

# University of Minnesota COVID-19 Health Insurance Model (MN-HIM)

## Modeling Approach

The University of Minnesota COVID-19 Health Insurance Model (MN-HIM) estimates the number of people at who lost employer-sponsored health insurance (ESI) during the four-week period ending on April 11, 2020. In developing this model we aimed to create both national and state-level estimates as well as provide a further breakdown between policyholders (age 18-64) and their dependents (adults and children).

To produce both sets of estimates and the accompanying breakdowns, we took the following steps:

1. Estimate the number of people who lost their jobs in the four weeks ending on April 11, 2020, by state and by industry.
2. Estimate the Census region- and industry-specific likelihood that an employee was an ESI policyholder.
3. Estimate the Census region- and industry-specific average number of dependents covered by a policyholder's ESI.
4. Combine the information from steps 1-3 to compute national and state-level estimates of ESI losses.

Our approach relied on the variation in ESI coverage rates across industries and across states to in order to derive estimates for the model. The modeling steps are described below in more detail.

## 1. Estimate the number of people who lost their jobs in the four weeks ending on April 11, 2020, by state and by industry.

We used the number of initial Unemployment Insurance (UI) claims as a proxy for job losses. However, as complete state-by-state data on the number of UI claims by state and industry do not currently exist, our approach to estimating these numbers took the following steps.

**Step 1.** As a baseline for the number of people employed in each industry and in each state as of February 2020, we used the data from Table 4 of the [Bureau of Labor Statistics \(BLS\) March 2020 State Employment and Unemployment](#) report. This report uses 11 NAICS industry categories: Mining and natural resources (NAICS codes 11, 21); Construction (NAICS 23); Manufacturing (NAICS 31-33); Trade; Transportation and utilities (NAICS 22, 42, 44-45, 48-49); Information (NAICS 51); Financial activities (NAICS 52, 53); Professional and business services (NAICS 54, 55, 56); Education and health services (NAICS 61, 62); Leisure and hospitality (NAICS 71, 72); Other services (except public administration) (NAICS 81); and Public administration (NAICS 92). We used each of these 11 industry categories for all of our modeling.

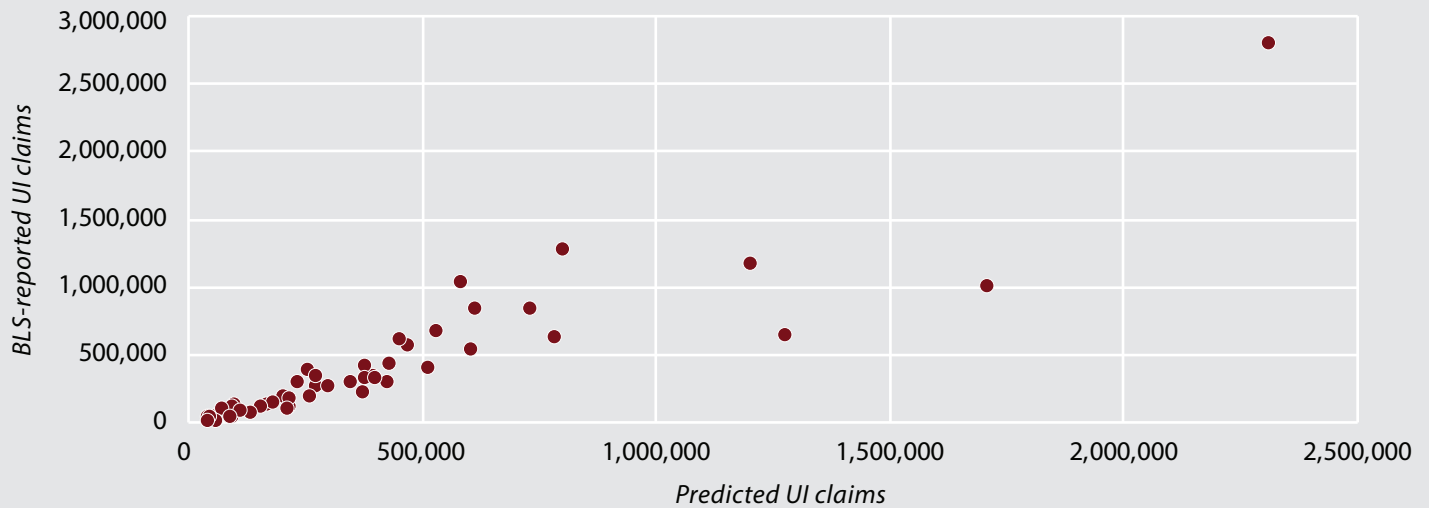
In order to then estimate the percent of employees who lost their jobs in each state and industry, we utilized state-specific, publicly reported data on industry-specific initial UI claims.

**Step 2.** We collected data on initial UI claims for the four weeks ending on April 11, 2020, from the 11 states that report this information publicly: [Iowa](#), [Kansas](#), [Massachusetts](#), [Michigan](#), [Nebraska](#), [Nevada](#), [New York](#), [North Dakota](#), [Oregon](#), [Texas](#), and [Washington](#). The total number of UI claims during the four week period in these 11 states totals over 5.4 million, accounting for over 25% of UI claims made nationally for the same period.

For each state where the sum of industry UI claims within that state deviated from that state's overall UI claims, or where the state data included an "unknown" industry category, we allocated the deviation and/or "unknown" industry UI claims across the state's industry categories proportionally across each industry's employment share within the state. We then summed the overall number of UI claims by industry across those states and divided it by the total number of people employed in each industry in February 2020 across those states to obtain an industry-specific estimate of the percent of employees per industry who applied for UI. This proportion was multiplied by the number of people employed in each industry and state in February 2020 to obtain a predicted number of UI claims by state and by industry. Summing the predicted number of UI claims across states and industries yielded a national estimate of 19.7 million UI claims in the four-week period ending on April 11, 2020, which is a close approximation of the 20.2 million claims reported by the BLS (not seasonally adjusted).

To examine the accuracy of our predicted number of UI claims, we compared our state estimates of the number of UI claims to the [BLS-reported UI claims by state](#) (Figure 1). We found that our estimates correlated reasonably well with the official BLS measure of UI claims by state.

**Figure 1. Comparing predicted and actual state UI claims**



For our model estimates of UI claims per industry at the state level, we used the actual state-level information for the 11 states that reported it. For the states that did not report industry-specific UI claims data, we imputed industry-specific UI claim estimates using our predicted number of UI claims per industry.

## 2. Estimate the Census region- and industry-specific likelihood that an employee was an ESI policyholder.

**Step 1.** To estimate the likelihood that an employee was an ESI policyholder, we first determined the proportion of workers with ESI coverage by industry using estimates of the percent of adult, nonelderly, civilian noninstitutionalized workers (age 18-64) who reported having ESI coverage using data from the 2019 Current Population Survey Annual Social and Economic Supplement (CPS ASEC). ESI coverage was defined for this model as “reporting having any type of employment-based coverage last year, excluding infants born after the calendar year.” (These infant respondents were included in the survey, but were not alive in the previous calendar year and thus were not eligible to have employer-sponsored coverage in that calendar year). Employment was defined as “current employment at the time of interview,” and industry was defined by using the 2-digit CPS recode of major groups for the current job, using the same industry categories listed above.

We limited this analysis to those age 18-64 since it is rare for workers under age 18 to have their own employer-sponsored insurance coverage and because most workers age 65 and older are covered under Medicare. We created these estimates by industry to account for the variation in rates of ESI coverage (again by industry) and rolled detailed industry categories up into broader categories to align with the industry categories as reported in BLS employment statistics and UI claims.

**Step 2.** Next, we estimated the percent of adult, nonelderly, civilian noninstitutionalized ESI-covered workers who were likely policyholders (i.e., held their own ESI policy) versus dependents (i.e., were covered under another’s ESI policy). We defined dependents for this model as “those who reported having employment-based coverage through either someone else in their household or someone else outside their household in the last year” (again, excluding infants not alive in the previous calendar year). We defined policyholders as “those who reported being the policyholder for their employment-based coverage.”

We grouped employed, nonelderly adult dependents into an industry using one of two methods, depending on whether there was at least one employed, nonelderly adult policyholder in the household. The household was defined using [SHADAC’s Health Insurance Unit \(HIU\)](#), which logically groups respondents based on who is likely considered a “family unit” in determining eligibility for either public or private coverage. We assigned dependents to an industry based on the reported industry categorization of

the policyholder in their HIU. **Method 1:** if the dependent was in the same household with one or more employed, nonelderly adult policyholder(s), we assigned them to the industry of that policyholder; in cases where multiple of these policyholders existed in the household, we assigned dependents to the policyholder industry with the higher NAICS code. **Method 2:** for employed, nonelderly adult dependents not in a household with an employed, nonelderly adult policyholder, we distributed these dependents to an industry category based on the distribution across industry categories estimated by Method 1.

We produced estimates of the percent of adult, nonelderly, civilian noninstitutionalized ESI-covered workers who were likely policyholders vs. dependents by the same industry groupings as in the previous step of the analysis. We also produced all of the above calculations separately by Census region to allow for regional variation in ESI coverage by industry while avoiding imprecise estimates that could arise from looking at more finite geographic areas. All estimates were produced using Stata (v16) to account for the complex sample design of the CPS.

### 3. Estimate the Census region- and industry-specific average number of dependents covered by a policyholder's ESI.

**Step 1.** To estimate the total number of dependents covered by each ESI policy we used the following criteria: dependents were defined as “nonelderly individuals who reported having ESI coverage, who did not report being ESI policyholders, and who were in the same household as an employed, non-elderly adult ESI policyholder” (as defined previously). In cases where there were multiple policyholders in the HIU, any dependents were assigned to the industry of the policyholder with the higher NAICS industry code. In cases where there was no policyholder in their HIU, we distributed these individuals across industry categories using the estimated industry distribution of those nonelderly dependents with an employed, nonelderly adult policyholder in the household (as described previously). We then estimated the total number of dependents by industry.

**Step 2.** The dependent per policyholder estimate was calculated by dividing the total number of dependents by the number of policyholders.

**FIGURE 2. Nonelderly Adult (18-64) Workers with ESI, 2018**

Industry of the Policyholder	Percent with ESI	Dependents per policyholder
Mining & natural resources	57.1	1.09
Construction	56.7	1.06
Manufacturing	83.5	0.98
Trade, transportation, utilities	68.6	0.86
Information	83.7	1.02
Financial activities	82.1	1.02
Professional & business services	72.9	0.97
Education & health services	79.5	1.01
Leisure & hospitality	44.7	0.69
Other services (except public admin)	51.0	0.92
Public administration	88.8	1.19
<b>Total</b>	<b>72.1</b>	<b>0.97</b>

The estimates described above were created using the 2019 CPS ASEC. We produced all of the above calculations separately by Census region to allow for regional variation in the average number of dependents per ESI policyholder by industry while avoiding imprecise estimates that could arise from looking at finer geographic areas. All estimates were produced using Stata (v16) to account for the complex sample design of the CPS.

### 4. Combine the information from steps 1-3 to compute national and state-level estimates of ESI losses.