

Surge Capacity of the U.S. Healthcare Workforce*

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Epidemiological models predict that COVID-19 will generate extraordinary demand for medical care, raising questions about whether the U.S. healthcare system has sufficient capital (ventilators and ICU beds) and labor (physicians, nurses and other healthcare workers) to provide needed care.¹ To gauge the surge capacity of the U.S. healthcare workforce, we calculate how much additional care could be provided if clinicians increased their workloads to 60 hours per week.² We use data from the 2015-2017 American Community Survey, which surveys 1% of the U.S. population each year, and records workers' occupation and weekly hours.³

Panel A of Figure 1 shows national-level statistics. We focus three occupations: physicians, registered nurses, and respiratory therapists, who provide intubation and ventilation management for COVID-19 patients with breathing difficulties.⁴ The U.S. has 237 physicians per 100,000 people, who work the equivalent of 4.3 12-hour shifts per week, and thus provide 1,022 clinician-shifts per 100,000 people per week. If physicians increased their capacity to 60 hours, or five 12-hour shifts, per week, they could provide an additional 163 clinician-shifts, or 16% more care. Registered nurses provide a baseline of 2,111

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¹Ferguson, Neil M., et al. March 16, 2020. "Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand." London: Imperial College COVID19 Response Team.

²We choose 60 hours because this is the average amount that physicians report working per week during the ages when they are in training. This training is notorious for requiring long hours, but these hours are apparently manageable for a period of months or a few years.

³We restrict our analysis to those working in hospitals and physicians' offices, as these industries are most relevant for COVID-19 care.

⁴Data on additional occupations are shown in the Appendix Table A1.

clinician-shifts per 100,000 people per week. Because they work fewer hours at baseline, they could increase their capacity by an additional 1,276 clinician-shifts per 100,000 people or 60% by working five shifts per week. Respiratory therapists' surge capacity is proportionally similar.

Surge capacity varies substantially by region. Physician surge capacity (Panel B of Figure 1), measured in clinician-shifts per 100,000 people per week, is nearly twice as large in the Northeast as in the Midwest or Deep South. Surge capacity for registered nurses (Panel C) is highest in the Midwest and lowest in the Southwest. Respiratory therapist (Panel D) surge capacity is highest in the Great Plains and the South. The Southwest has relatively low surge capacity for all three occupations.

Some clinicians have the training to care for COVID-19 patients. Others could be cross-trained to provide this care. Even clinicians who are not appropriate for cross-training can fill in for coworkers who have been shifted to COVID-19 care, as could retired workers who have training and experience but have higher COVID-19 mortality risk.⁵ As some states have already started doing⁶, easing licensing restrictions can give hospitals the flexibility to better cope with this unprecedented spike in demand.

⁵<https://khn.org/news/help-wanted-retired-doctors-and-nurses-don-scrubs-again-in-coronavirus-fight/>

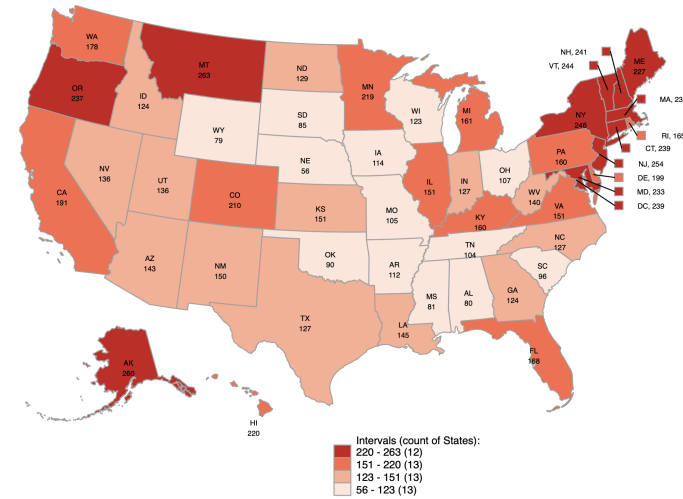
⁶E.g., <https://malegislature.gov/Bills/191/S2615> and <https://www.op.nysed.gov/COVID-19Volunteers.html>

Figure 1: Surge Capacity of Healthcare Workforce, per 100,000 People

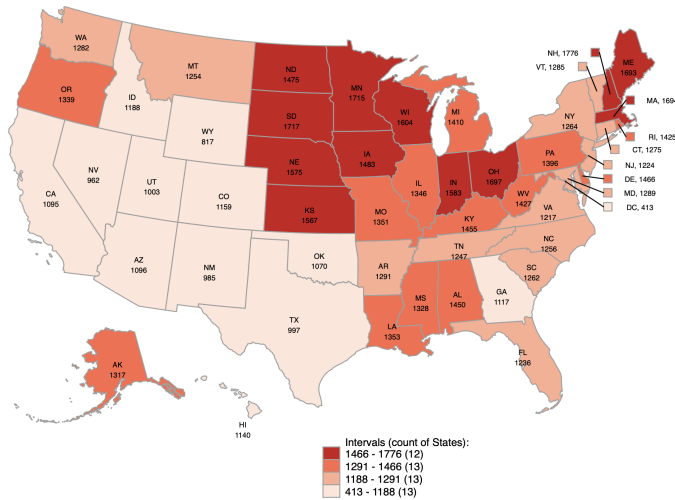
(A) Surge Capacity of Healthcare Workforce, per 100,000 People

	Number of Clinicians	12-Hour Shifts per Week		Clinician-Shifts per Week		
		Baseline	Surge Capacity	Baseline	Surge Capacity	Surge %
Physicians	237	4.3	0.7	1,022	163	15.9%
Registered Nurses	677	3.1	1.9	2,111	1,276	60.4%
Respiratory Therapists	32	3.1	1.9	99	59	59.6%

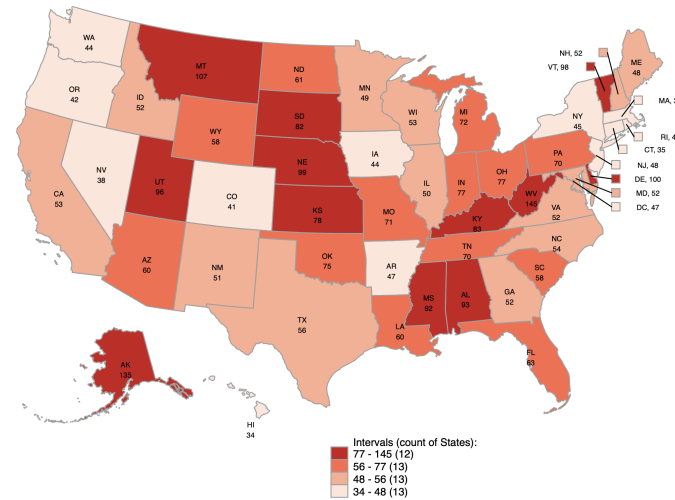
(B) Surge Shifts: Physicians



(C) Surge Shifts: Registered Nurses



(D) Surge Shifts: Respiratory Therapists



Note: Authors' calculations using 2015-2017 American Community Survey. Baseline is average weekly 12-hour shifts (weekly work hours divided by 12). Surge capacity assumes workloads increase to an average of five 12-hour shifts per week.

Appendix

A Data

We use data from the pooled 2015-2017 American Community Survey. We restrict to sub-industries Hospitals and Offices of Physicians.

- **Sample restrictions** We exclude individuals who are out of labor force and further restrict our sample to the sub-industries Hospitals and Offices of Physicians based on the 1990 Census Bureau industrial classification scheme.
- **Variables** The variable used to measure occupation is *occ*, which reports a person's primary occupation using the American Community Survey 2012-2017 occupation coding scheme. We refer to the Physicians and Surgeons occupation as Physicians throughout the paper. The variable used to measure weekly hours is *uhrswork*, which reports the number of hours per week that the respondent usually worked the previous year (top-coded at 99 hours a week).
- **Weighting** We scale the person weights such that the weights in each year sum up to that year's U.S population. Using the adjusted weights, we calculate yearly statistics and average across the statistics in each year from 2015 to 2017 to obtain the final statistics shown.
- **Sample size** The final sample size after applying the above restrictions is 88,034 persons in 2015, 89,086 persons in 2016 and 92,153 persons in 2017.

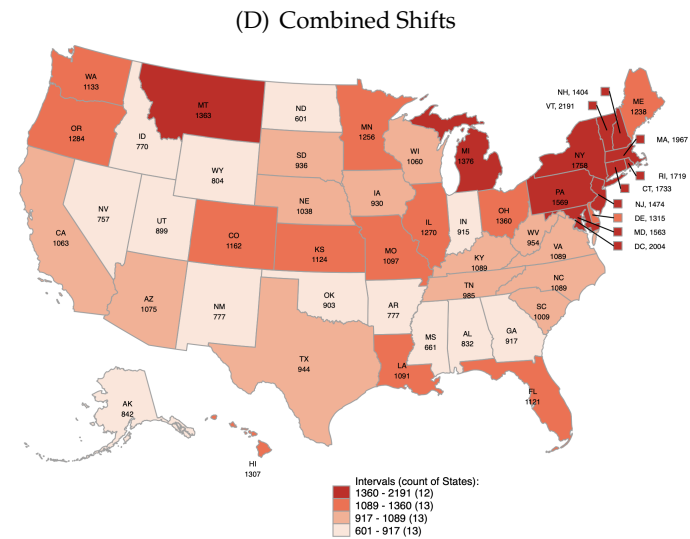
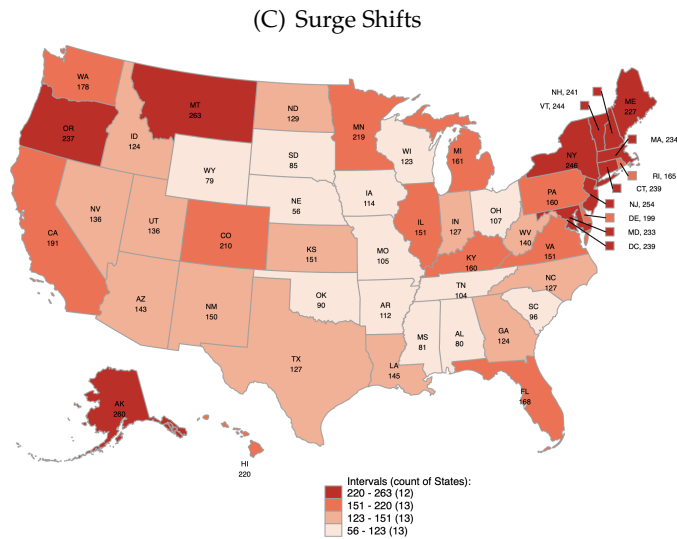
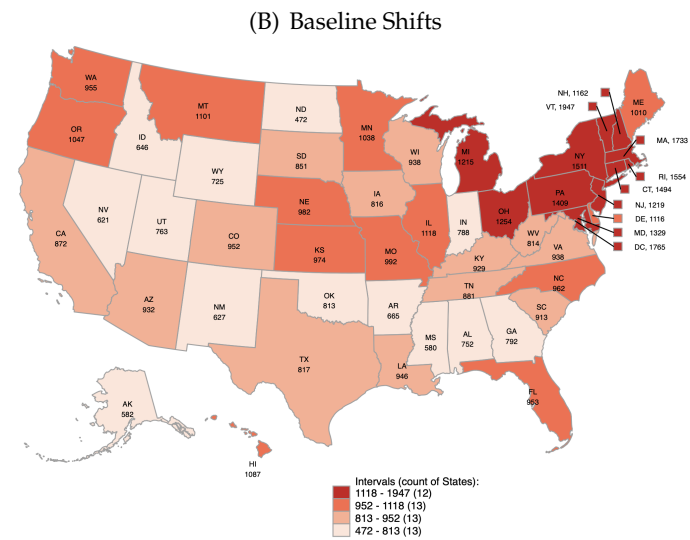
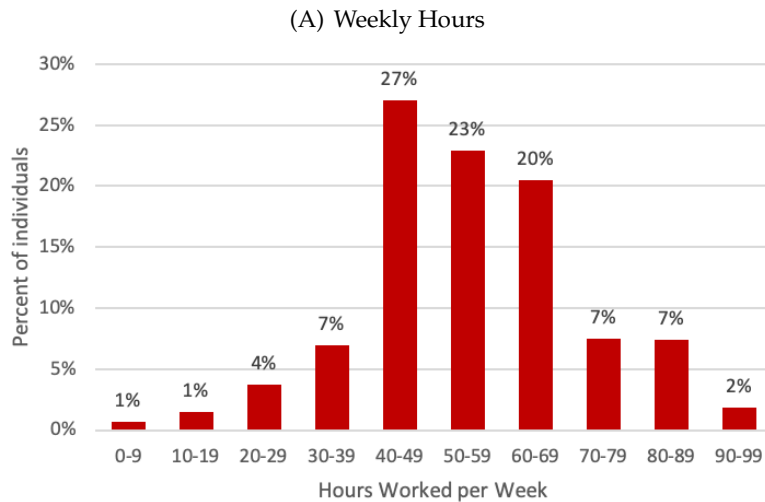
B Results

Table A1: Surge Capacity for Healthcare Workforce, per 100,000 People

	Number of Clinicians	12-Hour Shifts per Week		Clinician-Shifts per Week		
		Baseline	Surge Capacity	Baseline	Surge Capacity	Surge %
Physicians	237	4.3	0.7	1,022	163	15.9%
Physician Assistants	24	3.5	1.5	85	37	43.4%
Nurse Practitioners and Nurse Midwives	32	3.4	1.6	110	52	47.2%
Nurse Anesthetists	9	3.5	1.5	30	14	44.6%
Registered Nurses	677	3.1	1.9	2,111	1,276	60.4%
Licensed Practical Nurses	90	3.1	1.9	282	168	59.6%
Respiratory Therapists	32	3.1	1.9	99	59	59.6%

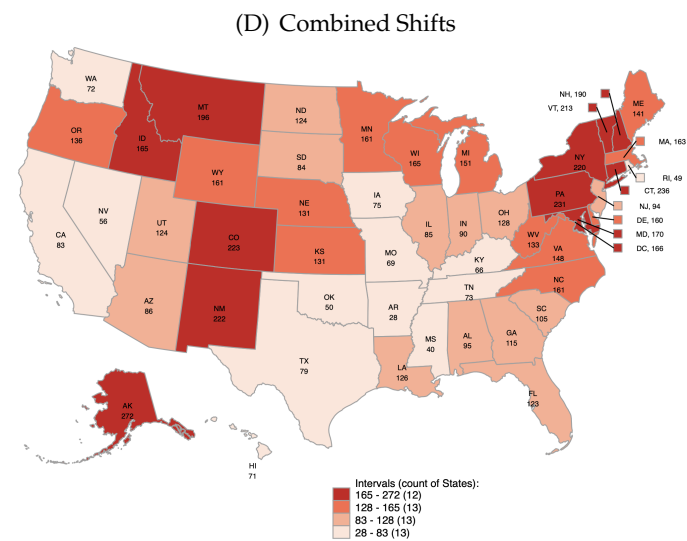
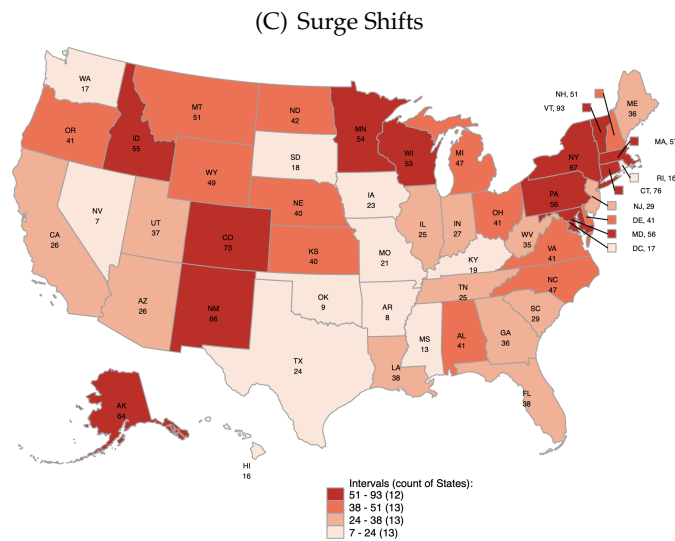
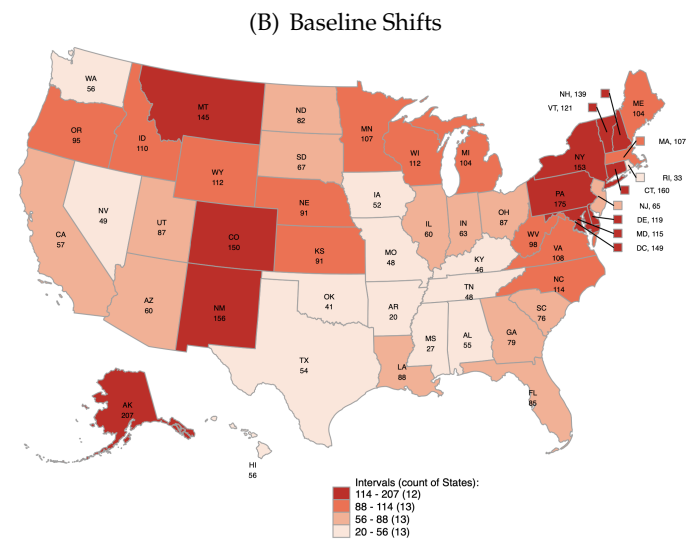
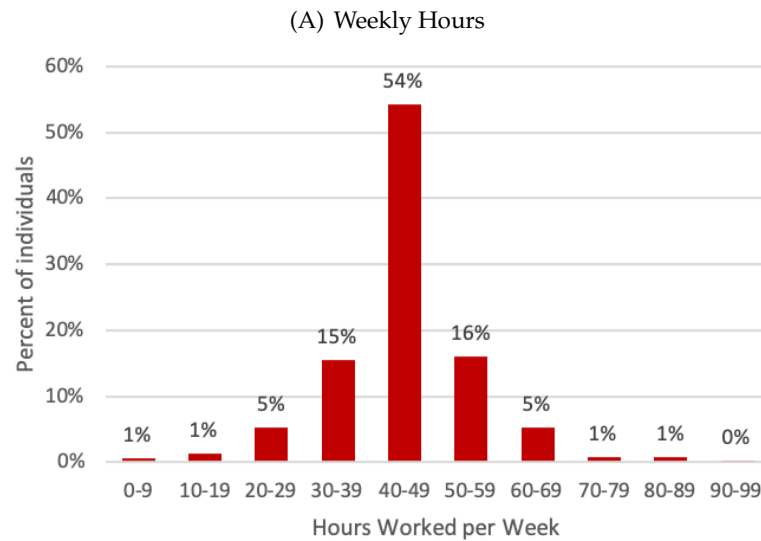
Note: Values are per 100,000 people and are calculated using the 2015-2017 American Community Survey. Baseline is weekly 12-hours shifts. Surge is calculated assuming workloads increase to 5 12-hours shifts per week (60 hours per week).

Figure A1: Physicians



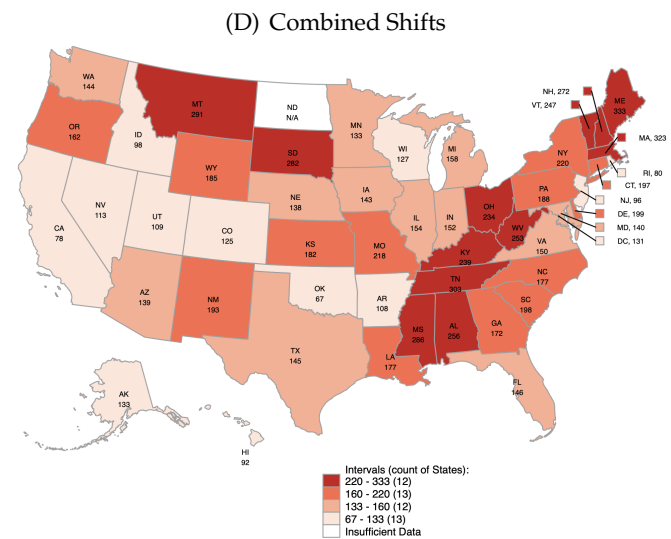
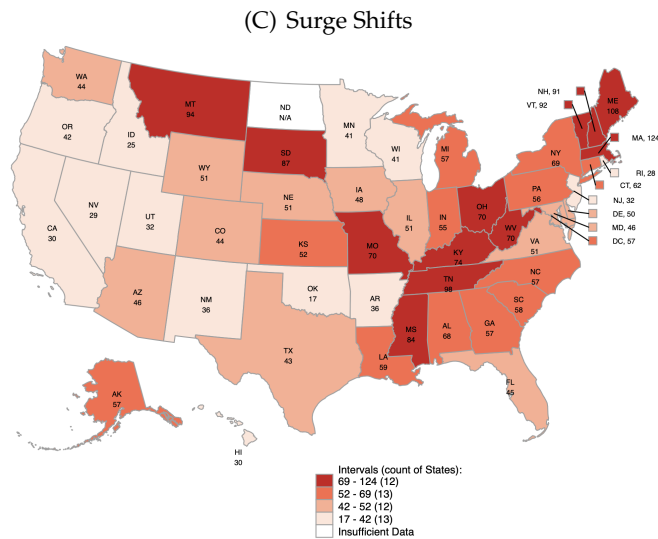
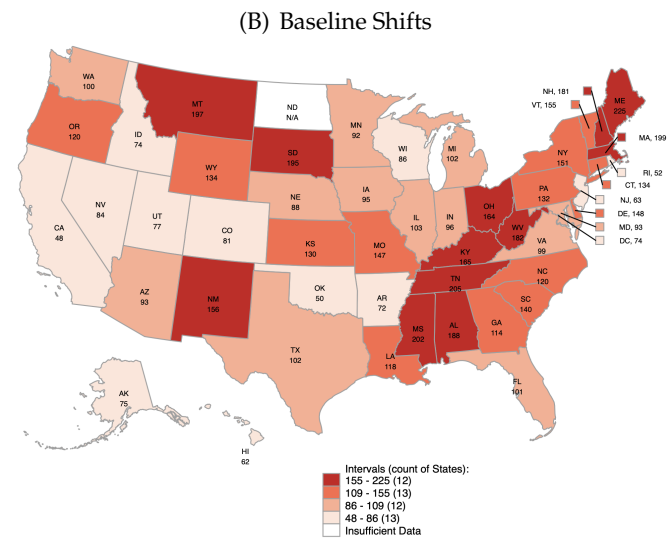
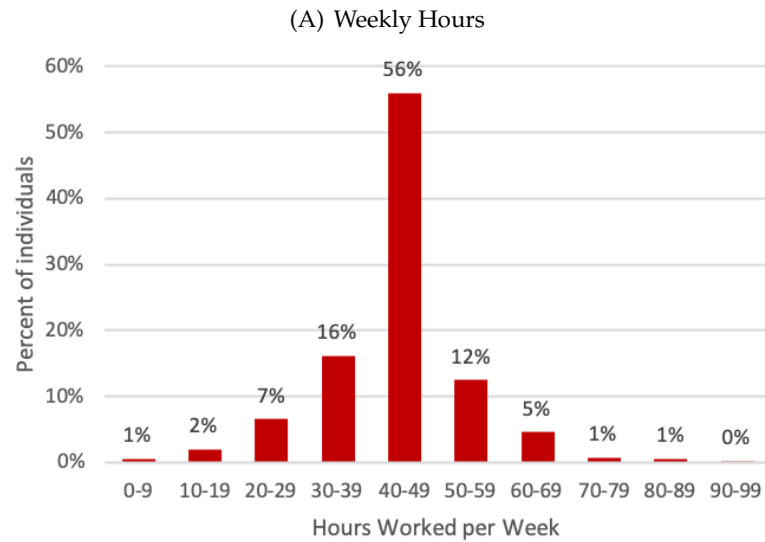
Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to physicians working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that physicians in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all physicians worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all physicians worked five shifts per week.

Figure A2: Physician Assistants



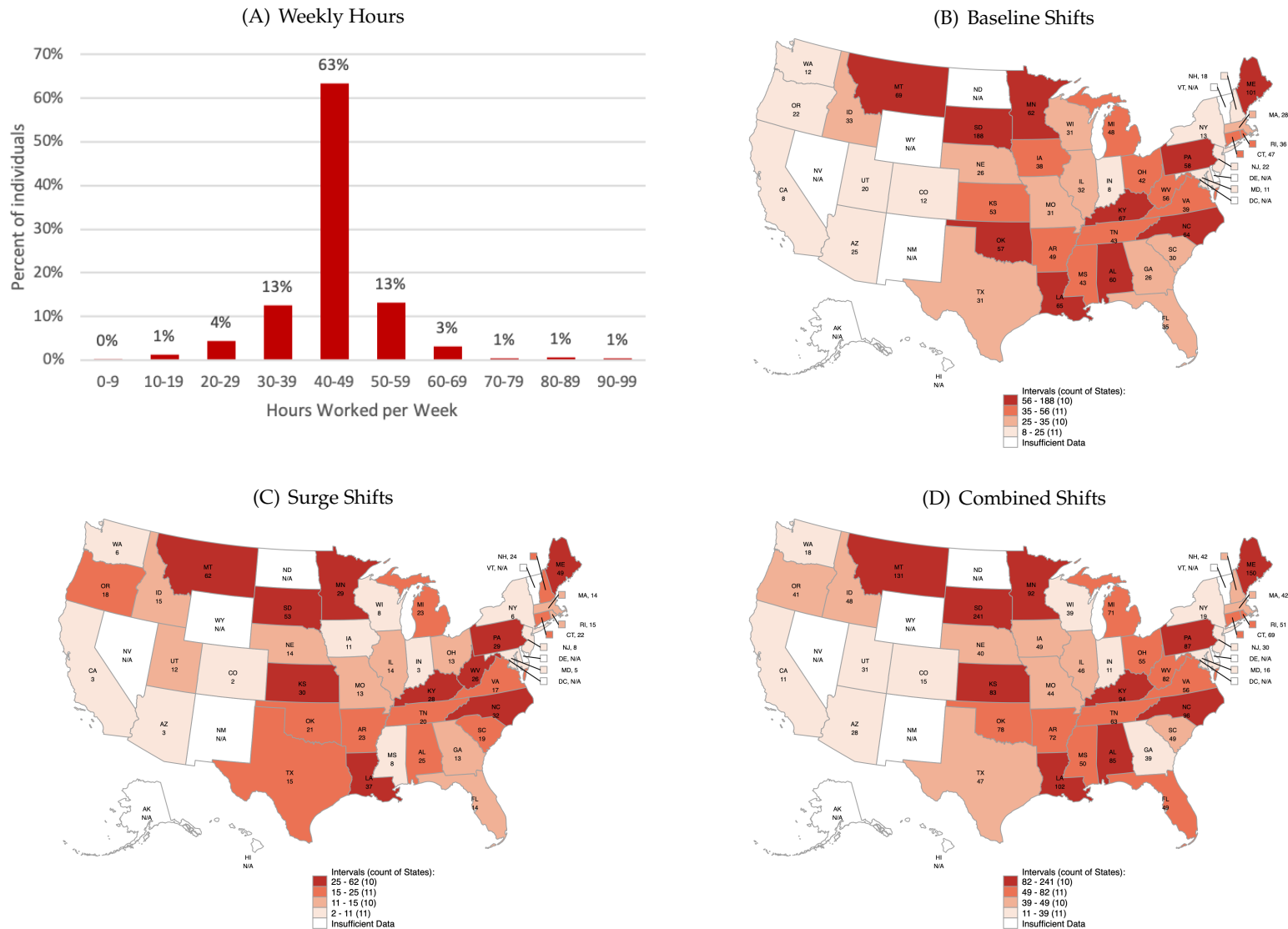
Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to physician assistants working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that physician assistants in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all physician assistants worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all physician assistants worked five shifts per week.

Figure A3: Nurse Practitioners and Nurse Midwives



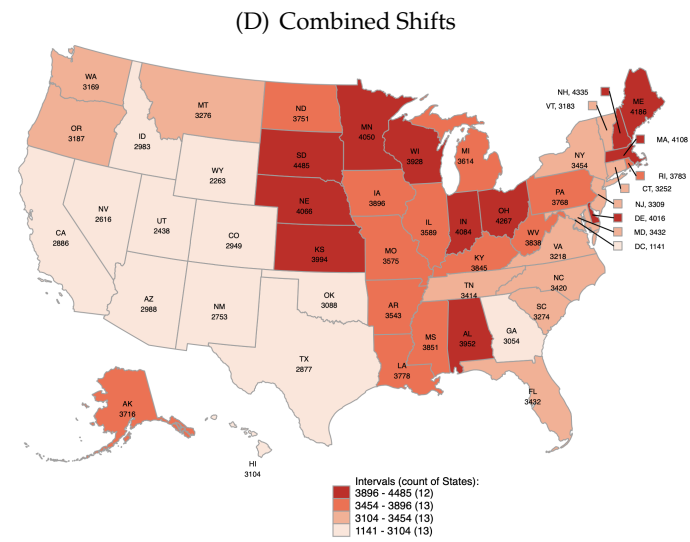
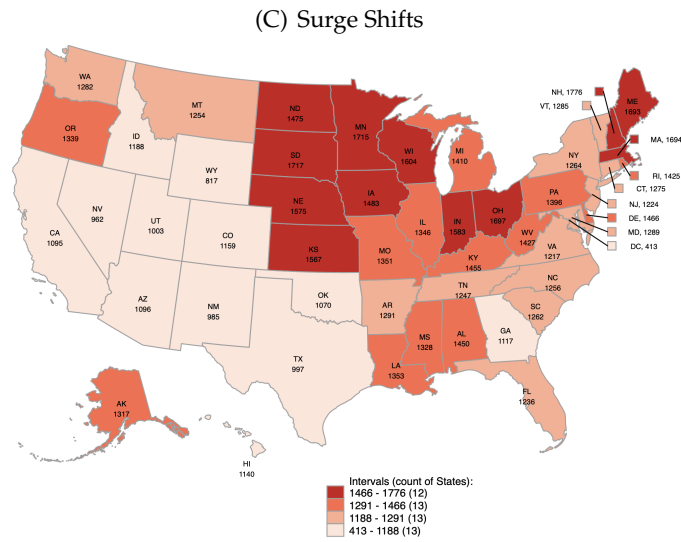
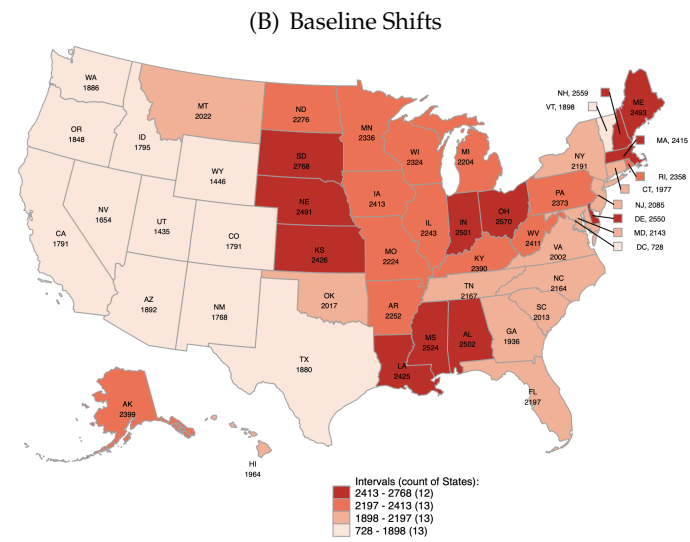
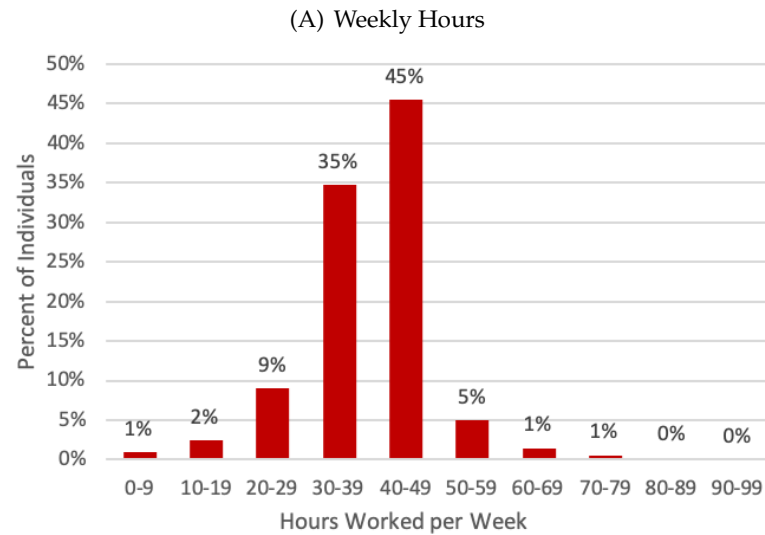
Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to nurse practitioners and nurse midwives working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that nurse practitioners and nurse midwives in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all nurse practitioners and nurse midwives worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all nurse practitioners and nurse midwives worked five shifts per week.

Figure A4: Nurse Anesthetists



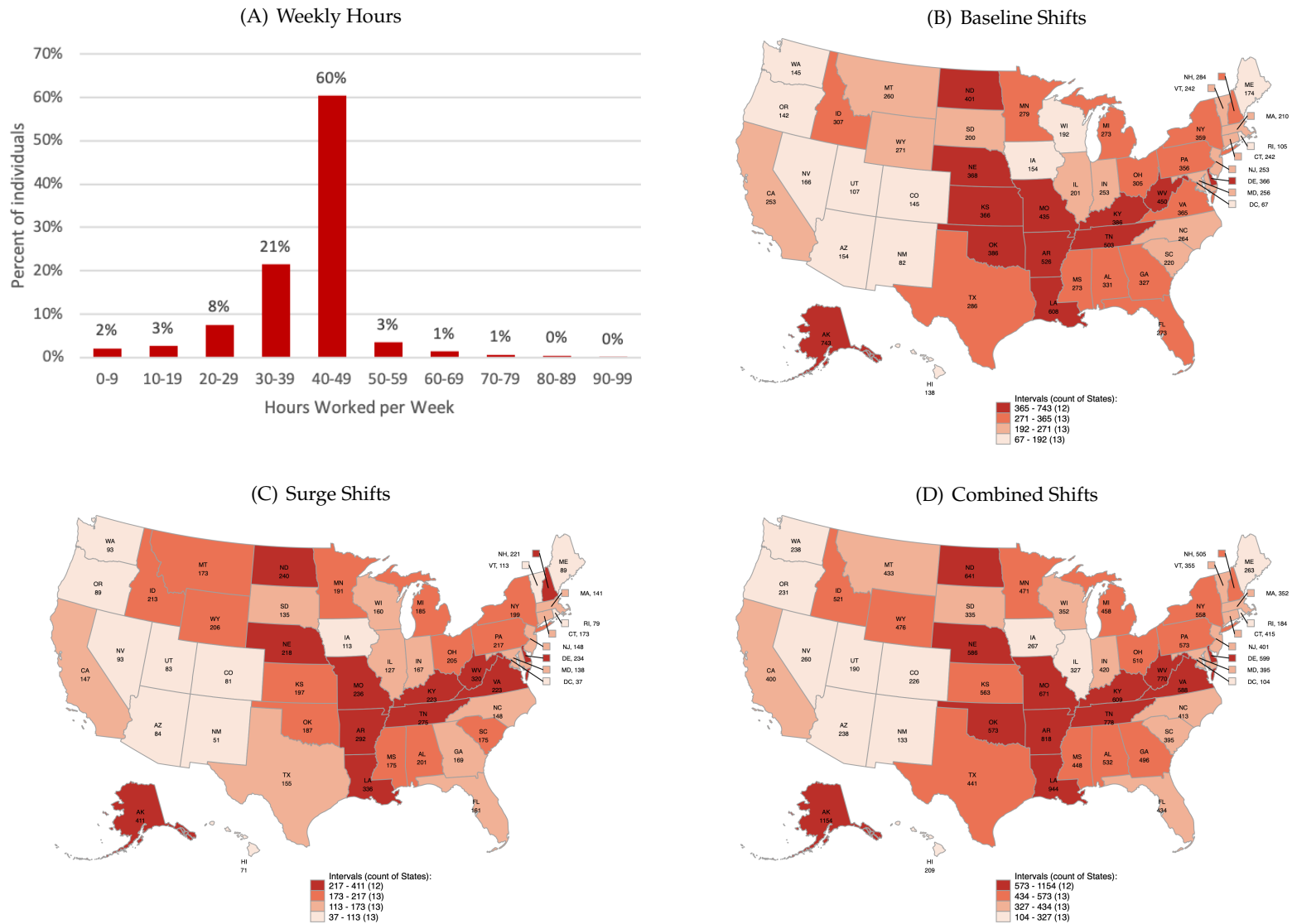
Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to nurse anesthetists working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that nurse anesthetists in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all nurse anesthetists worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all nurse anesthetists worked five shifts per week.

Figure A5: Registered Nurses



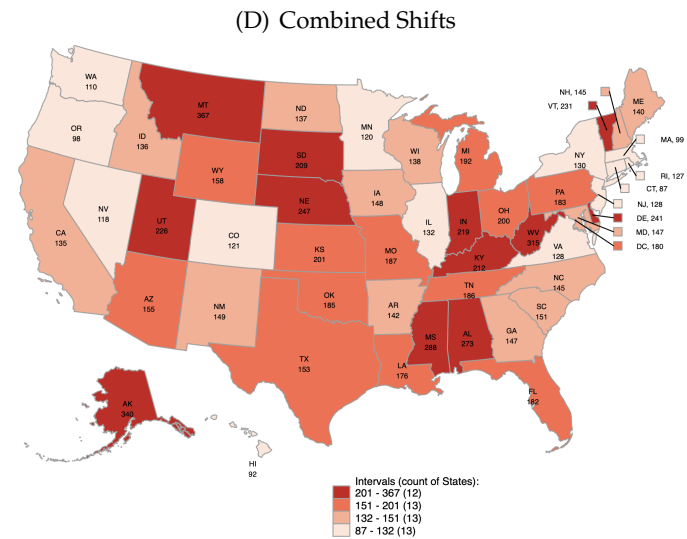
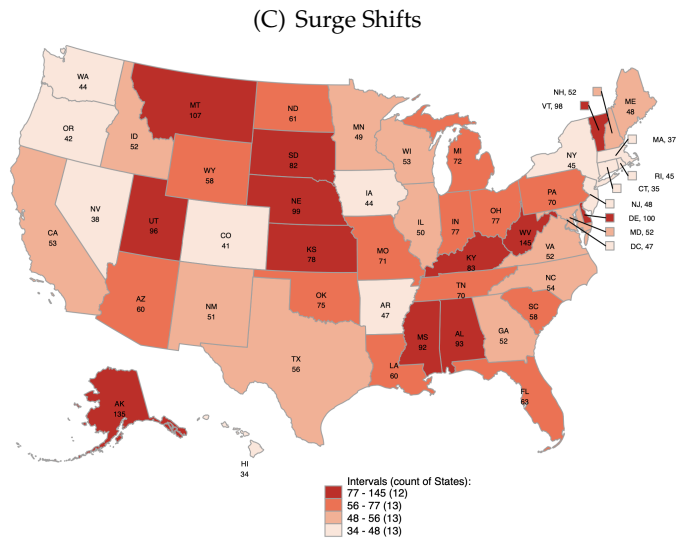
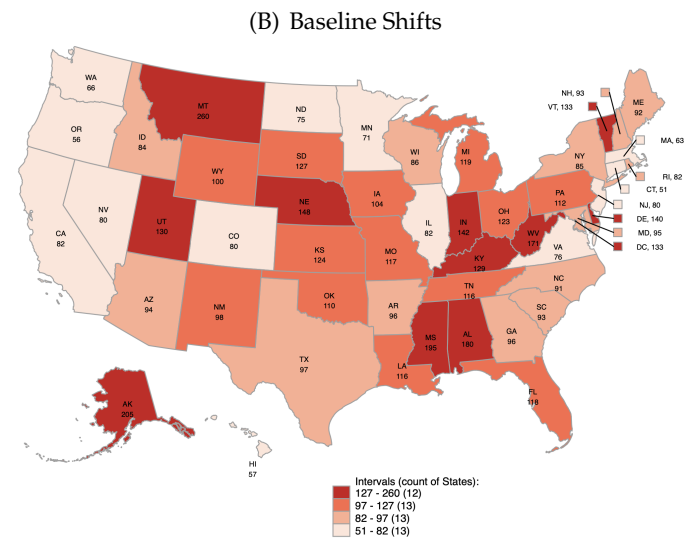
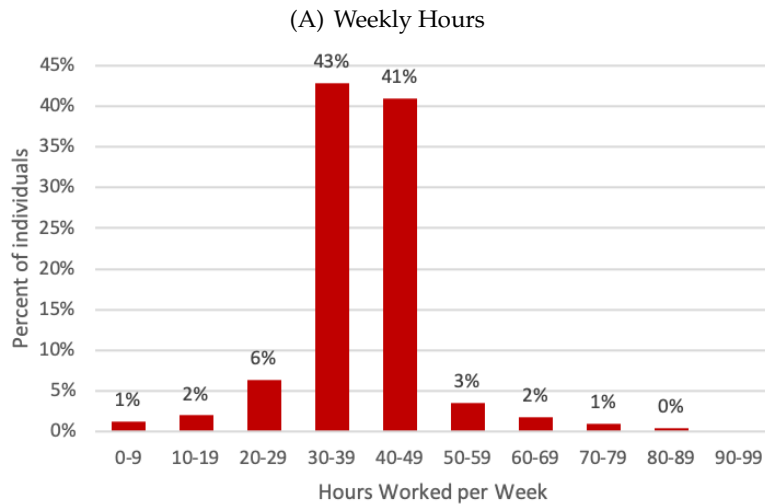
Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to registered nurses working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that registered nurses in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all registered nurses worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all registered nurses worked five shifts per week.

Figure A6: Licensed Practical and Vocational Nurses



Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to licensed practical and vocational nurses working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that licensed practical and vocational nurses in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all licensed practical and vocational nurses worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all licensed practical and vocational nurses worked five shifts per week.

Figure A7: Respiratory Therapists



Note: Based on authors' calculations using data from the 2015–2017 American Community Survey. Sample is limited to respiratory therapists working in hospitals or offices of physicians. Panel A shows the distribution of reported weekly hours worked. Panel B shows the number of shifts that respiratory therapists in each state currently work per week, per 100,000 population, where a shift is defined as 12 hours. Panel C shows the number of additional shifts that would be available per week per 100,000 population if all respiratory therapists worked five shifts (60 hours) per week. Panel D shows the sum of Panels B and C—the total number of shifts that would be available if all respiratory therapists worked five shifts per week.