

Appendix

We identified essential workers using the 2019 American Community Survey (ACS) in which employed individuals report their main occupation. Their occupation is then classified according to the Bureau of Labor Statistics Standard Occupational Classification (SOC) codes.

(<https://www.bls.gov/soc/>) SOC codes are hierarchical; they can have three, four, five or six digits with more digits corresponding to more detailed classifications. For example, a code starting with 29-1 represents the very broad category “Healthcare Diagnosing or Treating Practitioners”. Nested under this category is the title “Therapist” (29-112), a five-digit code, and more detailed six-digit classifications such as 29-1122, “occupational therapist” and 29-1127, “speech-language pathologist”.

Our primary method for identifying which SOC codes described essential workers was via a list of six-digit SOC codes compiled by the Department of Homeland Security’s Labor Market Information (LMI) Institute and the Council for Community and Economic Research (C2ER) (<https://www.lmiontheweb.org/more-than-half-of-u-s-workers-in-critical-occupations-in-the-fight-against-covid-19>). This list was modified by Leah Zallman to exclude SOC codes that start with an 11 (Management Positions) because many such persons can work from home, and to include some additional health, agricultural and food service SOC codes. A list of SOC codes considered essential occupations appears below.

This list of essential six-digit SOC codes was then matched to the SOC codes assigned in the ACS. In the ACS, among adults who reported an occupation, 71% were assigned a six-digit code and 29% reported three- four- or five-digit codes which were not on the list provided by LMI and C2ER.

To tabulate all essential workers we used the imputation method of McCormack et al (<https://pubmed.ncbi.nlm.nih.gov/32556217/>). For those three, four- or five-digit codes which had six-digit codes nested beneath them which were all designated essential or all designated non-essential, we assigned these three- four- or five- digit codes the corresponding status (i.e. essential or non-essential). This was the case for 27% of adults who reported an occupation, leaving 2% of all employed adults with indeterminate essential worker status. For the remaining five-digit codes that had a mix of essential and non-essential six-digit codes nested under them, we used the imputation method described in McCormack et al (<https://pubmed.ncbi.nlm.nih.gov/32556217/>). These workers (representing about 1% of all workers) are included in the total number of essential workers and of immigrant essential workers shown in Exhibit 1. However, they were not included in the remaining exhibits since we are unable to fully identify individual persons and specify their demographic characteristics.

Finally, about 25,000 respondents (about 1% of the adult workers in ACS) reported an occupation for which we were unable to impute a status of essential vs. non-essential since their occupation was assigned a 3- or -4 digit code that was ambiguous as to its essential status, and insufficient information was available on the codes nested beneath it to allow imputation.

List of Essential SOC Codes

SOC Code	Description
13-1021	Buyers and Purchasing Agents, Farm Products
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products
13-1041	Compliance Officers
13-1081	Logisticians
13-2031	Budget Analysts
13-2041	Credit Analysts
13-2053	Insurance Underwriters
13-2061	Financial Examiners
15-1211	Computer Systems Analysts
15-1212	Information Security Analysts
15-1241	Computer Network Architects
15-1244	Network and Computer Systems Administrators
15-1251	Computer Programmers
15-1252	Software Developers
15-1254	Web Developers
15-1299	Computer Occupations, All Other
17-2011	Aerospace Engineers
17-2031	Bioengineers and Biomedical Engineers
17-2041	Chemical Engineers
17-2051	Civil Engineers
17-2061	Computer Hardware Engineers
17-2081	Environmental Engineers
17-2121	Marine Engineers and Naval Architects
17-2131	Materials Engineers
17-2141	Mechanical Engineers
17-2171	Petroleum Engineers
17-2199	Engineers, All Other
17-3023	Electrical and Electronic Engineering Technologists and Technicians
19-2021	Atmospheric and Space Scientists
19-3033	Clinical and Counseling Psychologists
19-3034	School Psychologists
19-4021	Biological Technicians
19-4031	Chemical Technicians
21-1011	Substance Abuse and Behavioral Disorder Counselors
21-1014	Mental Health Counselors
21-1021	Child, Family, and School Social Workers
21-1022	Healthcare Social Workers
21-1023	Mental Health and Substance Abuse Social Workers
21-1029	Social Workers, All Other
21-1093	Social and Human Service Assistants
25-4022	Librarians and Media Collections Specialists
25-4031	Library Technicians
27-2012	Producers and Directors
27-3011	Broadcast Announcers and Radio Disc Jockeys
27-3023	News Analysts, Reporters, and Journalists
29-1031	Dietitians and Nutritionists
29-1051	Pharmacists
29-1071	Physician Assistants

29-1122	Occupational Therapists
29-1123	Physical Therapists
29-1124	Radiation Therapists
29-1126	Respiratory Therapists
29-1127	Speech-Language Pathologists
29-1129	Therapists, All Other
29-1131	Veterinarians
29-1141	Registered Nurses
29-1151	Nurse Anesthetists
29-1171	Nurse Practitioners
29-1292	Dental Hygienists
29-1299	Healthcare Diagnosing or Treating Practitioners, All Other
29-2031	Cardiovascular Technologists and Technicians
29-2032	Diagnostic Medical Sonographers
29-2034	Radiologic Technologists and Technicians
29-2035	Magnetic Resonance Imaging Technologists
29-2042	Emergency Medical Technicians
29-2043	Paramedics
29-2052	Pharmacy Technicians
29-2053	Psychiatric Technicians
29-2055	Surgical Technologists
29-2056	Veterinary Technologists and Technicians
29-2061	Licensed Practical and Licensed Vocational Nurses
29-2072	Medical Records Specialists
31-1121	Home Health Aides
31-1122	Personal Care Aides
31-1131	Nursing Assistants
31-9091	Dental Assistants
31-9092	Medical Assistants
31-9095	Pharmacy Aides
31-9096	Veterinary Assistants and Laboratory Animal Caretakers
31-9097	Phlebotomists
33-1011	First-Line Supervisors of Correctional Officers
33-1012	First-Line Supervisors of Police and Detectives
33-1021	First-Line Supervisors of Firefighting and Prevention Workers
33-1091	First-Line Supervisors of Security Workers
33-2011	Firefighters
33-3012	Correctional Officers and Jailers
33-3021	Detectives and Criminal Investigators
33-9093	Transportation Security Screeners
35-1011	Chefs and Head Cooks
35-1012	First-Line Supervisors of Food Preparation and Serving Workers
35-2021	Food Preparation Workers
35-3023	Fast Food and Counter Workers
35-3041	Food Servers, Nonrestaurant
35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers
35-9021	Dishwashers
35-9031	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop
35-9099	Food Preparation and Serving Related Workers, All Other
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers

37-2012	Maids and Housekeeping Cleaners
37-2021	Pest Control Workers
37-3013	Tree Trimmers and Pruners
39-4031	Morticians, Undertakers, and Funeral Arrangers
41-1011	First-Line Supervisors of Retail Sales Workers
41-3031	Securities, Commodities, and Financial Services Sales Agents
43-1011	First-Line Supervisors of Office and Administrative Support Workers
43-2011	Switchboard Operators, Including Answering Service
43-2099	Communications Equipment Operators, All Other
43-3011	Bill and Account Collectors
43-3021	Billing and Posting Clerks
43-3031	Bookkeeping, Accounting, and Auditing Clerks
43-3061	Procurement Clerks
43-3071	Tellers
43-3099	Financial Clerks, All Other
43-4041	Credit Authorizers, Checkers, and Clerks
43-4051	Customer Service Representatives
43-4061	Eligibility Interviewers, Government Programs
43-4131	Loan Interviewers and Clerks
43-4141	New Accounts Clerks
43-4151	Order Clerks
43-4161	Human Resources Assistants, Except Payroll and Timekeeping
43-4199	Information and Record Clerks, All Other
43-5011	Cargo and Freight Agents
43-5021	Couriers and Messengers
43-5031	Public Safety Telecommunicators
43-5032	Dispatchers, Except Police, Fire, and Ambulance
43-5041	Meter Readers, Utilities
43-5051	Postal Service Clerks
43-5052	Postal Service Mail Carriers
43-5053	Postal Service Mail Sorters, Processors, and Processing Machine Operators
43-5061	Production, Planning, and Expediting Clerks
43-5071	Shipping, Receiving, and Inventory Clerks
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping
43-6013	Medical Secretaries and Administrative Assistants
43-9021	Data Entry Keyers
43-9041	Insurance Claims and Policy Processing Clerks
43-9061	Office Clerks, General
43-9199	Office and Administrative Support Workers, All Other
45-1011	First-Line Supervisors of Farming, Fishing, and Forestry Workers
45-2011	Agricultural Inspectors
45-2041	Graders and Sorters, Agricultural Products
45-3031	Fishing and Hunting Workers
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers
47-2031	Carpenters
47-2061	Construction Laborers
47-2111	Electricians
47-2151	Pipelayers
47-2152	Plumbers, Pipefitters, and Steamfitters
47-4011	Construction and Building Inspectors

47-4041	Hazardous Materials Removal Workers
47-4051	Highway Maintenance Workers
47-4061	Rail-Track Laying and Maintenance Equipment Operators
47-5023	Earth Drillers, Except Oil and Gas
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers
49-2011	Computer, Automated Teller, and Office Machine Repairers
49-2091	Avionics Technicians
49-2092	Electric Motor, Power Tool, and Related Repairers
49-2097	Audiovisual Equipment Installers and Repairers
49-3011	Aircraft Mechanics and Service Technicians
49-3021	Automotive Body and Related Repairers
49-3022	Automotive Glass Installers and Repairers
49-3023	Automotive Service Technicians and Mechanics
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
49-9031	Home Appliance Repairers
49-9043	Maintenance Workers, Machinery
49-9051	Electrical Power-Line Installers and Repairers
49-9052	Telecommunications Line Installers and Repairers
49-9071	Maintenance and Repair Workers, General
51-1011	First-Line Supervisors of Production and Operating Workers
51-2031	Engine and Other Machine Assemblers
51-2041	Structural Metal Fabricators and Fitters
51-3011	Bakers
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders
51-3092	Food Batchmakers
51-3093	Food Cooking Machine Operators and Tenders
51-3099	Food Processing Workers, All Other
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4041	Machinists
51-4111	Tool and Die Makers
51-6011	Laundry and Dry-Cleaning Workers
51-6031	Sewing Machine Operators
51-8021	Stationary Engineers and Boiler Operators
51-8031	Water and Wastewater Treatment Plant and System Operators
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers
51-9111	Packaging and Filling Machine Operators and Tenders
51-9191	Adhesive Bonding Machine Operators and Tenders
51-9194	Etchers and Engravers
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic
51-9196	Paper Goods Machine Setters, Operators, and Tenders
51-9197	Tire Builders
51-9198	Helpers--Production Workers
53-3052	Bus Drivers, Transit and Intercity
53-4031	Railroad Conductors and Yardmasters
53-5011	Sailors and Marine Oilers
53-6051	Transportation Inspectors

53-7021	Crane and Tower Operators
53-7051	Industrial Truck and Tractor Operators
53-7061	Cleaners of Vehicles and Equipment
53-7062	Laborers and Freight, Stock, and Material Movers, Hand
53-7063	Machine Feeders and Offbearers
53-7064	Packers and Packagers, Hand
53-7065	Stockers and Order Fillers
53-7081	Refuse and Recyclable Material Collectors

Appendix Exhibit A1 – Characteristics and Service Use of Immigrant Essential Workers and Their Household Members Living in Arizona Who Were at Risk of Immigration Sanctions Due to the Public Charge Rule, 2019

Characteristic/Service Use	Immigrant Essential Workers (Unweighted N=3,218)	Immigrant Essential Workers at Risk of Sanctions (Non-citizens or in Mixed Status Households) (Unweighted N=1,951)	Household Members of Immigrant Essential Workers at Risk of Sanctions* (Unweighted N=3,374)	Total of Immigrant Workers and Their Household Members at Risk of Sanctions (Unweighted N=5,325)
Total State Wide	420,711	279,525	501,501	781,026
<i>Age group</i>				
Less than 18	n/a	n/a	244,090	244,090
18 to 64	393,986	266,809	236,772	503,581
> 65	26,725	12,716	20,639	33,355
<i>Sex</i>				
Male	221,064	152,756	250,087	402,843
Female	199,647	126,769	251,414	378,183
<i>Race/Ethnicity</i>				
Asian/Pacific Islander	69,752	39,554	44,455	84,009
Black/African American	18,077	9,682	12,489	22,171
Hispanic	270,319	201,316	391,050	592,366
White	56,647	25,813	43,050	68,863
Another race**	5,916	3,160	10,457	13,617
<i>Insurance</i>				
Medicaid	58,801	44,012	186,760	230,772
Medicare	28,602	13,440	26,769	40,209
Private	221,837	125,260	173,979	299,239
VA	249	189	698	887
Uninsured***	111,222	96,624	113,295	209,919
<i>Food Stamp Recipient</i>	54,697	42,974	107,291	150,265
<i>Welfare Recipient****</i>	3,120	1,918	3,543	5,461
<i>Primary Language at Home</i>				
English	62,902	32,250	74,500	106,750
Spanish	252,896	189,118	317,643	506,761
Other	104,913	58,157	51,725	109,882
<i>Family income relative to poverty</i>				
< 201% FPL	144,391	111,428	249,135	360,563
201-400% FPL	157,136	110,488	177,176	287,664
>400% FPL	115,782	54,725	73,586	128,311
<i>Citizenship</i>				
US born	n/a	n/a	346,565	346,565
Naturalized citizen	181,351	40,165	27,552	67,717
Non-citizen	239,360	239,360	127,384	366,744

Source: Authors' analysis of 2019 American Community Survey

Notes:

* All household members of immigrant essential workers who were at risk for sanctions were also considered to be at risk for sanctions.

** Includes Native American/Alaskan Native, more than one race and "other" identified races.

*** Includes persons covered only by the Indian Health Service.

**** Welfare recipient asked only for persons age 15 and above

SNAP = Supplemental Nutrition Assistance Program

FPL = Federal poverty level.

Immigrant essential workers = non-citizens and naturalized US citizens employed in essential jobs.

Appendix Exhibit A2 – Characteristics and Service Use of Immigrant Essential Workers and Their Household Members Living in California Who Were at Risk of Immigration Sanctions Due to the Public Charge Rule, 2019

Characteristic/Service Use	Immigrant Essential Workers (Unweighted N=42,036)	Immigrant Essential Workers at Risk of Sanctions (Non-citizens or in Mixed Status Households) (Unweighted N=24,065)	Household Members of Immigrant Essential Workers at Risk of Sanctions* (Unweighted N=39,695)	Total of Immigrant Workers and Their Household Members at Risk of Sanctions (Unweighted N=63,760)
Total State Wide	4,652,612	2,901,571	4,957,153	7,858,724
<i>Age group</i>				
Less than 18	n/a	n/a	2,234,761	2,234,761
18 to 64	4,295,564	2,769,653	2,391,402	5,161,055
> 65	357,048	131,918	330,990	462,908
<i>Sex</i>				
Male	2,500,120	1,650,376	2,356,689	4,007,065
Female	2,152,492	1,251,195	2,600,464	3,851,659
<i>Race/Ethnicity</i>				
Asian/Pacific Islander	1,506,564	726,257	896,280	1,622,537
Black/African American	80,697	36,854	69,762	106,616
Hispanic	2,570,631	1,920,866	3,557,477	5,478,343
White	435,512	190,632	354,878	545,510
Another race**	1,967	26,962	78,756	105,718
<i>Insurance</i>				
Medicaid	846,199	642,911	2,148,131	2,791,042
Medicare	343,182	129,997	360,632	490,629
Private	2,675,672	1,441,089	1,842,263	3,283,352
VA	3,273	1,814	2,723	4,537
Uninsured***	784,286	685,760	603,404	1,289,164
<i>Food Stamp Recipient</i>	477,683	360,058	899,759	1,259,817
<i>Welfare Recipient****</i>	39,858	26,753	41,274	68,027
<i>Primary Language at Home</i>				
English	421,668	178,778	616,939	795,717
Spanish	2,473,755	1,868,835	2,892,870	4,761,705
Other	1,757,189	853,958	844,673	1,698,631
<i>Family income relative to poverty</i>				
< 201% FPL	1,281,038	1,002,054	2,125,770	3,127,824
201-400% FPL	1,509,977	1,019,642	1,685,764	2,705,406
>400% FPL	1,838,981	864,557	1,136,798	2,001,355
<i>Citizenship</i>				
US born	n/a	n/a	3,201,630	3,201,630
Naturalized citizen	2,364,591	613,550	427,099	1,040,649
Non-citizen	2,288,021	2,288,021	1,328,035	3,616,056

Source: Authors' analysis of 2019 American Community Survey

Notes:

* All household members of immigrant essential workers who were at risk for sanctions were also considered to be at risk for sanctions.

** Includes Native American/Alaskan Native, more than one race and "other" identified races.

*** Includes persons covered only by the Indian Health Service.

**** Welfare recipient asked only for persons age 15 and above

SNAP = Supplemental Nutrition Assistance Program

FPL = Federal poverty level.

Immigrant essential workers = non-citizens and naturalized US citizens employed in essential jobs.

Appendix Exhibit A3 – Characteristics and Service Use of Immigrant Essential Workers and Their Household Members Living in New Mexico Who Were at Risk of Immigration Sanctions Due to the Public Charge Rule, 2019

Characteristic/Service Use	Immigrant Essential Workers (Unweighted N=663)	Immigrant Essential Workers at Risk of Sanctions (Non-citizens or in Mixed Status Households) (Unweighted N=411)	Household Members of Immigrant Essential Workers at Risk of Sanctions* (Unweighted N=639)	Total of Immigrant Workers and Their Household Members at Risk of Sanctions (Unweighted N=1050)
Total State Wide	90,416	61,308	95,936	157,244
<i>Age group</i>				
Less than 18	n/a	n/a	48,702	48,702
18 to 64	84,735	58,483	44,500	102,983
> 65	5,681	2,825	2,734	5,559
<i>Sex</i>				
Male	49,912	36,050	44,867	80,917
Female	40,504	25,258	51,069	76,327
<i>Race/Ethnicity</i>				
Asian/Pacific Islander	9,799	7,710	4,116	11,826
Black/African American	2,036	1,484	903	2,387
Hispanic	71,501	48,823	82,273	131,096
White	6,023	2,143	7,781	9,924
Another race**	1,057	1,148	863	2,011
<i>Insurance</i>				
Medicaid	16,935	11,566	47,803	59,369
Medicare	5,585	2,493	4,256	6,749
Private	37,267	21,305	21,975	43,280
VA	-	-	-	-
Uninsured***	30,629	25,944	21,902	47,846
<i>Food Stamp Recipient</i>	15,996	12,151	22,543	34,694
<i>Welfare Recipient****</i>	1,207	744	441	1,185
<i>Primary Language at Home</i>				
English	7,323	3,318	14,061	17,379
Spanish	67,834	49,307	64,381	113,688
Other	15,259	8,683	5,528	14,211
<i>Family income relative to poverty</i>				
< 201% FPL	39,728	29,195	51,301	80,496
201-400% FPL	29,202	21,110	33,296	54,406
>400% FPL	19,896	9,502	11,201	20,703
<i>Citizenship</i>				
US born	n/a	n/a	69,957	69,957
Naturalized citizen	35,723	6,615	4,357	10,972
Non-citizen	54,693	54,693	21,622	76,315

Source: Authors' analysis of 2019 American Community Survey

Notes:

* All household members of immigrant essential workers who were at risk for sanctions were also considered to be at risk for sanctions.

** Includes Native American/Alaskan Native, more than one race and "other" identified races.

*** Includes persons covered only by the Indian Health Service.

**** Welfare recipient asked only for persons age 15 and above

SNAP = Supplemental Nutrition Assistance Program

FPL = Federal poverty level.

Immigrant essential workers = non-citizens and naturalized US citizens employed in essential jobs.

Appendix Exhibit A4 – Characteristics and Service Use of Immigrant Essential Workers and Their Household Members Living in Texas Who Were at Risk of Immigration Sanctions Due to the Public Charge Rule, 2019

Characteristic/Service Use	Immigrant Essential Workers (Unweighted N=17,169)	Immigrant Essential Workers at Risk of Sanctions (Non-citizens or in Mixed Status Households) (Unweighted N=11,195)	Household Members of Immigrant Essential Workers at Risk of Sanctions* (Unweighted N=18,362)	Total of Immigrant Workers and Their Household Members at Risk of Sanctions (Unweighted N=29,557)
Total State Wide	2,244,671	1,588,801	2,698,467	4,287,268
<i>Age group</i>				
Less than 18	n/a	n/a	1,378,860	1,378,860
18 to 64	2,115,836	1,527,611	1,201,585	2,729,196
> 65	128,835	61,190	118,022	179,212
<i>Sex</i>				
Male	1,265,470	928,779	1,281,489	2,210,268
Female	979,201	660,022	1,416,978	2,077,000
<i>Race/Ethnicity</i>				
Asian/Pacific Islander	446,694	246,479	290,240	536,719
Black/African American	152,654	98,299	122,948	221,247
Hispanic	1,481,436	1,159,762	2,076,932	3,236,694
White	142,129	74,075	185,767	259,842
Another race**	21,758	10,186	22,580	32,766
<i>Insurance</i>				
Medicaid	77,481	58,471	783,177	841,648
Medicare	114,802	48,433	113,806	162,239
Private	1,215,019	749,138	926,109	1,675,247
VA	1,617	210	1,970	2,180
Uninsured***	835,752	732,549	873,405	1,605,954
<i>Food Stamp Recipient</i>	263,981	210,164	578,557	788,721
<i>Welfare Recipient****</i>	7,385	4,906	9,840	14,746
<i>Primary Language at Home</i>				
English	215,196	116,117	324,009	440,126
Spanish	1,430,782	1,125,993	1,688,010	2,814,003
Other	598,693	346,691	310,299	656,990
<i>Family income relative to poverty</i>				
< 201% FPL	772,913	635,850	1,363,595	1,999,445
201-400% FPL	779,144	570,437	878,518	1,448,955
>400% FPL	674,220	368,565	450,802	819,367
<i>Citizenship</i>				
US born	n/a	n/a	1,760,375	1,760,375
Naturalized citizen	896,190	240,320	143,424	383,744
Non-citizen	1,348,481	1,348,481	793,769	2,142,250

Source: Authors' analysis of 2019 American Community Survey

Notes:

* All household members of immigrant essential workers who were at risk for sanctions were also considered to be at risk for sanctions.

** Includes Native American/Alaskan Native, more than one race and "other" identified races.

*** Includes persons covered only by the Indian Health Service.

**** Welfare recipient asked only for persons age 15 and above

SNAP = Supplemental Nutrition Assistance Program

FPL = Federal poverty level.

Immigrant essential workers = non-citizens and naturalized US citizens employed in essential jobs.