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INSTITUTE OF CALIFORNIA

Health Care Access among California's Farmworkers

Technical Appendices

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Paulette Cha

with research support from Joy Collins

Appendix A. Quantitative Analyses

The research design for analyzing the NAWS data is an event study, a flexible version of difference-in-differences. I estimate the effects of fiscal year indicators on two sets of outcomes: health insurance and barriers to care. This allows me to incorporate overlapping policy changes such as the ACA Medi-Cal expansion and employer mandate, and to determine whether insurance effects grow or shrink over time. In the analyses, documented farmworkers are the comparators for undocumented farmworkers, and grower employees are the comparators for contractor employees. Unlike most event studies or difference-in-differences studies, this study does not have a true control group that was not exposed to the policy changes. The following estimating equation describes how the event study is operationalized for documented versus undocumented workers; other analyses with comparison groups follow the same model.

$$Y_{it} = a + b_0Undoc_iFY_t + b_1FY_t + b_2Undoc_i + b_3X'_{it} + d_t + e_{it}$$

$$\text{with } t \in \mathbb{Z}_{[2010,2018] \setminus \{2013\}}$$

The outcomes in Y are farmworkers' insured status, own employer-supplied insurance, employer-supplied insurance through a spouse, any employer-supplied insurance (own or through spouse), direct purchase insurance, Medi-Cal, and "other" coverage. In this equation, FY represents the fiscal year, $Undoc$ is an indicator of being an undocumented farmworker, X contains individual level covariates, d represents fiscal year fixed effects, e represents individual disturbances. The individual covariates include age, sex, marital status, number of children in the household, number of own family members in the household, and whether the farmworker has a spouse in the household. Throughout the estimating equation, i indexes individuals and t indexes fiscal year.

Farmworkers in the NAWS survey are excluded from the study if they have missing values for any of the variables in the model, but no other exclusion criteria were applied. International shuttlers, daily border crossers, migrant workers, and settled farmworkers were all included in the analyses. The omitted fiscal year is 2013, which contains most of the calendar year preceding the Medi-Cal expansion. The equation is estimated as a linear probability model. I conduct an analogous model of cost or insurance barriers to health care that includes fiscal years 2010 to 2017 because that outcome was unavailable in 2018. In the results tables, I present the coefficients in the vector b_1 , which are the year effects for documented immigrants relative to 2013; and the summed coefficients in $b_0 + b_2$, which are the year effects for undocumented immigrants relative to 2013. Appendix Figure A1 illustrates how recent health insurance expansions affected the fiscal years in this study. (If farmworkers were affected by these changes, we would expect their coverage changes over time to reflect increases in Medi-Cal eligibility and increased employer insurance availability.)

A causal interpretation of the estimates in b_1 and $b_0 + b_2$ would rely on pre-ACA estimates being close to zero. This is the event study analogue to the parallel trends assumption underlying causal interpretations of difference-in-differences estimates. As I show in the results tables beginning with Appendix Table 3, this pattern is not evident for any outcomes in this study. As a result, I interpret the findings for documented and undocumented farmworkers as associations, not causal effects. Still, for each fiscal year I subject the pair of effects (in vectors b_1 and $b_0 + b_2$) to a Wald test, and indicate when they are different at the 95 percent level of confidence or higher. This formally tests whether the associations differ by immigration status. All analyses are conducted in Stata MP, version 16.

APPENDIX FIGURE A1

Timeline of ACA provisions by fiscal year

Fiscal year	Medi-Cal	Employer mandate
2010		
2011		
2012		
2013		
2014	Partial year	
2015	Full year	100+ Partial year
2016	Full year	100+/50+ Full year
2017	Full year	50+ Partial year
2018	Full year	50+ Full year

NOTE: Federal fiscal years begin in October of the previous calendar year. The employer mandate affected companies with 100+ employees in 2015 before affecting companies with 50+ employees starting in 2016; company size thresholds are indicated.

Limitations

This study has several limitations. First, the survey data include farmworkers who fall under North American Industrial Classification System (NAICS) codes for Crop Production (111) or Support Activities for Crop Production (1151). It does not include guest workers on H-2A visas,¹ nor does it include agricultural workers in the areas of forestry or meat production. The findings are therefore most relevant for crop workers. The public data do not disclose county of interview, so I am unable to control for agricultural or health care characteristics at the county level. It is also not possible to adjust statistically for bias due to repeated observations from the same county. However, California’s agricultural industry is concentrated in the central valley and central coast, meaning that the number of counties may be too small to make appropriate statistical adjustments even if those data were available. I am also unable to identify which specific crop farmworkers are tending or harvesting. The study focuses on health insurance coverage and workers’ perceived barriers to getting care, and not health status or disease outcomes. The primary barrier investigated, cost or lack of insurance, is combined and cannot be analyzed as constituent parts.

The research design allows me to estimate effects in each fiscal year, for each group of farmworkers. However, there are fundamental differences in the trajectories of insurance and health care barriers between groups before any of the recent health policies were enacted; see, for example, Cha and McConville 2021 for a description of the patchwork of health care available to undocumented immigrants, their continued status as the primary uninsured group in California, and recent expansions to their health insurance eligibility. These differences cannot be controlled in this observational study, and the findings are associations rather than causal effects. Finally, NAWS data are available through 2018, so the quantitative analyses do not address the COVID-19 pandemic period. I use interviews with a small number of experts to fill in some of the gaps with regard to crop differences, geography, and the pandemic.

¹ Because of farm labor shortages, some agricultural employers have been transitioning to hiring more temporary guest workers under the H-2A visa program despite the associate administrative burden and requirement to provide housing (Martin 2017).

APPENDIX TABLE A1

Farmworker summary statistics

Variable	Mean/stdev
Individual characteristics	
Male	0.721 (0.448)
Age	40.32 (12.58)
Married	0.715 (0.452)
Undocumented	0.583 (0.493)
Indigenous	0.0830 (0.276)
Family and household	
Family size	3.239 (1.642)
Spouse in household (binary)	0.625 (0.484)
Number of children in household	1.210 (1.385)
Mixed-status family	0.274 (0.446)
Work characteristics	
International shuttler	0.0925 (0.290)
Employed by FLC	0.324 (0.468)
Works on field crop	0.0281 (0.165)
Works on fruits and nuts	0.586 (0.493)
Works in horticulture	0.0827 (0.275)
Works on vegetables	0.286 (0.452)
Works on misc./multiple crops	0.0172 (0.130)
N	5996

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2018.

NOTES: Weighted means and standard deviations shown for foreign-born farmworkers. International shuttlers spend more than 28 days abroad in a year but are not border commuters. FLC refers to a farm labor contractor. Undocumented, Indigenous, mixed-status family are all self-reported. Crowded housing refers.

APPENDIX TABLE A2

Farmworkers’ and family members’ descriptive statistics

	All immigrant farmworkers	Undocumented immigrant farmworkers	Adults in farmworker families	Adults in undocumented farmworker families	Children in farmworker families	Children in undocumented farmworker families
Individual characteristics						
Age	42.76	39.06	45.48	42.84	9.576	9.484
Male sex	0.707	0.677	0.547	0.550	0.520	0.522
Does not speak English	0.437	0.537	0.307	0.401	0.0123	0.0116
Speaks Spanish	0.921	0.948	0.732	0.765	0.824	0.845
Immigrant	1	1	0.795	0.838	0.103	0.121
Undocumented	0.503	1	0.354	0.761	0.0697	0.117
White race	0.0122	0.00714	0.129	0.109	0.0568	0.0455
Black race	0.000358	0	0.0191	0.0201	0.0129	0.0156
Native American	0	0	0.000833	0.00178	0	0
Asian or Pacific Islander	0.0217	0.00907	0.0658	0.0563	0.0352	0.0194
Other race (incl 2+ races)	0.000877	0	0.00771	0.00667	0.00832	0.00937
Latino ethnicity	0.965	0.984	0.778	0.806	0.887	0.910
< high school diploma	0.735	0.760	0.548	0.596	0.949	0.948
High school diploma or equivalent	0.201	0.189	0.227	0.208	0.0449	0.0429
At least 1 year of college	0.0636	0.0506	0.224	0.195	0.00610	0.00894
Has health insurance coverage	0.615	0.549	0.734	0.673	0.963	0.960
Has private health insurance coverage	0.307	0.239	0.426	0.359	0.255	0.185
Has health insurance through employer/union	0.265	0.214	0.353	0.303	0.200	0.141
Has direct purchase health insurance	0.0486	0.0305	0.0795	0.0582	0.0516	0.0348
Has Medicaid	0.302	0.314	0.285	0.298	0.757	0.811
Family and household						
Household size	4.701	4.790	4.159	4.313	5.356	5.460
Number of own family members in household	4.067	4.125	3.772	3.875	5.217	5.281
Income as % of FPL	316.8	276.9	397.9	341.3	214.9	199.8
Income < 138% FPL	0.329	0.361	0.301	0.325	0.600	0.611
Income < 200% FPL	0.526	0.585	0.451	0.501	0.693	0.710
Resides in group quarters	0.0225	0	0.0185	0.000277	0.00218	0

Lives in crowded household or group quarters	0.380	0.461	0.294	0.364	0.525	0.622
N	2289	1044	4921	2079	2434	1233

SOURCES: American Community Survey, 2018-2019

NOTES: Includes foreign-born farmworkers. Farmworkers are defined as individuals working in the crop production industry, with occupations in various agricultural roles. Undocumented status is statistically imputed using the California Poverty Measure's methodology ([see this technical appendix](#) for details). FPL refers to federal poverty level. Crowded quarters are defined as having more household members than rooms, a definition used by the [US Department of Housing and Urban Development](#).

APPENDIX TABLE A3

Insurance outcomes over time for immigrant farmworkers by documentation status

		Insured	Own ESI	Spouse ESI	Any ESI	Direct Purchase	Medi-Cal	Other
FY 2010								
	Doc	0.12**	-0.084*	-0.044***	-0.13***	0.039*	0.27***	0.0043
		0.039	0.034	0.012	0.035	0.017	0.034	0.011
	Undoc	-0.37***	-0.093**	-0.0096	-0.10**	-0.068***	-0.26***	0.0054
		0.039	0.035	0.012	0.036	0.018	0.035	0.011
FY 2011								
	Doc	-0.12**	-0.14***	0.00019	-0.14***	-0.0035	0.048	0.0027
		0.041	0.036	0.013	0.037	0.018	0.036	0.011
	Undoc	-0.071	0.079*	-0.055***	0.024	0.061***	-0.087*	0.0051
		0.041	0.036	0.013	0.037	0.018	0.036	0.011
FY 2012								
	Doc	-0.14**	-0.088*	-0.034*	-0.12**	-0.011	0.028	-0.0014
		0.043	0.038	0.013	0.039	0.019	0.038	0.012
	Undoc	-0.069	0.0100	-0.019	-0.0090	-0.040*	-0.077*	0.0089
		0.042	0.037	0.013	0.039	0.019	0.037	0.012
FY 2014								
	Doc	0.017	-0.19***	-0.045***	-0.23***	-0.0035	0.22***	0.0079
		0.037	0.033	0.012	0.034	0.016	0.033	0.010
	Undoc	-0.25***	-0.0083	-0.011	-0.019	-0.055***	-0.18***	0.0020
		0.034	0.030	0.010	0.031	0.015	0.030	0.0093
FY 2015								
	Doc	0.22***	-0.13***	-0.022	-0.15***	0.026	0.31***	0.058***
		0.037	0.033	0.012	0.034	0.017	0.033	0.010
	Undoc	-0.38***	-0.034	-0.027*	-0.061	-0.063***	-0.24***	-0.046***
		0.034	0.030	0.011	0.031	0.015	0.030	0.0095
FY 2016								
	Doc	0.34***	-0.11***	-0.029**	-0.14***	-0.038*	0.44***	0.048***
		0.036	0.031	0.011	0.032	0.016	0.031	0.0099
	Undoc	-0.41***	0.099***	-0.026**	0.073*	-0.013	-0.45***	-0.0091
		0.032	0.028	0.0100	0.029	0.014	0.028	0.0089
FY 2017								
	Doc	0.29***	0.0011	-0.035**	-0.034	-0.027	0.26***	0.055***
		0.035	0.030	0.011	0.031	0.015	0.030	0.0096
	Undoc	-0.35***	-0.14***	0.029**	-0.11***	-0.030*	-0.16***	-0.045***
		0.033	0.029	0.010	0.030	0.015	0.029	0.0091
FY 2018								
	Doc	0.28***	-0.066*	-0.021*	-0.087**	-0.034*	0.35***	0.026**
		0.033	0.029	0.010	0.030	0.015	0.029	0.0092
	Undoc	-0.30***	-0.0092	-0.034***	-0.043	-0.027	-0.23***	-0.014
		0.032	0.028	0.0099	0.029	0.014	0.028	0.0088

	Depvar mean	0.48	0.19	0.019	0.21	0.040	0.24	0.015
	N	5996	5996	5996	5996	5996	5996	5996

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2018.

NOTES: Includes foreign-born farmworkers. FY refers to fiscal year; fiscal year 2013 is omitted. * p<0.05, ** p<0.01, *** p<0.001. Boxed pairs of coefficients are statistically different from each other at the 95% level of confidence or higher. ESI is employer-supplied health insurance. Undocumented status is self-reported.

APPENDIX TABLE A4

Cost/insurance as barrier to care by documentation status and hire type

		Cost or lack of insurance		Cost or lack of insurance
FY 2010				
	Doc	-0.0016	Direct	0.15***
		0.039		0.035
	Undoc	0.10**	Contract	-0.18***
		0.039		0.038
FY 2011				
	Doc	0.22***	Direct	0.16***
		0.041		0.031
	Undoc	-0.055	Contract	0.024
		0.041		0.043
FY 2012				
	Doc	-0.053	Direct	0.085**
		0.043		0.030
	Undoc	0.24***	Contract	0.044
		0.042		0.048
FY 2014				
	Doc	-0.021	Direct	0.043
		0.037		0.028
	Undoc	0.20***	Contract	0.17***
		0.033		0.035
FY 2015				
	Doc	-0.012	Direct	0.12***
		0.037		0.030
	Undoc	0.20***	Contract	-0.049
		0.034		0.032
FY 2016				
	Doc	-0.14***	Direct	-0.018
		0.035		0.029
	Undoc	0.24***	Contract	0.054
		0.032		0.032
FY 2017				
	Doc	0.0094	Direct	0.062*
		0.034		0.029
	Undoc	0.17***	Contract	0.14***
		0.033		0.036
	Depvar mean	0.29		0.29
	N	5444		5444

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2017.

NOTES: Includes foreign-born farmworkers. FY refers to fiscal year; fiscal year 2013 is omitted. * p<0.05, ** p<0.01, *** p<0.001. Boxed pairs of coefficients are statistically different from each other at the 95% level of confidence or higher. Undocumented status is self-reported. Contract employees work for a farm labor contractor, and direct employees do not.

APPENDIX TABLE A5

Spouses' insurance outcomes by the farmworkers' documentation status

		Insured	FW ESI as Dependent	Spouse's Own ESI	Any ESI	Direct Purchase	Medi-Cal	Other
FY 2010								
	Doc FW	0.046	-0.066*	-0.033	-0.099*	0.013	0.17***	0.0065
		0.049	0.032	0.029	0.041	0.021	0.050	0.015
	Undoc FW	-0.30***	-0.079*	-0.055	-0.13**	-0.078**	-0.16**	0.0076
		0.056	0.036	0.033	0.046	0.024	0.057	0.017
FY 2011								
	Doc FW	-0.26***	-0.16***	-0.019	-0.18***	-0.048*	-0.065	0.0089
		0.050	0.032	0.030	0.041	0.022	0.050	0.015
	Undoc FW	-0.045	0.067*	-0.095**	-0.028	0.039	-0.0068	0.00046
		0.052	0.033	0.031	0.043	0.022	0.052	0.016
FY 2012								
	Doc FW	-0.19***	-0.070*	0.0052	-0.065	-0.015	-0.088	-0.00077
		0.051	0.033	0.030	0.042	0.022	0.052	0.016
	Undoc FW	-0.011	0.041	-0.084**	-0.042	-0.051*	0.025	0.0060
		0.054	0.035	0.032	0.044	0.023	0.054	0.017
FY 2014								
	Doc FW	-0.041	-0.16***	-0.021	-0.18***	-0.045*	0.14**	0.013
		0.044	0.029	0.026	0.037	0.019	0.045	0.014
	Undoc FW	-0.21***	-0.012	-0.055*	-0.067	-0.024	-0.12**	0.0022
		0.043	0.027	0.025	0.035	0.018	0.043	0.013
FY 2015								
	Doc FW	0.099*	-0.16***	-0.0040	-0.16***	-0.024	0.22***	0.071***
		0.046	0.029	0.027	0.038	0.020	0.046	0.014
	Undoc FW	-0.29***	-0.018	-0.046	-0.064	-0.041*	-0.16***	-0.053***
		0.045	0.029	0.027	0.037	0.020	0.046	0.014
FY 2016								
	Doc FW	0.081	-0.18***	-0.015	-0.20***	-0.044*	0.23***	0.056***
		0.044	0.028	0.026	0.036	0.019	0.044	0.013
	Undoc FW	-0.17***	0.081**	-0.025	0.057	-0.030	-0.18***	-0.0083
		0.042	0.027	0.025	0.035	0.018	0.042	0.013
FY 2017								
	Doc FW	0.19***	-0.11***	0.068**	-0.041	-0.055**	0.18***	0.059***
		0.041	0.026	0.024	0.034	0.018	0.041	0.013
	Undoc FW	-0.33***	-0.071**	-0.053*	-0.12***	-0.015	-0.14**	-0.051***
		0.041	0.026	0.024	0.034	0.018	0.041	0.013
FY 2018								
	Doc FW	0.24***	-0.18***	0.018	-0.16***	-0.033	0.37***	0.034**
		0.041	0.026	0.024	0.034	0.018	0.041	0.013
	Undoc FW	-0.41***	0.019	-0.11***	-0.091**	-0.039*	-0.26***	-0.020
		0.042	0.027	0.025	0.035	0.018	0.042	0.013

	Depvar mean	0.59	0.100	0.082	0.18	0.041	0.37	0.021
	N	3813	3813	3813	3813	3813	3813	3813

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2018.

NOTES: Includes spouses of farmworkers. FY refers to fiscal year; fiscal year 2013 is omitted. * p<0.05, ** p<0.01, *** p<0.001. Boxed pairs of coefficients are statistically different from each other at the 95% level of confidence or higher. ESI is employer-supplied health insurance. Undocumented status is self-reported, and refers to the farmworker, not the spouse.

APPENDIX TABLE A6

Insurance outcomes for children of farmworkers by farmworkers' documentation status

		All Kids Insured	Some Kids Insured	FW's ESI	Other Parent's ESI	Any ESI	Direct Purchase	Medi-Cal	Other
FY 2010									
	Doc FW	0.072*	0.036	0.024	-0.050*	-0.026	-0.010	0.092*	0.00097
		0.036	0.031	0.022	0.020	0.029	0.020	0.043	0.014
	Undoc FW	0.065	0.086*	-0.093***	-0.056*	-0.15***	-0.10***	0.26***	-0.0030
		0.040	0.034	0.024	0.022	0.032	0.022	0.047	0.015
FY 2011	Doc FW								
		-0.077*	-0.088**	-0.064**	-0.070***	-0.13***	-0.084***	0.075	0.0019
	Undoc FW	0.036	0.031	0.022	0.020	0.029	0.020	0.042	0.014
		0.24***	0.24***	-0.014	-0.040	-0.053	-0.011	0.28***	0.0078
	Doc FW	0.037	0.032	0.023	0.021	0.030	0.021	0.044	0.014
FY 2012									
	Undoc FW	-0.15***	-0.13***	0.0086	-0.055*	-0.047	-0.042	-0.032	0.00068
		0.039	0.033	0.024	0.022	0.032	0.022	0.046	0.015
	Doc FW	0.23***	0.26***	-0.028	-0.039	-0.067*	-0.020	0.28***	-0.0024
		0.039	0.034	0.024	0.022	0.032	0.022	0.046	0.015
FY 2014	Undoc FW								
		0.084*	0.068*	-0.018	-0.091***	-0.11***	-0.085***	0.18***	0.0048
	Doc FW	0.034	0.029	0.021	0.019	0.028	0.019	0.040	0.013
		0.046	0.082**	-0.040*	-0.012	-0.052*	0.011	0.11**	0.014
	Undoc FW	0.032	0.027	0.019	0.018	0.026	0.018	0.037	0.012
FY 2015									
	Doc FW	0.11**	0.077*	-0.050*	-0.049*	-0.099***	-0.080***	0.16***	0.053***
		0.035	0.030	0.022	0.020	0.029	0.020	0.041	0.013
	Undoc FW	0.060	0.087**	-0.028	-0.038*	-0.066*	-0.012	0.19***	-0.051***
		0.033	0.029	0.020	0.019	0.027	0.018	0.039	0.013
FY 2016									
	Doc FW	0.087*	0.065*	-0.044*	-0.056**	-0.10***	-0.11***	0.18***	0.030*
		0.034	0.029	0.021	0.019	0.028	0.019	0.040	0.013
	Undoc FW	0.073*	0.11***	0.028	-0.046*	-0.017	-0.0044	0.18***	-0.013

		0.032	0.027	0.020	0.018	0.026	0.018	0.038	0.012
FY 2017									
	Doc FW	0.16***	0.14***	-0.0036	-0.030	-0.034	-0.12***	0.18***	0.045***
		0.032	0.028	0.020	0.018	0.026	0.018	0.038	0.012
	Undoc FW	0.061	0.033	-0.066***	-0.030	-0.096***	0.0072	0.15***	-0.038**
		0.031	0.027	0.019	0.018	0.025	0.017	0.037	0.012
FY 2018									
	Doc FW	0.20***	0.16***	-0.058**	-0.050**	-0.11***	-0.096***	0.30***	0.0031
		0.031	0.026	0.019	0.017	0.025	0.017	0.036	0.012
	Undoc FW	-0.21***	0.0040	-0.024	-0.046	-0.070	-0.025	0.092	0.0015
		0.044	0.037	0.027	0.025	0.035	0.024	0.051	0.016
	Depvar mean	0.87	0.91	0.042	0.036	0.078	0.035	0.80	0.015
	N	3293	3293	3293	3293	3293	3293	3293	3293

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2018.

NOTES: Includes children of foreign-born farmworkers. FY refers to fiscal year; fiscal year 2013 is omitted. * p<0.05, ** p<0.01, *** p<0.001. Boxed pairs of coefficients are statistically different from each other at the 95% level of confidence or higher. ESI is employer-supplied health insurance. Undocumented status is self-reported, and refers to the farmworker, not the child or children.

APPENDIX TABLE A7

Insurance outcomes over time for farmworkers, by employer type

		Insured	Own ESI	Spouse ESI	Any ESI	Direct Purchase	Medi-Cal	Other
FY 2010								
	Direct	0.0067	-0.033	-0.032**	-0.065*	0.026	0.094**	-0.0017
		0.035	0.030	0.011	0.031	0.016	0.031	0.0098
	Contract	0.016	-0.15***	0.0064	-0.15***	-0.033	0.16***	0.0029
		0.039	0.034	0.012	0.035	0.017	0.034	0.011
FY 2011								
	Direct	0.020	0.016	-0.012	0.0043	0.084***	0.037	-0.0013
		0.032	0.027	0.0099	0.028	0.014	0.028	0.0088
	Contract	-0.21***	-0.28***	-0.0013	-0.28***	-0.14***	0.077*	0.0013
		0.043	0.038	0.014	0.039	0.019	0.038	0.012
FY 2012								
	Direct	-0.031	-0.012	-0.026**	-0.038	-0.022	0.036	-0.0012
		0.031	0.026	0.0095	0.027	0.014	0.027	0.0085
	Contract	-0.089	-0.20***	0.013	-0.18***	-0.029	0.092*	-0.000071
		0.048	0.042	0.015	0.043	0.021	0.043	0.013
FY 2014								
	Direct	0.021	-0.14***	-0.030***	-0.17***	-0.024	0.19***	0.0022
		0.029	0.025	0.0090	0.026	0.013	0.025	0.0080
	Contract	-0.13***	-0.061*	0.0019	-0.059	-0.017	-0.060	0.0014
		0.035	0.030	0.011	0.031	0.016	0.031	0.0098
FY 2015								
	Direct	0.029	-0.13***	-0.0080	-0.14***	0.010	0.14***	0.027**
		0.030	0.026	0.0094	0.027	0.013	0.027	0.0084
	Contract	0.17***	0.027	-0.022*	0.0048	-0.036*	0.21***	-0.014
		0.033	0.028	0.010	0.029	0.015	0.029	0.0091
FY 2016								
	Direct	0.21***	0.038	-0.012	0.026	-0.034**	0.16***	0.033***
		0.029	0.025	0.0090	0.026	0.013	0.026	0.0081
	Contract	-0.024	-0.17***	-0.032**	-0.20***	-0.0091	0.19***	0.0066
		0.032	0.028	0.010	0.029	0.014	0.028	0.0090
FY 2017								
	Direct	0.24***	0.035	-0.0037	0.031	-0.042**	0.19***	0.034***
		0.029	0.025	0.0091	0.026	0.013	0.026	0.0081
	Contract	-0.15***	-0.26***	0.0098	-0.25***	0.018	0.12***	-0.029**
		0.035	0.031	0.011	0.032	0.016	0.031	0.0099
FY 2018								
	Direct	0.23***	-0.010	-0.029***	-0.040	-0.038**	0.26***	0.012
		0.028	0.024	0.0087	0.025	0.012	0.025	0.0078
	Contract	-0.10*	-0.18***	0.058***	-0.12***	-0.023	0.069	-0.0011
		0.041	0.035	0.013	0.036	0.018	0.036	0.011

	Depvar mean	0.48	0.19	0.019	0.21	0.040	0.24	0.015
	N	5996	5996	5996	5996	5996	5996	5996

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2018.

NOTES: Includes foreign-born farmworkers. Contract workers are defined as those who work for farm labor contractors, while direct workers are all others. FY refers to fiscal year; fiscal year 2013 is omitted. * p<0.05, ** p<0.01, *** p<0.001. Boxed pairs of coefficients are statistically different from each other at the 95% level of confidence or higher. ESI is employer-supplied health insurance.

APPENDIX TABLE A8

Insurance and barrier to health care outcomes modeled against unemployment rates, by immigration status

	Insurance outcomes							Barrier
	Insured	Own ESI	Spouse ESI	Any ESI	Direct Purchase	Medi-Cal	Other	Cost or lack of insurance
Doc	-0.0461***	-0.00428	0.000632	-0.00364	0.00600***	-0.0341***	-0.00605***	0.0165***
	(-14.72)	(-1.56)	(0.65)	(-1.29)	(4.35)	(-12.31)	(-7.06)	(4.61)
Undoc	-0.444***	-0.0354	-0.00499	-0.0404	-0.0387**	-0.328***	-0.0404***	0.296***
	0.0307	0.0269	0.00947	0.0278	0.0135	0.0272	0.00841	0.0367
Depvar mean	0.48	0.19	0.019	0.21	0.040	0.24	0.015	0.29
N	5996	5996	5996	5996	5996	5996	5996	5444

SOURCES: National Agricultural Workers Survey, fiscal years 2010-2018 for insurance outcomes and 2010-2017 for cost.

NOTES: Includes immigrant farmworkers in California. All coefficients represent the effect of unemployment rates by fiscal year, for each group. * p<0.05, ** p<0.01, *** p<0.001. Boxed pairs of coefficients are statistically different from each other at the 95% level of confidence or higher. ESI is employer-supplied health insurance. Documentation status is self-reported.

Appendix B. In-Depth Interviews

The qualitative research included a small number of interview participants with expertise in farmworkers, their work and living conditions, and their engagement with the health care system. One or two PPIC researchers conducted semi-structured interviews with five experts. These individuals provided insights from the perspectives of a farmworker advocate and researcher, an agricultural employer, and a health care provider serving farmworker communities.

Individuals interviewed

- Ed Kissam (Werner-Kohnstamm Family Fund)
- Tom O’Brian (Driscolls)
- Dr. Kevin Ouma (Clinica Sierra Vista)
- Dave Puglia (Western Growers)
- David Zanze (Western Growers Alliance Trust and Pinnacle Claims Management)

Informed Consent

The following script was shared in written form ahead of the scheduled interview. Before the interview, we obtained informed consent orally using the same language.

The Public Policy Institute of California (PPIC), a non-profit research organization, is conducting a study on immigrant farmworkers and health care access. A component of the research includes expert interviews and we are requesting your participation in a 45–60 minute interview. The information you provide will be incorporated into a PPIC report on farmworkers and health care. The organizations and names of those interviewed will be included in an appendix of the report, so the information you provide will not be confidential, although no direct attribution will be included in the report.

Your participation in the study is voluntary. If you do not wish to participate, we may attempt to contact another person within your organization to participate. If you do participate, you can stop at any time, you do not have to answer any questions for any reason, and you should not feel obligated to discuss any topic with which you are not comfortable.

Would you like to continue?

Interview protocol

The following is an example of our protocol. Some questions were tailored to each expert’s background, and we allowed the interviewee to take the conversation in new directions.

Thank you for agreeing to participate. We will propose general topics and questions, and let the conversation develop organically. If it is acceptable to you, we would like to record your interview, as this would provide an accurate record to which we could later refer, and would allow us to more fully engage during the discussion itself. We would not keep your recording beyond the life of this project.

<Start recording if consent given>

Let us start by discussing your experience as an employer of farmworkers.

What role, if any, do employers (growers, farm labor contractors) play in providing health insurance or direct health care to immigrant farmworkers?

Could you tell us what role, if any, your company plays in connecting farmworkers to health care or health insurance?

- *How typical is your role in the industry?*
- *How might this differ from non-farm employers?*

Does farm work pose health or health care access challenges distinct from those faced by immigrants in other industries/urban areas?

- *Is location or transportation a challenge?*

Have you witnessed changes in immigrant farmworkers' access to care following the Affordable Care Act (Obamacare)?

- *How about the Medicaid expansion?*
- *Does the ACA employer mandate affect many growers or FLCs? What has been the response of employers?*
- *Did California's Medi-Cal expansion to all young adults in 2020 have a noticeable effect?*

What, if anything, has changed for immigrant farmworkers' health care access during the pandemic?

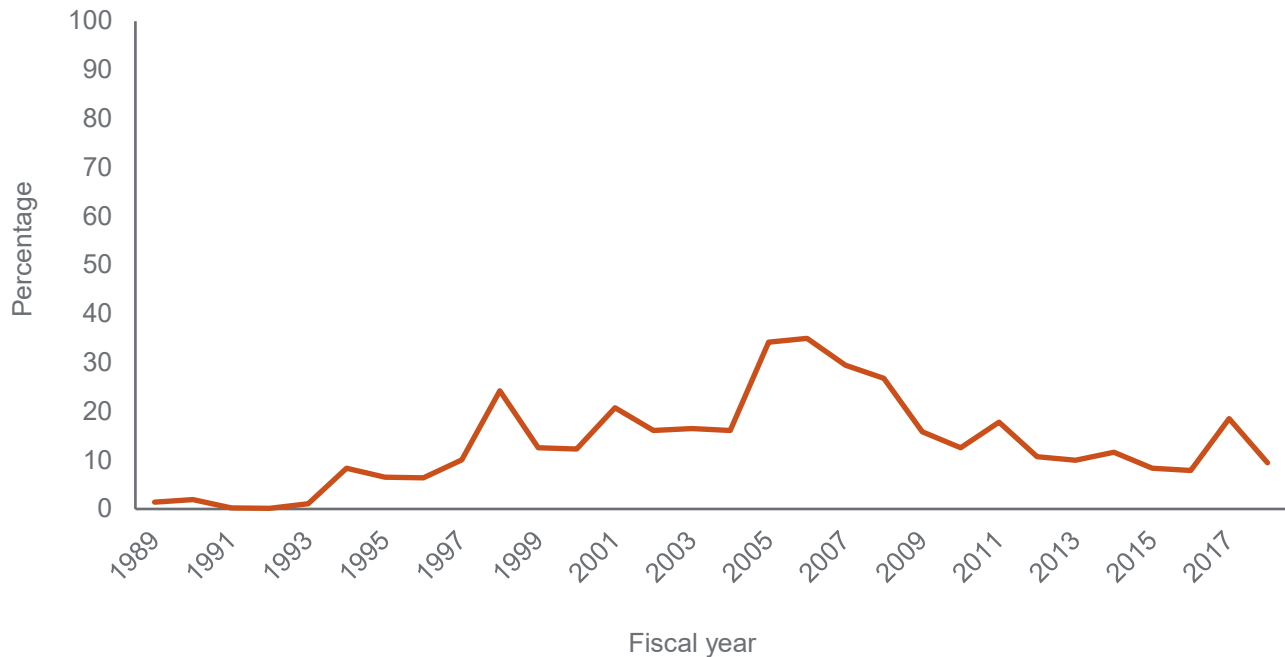
- *Have there been new points of access for COVID testing?*
- *Vaccination?*

Appendix C. Indigenous Farmworkers

A recent study of indigenous farmworkers in California collected data in Mixtec, Triqui, and Zapotec, and referred to the presence of workers who speak dozens of other indigenous languages, including Chinantec, Chatino, Mam, Nahuatl, and Tlapanec (California Institute for Rural Studies 2021). While only a negligible proportion of documented farmworkers are Indigenous,² much higher proportions of undocumented farmworkers are (Appendix Figure C1). These individuals are likely to face multiple barriers to health care.

APPENDIX FIGURE C1

Since the mid-1990s, a notable minority of undocumented farmworkers are Indigenous



SOURCE: National Agricultural Workers Survey, fiscal years 1989–2018

NOTE: Presents the percentage of workers who speak an Indigenous language among undocumented immigrant farmworkers; undocumented status and Indigenous background are self-reported.

The majority of California’s agricultural activity is focused in its Central Valley and Central Coast. The top ten counties for agricultural revenues are (in declining dollar amount) Fresno, Kern, Tulare, Monterey, Stanislaus, Merced, San Joaquin, Kings, Imperial, and Madera (California Department of Food and Agriculture 2020a).

However, not all farmworkers are in these concentrated areas of production, and geography and language can interact to create challenging environments for seeking health care. Some, for example, work in nurseries in the state’s far north. In the interviews, I heard about varying capacity to serve farmworkers who speak Indigenous languages. These workers may be in locations unprepared to offer appropriate health services, especially if workers require Indigenous language services. On the other hand, some employers have been able to coordinate support in appropriate languages to ensure their workers can access care.

² Between fiscal years 1989 and 2018, less than 0.2% of California’s documented farmworkers were Indigenous. Most recently, in fiscal year 2018, less than 0.02% of were Indigenous.



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Public Policy Institute of California
500 Washington Street, Suite 600
San Francisco, CA 94111
T: 415.291.4400
F: 415.291.4401
PPIC.ORG

PPIC Sacramento Center
Senator Office Building
1121 L Street, Suite 801
Sacramento, CA 95814
T: 916.440.1120
F: 916.440.1121