Health insurance coverage among farmworkers in California before and after the introduction of the Affordable Care Act (ACA): A mixed methods study

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Abstract

Background: Previous studies have found that although health insurance coverage expanded for farmworkers after the introduction of the Patient Protection and Affordable Care Act (ACA), coverage levels were lower than the general population. California recently introduced policies to expand coverage for previously excluded undocumented workers. This study examines the impact of the ACA on insurance coverage for farmworkers and identifies barriers to further expansion.

Methods: A mixed methods approach was utilized. Weighted statistical analyses were conducted on the National Agriculture Worker Survey (NAWS) data for 2011-12, 2015-16 and 2017-18 to study health insurance coverage before and after the introduction of the ACA. Qualitative interviews were conducted with growers, healthcare providers and community-based organizations to examine ACA related changes in health insurance for farmworkers.

Results: The ACA led to doubling of health insurance coverage for farmworkers in California (32.0%: 2011-12 to 64.8%: 2017-18), with higher rates for documented (43.0%: 2011-12: to 77.7%: 2017-18) than undocumented workers (2011-12: 26.0% to 2017-18: 46.8%), which were lower than rates for non-agricultural workers (73%)**.** Barriers to obtaining coverage include the high cost of insurance for growers, high deductibles and copays for farmworkers and distrust of government agencies.

Conclusions: While the ACA led to significant improvements in health insurance coverage for farmworkers in CA, significant barriers remain for farmworkers seeking to obtain insurance and for growers seeking to provide coverage.

Policy Implications: States should consider funding a farmworker specific Medicaid program to provide health insurance coverage and care coordination across counties and states.

Key words: Affordable Care Act, agricultural workers, healthcare access, healthcare utilization

Introduction:

According to the United States Department of Agriculture (USDA), in 2021, approximately 19.7 million jobs were directly or indirectly related to agriculture and food industries, with approximately 2.6 million jobs being directly on farms[1]. It has long been recognized that farm work is a dangerous occupation, and farmworkers experience elevated rates of stress, injuries, chronic diseases, and COVID-19[2-9]. Despite their significant health needs, farmworkers have traditionally faced significant barriers to accessing health insurance and health care services, including a lack of affordable employer-sponsored insurance, fear of being targeted by the government and the migrant workers have faced difficulties in trying to access county-operated programs [10, 11,12].

The introduction of the Patient Protection and Affordable Care Act (ACA) significantly increased health insurance coverage for farmworkers nationally, rising by 31.5% in 2011-12 to 46.7% in 2016[13]. However, the ACA did not provide coverage for undocumented workers through either Medicaid, or the health insurance exchanges[14]. While large growers were required to offer insurance plans to their workers, growers with fewer than 50 employees or employees who work for less than 120 days (such as migrant workers during harvest season) were not required to offer health insurance coverage[15,16]. Hence, the ACA had a differential impact on agricultural workers compared to workers engaged in other occupations.

In response to the gaps in the ACA, California, home to approximately 407,300 farmworkers (over 40% of the US total),[17] enacted several policies to extend health insurance coverage to undocumented workers, including expanding Medicaid (Medi-Cal in California) coverage to those under 26 and over 50 years of age [18,19,20]. Since 2016, however, there has also been a change in the rhetoric around and treatment of undocumented workers, particularly as it pertains to the Public Charge rule[21,22,23]. Furthermore, the period between 2016 and 2018 was associated with a number of attempts to weaken or repeal the ACA. Thus, it is unclear whether the gains in farmworker's access to insurance coverage continued after 2016.

This study examines the change in health insurance coverage for farmworkers in California compared to the rest of the U.S. using data from the National Agriculture Worker Survey (NAWS) for the years 2011-12, 2015-16 and 2017-18. The study will also examine differences in the availability of health insurance coverage for agriculture workers in states that did and did not adopt the Medicaid expansion and examine differences between California and other states which adopted the Medicaid expansion policy based on documentation status. The quantitative section of the study will use weighted summary statistics and Logistic regression analysis to identify differences based on passage of time (before and after the ACA), region, legal status, gender, migrant status, ethnicity, educational attainment, and other sociodemographic factors.

The qualitative section of the study includes in depth semi structured interviews conducted with agricultural employers, including growers, farm labor contractors, healthcare providers and farmworker advocates to understand their perspective on the impact of the ACA on improving healthcare access for farmworkers. Very little research has been done on the barriers being faced by employers and healthcare providers in delivering healthcare services to agriculture workers. The purpose of this study is to identify whether rates of health insurance coverage among

farmworkers have continued to increase post-ACA and identify barriers to and opportunities for further increases in health insurance coverage.

Methods:

Quantitative study methods: Data from the NAWS for the years 2011-12, 2015-16 and 2017-18 were used to study the impact of the ACA on the availability of health insurance coverage for farmworkers[24]. The dataset contains 10953 observations NAWS (2011-12: 3025, NAWS 2015-16: 5342 and NAWS 2017-18: 2586 observations). The variables used in the analysis included:

Health insurance – Whether the farmworker reports having health insurance at the time of the interview.

Legal status - Current legal status and include citizen, green card (authorization to live and work permanently in the U.S.) other work authorization.

Demographic variables – Including sex, age, marital status, country of birth, educational status defined as highest level of education attainment, self-reported status as member of an indigenous community and ethnicity. Ethnicity was coded as Hispanic (including Mexican American, Mexican, Puerto Rican, Chicano and "other Hispanic" categories) or non-Hispanic.

Work related variables – Including type of employer (grower or contractor)***,*** type of work (i.e., fieldwork, nursery, packing house or other), migrant status (worker who travels more than 75 miles from a usual residence), and whether income was above or below the federal poverty level.

Region - Residence in California or another state.

Medicaid expansion – Residence in a state that had adopted the Medicaid expansion by 2018. The states that had not accepted the expansion were Wyoming, Texas, South Dakota, Kansas, Wisconsin, Tennessee, Alabama, Mississippi, Florida, Georgia, North Carolina, South Carolina.

Statistical analysis: Data for 2-year period were combined at the recommendation of the NAWS administrators to obtain the most accurate weighted estimates. Appropriate summary statistics were weighted as per the instructions in the NAWS codebook using the weighting variable PWTYCRD and reported as mean and standard errors for continuous variables and percentages for categorical variables[25]. The data was analyzed using STATA version 17.0.

The data was divided into multiple groups using the NAWS 2011-12, 2015-16 and 2017-18 categories for demographic variables and then further split into a table displaying health insurance coverage by documentation status for U.S., California, rest of U.S. excluding California, states which did and did not adopt Medicaid expansion under the ACA and states which did adopt Medicaid expansion under the ACA excluding California. The relationships between healthcare access in the form of health insurance and other categorical variables were tested using Chi square test of independence, and the continuous variable age was converted to a categorical variable and tested using chi square test of independence. All tests were conducted at an alpha level of 0.05. Weighted logistic regression models were used to assess if there is a difference in the health insurance coverage among agricultural workers in California compared to the rest of the U.S.

Assumptions for logistic regression were tested including binary outcome, independent observations, large sample size and linearity in log odds. The influential points were examined using Standardized Residual plot and Dbeta plot. The logistic regression model was initially run as a complete case analysis with all the predictors, and then only to include predictors which were found to be statistically significant. Moderation was tested by adding interaction terms between being a resident of California and survey year and residing in a state that adopted Medicaid expansion under the ACA and survey year. Model fit was compared, and the best fitting model

was chosen based on Lfit, AIC, BIC criteria, examining area under the logistic regression curve and removing variables which did not improve model fit to ensure parsimony and avoid overfitting.

Qualitative study methods: A grounded theory method of data collection and analysis was used to examine the perspectives of employers, healthcare providers, advocates, and health insurance providers on the impact of the ACA on the ability to farmworkers to access healthcare services in the U.S[26]. A snowball sampling approach was used to recruit study participants which included growers, farm labor contractors, representatives of healthcare providers, health insurance providers or farmworker advocacy groups who offer their services either exclusively to agricultural workers or have many clients who are agriculture workers[27]. Table 1 provides demographic characteristics of the study participants. Interviews were conducted till the point of theoretical saturation was reached. Due to the small number of organizations which work with agricultural workers in California, demographic information such as age, race, educational attainment was not asked to maintain the confidentiality of the participants. The University of California Merced Institutional Review Board approved the study protocol.

Table 1 Demographic characteristics of the Interview participants

Interviewee characteristics	**N= 33 (Percentage)**
Gender	
Male	20 (60.6)
Female	13 (40.4)
Type of organization	
Grower	13 (39.4)
Contractor	3 (9.1)
Advocacy groups	9 (27.3)

Healthcare provider	3 (9.1)
Health insurance provider	5 (15.2)
Position	
Founder/ Partner	8 (24.2)
Executive	25 (75.8)

All interviews were conducted virtually between June 2021 and October 2021. The interviews were recorded, and transcribed verbatim by a member of the research team. Detailed field notes were taken during and immediately after the interview. The transcripts were cross-checked twice with the video recordings to ensure accuracy. The data was managed using the qualitative data management software Dedoose. Three members of the research team performed focused coding and met as a team to discuss the codes used and reach a consensus. Any differences in opinion were acknowledged and recorded in the form of memos which were examined during data analysis. The axial coding technique was used to identify subthemes, understand relationships between the codes, and further explore the emerging themes from successive interviews[28,29,30,31].

Results:

The characteristics of the survey respondents are displayed in Table 2. California workers accounted for 31.3% of the sample in 2011-12, 41.5% in 2015-16 and 42.2% in 2017-18. The percentage of migrant workers declined from 17.1% in 2011-12 to 19.0% in 2015-16 to 13.3% in 2017-18. The number of undocumented workers participating in the survey decreased from 48.1% in 2011-12 to 36.4% who were undocumented in 2017-18, while the average age of respondents increased from 37.3 years in 2011-12 to 40.9 years in 2017-18. The percentage of male workers dropped from 72.1% of the sample in 2011-12 to 69.3% in 2017-18.

Table 2 Characteristics of the survey participants

Characteristics	NAWS (2011-12) (N=3025) Percentage or Mean (SE)	NAWS (2015-16) (N=5342) Percentage or Mean (SE)	NAWS (2017-18) (N=2586) Percentage or Mean (SE)
Region (CA)			***
Other states	68.7%	58.5%	57.8%
California	31.3%	41.5%	42.2%
Health insurance			
Insured	31.5%	46.8%	56.3%
Uninsured	68.5%	53.3%	43.7%
Marital status			***
Single	35.2%	34.9%	34.7%
Married/living together	57.9%	56.65	57.3%
Divorced/widowed	6.9%	8.6%	8.0%
Age	37.3 (0.56)	38.4 (0.58)	40.9 (0.60) ***
Migrant status			***
Not migrant	82.9%	81.0%	86.7%
Migrant	17.1%	19.0%	13.3%
Gender			
Male	72.1%	67.5%	69.3%
Female	27.9%	32.5%	30.7%
Indigenous status			***
Not indigenous	93.6%	93.8%	93.7%
Indigenous	6.5%	6.2%	6.3%
Family Poverty level			***
Above poverty level	70.2%	67.4%	78.3%
Below poverty level	29.8%	32.7%	21.7%

Legal status			***
Citizen	32.8%	29.3%	37.8%
Green card	18.3%	20.7%	23.7%
Work authorization	0.8%	0.8%	2.3%
Undocumented	48.1%	49.1%	36.4%
Educational status			***
Eighth grade or less	47.6%	46.4%	41.9%
9th to 12th grade	39.3%	43.6%	45.6%
Some college	13.1%	10.0%	12.5%
Type of work			**
Fieldwork	63.4%	64.1%	63.9%
Nursery	26.6%	21.8%	26.7%
Packing house	6.3%	13.2%	7.1%
Other	3.6%	0.9%	0.8%
Type of employer			
Grower	90.7%	80.0%	89.0%
Contractor	9.3%	20.0%	11.0%
Ethnicity			***
Not Hispanic	25.3%	17.0%	23.0%
Hispanic	74.7%	83.0%	77.0%
Country of birth			***
U.S.	28.9%	24.0%	31.8%
Mexico	64.1%	68.5%	64.4%
Central America	5.8%	6.2%	3.1%
Other	1.2%	0.1%	0.7%
Medicaid Expansion+			***
Yes	76.6%	75.9%	74.6%
No	23.3%	24.1%	25.4%

* p < 0.05, ** p < 0.01, *** p < 0.001 [1]Significant differences between the groups in terms of health insurance coverage by covariates were tested using chi square tests for categorical variables and continuous variables were converted to categorical variables and tested by chi square test.

+ States that had adopted the Medicaid expansion as of 2018

Health insurance coverage by documentation status: Table 3 provides the weighted estimates of health insurance coverage among agricultural workers by documentation status. Health insurance coverage increased from 31.5% in 2011-12 to 46.7% in 2015-16 and to 56.3% in 2017-18. Documented workers saw an increase in coverage from 46.4% in 2011-12 to 68.7% in 2015-16 and 71.1% in 2017-18. Though the coverage was lower than for documented workers, insurance coverage for undocumented workers increased during this period, from 15.9 % in 2011-12 to 24.5% in 2015-16 and 31.0% in 2017-18. The rates of coverage for both documented and undocumented workers were lower than the coverage rates for the public, for whom rates of coverage increased from 85% of the population in in 2011-12 to 91.0% in 2015-16 and 91.3% in 2017-18.

Table 3 Health insurance coverage among agricultural workers by documentation status in different survey years in different regions under study

Health Insurance coverage	**2011-12 (Percentage)**			**2015-16 (Percentage)**			**2017-18 (Percentage)**			Change from 2011/12 to 2015/16			Change from 2015/16 to 2017/18		
	Gen. * Public	**Doc.**	**Undoc.**	**Gen. Public**	**Doc.**	**Undoc.**	**Gen. Public**	**Doc.**	**Undoc.**	**Gen. Public**	**Doc.**	**Undoc.**	**Gen. Public**	**Doc.**	**Undoc.**
U.S.	85.0%	46.3%	15.9%	91.0%	68.7%	24.5%	91.2%	71.1%	31.0%	6.0%	22.4%	8.6%	0.2%	2.3%	6.6%
California	82.0%	43.0%	26.0%	92.1%	82.4%	36.8%	92.8%	77.7%	46.8%	10.1%	39.4%	10.8%	0.7%	-4.7%	10.0%
Rest of U.S.	86.2%	47.4%	8.8%	91.6%	61.1%	13.5%	91.9%	66.8%	16.6%	5.4%	13.7%	4.7%	0.3%	5.7%	3.1%
-Medic	87.0%	49.0%	20.5%	92.5%	72.7%	30.4%	93.0%	74.9%	38.1%	5.5%	23.7%	9.9%	0.5%	2.2%	7.7%

aid expansion															
- No Medicaid expansion	84.0%	37.9%	2.5%	89.5%	50.0%	10.1%	89.0%	58.6%	13.3%	5.5%	12.1%	7.7%	-0.5%	8.6%	3.2%

* Coverage rates for the general population were taken from: https://www.kff.org/other/state-indicator/total population/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

Health insurance coverage for farmworkers in California was generally higher than for the rest of the country, with coverage rates for documented workers increasing from 43.0% in 2011-12 to 82.4% in 2015-16 before dropping to 77.7% in 2017-18. In contrast, coverage for documented workers in other states increased from 47.4% in 2011-12 to 61.1% in 2015-16 and 66.9% in 2017-18. The gains were more substantial in states that adopted the Medicaid expansion, with coverage rates increasing from 49.0% in 2011-12 to 72.7% in 2015-16 and 74.9% in 2017-18. The coverage rates for undocumented workers remained smaller in the rest of the US than in California, particularly in states that did not adopt the Medicaid expansion (increasing from 2.5% in 2011-12 to 10.1% in 2015-16 and 13.3% in 2017-18). But coverage rates for undocumented workers were smaller in states that adopted Medicaid expansion when compared to California.

Logistic regression results: The unadjusted weighted logistic regression model showed that agriculture workers had 2.80 (95% CI: 2.09, 3.76) times the odds in 2017-18 and 1.91 (95% CI: 1.43, 2.54) times the odds of having health insurance coverage in 2015-16 compared to 2011-12. The unadjusted weighted logistic regression model showed that agricultural workers in California had 1.72 (95% CI: 1.36, 2.18) times the odds of having health insurance coverage compared to workers outside California. The unadjusted weighted logistic regression model showed that

agriculture workers in states that adopted Medicaid expansion under the ACA had 2.53 (95% CI: 1.87, 3.43) times the odds of having health insurance coverage compared to workers outside states that adopted the Medicaid expansion.

As the sample had most workers outside California, most workers were male, were of Hispanic ethnicity, were married, were not migrant workers, were not indigenous workers, were born in Mexico, worked for growers, were mostly field workers with family income above the federal poverty level, had educational attainment of eighth grade or lower, they were chosen as reference groups for their respective categories. The study investigators are attempting to look for differences between health insurance coverage before the ACA in the year 2011-12 and the states that did not adopt Medicaid expansion were chosen as reference groups.

Weighted logistic regression analysis were run with all predictors and only significant predictors. Moderation was tested between survey year and staying in California and survey year and staying in states which adopted Medicaid expansion and was not found as the results were non-significant with p value>0.05. The results of the model with all predictors with and without the interaction terms are presented in table 4. The model with all predictors was chosen as the final model as it was found to have lower AIC, BIC values, the goodness of fit was tested using Hosmer and Lemeshow' s goodness of fit test and was found to be non-significant. The interaction terms were non-significant and were not added to final model to ensure parsimony.

Table 4 Results of logistic regression models with and without interaction terms

Coefficients	**Odds Ratio (95% Confidence intervals)**		
	Model 1 (No interaction terms)	**Model 2** (Testing for interaction between CA and Year)	**Model 3** (Testing for interaction between Medicaid expansion

			and Year)
Region (CA)			
Other states	Reference group	Reference group	Reference group
California	2.66 (1.96,3.60) ***	2.19 (1.14,4.20) **	2.64 (1.95,3.58) ***
Year			
2011-12	Reference group	Reference group	Reference group
2015-16	2.50 (1.85,3.38) ***	2.24 (1.60,3.12) ***	1.83 (1.09,3.08) **
2017-18	3.00 (2.15, 4.17) ***	2.75 (1.92,3.93) ***	2.71 (1.55,4.73) **
Medicaid expansion			
Not expanded Medicaid	Reference group	Reference group	Reference group
Expanded Medicaid	1.91 (1.42, 2.57) *	1.88 (1.41, 2.52) ***	1.59 (1.01, 2.51) *
Marital status			
Single	0.61 (0.49,0.77) ***	0.61 (0.49,0.76) ***	0.61 (0.49,0.76) ***
Married/living together	Reference group	Reference group	Reference group
Divorced/widowed	0.62 (0.43,0.90) **	0.62 (0.43,0.89) **	0.62 (0.43,0.89) **
Legal status			
Citizen	8.49(5.76,12.52) ***	8.51(5.78,12.54) ***	8.51(5.79,12.52) ***
Green card	5.20 (4.04,6.68) ***	5.24 (4.04,6.78) ***	5.20 (4.04,6.70) ***
Work authorization	1.08 (0.61,1.93)	1.07 (0.60,1.90)	1.08 (0.60,1.93)
Undocumented	Reference group	Reference group	Reference group
Age	0.99 (0.98,1.00)	0.99 (0.98,1.00)	0.99 (0.98,1.00)
Migrant status			
Not migrant	Reference group	Reference group	Reference group
Migrant	0.57 (0.43,0.76) ***	0.57 (0.43,0.76) ***	0.57 (0.43,0.75) ***
Gender			
Male	Reference group	Reference group	Reference group
Female	1.37 (1.12,1.67) **	1.37 (1.13,1.67) **	1.37 (1.13,1.68) **
Indigenous status			
Not indigenous	Reference group	Reference group	Reference group
Indigenous	0.68 (0.44,1.04)	0.68 (0.44,1.05)	0.68 (0.44,1.05)
Family Poverty level			

Above poverty level	Reference group	Reference group	Reference group
Below poverty level	0.96 (0.76, 1.20)	0.96 (0.76, 1.2)	0.96 (0.77, 1.2)
Educational status			
Eighth grade or less	Reference group	Reference group	Reference group
9th to 12th grade	1.06 (0.87,1.29)	1.05 (0.87,1.28)	1.05 (0.86,1.28)
Some college	1.69 (1.14,2.52) **	1.68 (1.13,2.49) *	1.68 (1.14,2.50) *
Type of work			
Fieldwork	Reference group	Reference group	Reference group
Nursery	1.43 (1.09,1.88) **	1.42 (1.09,1.87) *	1.43 (1.08,1.87) *
Packing house	1.12 (0.65,1.93)	1.12 (0.66,1.90)	1.11 (0.65,1.91)
Other	3.92(2.13,7.20) ***	4.00(2.17,7.38) ***	4.00(2.17,7.38) ***
Type of employer			
Grower	Reference group	Reference group	Reference group
Contractor	1.00(0.73,1.37)	0.99(0.73,1.34)	0.99(0.73,1.34)
Ethnicity			
Not Hispanic	2.05 (1.38,3.06) ***	2.02 (1.36,2.99) ***	2.06 (1.38,3.07) ***
Hispanic	Reference group	Reference group	Reference group
Country of birth			
U.S.	0.67 (0.41,1.12)	0.67 (0.41,1.12)	0.67 (0.41,1.11)
Mexico	Reference group	Reference group	Reference group
Central America	0.52 (0.33,0.81) **	0.53 (0.34,0.83) **	0.52 (0.33,0.81) **
Puerto Rico	0.60 (0.24,1.47)	0.60 (0.24,1.50)	0.58 (0.24,1.43)
Caribbean	0.51 (0.15,1.77)	0.52 (0.15,1.77)	0.49 (0.14,1.71)
Southeast Asia	0.58 (0.06, 5.36)	0.57 (0.06, 5.03)	0.60 (0.07, 5.29)
South America	1.01 (0.21,4.85)	1.00 (0.21,4.68)	1.00 (0.21,4.67)
Asia	0.53 (0.16,1.79)	0.55 (0.16,1.85)	0.50 (0.15,1.69)
Pacific islands	0.13 (0.02,0.87) *	0.14 (0.02,0.91) *	0.13 (0.02,0.86) *
Other	2.94 (0.41, 21.12)	2.99 (0.41, 21.92)	3.13 (0.41, 23.84)

CA##Year California##2015-16 California##2017-18		1.33 (0.67,2.66) 1.27 (0.62,2.60)	
Medicaid expansion##Year Medicaid expansion##2015-16 Medicaid expansion##2017-18			1.47 (0.80,2.71) 1.13 (0.58,2.20)

Values in () are 95% Confidence intervals, *p < 0.05, ** p < 0.01, *** p < 0.001

Agriculture workers in California had 2.66 (95% CI: (1.96,3.60) times the odds of having health insurance coverage compared to workers outside California while controlling for other covariates. Controlling for other covariates, agriculture workers had 3.00 (95% CI: 2.15, 4.17) times the odds in 2017-18 and 2.50 (95% CI: 1.85, 3.38) times the odds of having health insurance coverage in 2015-16 compared to 2011-12. Controlling for other covariates, agriculture workers in states which adopted Medicaid expansion had 1.91 (95% CI: 1.42, 2.57) times the odds of having health insurance coverage compared to the states which did not adopt Medicaid expansion. Controlling for other covariates, agriculture workers who were single had 0.61 (95% CI: 0.49,0.77) times the odds and divorced/widowed workers had 0.62 (95% CI: 0.43,0.90) times the odds of having health insurance coverage compared to workers who were married/ living together.

Controlling for other covariates, agriculture workers who were citizens had 8.49 (95% CI: 5.76,12.52) times the odds and green card holders had 5.20 (95% CI: 4.04,6.68) times the odds of having health insurance coverage compared to undocumented workers. Controlling for other

covariates, migrant workers had 0.57 (95% CI: 0.43,0.76) times the odds of having health insurance coverage compared to non-migrant workers. Controlling for other covariates female workers had 1.37 (95% CI: 1.12,1.67) times the odds of having health insurance coverage compared to male workers. Controlling for other covariates, agricultural workers who worked in the nursery had 1.43 (95% CI: 1.09,1.88) times the odds and those engaged in other type of work had 3.92 (955 CI: 2.13,7.20) times the odds of having health insurance coverage compared to the workers who were engaged in field work. Controlling for other covariates, agricultural workers of non- Hispanic ethnicity had 2.05 (95% CI: 1.38,3.06) times the odds of having health insurance coverage compared to Hispanic workers.

Controlling for other covariates, agriculture workers born in Central America had 0.52 (95% CI: 0.33,0.81) times the odds and workers born in Pacific islands had 0.13 (95% CI: 0.02,0.87) times the odds of having health insurance coverage compared to workers who were born in Mexico. Controlling for other covariates workers who had attended some college had 1.69 (95% CI: 1.14,2.52) times the odds of having health insurance coverage compared to the workers with eighth grade or lower level of educational attainment. There was found to be no statistically significant association with age, indigenous status, family poverty level and type of employer.

Qualitative data analysis

The data was analyzed using the constructivist grounded theory approach which recognizes that the researcher is not a neutral observer and enters the field with some a priori knowledge in the context of which he/she constructs knowledge with the study participants. This approach is different from the traditional grounded theory approach which emphasizes that the researcher

should be like an empty vessel and delay literature review to avoid preconceived notions thereby develop new and emerging theories which are grounded in the data collected during the study. The constructivist grounded theory approach allows the investigators to be iterative, flexible, and reflexive during data collection and data analysis.

Reflexivity statement: The study investigators are being reflexive in acknowledging the impact of our identities in the data collection and data analysis process. Our team comprises of public health researchers of both genders with prior training in various disciplines such as medicine, economics, law, sociology, agriculture, and environmental science with one member who is an immigrant. In relation to the project, we have an insider-outsider position. We have an insider position because we are public health researchers and agriculture cooperative extension specialists who interviewed growers, healthcare providers, health insurance providers and farm worker advocacy groups. The research team's professional experience allowed them to better understand the jargon and the struggles of delivering healthcare services to vulnerable populations. We have an outsider position as some team members do not work directly with agriculture workers may not be completely aware of the struggles faced by agriculture workers in trying to access healthcare services [32].

We have used a collaborative approach with the participants, positioning ourselves as inquirers, and cocreators of knowledge. The study participants are highly qualified individuals with great knowledge of their field which helps us examine the issues of healthcare access using the "studying up" approach to examine the issue from the point of view of those who are in a position of power and privilege[33]. Interviewees are being considered as co-creators of knowledge. They are helping to recruit other participants and therefore hold some power in regulating the direction of the study. They are the owners of the data and are given access to their interview

transcripts when requested. The themes emerging for the interviews have been divided into the following sections:

Impact of the ACA on growers: One theme that emerged from the interviews was the financial hardship the ACA created for employers. Growers who had provided health insurance coverage to their workers prior to the ACA reported that their previous health insurance plans were cheaper and better tailored to the needs of their workers. The growers claimed that the ACA required their plans to cover services which were not utilized by their workers.

"Before Obamacare, because we could manage the plan and our plan was directed to the needs of our farm workers for their children and for them." [Grower]

The growers expressed the view that the plans were more expensive and came at a time when they were trying to balance costs with higher wages and benefits. This led to financial hardships for some small and medium growers, some of whom reported downsizing to reduce costs. The respondents repeatedly expressed frustration over their lack of control and the need to offer what they considered inferior, less appealing plans to their employees.

"Unfortunately, you know we're operating in a very, very low margin environment, and so you know we basically tend to get the plans that we think are going to kind of cover the basics and that people are most likely to sign up for and, in my opinion, they're not as good as they used to be. But we are offering it and some people choose to take it." [Grower]

In addition, the view was expressed that the ban on annual limits imposed by the ACA made the plans more expensive but less beneficial for their workers due to high costs and inferior coverage. The associated regulatory burden has made them less likely to try and develop plans tailored to meet the needs of their workers.

"I think a lot of employers, have done what they need to do from a legal perspective to meet compliance requirements and had to move the center of their focus in that direction, rather than the focus being on what does this worker actually want and need." [Health insurance provider]

Impact of the ACA on farmworkers: The stakeholders expressed varying opinions about the impact of the ACA on agricultural workers. Some believed that it led to an increase in the quality of health insurance coverage for agricultural workers, though this was not sustained after 2016.

"I mean I honestly thought that Obamacare was good in that it really provided…standardization and gave us some real clear direction in terms of the benefits that we had to had to provide, as I understand it. The quality of these insurance plans has basically eroded a little bit…during the last administration." [Grower]

The view was also expressed that the high cost associated with employer provided insurance often led to low uptake among workers. The plans were not tailored to meet the needs of the workers and frequently provide inadequate coverage with high copays and deductibles.

"One of my frustrations when Obamacare was rolled out was our copay, we set up that the lowest paid employee paid the least, so they had a $10 copay, and the highest paid employee paid the most, so I had a $50 copay for myself, and Obamacare flattened that so we couldn't do that anymore." [Grower]

A further limitation of the ACA was the failure to cover seasonal workers who work less than 120 days per year. Because only agricultural employers and farm labor contractors with more than 50 employees were required to offer employment-based insurance coverage, seasonal and H2A workers (immigrants with limited work authorization) were less likely to benefit from the plans.

"So, if you actually have work with your H2A population that is only going to take five months and that was the contract you designed with the State Department in terms of your approval then you can say these people are seasonal workers under the ACA and we don't have to offer benefits." [Health insurance provider]

The view was expressed that the high cost of the plans resulted in no significant uptake in health insurance coverage for undocumented workers under ACA, particularly among those who do not qualify for full scope Medicaid.

"I remember talking to a single mother about six months ago, and she told me 'I can't afford premiums from employer, and I can't even qualify to get health insurance through the government, so therefore I'm stuck,' and she barely makes enough. More of those trends and more of those problems, not only in health care, but also in housing." [Farmworker advocate]

Young workers are less likely to apply for insurance because they believe that they are unlikely to get ill, while many prefer to seek more affordable coverage in Mexico.

"One of the problems is younger workers they don't care about the insurance they don't believe in the insurance… They have a cheaper plan across the border Mexico, so they are given the opportunity to choose the one in Mexico or the one in the United States." [Health insurance provider]

Many farmworker advocates reported that farmworkers distrust government agencies and fear deportation, loss of work authorization or public charge status, which can impact efforts to obtain legal documentation status.

"*Even if you do have access to paid sick leave, there is still that fear of employer retaliation and that is connected, of course, a lot to immigration status since if you lack immigration status or if you're an H2A worker obviously your employment is dependent on your employer and so there's a*

lot of fears, even if it's available, if you know it's available, it's still hard to take because you're worried about the consequences."[Farmworker advocate]

Recommendations to improve access: Most stakeholders recommended government funded universal health insurance coverage to ease the financial burden on both employers and farm workers.

"Well, universal health care comes to mind right away. I think ideally, that would be a great way to have access right if we made it truly accessible for all vulnerable populations, so I know you said you know one so that's my magic wand, if I had it I would definitely enable all of us to be able to have access to health care, regardless of our background of our social economic status of our education of our gender you name it whatever the barrier is." [Farmworker advocate]

Some growers wanted government funding to help small growers overcome financial hardships due to the ACA. Growers and stakeholders believed that there was a need to improve data collection about insurance coverage and impact of ACA to develop truly meaningful health policies. Some stakeholders have also emphasized the need for greater focus on ensuring OSHA and ACA compliance on all growers to improve the health of the workers.

"Trying to figure out, what are the current costs that are being externalized. So, you know going to the ER and going to get subsidized care, who is paying the true cost of this right now? And what is the true cost?" [Farmworker advocate]

Discussion: The purpose of this study was to examine the changes in health insurance coverage for farmworkers from 2011-12 to 2017-18. The results suggest that there were significant increases in coverage from 2011-12 to 2017-18, particularly for documented workers in states that had adopted the Medicaid expansion. Still, the coverage rates were still significantly below the

90.6% coverage for US. adults between 18 to 64 years[34,35]. The qualitative results highlight some of the barriers that exist to further expansion of health insurance coverage for farmworkers, including the cost of plans that are compliant with the ACA and the challenges faced by farmworkers who are migrant workers.

These results are similar to those reported in Kandilov et. al (2021) where a difference-in-differences model compared workers in states that did and did not adopt Medicaid expansion in 2014. That study reported a 12 % increase in health insurance coverage among documented workers in states that adopted Medicaid expansion with no significant change reported for undocumented workers[36].

The results are in sharp contrast to the 90.6% coverage for US. adults between 18 to 64 years of age as reported by the results of the National Health Interview Survey for 2018[37]. They also lag when compared to health insurance coverage rate of 73% for all workers in the U.S. based on the results of the national level Employee Benefits Survey conducted by the Bureau of Labor Statistics for 2018[38].

The relationship between availability of health insurance coverage and region (California and the rest of U.S.) as well as states which did and did not adopt Medicaid expansion was found to be statistically non-significant at alpha value of 0.05 based on Chi square test of independence. Moderation effects were examined between region and survey year, as states which did and did not adopt Medicaid expansion and survey year and were non-significant and therefore not included in the final regression model. These results could occur because of various potential reasons such as these benefits have not yet been fully extended to agriculture workers at the time of the survey. Another potential reason is that a large proportion of agricultural workers are undocumented, they

may not be able to adequately benefit from these policies. We need to control for other variables not covered in the survey to fully understand the benefit of these policies for agricultural workers.

This study extends the previous research by examining the changes that occurred during the initial years of the Trump Administration. Additionally, this study provides the perspectives of employers, healthcare providers, and advocacy groups on the barriers that exist in expanding ACA coverage. The role of documentation status in farmworkers reduced ability to access healthcare services has also been explored in some studies with findings similar to the findings of our study[39,40,41]. Specifically, results document the financial hardships reported by employers and their frustrations with ensuring regulatory compliance with the ACA while offering plans which do not meet the perceived needs of their workers. The employers' claims that the uptake of health insurance would increase if they could offer different types of coverage (i.e., with lifetime caps or higher deductibles) would need to be weighed against the likely impact that these changes would have on the quality of the plans and use of preventive and other services.

Limitations: Because the NAWS is a cross-sectional survey of hired agricultural workers in the U.S., caution should be used in drawing causal inferences regarding the association between increases in coverage and the implementation of the ACA or subsequent changes in the atmosphere around the Public Charge rule. Other factors occurring simultaneously may have contributed to these changes but there were no other major significant changes in health insurance policy during this time. Nor does the NAWS survey represent the views of agriculture workers who are either self-employed, work at farms which do not participate in the NAWS survey or are out of work or temporarily employed outside of agriculture. While the NAWS study does attempt to provide a representative sample of farmworkers, changes in the attitude toward undocumented

workers since 2016 might have reduced the willingness of some farmworkers to be interviewed. That said, the NAWS does remain the single most comprehensive survey on farmworkers and there are numerous procedures in place to ensure the quality of the data[42].

The qualitative interviews reflect the opinions and experiences of employers, healthcare providers and advocacy groups who were interviewed for the study. Employers and healthcare providers in other states may express different opinions or experiences related to the same issues. Although this approach will not allow representativeness of the population being studied or permit generalizability of the study results, it enables a strategic, systematic, and flexible approach towards gathering information about the primary research question. The study tried to ensure equal representation from both large and small-growers, advocacy groups, health care providers and health insurance providers to include the spectrum of opinions about the impacts of the ACA on access to health insurance coverage among agricultural workers.

Conclusions: The study reports a differential impact of the ACA on the availability of health insurance coverage for farmworkers. States, like California, that adopted the Medicaid expansion saw significantly greater increases in coverage rates for both documented and undocumented workers than states that did not adopt the expansion, but the rates were significantly lower than coverage rates for the general population. Further research is needed to determine whether the policies implemented in California since 2016 have improved access for farmworkers, and the extent to which the reported financial and regulatory hardships associated with policies that are ACA compliant are inhibiting further expansion.

Policy implications: States that have adopted Medicaid expansion have seen increases in coverage rates for both documented and undocumented farmworkers. Additional policies are needed to

further extend coverage rates, particularly for undocumented workers. Future health policies should consider whether the benefits from relaxing coverage requirements would outweigh the harm caused by decreasing the quality of coverage and the potential additional barriers to utilization. Health insurance coverage for undocumented workers needs to be improved and further work is needed to determine if the differences in coverage between California and the rest of the U.S. were associated with better health outcomes among undocumented workers. Although the ACA has expanded health insurance coverage for agricultural workers, challenges remain as growers find ACA to be costly and burdensome and most stakeholders reported high costs of health insurance to agriculture workers. States should consider funding an agricultural worker-specific Medicaid type program that would provide health insurance coverage regardless of legal status, and further work needs to be done to develop innovative models of healthcare delivery to ensure equitable access to high quality integrated and coordinated healthcare services for agricultural workers.

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