the past 24 hours, have you done any of the following?” (Waves 10:13). To calculate the proportion of individuals working out of home, we consider the answers “2: No”, “1: Gone to work or school outside the place where you are currently staying”, and “1: Gone to work or school indoors, outside the place where you are currently staying” respectively for C3, C13, and C13b. We aggregate the proportions weekly for each of the Census regions from April 6, 2020 (period 1) to June 25, 2022 (period 6).
- We combine questions C7 “To what extent are you intentionally avoiding contact with other people?” (Waves 1:3, 5:10), and C7a “In the past 7 days, how often did you intentionally avoid contact with other people?” (Waves 11:13). To calculate the proportion of individuals avoiding contact with other people, we consider the answers “1: All of the time, 2: Most of the time; I only leave my home to buy food and other essentials”, and “1: All of the time, 2: Most of the time”, respectively for C7 and C7a. We aggregate the proportions weekly for each of the Census regions from April 6, 2020 (period 1) to June 25, 2022 (period 6) but for Wave 4 (from September 8, 2020, to November 23, 2020), for which the data is not available.

The survey participants were sampled from Facebook users. To obtain a representative sample of the United States population, Facebook used its own demographic data to calculate statistical weights for each survey participant. The weight methodology and limitations, as well as examples of how to use the weights when calculating estimates are explained in the Facebook User Guide for the CTIS Weights.²

Vertical lines in Figures S2 – S4 indicate minor changes in question wording.

¹ Joshua A. Salomon, Alex Reinhart, Alyssa Bilinski, Eu Jing Chua, Wichada La Motte-Kerr, Minttu M. Rönn, Marissa Reitsma, Katherine Ann Morris, Sarah LaRocca, Tamar Farag, Frauke Kreuter, Roni Rosenfeld, and Ryan J. Tibshirani (2021). “The US COVID-19 Trends and Impact Survey: Continuous real-time measurement of COVID-19 symptoms, risks, protective behaviors, testing, and vaccination”, *Proceedings of the National Academy of Sciences* 118 (51) e2111454118.
<https://doi.org/10.1073/pnas.2111454118>

² <https://dataforgood.facebook.com/dfg/resources/user-guide-for-ctis-weights>

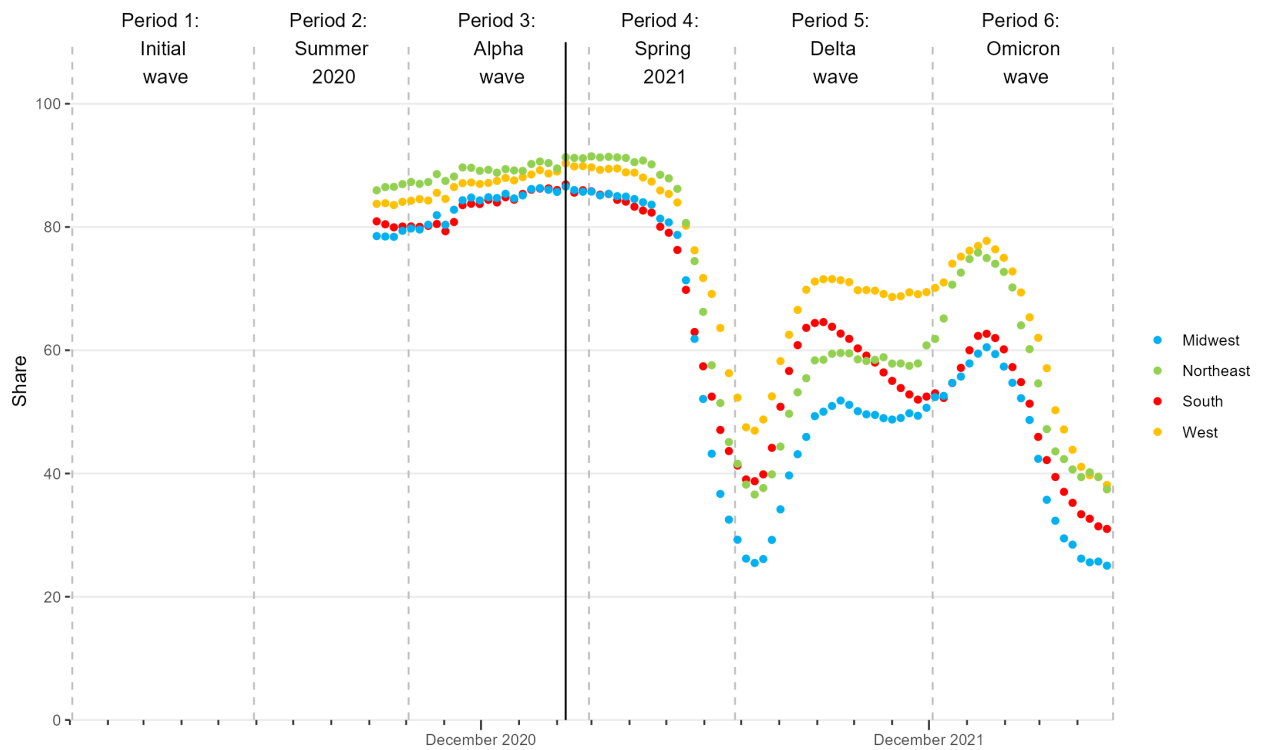


Fig. S2. Mask use by period and region, U.S., September 8, 2020 – April 30, 2022. Proportion of survey respondents reporting that they wear a mask in public all or most of the time. The solid line indicates a minor change in question wording. Periods defined as follows: Period 1 (January 3 to May 30, 2020), Period 2 (May 31 – October 3, 2020), Period 3 (October 4, 2020 to February 27, 2021), Period 4 (February 28 to June 26, 2021), Period 5 (June 27 to December 4, 2021), and Period 6 (December 5, 2021 to April 30, 2022). Source: authors' calculations of Delphi US CTIS survey.

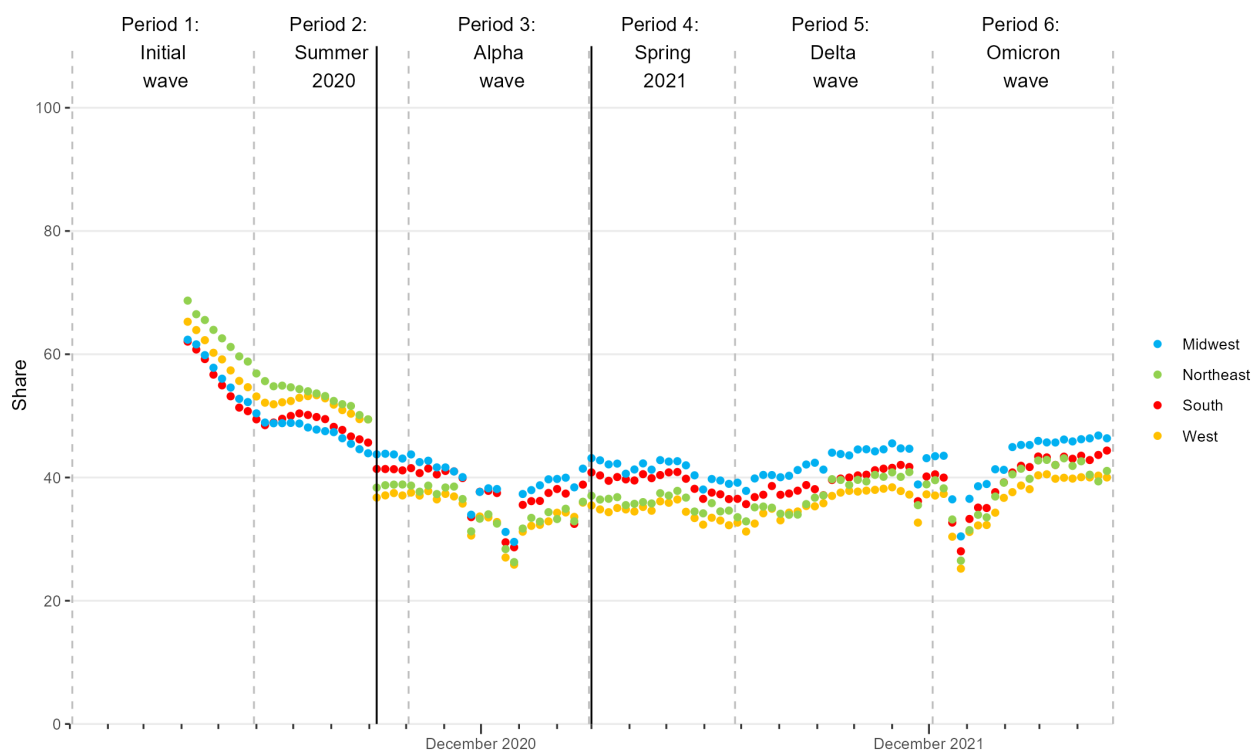


Fig. S3. Working out of home by period and region, U.S., April 6, 2020 – April 30, 2022. Proportion of survey respondents reporting not working/going to school outside of their place. Solid lines indicate minor changes in question wording. Periods defined as follows: Period 1 (January 3 to May 30, 2020), Period 2 (May 31 – October 3, 2020), Period 3 (October 4, 2020 to February 27, 2021), Period 4 (February 28 to June 26, 2021), Period 5 (June 27 to December 4, 2021), and Period 6 (December 5, 2021 to April 30, 2022). Source: authors' calculations of Delphi US CTIS survey.

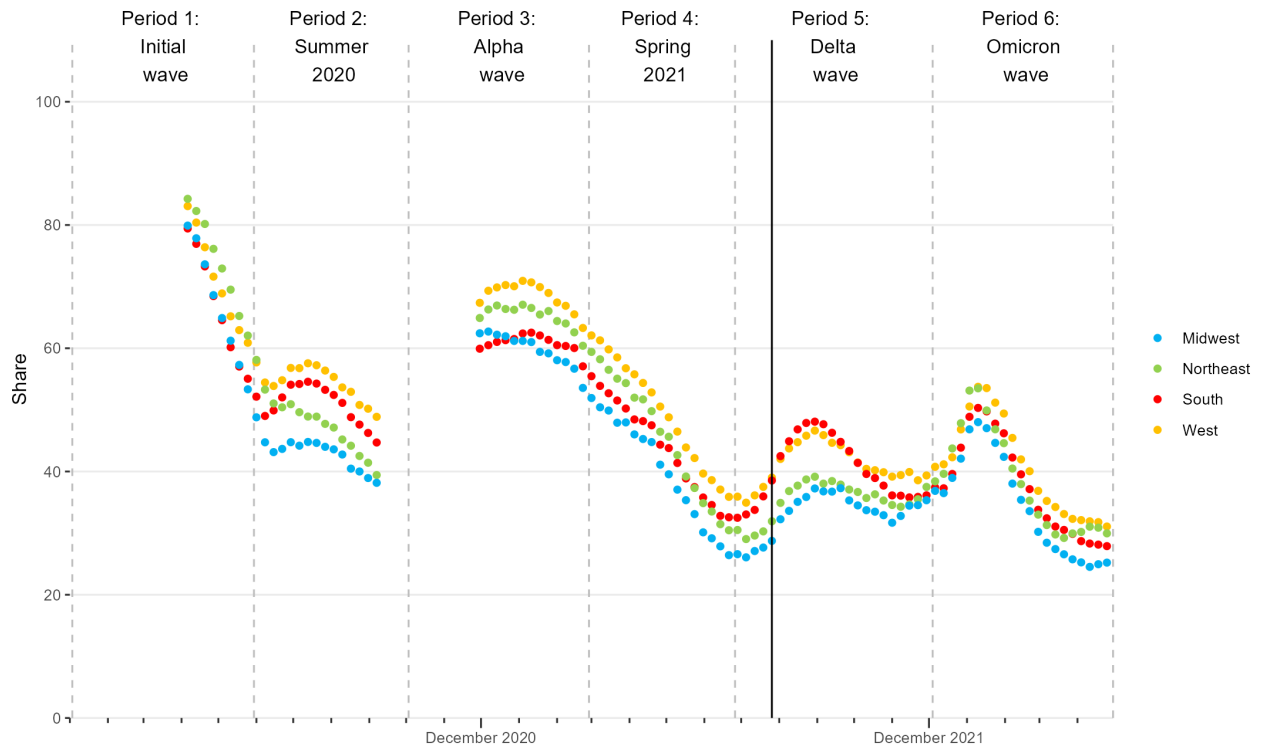


Fig. S4. Avoiding contact with other people by period and region, U.S., April 6, 2020 – June 25, 2022. Proportion of survey respondents reporting avoiding contact with other people all or most of the time. The solid line indicates a minor change in question wording. Periods defined as follows: Period 1 (January 3 to May 30, 2020), Period 2 (May 31 – October 3, 2020), Period 3 (October 4, 2020 to February 27, 2021), Period 4 (February 28 to June 26, 2021), Period 5 (June 27 to December 4, 2021), and Period 6 (December 5, 2021 to April 30, 2022). Source: authors' calculations of Delphi US CTIS survey.