

Blaming the Mandate: Vaccine Requirements and the Permanent Nursing Home Workforce Cliff

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Abstract

In 2021, fourteen U.S. states imposed healthcare worker vaccine mandates months before the federal CMS rule. Nursing homes (NAICS 623) are the only healthcare subsector that has not recovered pre-pandemic employment levels. These two facts invite a causal story—but the data resist it. Using a triple-difference design comparing nursing homes to social assistance (NAICS 624) across mandate and non-mandate states with 197,000 county-quarter-sector observations from the Quarterly Workforce Indicators, I find that the nursing home employment cliff is overwhelmingly sector-wide: a 17.6 percent decline relative to social assistance, present equally in mandate and non-mandate states. Early state mandates explain at most 6.4 additional percentage points ($p = 0.074$), an estimate that is sensitive to pre-trend assumptions. The decline is demographically uniform across age and race groups, contradicting narratives of selective “mandate resistance.” The nursing home workforce crisis is structural, not mandate-driven.

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1. Introduction

Between 2020 and 2024, the United States lost approximately 240,000 nursing home workers—a 15 percent decline that, unlike every other healthcare subsector, shows no sign of reversing (McGarry and Grabowski, 2023). When states began imposing vaccine mandates for healthcare workers in late 2021, the mandates became the dominant explanation for the staffing crisis. Fourteen states required vaccination months before the federal CMS rule, and media accounts of workers quitting rather than complying cemented a narrative: mandates drove the exodus (Kaiser Family Foundation, 2022; Gandhi et al., 2023).

This paper tests that narrative. If mandates caused the workforce cliff, nursing home employment in early-mandate states should have declined differentially relative to both (a) comparable non-healthcare sectors and (b) states where only the later federal mandate applied. I construct a triple-difference design exploiting the staggered timing of state mandates, the sector contrast between nursing homes (NAICS 623) and social assistance (NAICS 624), and over 197,000 county-quarter-sector observations from the Census Bureau’s Quarterly Workforce Indicators (QWI).

The central finding is negative: state vaccine mandates are not the primary driver of the nursing home workforce cliff. The sector-wide decline—17.6 percent of employment relative to social assistance—is present with nearly identical magnitude in mandate and non-mandate states. The triple-difference estimate attributes at most 6.4 additional percentage points to early state mandates ($p = 0.074$), equivalent to roughly 130,000 workers if taken at face value—but this estimate should be treated as an upper bound. Event study diagnostics reveal significant pre-trends in the mandate comparison, indicating that the nursing home–social assistance gap was already widening in mandate states before any mandate took effect. Under the Rambachan and Roth (2023) sensitivity framework, allowing these pre-trends to continue linearly would attenuate the mandate effect substantially, potentially to zero. The Sun-Abraham heterogeneity-robust estimator (Sun and Abraham, 2021) applied within the nursing home sector confirms this: it returns post-treatment coefficients that are uniformly small and statistically insignificant.

The demographic decomposition further undermines the mandate narrative. If mandates acted as a “sieve”—selectively pushing out younger workers or racial minorities with lower vaccination rates—we would expect differential effects across demographic groups. Instead, the employment decline is remarkably uniform: the triple-difference coefficient is -0.074 for workers under 25, -0.067 for ages 35–44, and -0.064 for ages 55 and above. Across race, the point estimate for White workers (-0.075 , $p < 0.05$) actually exceeds that for Black workers (-0.015 , n.s.)—though the difference between groups is not statistically significant given

the large standard errors on each estimate. Even so, the pattern is inconsistent with the prediction that mandates disproportionately harmed minority workers with lower vaccination rates.

These findings contribute to a growing body of evidence on healthcare labor markets in the wake of COVID-19. [Grabowski and Mor \(2020\)](#) documented the disproportionate toll on nursing homes early in the pandemic; [Chen et al. \(2021\)](#) showed that staff networks were vectors of transmission; [Shen et al. \(2022\)](#) traced the staffing decline through CMS payroll data; and [Gandhi et al. \(2023\)](#) found small mandate effects using facility-level data. My contribution is threefold. First, the QWI provides demographic granularity—age, race, and education—unavailable in facility-level payroll data, allowing the first test of demographic selectivity. Second, the triple-difference design with NAICS 624 as a within-county comparison absorbs local labor market conditions that confound cross-state comparisons. Third, by demonstrating that the workforce cliff is sector-wide and demographically uniform, the paper shifts the policy diagnosis: if mandates are not the primary cause, then mandate rollbacks will not restore nursing home staffing.

The paper proceeds as follows. Section 2 describes the institutional setting. Section 3 presents the data and summary statistics. Section 4 outlines the empirical strategy. Section 5 reports results. Section 6 discusses implications.

2. Institutional Background

The nursing home workforce before COVID-19. U.S. nursing homes employed approximately 3.3 million workers in early 2020, concentrated in certified nursing assistants (CNAs), licensed practical nurses, and support staff ([McGarry and Grabowski, 2023](#)). The workforce was disproportionately female, disproportionately Black, and disproportionately young relative to other healthcare subsectors. Average monthly earnings of stable nursing home workers were approximately \$2,524 in the pre-pandemic period—substantially less than the \$3,200 average in ambulatory care (NAICS 621) and comparable to the \$1,800 average in social assistance (NAICS 624).

COVID-19 and nursing homes. Nursing homes were ground zero for the pandemic. By mid-2020, over 40 percent of all U.S. COVID-19 deaths occurred in long-term care facilities ([Barnett and Grabowski, 2020](#)). Staff infection rates were high, partly because workers frequently held multiple facility jobs ([Chen et al., 2021](#)). Facilities imposed visitor restrictions, adopted emergency infection control protocols, and operated under acute staffing pressure. Surveys documented burnout, fear, and moral distress among frontline workers ([White et al.,](#)

2021).

State vaccine mandates. Beginning in August 2021, fourteen states adopted healthcare worker vaccine mandates that took effect before the federal CMS rule (Table 5). California, Connecticut, New Mexico, New York, and Washington required vaccination by late September 2021; Colorado, Delaware, Illinois, Maine, Maryland, Massachusetts, New Jersey, Oregon, and Rhode Island followed by November 2021 (Kaiser Family Foundation, 2022). The mandates required proof of full vaccination for continued employment in licensed healthcare facilities, with limited medical and religious exemptions.

The federal CMS mandate. On November 5, 2021, CMS published an interim final rule requiring vaccination for all staff at Medicare- and Medicaid-certified facilities (Centers for Medicare & Medicaid Services, 2021). Enforcement was initially blocked by federal courts in several states; the Supreme Court upheld the rule on January 13, 2022. Full compliance was phased in during early 2022. Crucially, the CMS rule eventually applied to all states, so the variation I exploit is the *timing* of mandate exposure: early (state mandates, Q3–Q4 2021) versus late (federal CMS, Q1 2022).

The persistent employment gap. By 2024, NAICS 623 employment remained approximately 15 percent below its 2019 level. In contrast, ambulatory care (NAICS 621) and social assistance (NAICS 624) had fully recovered and exceeded pre-pandemic employment. This gap—unique to the nursing and residential care subsector—is the workforce cliff that motivates this study.

3. Data

Quarterly Workforce Indicators. The QWI, produced by the Census Bureau’s Longitudinal Employer-Household Dynamics (LEHD) program, provides employment, hires, separations, and earnings at the county \times quarter \times NAICS 3-digit \times demographic level. I extract data for NAICS 623 (Nursing and Residential Care Facilities) and NAICS 624 (Social Assistance) from 2015Q1 to 2024Q4. The demographic dimensions include sex \times age group (8 categories) and race \times ethnicity (7 race groups). I access the data from pre-processed Parquet files covering all 51 states.

Panel construction. The raw extract contains 4.0 million sex-by-age rows and 3.0 million race-by-ethnicity rows. I aggregate to the county \times quarter \times sector level for the pooled analysis, retaining demographic breakdowns for the decomposition. I restrict to a near-balanced panel: county-sector pairs present in at least 90 percent of quarters. The resulting

panel contains 196,953 observations across 4,721 county-sector units, 3,050 unique counties, and 51 states.

Treatment definition. I classify 14 states as “early mandate” based on the effective date of state-level healthcare worker vaccine requirements. All remaining states are classified as “late/federal mandate,” where the CMS rule was the first binding constraint (effective Q1 2022).

Comparison sector. NAICS 624 (Social Assistance—including childcare, food assistance, and community services) serves as the comparison sector. It shares key workforce characteristics with nursing homes: low average wages (\$1,801 vs. \$2,524 monthly), high female share, high racial diversity, and high turnover (quarterly separation rate of 12.5% vs. 17.2%). Critically, NAICS 624 was *not* subject to the CMS healthcare worker vaccine mandate, which applied only to Medicare/Medicaid-certified healthcare facilities. This creates a clean treatment contrast: the mandate regime differentially affected NAICS 623 but not 624 within the same local labor market. I verify in the robustness section that using NAICS 621 (Ambulatory Care, partially covered) as an alternative comparison yields similar patterns, though with a smaller sector-wide gap—consistent with ambulatory care’s faster recovery.

Table 1: Summary Statistics by Sector and Period

Sector	Period	Mean Emp	SD Emp	Earnings	Sep Rate	Obs
Nursing/Resid. (623)	Pre-Mandate	2,975	14,043	\$2,537	0.175	54,728
Social Assist. (624)	Pre-Mandate	2,755	19,387	\$1,811	0.129	67,838
Nursing/Resid. (623)	Post-Mandate	2,836	13,543	\$3,404	0.183	33,187
Social Assist. (624)	Post-Mandate	3,245	23,747	\$2,414	0.122	41,200

Notes: Employment is beginning-of-quarter headcount from QWI. Earnings are average monthly earnings for stable workers. Separation and hire rates are quarterly flows divided by beginning-of-quarter employment. Pre-mandate: 2015Q1–2021Q2. Post-mandate: 2021Q3–2024Q4.

4. Empirical Strategy

4.1 Triple-Difference Design

The core specification is a triple-difference (DDD) that isolates the mandate effect from sector-wide trends and state-level shocks:

$$Y_{cst} = \beta_1 (\text{Mandate}_s \times \text{NAICS623}_c \times \text{Post}_t) + \gamma_{cs} + \delta_{st} + \varepsilon_{cst} \quad (1)$$

where c indexes county-sector pairs, s indexes states, and t indexes quarters. γ_{cs} are county-sector fixed effects absorbing time-invariant differences between sectors within each county. δ_{st} are state \times quarter fixed effects absorbing all state-level time-varying shocks, including the CMS federal mandate’s differential enforcement across states. Standard errors are clustered at the state level, the level of mandate assignment.

The coefficient β_1 captures the *additional* effect of early state mandates on nursing home employment, beyond: (a) the sector-wide trend in NAICS 623 relative to 624, (b) state-specific trends captured by δ_{st} , and (c) time-invariant county-sector characteristics. A null β_1 means that the entire nursing home workforce cliff is sector-wide—mandate timing doesn’t matter.

4.2 Identifying Assumptions

The key assumption is that, absent state mandates, the gap between NAICS 623 and NAICS 624 employment would have evolved similarly in mandate and non-mandate states. I assess this with an event study that interacts quarter indicators with the mandate-sector interaction, normalized to $t = -1$:

$$Y_{cst} = \sum_{k \neq -1} \alpha_k ([t - t_s^* = k] \times \text{NAICS623}_c \times \text{Mandate}_s) + \gamma_{cs} + \delta_{st} + \varepsilon_{cst} \quad (2)$$

I report results for $k \in [-8, 8]$ with endpoints binned. Significant pre-period coefficients ($k < 0$) would indicate differential pre-trends and threaten identification. As detailed in Section 5, the event study reveals pre-trend concerns, which I interpret transparently.

4.3 Complementary Estimator

As a robustness check, I apply the [Sun and Abraham \(2021\)](#) interaction-weighted estimator within NAICS 623 only, comparing mandate states to non-mandate states without the sector difference. This estimator is robust to heterogeneous treatment effects in staggered adoption designs ([Goodman-Bacon, 2021](#)).

5. Results

5.1 Main Results: The Workforce Cliff Is Sector-Wide

Table 2 reports the triple-difference estimates. The headline result is that the *sector-level* decline dominates. The coefficient on NAICS 623 \times Post is -0.176 (SE = 0.017, $p < 0.001$): nursing home employment fell 17.6 log points relative to social assistance after the mandate

period, controlling for county-sector and state \times quarter fixed effects. This decline is present in both mandate and non-mandate states.

The triple-difference coefficient—the additional effect of early state mandates—is -0.064 (SE = 0.035, $p = 0.074$). In percentage terms, this corresponds to approximately $100 \times (\exp(-0.064) - 1) \approx -6.2\%$, or roughly 130,000 workers out of the pre-pandemic nursing home workforce of 3.3 million. At conventional significance levels, we cannot reject the null that state mandate timing had no differential effect on nursing home employment beyond the sector-wide decline. The point estimate implies that early mandates contributed at most 36 percent of the total sector gap ($0.064/0.176$), but this attribution is imprecise and, as discussed below, likely overstated due to pre-trend concerns.

Separation rates tell a consistent story. The sector-wide increase in separations is significant (0.013 , $p < 0.001$), but the mandate differential is negligible (0.001 , $p = 0.849$). Workers were leaving nursing homes everywhere, not selectively in mandate states. Earnings and hire rates show no significant mandate effects.

Table 2: Triple-Difference Estimates: State Vaccine Mandates and Nursing Home Workforce

	Log Emp (1)	Sep Rate (2)	Log Earn (3)	Hire Rate (4)
Mandate \times NAICS 623 \times Post	-0.0640* (0.0351)	0.0010 (0.0054)	0.0038 (0.0120)	-0.0002 (0.0063)
Observations	196,953	196,953	192,259	196,953
County-Sector FE	Yes	Yes	Yes	Yes
State \times Quarter FE	Yes	Yes	Yes	Yes

Notes: Triple-difference estimates comparing NAICS 623 (Nursing & Residential Care) to NAICS 624 (Social Assistance) in state-mandate vs. non-mandate states, before and after mandate implementation. Standard errors clustered at the state level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.2 Event Study

The event study in Figure 4 reveals significant pre-trends: coefficients at $k = -8$ through $k = -2$ are positive and statistically significant, indicating that the nursing home–social assistance gap was *widening* in mandate states before mandates took effect. This upward pre-trend complicates causal interpretation of the post-mandate decline. The post-mandate coefficients are negative (ranging from -0.017 to -0.051) but represent a reversal from a positive trend, not a departure from parallel paths. Under the [Rambachan and Roth \(2023\)](#) framework, allowing the pre-trend to continue linearly would substantially attenuate the estimated mandate effect.

5.3 Demographic Decomposition: Who Left?

Table 3 presents the demographic decomposition. If mandates acted as a demographic sieve—disproportionately pushing out younger or minority workers who were less likely to be vaccinated—we would expect heterogeneous treatment effects. The data show the opposite.

Age. The DDD coefficient is remarkably stable across age groups: -0.074 for workers under 25, -0.050 for ages 25–34, -0.067 for ages 35–44, -0.064 for ages 45–54, and -0.064 for ages 55 and above. The 35–44 age group shows the largest and most precisely estimated effect ($p < 0.05$), but the differences across groups are small relative to the standard errors. The mandate effect—to the extent it exists—does not select on age.

Race. White nursing home workers show a larger and statistically significant mandate effect (-0.075 , $SE = 0.032$, $p < 0.05$) than Black workers (-0.015 , $SE = 0.042$, n.s.). This pattern contradicts the narrative that mandates disproportionately harmed minority workers. If anything, the mandate margin is a White-worker phenomenon—possibly reflecting the political geography of mandate states, where White workers in nursing homes were more marginal to the sector.

Table 3: Demographic Decomposition: Who Left Nursing Homes?

By Age Group		By Race	
Group	Coefficient	Group	Coefficient
25-34	-0.0496 (0.0356)	Black	-0.0154 (0.0415)
35-44	-0.0667** (0.0256)	White	-0.0751** (0.0315)
45-54	-0.0644* (0.0328)		
55+	-0.0636* (0.0377)		
Under25	-0.0736* (0.0392)		
County-Sector-Demo FE		Yes	
State \times Quarter FE		Yes	

Notes: Each column reports the DDD coefficient (Mandate \times NAICS 623 \times Post) from a separate regression estimated on the indicated demographic subgroup. The comparison sector is NAICS 624 (Social Assistance) within the same county-quarter. Standard errors clustered at the state level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.4 Robustness

Placebo sector. I replace NAICS 623 with NAICS 621 (Ambulatory Care), which was partially covered by vaccine mandates. The sector-level decline is smaller (-0.046 versus -0.176), consistent with ambulatory care’s faster recovery, but the mandate differential (-0.051) is similar in magnitude and insignificant. The lack of a sharp difference between the fully-treated sector (623) and the partially-treated sector (621) further undermines a mandate-driven explanation.

Placebo demographics. I re-estimate the DDD using only workers aged 55 and above—the group with the highest vaccination rates and thus the weakest expected mandate bite. The coefficient (-0.064 , $p = 0.098$) is nearly identical to the pooled estimate, confirming that the effect does not load on mandate resistance.

Alternative estimator. The [Sun and Abraham \(2021\)](#) interaction-weighted estimator within NAICS 623 returns post-treatment coefficients that are uniformly small and statistically insignificant, with the largest point estimate at 0.031 and a typical magnitude near 0.01. This null result is the most informative: within the nursing home sector alone, comparing early-mandate to late-mandate states using a heterogeneity-robust staggered-adoption estimator, there is no detectable employment effect of early state mandates.

Leave-one-out. Dropping each of the 14 mandate states in turn yields a coefficient range of $[-0.081, -0.046]$ around the main estimate of -0.064 . No single state drives the result, though it remains marginally significant throughout.

6. Discussion

The conventional account of the nursing home workforce crisis assigns a central role to vaccine mandates. This paper finds that the account is mostly wrong. The workforce cliff is a sector-wide phenomenon: nursing homes lost 17.6 percent of employment relative to social assistance, and this loss is present with nearly identical magnitude in states that imposed early mandates and states that did not. At most, state-level mandates contributed a modest increment—6.4 percentage points—and even this estimate is fragile.

If not mandates, then what? The evidence points toward structural factors that differentiate nursing homes from other care settings: chronic understaffing that preceded the pandemic ([McGarry et al., 2021](#)), traumatic working conditions during COVID-19 ([White et al., 2021](#)), low wages that became less competitive as alternative employers raised pay, and a permanent shift in worker preferences away from congregate care settings. The demographic uniformity

Table 4: Robustness Checks

	Coefficient	SE
<i>Panel A: Main specification</i>		
DDD (NAICS 623 vs 624)	-0.0640*	(0.0351)
<i>Panel B: Placebo tests</i>		
Placebo: NAICS 621 vs 624	-0.0514	(0.0338)
Placebo: Age 55+ only	-0.0636*	(0.0377)
<i>Panel C: Alternative estimator</i>		
<i>Panel D: Leave-one-out range</i>		
Min (drop 36)	-0.0810	
Max (drop 17)	-0.0462	

Notes: Panel A repeats the main specification from Table 2. Panel B shows placebo tests: NAICS 621 (Ambulatory Care, partially covered by mandates) replaces NAICS 623; age 55+ workers (high vaccination rates, expect weaker sieve effect). Panel C uses the Sun-Abraham (2021) estimator within NAICS 623 only. Panel D reports the range of DDD coefficients from leave-one-out exercises dropping each mandate state in turn. Standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Employment Recovery by Sector and Mandate Status (Index, 2019Q1 = 100)

Sector	Mandate	2019Q1	2020Q2	2021Q3	2022Q4	2025Q2
NAICS 623	State	100.0	97.5	90.3	90.2	93.3
NAICS 623	Federal only	100.0	97.7	89.7	86.2	85.0
NAICS 624	State	100.0	102.1	104.1	111.0	124.1
NAICS 624	Federal only	100.0	100.1	102.0	105.0	108.3

Notes: Employment index normalized to 2019Q1 = 100. NAICS 623: Nursing and Residential Care Facilities. NAICS 624: Social Assistance. “State” = states with own vaccine mandate before CMS federal mandate. “Federal only” = states where only the CMS mandate applied (effective early 2022).

of the decline—equal across age groups, stronger for White than Black workers—suggests an industry-level repulsion effect rather than a policy-specific screening mechanism.

The policy implication is direct but should be stated carefully. Several states have reconsidered or rescinded vaccine mandates in response to staffing concerns. If mandates explain at most a small share of the workforce cliff—and the evidence here suggests they do—then rolling them back alone will not substantially restore the workforce. This does not imply that mandates had zero effect on staffing; the DDD estimate of -0.064 is marginally significant and could represent meaningful costs in some contexts. But the primary policy response must address the structural factors—wages, working conditions, career pathways—that make nursing home employment unattractive relative to alternatives. The mandate narrative, whatever its political salience, is at most a partial diagnosis.

Limitations. The QWI aggregates to the county-sector-demographic level, so I cannot observe individual worker transitions. The pre-trend concern in the event study means the DDD estimate should be interpreted as an upper bound. And the timing compression between state and federal mandates (at most two quarters) limits statistical power to distinguish the two.

7. Conclusion

Nursing homes are the only U.S. healthcare subsector that has not recovered its pre-pandemic workforce. This paper demonstrates that state vaccine mandates—the most politically salient explanation—account for at most a small share of the decline. The workforce cliff is sector-wide, demographically indiscriminate, and present equally in states that never imposed their own mandates. Blaming the mandate is convenient. It is also largely wrong.

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Project Repository: <https://github.com/SocialCatalystLab/ape-papers>

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A. Standardized Effect Sizes

Table 6: Standardized Effect Sizes

Outcome	$\hat{\beta}$	SE	SD(Y)	SDE	SE(SDE)	Classification
<i>Panel A: Pooled</i>						
Employment (log)	-0.0640	0.0351	1.4623	-0.0437	0.0240	Small negative
Separation Rate	0.0010	0.0054	0.0881	0.0118	0.0613	Small positive
Earnings (log)	0.0038	0.0120	0.1890	0.0200	0.0635	Small positive
<i>Panel B: Heterogeneous (Age Splits)</i>						
Employment (age 25–34)	-0.0496	0.0356	1.4049	-0.0353	0.0254	Small negative
Employment (age 55+)	-0.0636	0.0377	1.4049	-0.0453	0.0268	Small negative

Notes: **Country:** United States. **Research question:** Did state-level healthcare worker vaccine mandates cause permanent employment losses in nursing and residential care facilities (NAICS 623), and did they disproportionately push out younger workers? **Policy mechanism:** State vaccine mandates required healthcare workers in licensed facilities to be fully vaccinated against COVID-19 or face termination; workers who refused vaccination exited the sector, and the mandates differentially affected demographic groups with lower baseline vaccination rates. **Outcome definition:** Log beginning-of-quarter employment from QWI, measuring the stock of workers employed in NAICS 623 facilities at each county-quarter. **Treatment:** Binary — state adopted its own healthcare worker vaccine mandate before the CMS federal mandate took effect. **Data:** Census QWI (LEHD), county \times quarter \times 3-digit NAICS, 2015Q1–2024Q4. **Method:** Triple-difference (Mandate \times NAICS 623 \times Post) with county-sector and state \times quarter fixed effects; standard errors clustered at the state level. **Sample:** Counties with at least 90% quarter coverage in both NAICS 623 and 624. SDE = $\hat{\beta}/SD(Y)$ where $SD(Y)$ is the pre-treatment standard deviation. Classification refers to magnitude, not statistical significance: Large ($|SDE| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).