

Sonoma County Farmworker Health Survey (FHS) 2013-14:

Report on the health and well-being of Sonoma County farmworkers

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Foreword

In the face of improving market and economic conditions, Sonoma County agriculture continues to report multi-layered challenges to maintain a strong and healthy workforce. To ensure a healthy agricultural workforce and a thriving agricultural economy in Sonoma County, the County of Sonoma Department of Health Services partnered with California Human Development on an effort to increase understanding of local agricultural worker health, safety and well-being. This partnership was made possible by a generous Community Transformation Grant (CTG) from the Centers for Disease Control and Prevention funded through the Affordable Care Act, which established the Prevention and Public Health Fund to promote healthy lifestyles and reduce rates of chronic disease.

Sonoma County is committed to ensuring health equity for all, toward the end of achieving our vision of being the healthiest county in the state. The unique Sonoma County Farmworker Health Survey (FHS) sheds light on the inequities that are explored in *A Portrait of Sonoma County*, a Board of Supervisor commissioned report that examines disparities in health, education and income by neighborhood, race, ethnicity, and gender. FHS findings provide strong evidence in support of one of the *Portrait's* recommendations, to mend the holes in the safety net for undocumented residents. Data presented in FHS found that the vast majority of surveyed farmworkers and their families are permanent residents of Sonoma County. The survey also found that most farmworkers lack access to vital services and experience disparities in income, access to healthcare, and health status.

FHS is also supported by the *Sonoma County Healthy and Sustainable Food Action Plan*, a comprehensive Board of Supervisor endorsed plan that outlines a shared community vision for a sustainable, local food system. The plan serves as a framework to guide collaboration and integrate the efforts of diverse food system stakeholders. It is intended to catalyze policy change, encourage investment and raise awareness and support from our community and policymakers. The plan groups food system opportunities and concerns into four action areas: 1) Agriculture and Natural Resources, 2) Economic Vitality, 3) Health Eating, and 4) Social Equity. Though this project could arguably fall under any of the plan's four action areas, we see unique alignment with the social equity section that addresses system-wide inequities such as poverty and a lack of access to education and opportunities that ultimately lead to poor health outcomes, food insecurity and hunger.

Sonoma County growers and producers have made major investments in land, mechanization and infrastructure that will support sustainable agriculture and open space for years to come. It is our hope that this report will spur dialogue and encourage action to ensure corresponding investments are made in the health, safety and overall well-being of our agricultural workforce. It is our belief that ensuring investment in the well-being of our human capital, in addition to investments in working lands and sustainable businesses, are all necessary to create a beautiful, thriving and sustainable community for all.

Sincerely,



Rita Scardaci, PHN, MPH, Director
Sonoma County Department of Health

Contents

FOREWORD	2
EXECUTIVE SUMMARY	7
BACKGROUND	7
MAIN FINDINGS	7
DEMOGRAPHICS	7
HOUSING	7
TRANSPORTATION	8
ECONOMIC WELLNESS	8
ACCESS TO HEALTH-RELATED CARE	8
HEALTH BEHAVIORS AND HEALTH CONDITIONS	9
WORKSITE CONDITIONS AND WELLNESS	9
CONCLUSIONS	9
THE CONTEXT OF SONOMA COUNTY	10
FOR THE COMMUNITY: OPPORTUNITIES FOR FUTURE RESEARCH	11
DEMOGRAPHICS	12
MAIN FINDINGS	12
FARMWORKER DEMOGRAPHICS	12
CHARACTERISTICS	12
ENGLISH PROFICIENCY	12
FAMILY STRUCTURE	12
RESIDENCY IN SONOMA COUNTY	12
WORKING DEMOGRAPHICS	12
CONCLUSIONS	13
TABLES	14
HOUSING	16
MAIN FINDINGS	16
BACKGROUND	16
RESULTS	17
DESCRIPTION OF HOUSING IN SONOMA COUNTY	17
EMPLOYER SUPPORT FOR HOUSING	17
COST OF HOUSING	17
OVERCROWDING	18
Prevalence of farmworkers living in overcrowded housing	18
Overcrowded housing by farmworker family structure	18
DISCUSSION	19
TYPE OF HOUSING	19
AFFORDABILITY OF HOUSING	19
OVERCROWDING	19
LIMITATIONS	19
CONCLUSIONS	20
TABLES	21
TRANSPORTATION	27
MAIN FINDINGS	27
BACKGROUND	27
RESULTS	28
MODE OF TRANSPORTATION	28
TIME AND COST	28
Typical time and cost of transportation to work in Sonoma County	28
Estimated cost of transportation during peak harvest season	28
Cost of using raiteros	29
ESTIMATED TRANSPORTATION ROUTES TO WORK	29
DISCUSSION	29

ACCESS TO SAFE, RELIABLE, AND AFFORDABLE TRANSPORTATION _____	29
COST OF TRANSPORTATION _____	29
LIMITATIONS _____	30
CONCLUSIONS _____	30
TABLES _____	31
ECONOMIC WELLNESS _____	35
MAIN FINDINGS _____	35
BACKGROUND _____	35
RESULTS _____	36
TOTAL FAMILY INCOME IN 2012 _____	36
Farmworker family incomes as compared to Sonoma County _____	36
Missing responses for total family income in 2012 _____	37
MAKING ENDS MEET _____	37
NON-WAGE SOURCES OF INCOME _____	37
REMITTANCES _____	38
BANK ACCOUNTS IN THE US _____	38
FOOD INSECURITY _____	38
Prevalence of food insecurity _____	38
Farmworkers growing food for their own consumption _____	38
Demographics of food insecure farmworkers _____	39
DISCUSSION _____	29
POVERTY _____	39
PUBLICLY-FUNDED ASSISTANCE PROGRAMS _____	40
FOOD INSECURITY _____	40
LIMITATIONS _____	40
CONCLUSIONS _____	40
TABLES _____	42
ACCESS TO HEALTH-RELATED CARE _____	49
MAIN FINDINGS _____	49
BACKGROUND _____	49
RESULTS _____	50
ACCESS TO HEALTH CARE _____	50
Health insurance _____	50
Health insurance coverage: Farmworker families as compared to Sonoma County overall _____	50
Payment for health insurance _____	50
Demographics of farmworkers with health insurance _____	51
Utilization and access to medical care _____	51
Access and barriers to medical care in Sonoma County _____	51
Demographics of farmworkers utilizing “clinic/health center” for medical care _____	52
Last routine check-up with a doctor _____	52
Access to medications _____	52
Colorectal cancer (CRC) screenings _____	52
Access to dental care _____	53
DISCUSSION _____	53
HEALTH INSURANCE COVERAGE FOR FARMWORKERS _____	53
HEALTH INSURANCE AMONG CHILDREN OF FARMWORKERS _____	53
ACCESS TO CARE _____	53
CANCER SCREENINGS _____	54
LIMITATIONS _____	54
CONCLUSIONS _____	54
TABLES _____	56
HEALTH BEHAVIORS AND HEALTH CONDITIONS _____	66
MAIN FINDINGS _____	66
BACKGROUND _____	67
RESULTS _____	67
HEALTH BEHAVIORS _____	67

Current cigarette use _____	67
Binge drinking _____	68
Prevalence of binge drinking _____	68
Frequency of binge drinking _____	68
Nutrition _____	68
Fruit and vegetable consumption _____	68
Access to fruits and vegetables in neighborhood _____	69
Sugar-sweetened beverage consumption _____	69
Diet on the job _____	69
Women’s health _____	69
HEALTH CONDITIONS _____	69
High blood pressure _____	70
Prevalence of ever being diagnosed with high blood pressure _____	70
Medications for high blood pressure _____	70
Demographics of farmworkers ever diagnosed with high blood pressure _____	70
Diabetes _____	70
Prevalence of ever being diagnosed with diabetes _____	71
Medications for diabetes _____	71
Demographics of farmworkers ever diagnosed with diabetes _____	71
Obesity _____	71
Prevalence of obesity _____	71
Mental Health _____	71
Prevalence of depressive disorders _____	71
Demographics of farmworkers that needed additional screening for a depressive disorder _____	72
Self-rated health in general _____	72
Prevalence of Poor or Fair self-rated general health _____	72
Demographics and health behaviors of farmworkers reporting Poor or Fair self-rated general health _____	72
Associations between self-rated general health and selected health outcomes _____	72
DISCUSSION _____	73
BINGE DRINKING _____	73
OBESITY AND SUGAR-SWEETENED BEVERAGES (SSBs) _____	73
HIGH BLOOD PRESSURE _____	73
DIABETES _____	74
HEALTHY AGING _____	74
LIMITATIONS _____	74
CONCLUSIONS _____	75
TABLES _____	76
WORKSITE CONDITIONS AND WELLNESS _____	88
MAIN FINDINGS _____	88
BACKGROUND _____	88
RESULTS _____	88
INJURIES OR POISONINGS _____	88
Prevalence _____	88
Injuries or poisonings by employer type _____	89
Surveillance of pesticide poisonings in Sonoma County _____	89
WORKSITE CONDITIONS _____	90
Reported worksite conditions _____	90
Access to shelter from the weather by employer type _____	90
DISCUSSION _____	91
INJURIES AND POISONINGS _____	91
ACCESS TO SHELTER FROM THE WEATHER _____	91
LIMITATIONS _____	91
CONCLUSIONS _____	91
TABLES _____	93
METHODS _____	96
FARMWORKER HEALTH SURVEY _____	96
SAMPLE _____	96
DATA COLLECTION PROCEDURES _____	96

MEASUREMENT	96
STATISTICAL ANALYSES	97
ACKNOWLEDGEMENTS AND CONTRIBUTIONS	98
REFERENCES	99
APPENDICES	105

Executive Summary

Background

Agriculture is an essential component of the economy in Sonoma County, where wine grapes alone grossed nearly \$600 million in 2012. A healthy agricultural workforce is critical to maintaining the local economy, yet agriculture has been recognized as one of the most demanding and high-risk industries for hired workers. Compared to the general population, farmworkers experience higher rates of unintentional fatal and occupational injuries and a higher prevalence of chronic diseases. Previous research also indicates many farmworkers lack high-quality, affordable housing options and that housing affects many aspects of health. With the goal of identifying preventable disparities, the Sonoma County Farmworker Health Survey (FHS) was conducted in the fall of 2013 to collect local data on the health and well-being of Sonoma County farmworkers.

Main Findings



DEMOGRAPHICS

Farmworkers surveyed (n=293) were mostly male (91%), Latino (95%), young (median = 37 years), and had a low educational attainments (54% had less than a ninth grade education). The majority of farmworkers (88%) reported that Sonoma County was their permanent residence, and most (71%) farmworkers were living in the US with their families. These data suggest that the farmworker labor force in Sonoma County is relatively stable, a trend that is being observed in other communities in California.

Key Finding #1: The majority of farmworkers (88%) are permanent residents of Sonoma County.



HOUSING

Most farmworkers lived in houses (41%) or apartments (45%) in Sonoma County, and essentially no homelessness was reported in this assessment. Thirty percent (30%) of farmworkers were receiving some type of housing support from their agricultural employer. These results suggest that Sonoma County farmworkers are mostly living in off-site, unsubsidized, and privately-owned dwellings in Sonoma County, consistent with trends among California farmworkers overall. The US Department of Housing and Urban Development recommends that housing should require no more than 30% of a family's annual income. Farmworker families earning \$20,000 each year were estimated to spend between 30% and 54% of their annual income on housing, making it clear that farmworkers lack access to affordable housing. Additionally, up to 67% of farmworkers lived in overcrowded dwellings in Sonoma County, and farmworkers who lived with their families were the most likely to live in overcrowded conditions. The health impacts of overcrowded housing conditions are numerous and severe, and children are particularly affected by overcrowded conditions.

Key Finding #2: Farmworkers live in unaffordable and overcrowded housing conditions. 67% Farmworkers reported living in overcrowded dwelling in Sonoma County.



TRANSPORTATION

Prior state-wide research combined with FHS results suggest that farmworkers lack access to safe, reliable, and affordable transportation options in Sonoma County. While the majority (63%) of surveyed farmworkers reported driving a car to their farmwork job in Sonoma County, about 20% of farmworkers utilized *raiteros*, or individuals that farmworkers pay to drive them from place to place. Data from other studies find that *raiteros* can be unsafe and expensive. FHS finds that farmworkers utilizing *raiteros* were spending \$0.10 more per minute of travel than farmworkers using other types of ride sharing like buses. During peak harvest season, the farmworker’s transportation to and from work was estimated to cost 6% of the total annual family income of farmworker families earning \$20,000 each year. This estimate illustrates that work-related transportation is a significant annual cost for farmworker families.



ECONOMIC WELLNESS

An estimated 92% of surveyed farmworker families did not earn enough to meet their family’s basic needs in Sonoma County. Single and childless farmworkers (\$19,000) earned about half the income of Sonoma County one-person households in 2012 (\$36,000). This difference is even more dramatic for farmworker families. Farmworkers living with their families (\$24,000) earned about one-third the income of Sonoma County families in 2012 (\$70,000). Only one in four farmworkers reported that their family received any non-wage income in 2012 (e.g., CalFresh). However, no data was collected on immigration status, so patterns of eligibility for publicly-funded benefits were unknown. Sonoma County farmworkers (17%) reported more food insecurity in the last 12 months when compared to the lowest income (\leq 200% federal poverty level) Sonoma County adults in 2011-12 (11%). Taken together, these data highlight a dramatic economic disparity between farmworkers and even the poorest Sonoma County residents. Extensive research has documented poverty as a strong social determinant of health, which may have tremendous effects on the health and well-being of farmworkers and their families.

Key Finding #3: 92% of Sonoma County farmworker families earn insufficient incomes to meet their family’s basic needs.



ACCESS TO HEALTH-RELATED CARE

Every child in Sonoma County is eligible for health insurance, yet only three in four (77%) children of farmworkers were insured. Thirty percent (30%) of Sonoma County farmworkers had health insurance, about three-times lower than Sonoma County adults in 2011-12 (86%). Farmworkers reported that cost or lack of health insurance were the main barriers to receiving needed medical care and medications in Sonoma County. Three in five (61%) farmworkers that needed medical care in Sonoma County in the last 12 months reported going to a clinic or health center, one in five (21%) reported going to a hospital, and less than 5% reported going to the emergency room. In sum, the low health insurance coverage among Sonoma County farmworkers and their children may be restricting access and utilization of needed medical care.

Key Finding #4: Only 30% of Sonoma County farmworkers reported having health insurance, thereby restricting access to preventive and medical care.



HEALTH BEHAVIORS AND HEALTH CONDITIONS

Sonoma County farmworkers (47%) were three-times more likely to binge drink in the last 30 days when compared to US adults in 2011 (18%). However, the frequency of binge drinking (4.1 occasions in the past 30 days) among Sonoma County farmworkers who binge drank was the same as US adults in 2011. Sonoma County farmworkers (44%) were three-times more likely to report their own general health as *Poor* or *Fair* when compared to Sonoma County adults in 2011-12 (13%). The self-reported prevalence of diabetes among farmworkers (15%) was three-times higher than Sonoma County adults in 2011-12 (5%). One in four (26%) farmworkers had ever been diagnosed with high blood pressure, nearly the same prevalence as Sonoma County adults in 2011-12 (25%). Fewer farmworkers (45%) ever diagnosed with high blood pressure were currently taking high blood pressure medications when compared to Sonoma County adults in 2011-12 (77%). All told, these data highlight health disparities and that Sonoma County farmworkers are at increased risk of chronic diseases like diabetes Type II mellitus and heart disease.

Key Finding #5: Sonoma County farmworkers experience significant health disparities.



WORKSITE CONDITIONS AND WELLNESS

About 1 in 10 (9%) farmworkers reported an injury or poisoning while working in Sonoma County in the last 12 months, and nearly half (48%) of these injuries or poisonings resulted in a workers' compensation claim. Farmworkers that did report an injury or poisoning were more likely to work for a farm labor contractor when compared to farmworkers that worked for the grower or owner (17 vs. 6%). Nearly all farmworkers were provided daily access to drinking water, toilets, and other required worksite amenities. Thirteen percent (13%) of farmworkers lacked consistent daily access to shelter from the heat or weather. Farmworkers working for a contractor or labor management company were less likely to have access to shelter when compared to farmworkers working for the grower or owner (19% vs. 9%).

Why are these findings important?

Sonoma County is world renowned for the beauty, quality and strength of its agricultural economy. Underpinning all of this success are the farmworkers who work the local vineyards, ranches, dairies and fields of its robust agricultural sectors. This survey, the first of its kind, represents an important step towards reducing disparities and achieving health equity for this community. By clearly documenting and understanding the health and well-being of the county's farmworkers, community advocates and stakeholders will now have important local data to identify opportunities to improve health and to help craft and customize the strong local policies, programs and services that best fit the unique needs of Sonoma County's farmworkers and their families.

Conclusions

The majority of Sonoma County farmworkers and their families live year-round in this community. Sonoma County farmworker families are not earning enough to meet their family's basic needs. Farmworkers lack access to affordable housing in Sonoma County, and current housing conditions are overcrowded. The majority of Sonoma County farmworkers lack health insurance, and this lack of insurance is the main barrier to receiving needed medical care. When compared to Sonoma County adults overall, farmworkers are three-times more likely to report their own health as *Fair* or *Poor*, a measure that is considered a good indicator of overall health. Taken together, these data highlight a specific population living with the inequities explored in *A Portrait of Sonoma County*, a Board of Supervisor commissioned report that examines disparities in health, education, and income by neighborhood, ethnicity, and gender.

The Context of Sonoma County

Sonoma County, CA is in the North Bay of the San Francisco Bay area and is surrounded by Napa, Lake, Mendocino, and Marin Counties.

Agriculture in Sonoma County is centered on the wine industry, an intensive and highly capitalized industry with increasing reliance on mechanization and other labor saving innovations. Other agricultural activities also contribute to the local economy, including dairy and livestock, fruits and vegetables, and poultry and fisheries. To support this agriculture, Sonoma County employs between 4,000 and 6,000 permanent farmworkers, a number that increases during peak harvest season when migrant farmworkers arrive. Farmworkers are employed in different ways, including direct employment by farm owners and growers, farm management companies, and labor contractors.

The Human Development Index (HDI), by *Measure of America*, captures outcomes in three areas essential to well-being and access to opportunity. Sonoma County has a HDI of 5.42 out of 10, slightly higher than California's HDI of 5.39. Compared to California overall and to Fresno County, one of the largest agricultural hubs in the nation, Sonoma County has a lower percentage of persons below the poverty level and a lower unemployment rate. The median household income and the percentage of residents with at least a bachelor's degree is higher in Sonoma County. However, the cost of living is also higher in Sonoma County. The self-sufficiency standard, a measure that accounts for cost of living, indicates that a family with two adults, one infant, and one teenager requires \$67,365 in Sonoma County each year to meet their family's basic needs, compared to \$52,865 in Fresno County. Together, these data suggest that while median family income and education are higher in Sonoma County, the cost of living in Sonoma County is much higher than Fresno County.



	Sonoma County, CA	Fresno County, CA	California
Human Development Index ¹	5.42	--	5.39
Persons below poverty level ²	11.9%	26.0%	15.9%
Self-Sufficiency Standard for a family with 2 adults, 1 infant, and 1 teenager ³	\$67,365	\$52,865	--
Median Household Income ²	\$63,356	\$45,563	\$61,094
Unemployment Rate ⁴	4.7%	11.0%	7.5%
Bachelor's Degree or Higher ⁵	32.2%	19.6%	30.7%

¹ A Portrait of Sonoma County and A Portrait of California, Measure of America

² American Communities Survey, 2009-2013

³ Self-Sufficiency Standard for households with 2 Adults, 1 infant, 1 teenager in the specific county in 2014

⁴ Bureau of Labor Statistics, December 2014

⁵ Percent of persons over 25 years, American Communities Survey, 2009-2013

For the Community: Opportunities for Future Research

To our knowledge, the Sonoma County Farmworker Health Survey (FHS) 2013-14 was the first assessment of the health and well-being of farmworkers in Sonoma County. Because it was the first local assessment, FHS focused on collecting high-level and broad data in order to describe the general wellness of Sonoma County farmworkers. FHS results find dramatic health disparities among Sonoma County farmworkers and provide future research direction to the larger community. Future areas of research for the community to explore include:

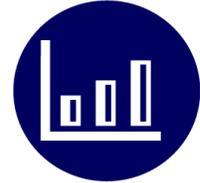
- *Health insurance coverage:* Only 30% of Sonoma County farmworkers had health insurance in the US, and farmworkers reported that only 77% of their children had health insurance in the US. Further research is needed to identify type of health insurance held by the insured farmworkers, barriers to enrolling in health insurance among the uninsured, and safety net options for farmworkers ineligible for Medi-Cal or tax credits or subsidies.
- *Utilization of healthcare:* Health insurance coverage among Sonoma County farmworkers and their children was low. Significant research on the relationship between health insurance and access to and utilization of healthcare indicates that the uninsured are less likely to access healthcare than their insured peers [1, 2]. More research is needed on farmworkers' and their families' access to and utilization of healthcare and any disparities that may exist.
- *Affordable housing options:* Data from the FHS suggest that Sonoma County farmworkers lack access to affordable housing options, and the lack of affordable housing may be leading to the observed overcrowded housing conditions. More information is needed on the type of housing utilized by farmworkers and options for affordable housing.
- *Current health status:* FHS results indicate that Sonoma County farmworkers may be at a disproportionately high risk of chronic diseases. Questions asked in FHS were broad, so more detailed information is needed to understand current health status of farmworkers.
- *Enrollment in publicly-funded benefits:* Only 25% of farmworkers were receiving non-wage income from other sources like CalFresh. Given that nine in ten farmworker families were estimated to not have sufficient incomes to support their basic needs in Sonoma County, more research is needed about eligibility of farmworker families for publicly-funded assistance programs. More information is also needed about the immigration statuses of farmworkers and their families and how that documentation affects enrollment in programs.
- *Excessive alcohol consumption:* Data from FHS show that about half of farmworkers reported binge drinking in the last 30 days, and this prevalence was about three-times higher than US adults. Binge drinking has high individual health costs (e.g., increased risk of unintentional injuries) as well as societal costs (e.g., increased domestic violence) [3-5]. More data is needed on the causes of binge drinking among farmworkers, access to transportation after drinking, and potential mitigations of excessive alcohol consumption.
- *Food insecurity:* Sonoma County farmworkers were significantly more likely to report food insecurity in the last 12 months when compared to the poorest Sonoma County adults in 2011-12. However, only one question was asked about food insecurity, so more information is needed on the true prevalence of food insecurity, sub-populations of farmworkers most at risk, and potential approaches to prevent food insecurity.
- *Homelessness:* Essentially no homelessness was reported by farmworkers in this assessment; however, this finding is inconsistent with the experiences of farmworker service providers. More data is needed to describe the prevalence of homelessness among farmworkers.

Demographics

Main Findings

The majority of farmworkers were permanent residents of Sonoma County. Farmworkers surveyed were mostly male, Latino, young, and lacked education.

The demographics of surveyed farmworkers (n=293) in the Sonoma County Farmworker Health Survey (FHS) 2013-14 are described below.



Farmworker Demographics

CHARACTERISTICS

Among surveyed farmworkers, 91% were male, and the median age was 37 years (range: 18-75 years). The vast majority of farmworkers (95%) reported being Latino or Hispanic, and the majority ethnicity was Mexican (90%), followed by Mexican-American (5%). More than half (54%) of farmworkers had a highest educational attainment of 8th grade or less (Table D1).

ENGLISH PROFICIENCY

Three-quarters (73%) of farmworkers reported speaking English “Not at all” or “A little”, and only 21% of farmworkers reported reading English “Somewhat”, “Well”, or “Very well” (Table D1).

FAMILY STRUCTURE

The US family structure of farmworkers was determined. About 29% of farmworkers reported being single, 4% were single with children, 24% were married or living with a partner, and 43% were married or living with a partner and children. Among farmworkers with children, the median number of children was 2 (range: 1-6; Table D1).

RESIDENCY IN SONOMA COUNTY

Eighty-eight percent (88%) of surveyed farmworkers reported considering Sonoma County their permanent residence, and the majority (85%) reported spending between 10 and 12 months in Sonoma County annually (Table D1).

Working Demographics

Farmworkers were characterized in three ways:

1. Full-time farmworker where their current or previous boss was the owner or grower (full-time, grower);
2. Full-time farmworker where their current or previous boss was a contractor, labor management company (LMC), or the farmworker doesn't know who their boss was (full-time, LMC); or
3. Part-time or seasonal farmworker with any boss (seasonal).

Forty-two percent (42%) of farmworkers reported being full-time, grower-employed farmworkers; 33% were full-time, LMC farmworkers; and 25% were seasonal farmworkers. Nearly all farmworkers (92%) reported working with grapes. Only 5% of farmworkers reported managing other workers. Half of farmworkers reported sources of income outside of farmwork over the last 12 months, meaning that they were doing work other than farmworker for an income (Table D2).

Conclusions

Farmworkers surveyed in FHS were primarily male (91%), Latino/Hispanic (95%), and under 40 years (median = 37 years). About three-quarters of farmworkers were not proficient at speaking or reading English. Most (92%) farmworkers reported working with grapes, so these results may under-represent the responses of livestock and dairy farmworkers in Sonoma County. Forty-three (43%) of farmworkers reported living with a spouse/partner and children in the US, and another 24% were childless but living with their spouse/partner. Nearly all (88%) surveyed farmworkers considered Sonoma County their permanent residence. Together, these results suggest that farmworkers surveyed in the FHS were relatively settled in Sonoma County with their families. These data are supported by data from the National Agricultural Workers Survey (NAWS), which found that 70% of California's hired farmworkers were stable, settled, and living with family members in their home [6].

Tables

TABLE D1. Surveyed farmworker demographics -- FHS, 2013-14

	n	% [§]	Other Statistic
CHARACTERISTICS			
Sex			
Male	267	91.1	
Female	26	8.9	--
Age			
Median (min-max)	--	--	37 (18-75)
18-24	39	13.6	--
25-34	89	31.0	--
35-44	69	24.0	--
45-54	51	17.8	--
55+	39	13.6	
Race			
Latino or Hispanic	272	95.4	--
non-Latino or Hispanic	13	4.6	--
Ethnicity			
Mexican	250	89.9	--
Mexican-American	15	5.4	--
Central American	8	2.9	--
Other	5	1.8	--
Highest educational attainment			
8th grade or less	150	54.0	--
High school equivalent	117	42.1	--
More than high school	11	4.0	--
ENGLISH PROFICIENCY			
Farmworker speaks English...			
Not at all or A little	208	73.0	--
Somewhat, Well or Very well	77	27.0	--
Farmworker reads English...			
Not at all or A little	225	78.9	--
Somewhat, Well or Very well	60	21.2	--
FAMILY STRUCTURE			
Farmworker Family Structure			
Single	83	28.7	
Single + child(ren)	11	3.8	
Median (range) number of children	--	--	2 (1-4)
Married/Living with partner	70	24.2	
Married/Living with partner + child(ren)	125	43.3	
Median (range) number of children	--	--	2 (1-6)
PERMANENT RESIDENCE			
Considers Sonoma County permanent residence			
Yes	250	87.7	--
No	33	11.6	--
Time farmworker spent in Sonoma County in last 12 months			
0 to 3 months	13	4.6	--
4 to 6 months	8	2.9	--
7 to 9 months	11	3.9	--
10 to 12 months	241	84.6	--

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

TABLE D2. Work demographics of surveyed farmworkers -- FHS, 2013-14

	n	% [§]
--	---	----------------

Characterization of farmworker

Full-time farmworker where current or previous boss was owner or grower 123 42.1

Full-time farmworker where current or previous boss was contractor, labor management company or farmworker didn't know 95 32.5

Part-time or seasonal farmworker with any boss 74 25.3

Farmworker reported working with...

Grapes 268 91.5

Other crops, not grapes 25 8.5

Farmworker manages other workers

Yes 14 4.8

No 279 95.2

Farmworker reported boss for current or last farmwork position was...

Grower or owner 160 55.1

Contractor or labor management company 104 35.9

Don't know 26 9.0

Farmworker had other sources of income outside of farmwork in the last 12 months

Yes 146 49.8

No 147 50.1

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

Housing

Main Findings

Housing characteristics Data show that most (86%) farmworkers were living in unsubsidized and privately-owned houses (41%) or apartments (45%) in Sonoma County. No homelessness and use of temporary dwellings was reported in this assessment, but this finding conflicts with the experiences of service providers of the farmworker community. Thirty percent (30%) of farmworkers were receiving some type of support for their housing from their current or previous agricultural employer, including 14% of farmworkers that lived in on-farm housing.

Affordability of housing Each month, the median payment by farmworkers for an apartment was \$800 and median monthly payment for a house was \$500. As such, farmworker families earning \$20,000 per year were estimated to spend between 30% and 54% of their annual income on housing. The US Department of Housing and Urban Development recommends that housing should account for no more than 30% of a family's income, suggesting that farmworkers lack access to affordable housing.

Overcrowding Between 34% and 67% of Sonoma County farmworkers lived in overcrowded dwellings in Sonoma County, and farmworkers who lived with their spouses/partners and children experienced the highest crowding. Due to the high prevalence of overcrowded housing, farmworkers and their families may be at increased risk of the numerous deleterious health and social impacts associated with crowded housing.

Background

Poor housing conditions are a serious public health problem [7]. A large body of research provides evidence that inadequate housing increases risk of infectious diseases, chronic illnesses, injuries, stress, mortality, and others [8-12]. Housing is such a large problem that in 2009 the US Surgeon General issued a Call to Action for healthy homes [13]. Healthy housing is defined as housing that is designed, built, renovated, and maintained in ways that support the health of residents [12, 13]. Housing conditions can have adverse health effects in at least five areas: physical conditions like heat and cold, radon exposure, noise, and ventilation; chemical conditions like carbon monoxide, tobacco smoke, and lead; biological conditions like rodents, cockroaches, and associated allergens; building and equipment conditions like unintentional injuries and poor sanitation; and social conditions like a lack of privacy [12, 14].



The housing options available to California farmworkers have dramatically changed since the 1960s, with a shift from farm labor camps to unsubsidized, off-farm, and privately owned housing for farmworkers [10]. Surveys of farm labor employers from 1986 to 2012 have found a decline in the number of employers that provided housing for seasonal workers [6]. This move to off-farm housing shifted the cost of housing to the farmworkers themselves, leading to many farmworkers and their families now lacking access to affordable housing [10].

Studies throughout California have found that farmworkers and their families very frequently reside in substandard housing conditions. Most notably, farmworker families frequently live in overcrowded conditions, and housing often has molds and other allergens, insects and rodents, and structural and maintenance problems [6, 10, 15]. All of these housing conditions have been associated with risk of disease [8-10, 16].

Results from the Sonoma County Farmworker Health Survey (FHS) 2013-14 describe general trends in the housing of Sonoma County farmworkers and their families.

Results

Farmworkers were asked questions about their housing while working in Sonoma County, including type of housing, cost of housing, employer support for housing, and number of individuals residing in farmworkers' residences.

DESCRIPTION OF HOUSING IN SONOMA COUNTY

The vast majority of farmworkers reported living in apartments (45%) or houses (41%) in Sonoma County. No farmworkers reported living in a homeless shelter, on the street or under a bridge, labor camps, or a campsite or tent. Nearly all farmworkers reported that they had access to the following basic amenities in living spaces in Sonoma County: hot running water (99%), cold running water (99%), flush toilet (99%), bath or shower (99%), stove (98%), and refrigerator (99%; Table H1).

EMPLOYER SUPPORT FOR HOUSING

Some farmworkers received support for their housing from their agricultural employer. Support was defined as on-farm housing or employer-provided, off-farm housing. One in three (30%) farmworkers were given some housing support from their current or previous agricultural employer. More specifically, 14% of farmworkers lived on the farm where they worked, and most of this on-farm housing (78%) was provided for free. The remaining 86% of farmworkers did not live on the farm where they worked. Among those living off-farm, 19% were provided either free or paid housing from their agricultural employer (Figure H1; Table H2).

Together, results suggest two overall trends:

1. Most farmworkers did not live on the farm where they currently worked.
2. Most farmworkers were living in unsubsidized and privately owned dwellings in Sonoma County.

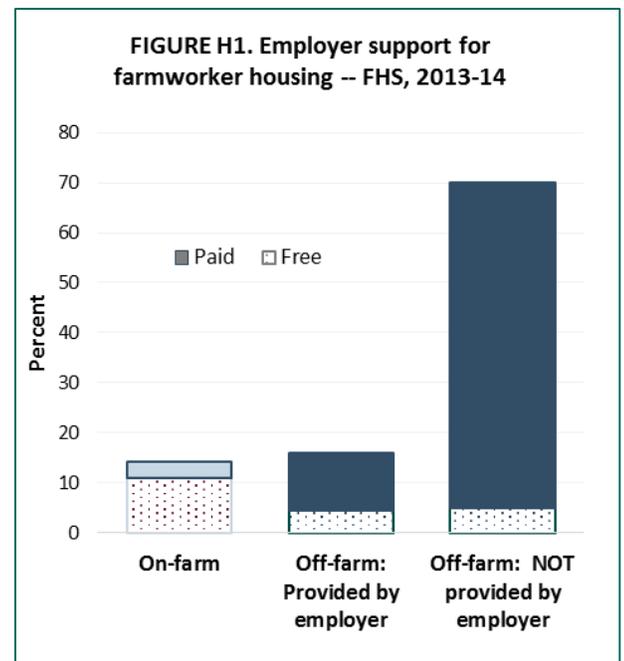
COST OF HOUSING

The median monthly payment for farmworkers' housing overall and by dwelling size was determined. For farmworkers' paying rent for an apartment, the overall median monthly payment was \$800 (range: \$176-\$1400). Most farmworkers reported living in an apartment with two rooms used for sleeping, and

Comparison Groups

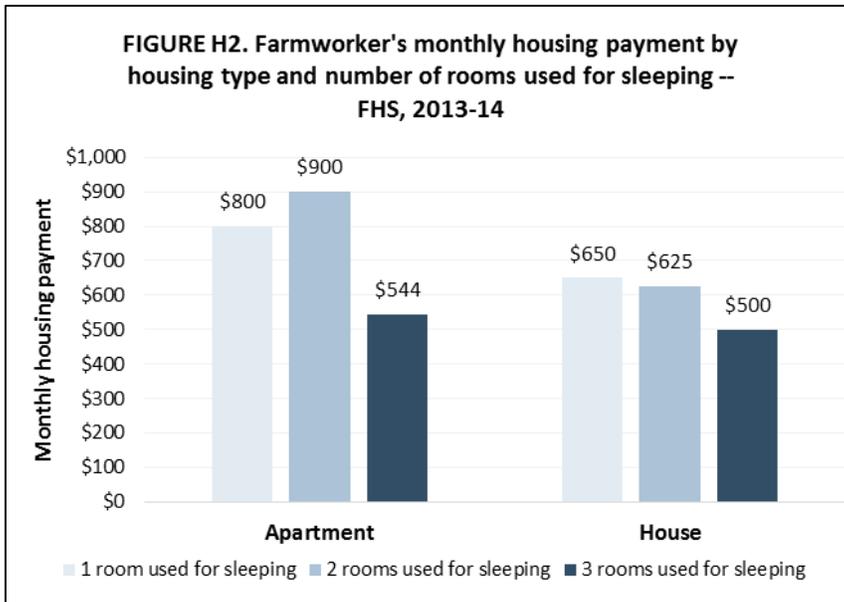
Results of the FHS were compared to findings from other populations in order to identify health disparities among Sonoma County farmworkers. For the *Housing* section, comparison groups included:

Farmworker variable	Who are farmworkers compared to?	Where do the data come from?
Median monthly payment for housing	Fair Market Rent prices for Sonoma County housing for the 2013 fiscal year	US Department of Housing and Urban Development, 2013 fiscal year
Overcrowded housing	US households in 2005	American Housing Survey (AHS) 2005



the median monthly payment for this type of space was \$900 (range: \$176-\$1400). The overall median monthly payment for farmworkers living in a house was \$500 (range: \$50-\$3500). For houses with two rooms used for sleeping, the median monthly payment was \$625 (range: \$200-\$1275; Figure H2; Table H3).

The Fair Market Rent (FMR) prices for Sonoma County in the fiscal year 2013 priced a two-bedroom unit at \$1,332 per month (Table H4). Based on this information, farmworkers were typically paying less than FMR in Sonoma County. However, about a quarter (27%) of farmworkers earned \$19,000 or less in 2012 and another quarter (26%) earned between \$20,000 and \$29,000 in 2012 (Table E1), so housing likely required a significant proportion of farmworker’s annual earnings. For example, housing costs would account for between 30% and 54% of the annual income of farmworkers earning \$20,000 per year¹. This rough estimate was developed only to illustrate that housing requires a large portion of farmworker family’s annual income. Housing costs were not adjusted for the number of people living in dwellings (due to small sample sizes), so the number of rooms in the dwelling farmworkers were renting was unknown.



OVERCROWDING

Overcrowding in terms of persons-per-room (PPR)² and persons-per-room used for sleeping (PPRS; PPRS is a proxy for persons-per-bedroom (PPRB))³ was assessed.

Prevalence of farmworkers living in overcrowded housing

On average, there were 5.2 (standard deviation (sd) = 3.4) people sleeping in farmworkers’ dwellings, and an average of 1.3 children (sd = 1.4) living in these residences. In FHS, two-thirds (67%) of farmworkers lived in overcrowded dwellings categorized as more than 1.5 PPR. In the US in 2005, only 0.6% of Americans resided in overcrowded dwellings as measured by PPR [17]. As measured by PPRS, about one-third (34%) of Sonoma County farmworkers lived in overcrowded residences or those with more than 2.0 PPRS. Only 3% of Americans resided in overcrowded dwellings in terms of PPB in 2005 (Table H5) [17]. It should be noted that comparison data from the US in 2005 [18] were collected before the economic recession in 2007-2009, so housing statistics in the US may have changed somewhat dramatically since that time.

Overcrowded housing by farmworker family structure

The family structure⁴ of farmworkers was accounted for when considering overcrowded housing conditions. As measured by PPR and PPRS, farmworkers living with their spouse/partner and children

¹ Median monthly housing payments ranged from \$500 to \$900 per month (Table H3) or \$6,000 to \$10,800 per year.

² PPR = # of people sleeping in the dwelling/ # of rooms in the dwelling

³ PPRS = # of people sleeping in the dwelling/ # of rooms used for sleeping in the dwelling

⁴ Family structures: married/living with a partner and children, married/living with a partner without children, or single with and without children

were significantly more likely to live in overcrowded dwellings when compared to farmworkers that were living only with their spouse/partner or were single (*p-values*<0.05; Table H6).

Discussion

TYPE OF HOUSING

Results of FHS find that most farmworkers were living in off-farm apartments or houses in Sonoma County, which is consistent with prior studies showing that housing for California farmworkers has shifted to off-site and privately rented housing [6, 10]. No homelessness and use of temporary dwellings was observed among Sonoma County farmworkers surveyed in this assessment. This finding conflicts with the observations of service providers who report that many farmworkers experience homelessness.

AFFORDABILITY OF HOUSING

According to the US Department of Housing and Urban Development (HUD), housing should account for no more than 30% of a family's income [19, 20]. In Sonoma County, farmworkers earning \$20,000 per year were estimated to spend roughly 30% and 54% of their annual income on housing. Given HUD's threshold of 30%, results indicate that Sonoma County farmworkers and their families lack access to affordable housing. Housing is the single largest expenditure for most households, and high housing prices leave low-income families with little funds to go towards food, medical care, and other basic necessities that support well-being. As such, the cost of housing has the potential to dramatically affect all domains of life subject to budget constraints - including health [19, 21].

OVERCROWDING

Between 34% and 67% of farmworkers surveyed in FHS lived in overcrowded dwellings in Sonoma County. Overcrowded housing conditions can have serious health consequences. Crowding increases transmission of infectious diseases such as tuberculosis and respiratory infections [9, 22-25]. Overcrowding can increase the interior moisture in dwellings [9], and cold, damp, and molding housing conditions are associated with respiratory conditions [26-30], headaches, fever, nausea, and others [31]. FHS reveal that surveyed farmworkers who lived with their spouses/partners and had children in their dwelling experienced the highest crowding. This is alarming because overcrowding can have an especially negative impact on the health of children [32]. Studies find that crowding has negative effects on the mental health [33], ability to cope with stress [34], interactions between children and parents [35], social relationships, and sleep [33] of children. Crowded conditions can also increase children's risk of injuries [36], blood pressure [35], respiratory conditions [37], and exposure to infectious diseases [32], and malnutrition [9, 32, 38, 39].

LIMITATIONS

FHS did not account for the relative size of farmworker dwellings. This is important because a larger dwelling (more square footage) with 2.0 PPR may offer more privacy and seem less crowded than a smaller dwelling with 2.0 PPR. The comparison overcrowding data for the US overall [17] was collected before the recession in 2007, so housing statistics may have changed since that time. Other than questions about basic amenities, the conditions of dwellings were not measured here. For example, no data was collected on presence of mold, rodents, lack of privacy, and others.

CONCLUSIONS

Overall, this assessment finds that surveyed Sonoma County farmworkers lived in unaffordable and overcrowded housing conditions. Most farmworkers were not receiving support for housing from their current agricultural employer, which was consistent with results from other studies in California.

Technical Notes

There are many methods for defining overcrowded housing, but the two measures utilized in this analysis were persons-per-room (PPR) and persons-per-room used for sleeping (PPRS). PPR was measured as the number of people sleeping in the dwelling divided by the number of rooms in the dwelling. A PPR of more than 1.5 is consistently considered overcrowded [30]. In FHS, the number of bedrooms in the dwelling was not measured, but the number of rooms used for sleeping was measured. As such, PPRS was utilized and measured as number of people sleeping in the dwelling divided by the number of rooms used for sleeping in the dwelling. The PPRS measure is a proxy for the persons-per-bedroom (PPB) measure usually used. As compared to PPR, PPB better reflects the rules and standards used by HUD assisted housing [30]. Data from the 2005 American Housing Survey (AHS) for the United States [31] was used to develop comparison overcrowding statistics [30]. To develop a comparison group for rental prices in Sonoma County in 2013, the Fiscal Year (FY) 2013 Fair Market Rent (FMRs) for Sonoma County, CA were obtained from HUD. HUD's FMR calculation methodology has been published elsewhere [48].

Tables

TABLE H1. Characteristics of surveyed farmworker's housing in Sonoma County -- FHS, 2013-14

	n	%
Description of housing while in Sonoma County^{†§}		
Apartment	131	44.7
House	120	41.0
Trailer	18	6.1
Motel or Hotel	10	3.4
Dormitory or Bunkhouse	8	2.7
Car	3	1.0
Garage, attached to or separate from the house	2	0.7
Other	2	0.7
Campsite or tent	0	0.0
Homeless Shelter	0	0.0
On the street or under a bridge	0	0.0
Labor Camp	0	0.0
Farmworker had the following amenities in the place where they live in Sonoma County[¶]		
Hot running water	289	99.3
Cold running water	289	99.3
Flush toilet	288	99.0
Bath or shower	288	99.0
Stove	285	97.9
Refrigerator	287	98.6

Abbreviations: n = number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[¶] Row percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

TABLE H2. Employer's support for farmworker's housing in Sonoma County -- FHS, 2013-14

	n	% [§]
Any support^a provided by agricultural employer for farmworker's housing		
Support for housing from employer	87	30.1
No support for housing from employer	202	69.9
Detailed description of agricultural employer support for farmworker's housing		
<i>On-farm housing</i>	41	14.2
Free housing	32	78.0
Pays for housing	9	22.0
<i>Off-farm housing</i>	248	85.8
<u>Employer provides housing</u>	46	18.5
Free housing	13	28.3
Pays for housing	33	71.7
<u>Employer does not provide housing</u>	202	81.5
Free housing	14	6.9
Pays for housing	188	93.1

Abbreviations: n = number

[§] Column percents shown; Percentages are provided for each indent level;

Percentages might not add to 100 because of rounding

^a Support is defined as on-farm housing or employer provided off-farm housing

TABLE H3. Monthly cost of surveyed farmworker's housing in Sonoma County -- FHS, 2013-14

	n	median (min-max)
Farmworkers' median monthly housing payment by housing type		
Apartment	119	\$800 (\$176-\$1400)
1-room used for sleeping	16	\$800 (\$400-\$1000)
2-rooms used for sleeping	69	\$900 (\$176-\$1400)
3-rooms used for sleeping	27	\$544 (\$220-\$1300)
House	76	\$500 (\$50-\$3500)
1-room used for sleeping	5	\$650 (\$600-\$700)
2-rooms used for sleeping	14	\$625 (\$200-\$1275)
3-rooms used for sleeping	34	\$500 (\$170-\$3500)

Abbreviations: n=number; min = minimum; max = maximum

† Respondent may have said yes to more than one category

TABLE H4. Fair Market Rent (FMR) prices for Sonoma County -- HUD, 2013 fiscal year

	<u>FMRs By Unit Bedrooms</u>				
	Efficiency	One-Bedroom	Two-Bedroom	Three-Bedroom	Four-Bedroom
Monthly rent	\$873	\$1,018	\$1,332	\$1,963	\$2,301

TABLE H5. Overcrowded housing among surveyed Sonoma County farmworkers as compared to the US in 2005 -- FHS, 2013-14 and AHS, 2005

	Farmworkers ¹			United States ²
	n	% [§]	mean (s.d.)	% [§]
Total number of people sleeping where farmworker lives	284	--	5.2 (3.4)	--
Number of children sleeping where farmworkers lives	284	--	1.3 (1.4)	--
Persons-per-room (PPR)^a	281	--	2.0 (0.9)	--
0-1 [Not overcrowded]	55	19.6	--	97.6
>1 to 1.5 [Moderately overcrowded]	38	13.5	--	1.8
>1.5 [Overcrowded]	188	66.9	--	0.6
Persons-per-room used for sleeping (PPRS)^b	281	--	2.1 (1.0)	--
0-1 [Not overcrowded]	41	14.6	--	73.9
>1 to 2 [Not overcrowded]	145	51.6	--	23.5
>2 [Overcrowded]	95	33.8	--	2.7

Abbreviations: n=number; sd = standard deviation

¹ Data from Sonoma County Farmworkers Health Survey (FHS), 2013-14

² Data from the American Housing Survey, 2005 found at:

http://www.huduser.org/publications/pdf/measuring_overcrowding_in_hsg.pdf

[§] Column percents shown; Percentages might not add to 100 because of rounding

^a Persons-per-room (PPR) was calculated as: # of people sleeping in the dwelling/# of rooms in the dwelling

^b Persons-per-room used for sleeping (PPRS) was calculated as: # of people sleeping in the dwelling/# of rooms used for sleeping in the dwelling

TABLE H6. Surveyed farmworkers living in overcrowded housing by farmworker's family structure -- FHS, 2013-14

	Married/Living with partner and children n (Col %)	Married/Living with partner n (Col %)	Single n (Col %)	χ^2 p
Persons-per-room (PPR)^a				
0-1.5 [Not overcrowded]	32 (25.8)	30 (44.1)	29 (33.7)	0.03
>1.5 [Overcrowded]	92 (74.2)	38 (55.9)	57 (66.3)	
Persons-per-room used for sleeping (PPRS)^b				
0-2 [Not overcrowded]	73 (58.9)	50 (74.6)	62 (71.3)	0.05
>2 [Overcrowded]	51 (41.1)	17 (25.4)	25 (28.7)	

Abbreviations: n=number; Col % = column percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05

^a Persons-per-room (PPR) was calculated as: # of people sleeping in the dwelling/# of rooms in the dwelling

^b Persons-per-room used for sleeping (PPRS) was calculated as: # of people sleeping in the dwelling/# of rooms used for sleeping in the dwelling

Transportation

Main Findings

Access to safe, reliable, and affordable transportation The majority (63%) of surveyed Sonoma County farmworkers reported driving a car to their job, and implementation of California Assembly Bill 60 provides the opportunity to ensure that all Sonoma County farmworkers have a California driver's license. Few surveyed farmworkers reported using public transportation (3%) or a labor truck, bus or van (3%). One in five (20%) surveyed farmworkers reported utilizing *raiteros* (people paid by farmworkers to drive them from place to place), and farmworkers that used *raiteros* were paying more for travel than farmworkers using other types of ride sharing. The increased cost of *raiteros* in the Farmworker Health Survey (FHS) are consistent with previous studies that have shown that *raiteros* can be an expensive, unreliable, and unsafe form of transportation.

Cost of transportation For surveyed farmworkers traveling the median of 25 minutes to get to work, the cost of travel to get to work was estimated to be \$4.25. During peak harvest season from May to September, farmworker's transportation to and from their farmwork job was estimated to cost about 6% of the total annual family income for farmworker families earning \$20,000 per year. This estimate is significant because it does not address transportation costs for the rest of the year or for other family members. These data highlight the need for low-cost transportation options for Sonoma County farmworkers.

Background

Farmworkers endure potentially dangerous conditions on the way to and from work due to their limited transportation options. Most farmworkers earn very low wages, which can restrict access to a reliable and well-maintained car, insurance, and fuel. Public transportation networks often don't reach the remote areas where farms are located [41]. This frequently leaves farmworkers without affordable, safe, and reliable methods to get to work, and can result in some workers driving their own vehicle with or without a license [42]. Farmworkers that don't drive often share rides with others, including the use of *raiteros* [41, 42] or individuals that farmworkers pay to drive them from place to place [43]. Farmworkers that ride with others can be subject to inconsistent and exorbitant costs, dangerous conditions, and unsafe vehicles [42].

Data from the Sonoma County Farmworker Health Survey (FHS) 2013-14 describe general trends in transportation of surveyed Sonoma County farmworkers.



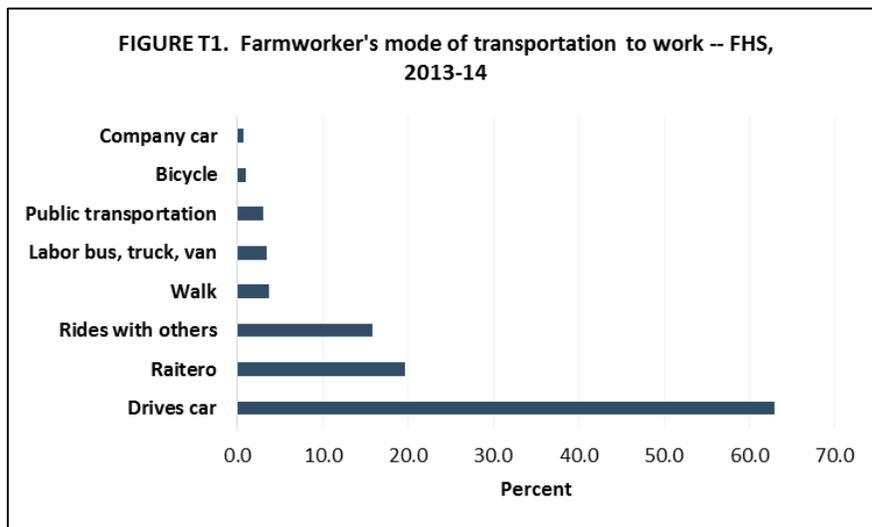
Results

Farmworkers were asked questions about transportation in Sonoma County, including mode of transportation to work, time and cost of getting to work, and locations of travel.

MODE OF TRANSPORTATION

Sixty-three percent (63%) of surveyed farmworkers in Sonoma County reported driving a car to their current or most recent farmwork job. About 20% of farmworkers reported utilizing *raiteros*⁵ and 16% rode with others to work. Very few farmworkers reported walking (4%), using a labor bus, truck, or van (3%), public transportation (3%), a bicycle (1%), or a company car (1%) to get to work (Figure T1; Table T1). It should be noted that surveyed farmworkers

may have been utilizing more than one type of transportation and so their responses could be represented in more than one category. Forty percent (40%) of farmworkers reported using some type of ride sharing to get to their current or previous farmwork job in Sonoma County. Among those that used ride sharing, about half (49%) utilized *raiteros* (Table T1).



TIME AND COST

Typical time and cost of transportation to work in Sonoma County

On a typical day in Sonoma County, the median number of minutes required for surveyed farmworkers to travel to work was 25 minutes (range: 0-150 minutes), and the median daily cost of transportation for farmworkers was \$8⁶ (range: \$0-\$100). The adjusted daily cost of transportation for each minute getting to and from work was a median of \$0.17 per minute of travel⁷ (range: \$0.00-\$1.67; Table T1). For farmworkers traveling the median of 25 minutes to get to work, the cost of travel to get to work was estimated to be \$4.25.

Estimated cost of transportation during peak harvest season

Farmwork is often seasonal and the location of work may change regularly, meaning that transportation costs for farmworkers likely varies greatly throughout the year. However, a rough estimate of spending on transportation during peak harvest season was calculated. This estimate is provided only to illustrate that transportation is a significant cost for farmworker families. Peak harvest season in California is from May to September [6]. During this five-month timeframe, farmworkers were likely to incur daily transportation costs to their farmwork jobs. Using the self-reported median daily transportation cost of \$8 (Table T1), surveyed farmworkers were estimated to spend \$1,224 on transportation during the 153 day peak harvest season. For farmworker families earning \$20,000 a year, this daily transportation cost for the farmworker during peak harvest season was estimated to account for roughly 6% of the total

⁵ Individuals that farmworkers pay to drive them from place to place

⁶ 14% of farmworkers did not know their daily transportation costs, so the data presented here is complete and should be interpreted with caution.

⁷ 16% of data was missing for this variable (including those that did not know their daily cost of transportation), so this estimate may not provide complete picture of adjusted daily transportation costs.

annual family income, without including the transportation costs for the rest of the year or for other family members.

Cost of using raiteros

The adjusted daily cost of travel was analyzed to determine if transportation costs were different for surveyed farmworkers using *raiteros*, other types of ride sharing⁸, or no ride sharing⁹. There were significant differences in adjusted daily travel cost between farmworkers using *raiteros*, those using other types of ride sharing, and farmworkers not utilizing ride sharing ($p < 0.001$). Farmworkers that used *raiteros* were spending significantly more on transportation per minute of travel to and from work each day when compared to farmworkers using other types of ride sharing (\$0.21/minute of travel vs. \$0.11/minute of travel, respectively; $p < 0.05$). Farmworkers reported using no ride sharing also spent significantly more on transportation per minute of travel when compared to farmworkers using other types of ride sharing (\$0.23/minute of travel v. \$0.11/minute of travel, respectively; $p < 0.05$; Table T2).

ESTIMATED TRANSPORTATION ROUTES TO WORK

Data on the cities or towns where surveyed farmworkers reported living and working were analyzed. These data were intended to be used to identify key locations for transportation and other services for farmworkers. Thirty-eight percent (38%) of surveyed farmworkers reported living in Santa Rosa, another 25% lived in Healdsburg, about 8% each reported living in Cloverdale and Windsor, and 7% lived in Sonoma. While in Sonoma County, 33% of farmworkers reported working in Healdsburg, 16% in Geyserville and surrounding areas, 15% in Sonoma, 12% in Windsor, and 12% in Santa Rosa (Table T3). The top five combinations of living and working locations were: 1. Healdsburg to Healdsburg (17%), 2. Santa Rosa to Santa Rosa (9%), 3. Sonoma to Sonoma (7%), 4. Santa Rosa to Healdsburg (6%), 5. Geyserville to Geyserville or surrounding areas (5%). These results suggest that over a third of surveyed farmworkers are living and working in the same city or geographic region (Table T4).

Discussion

ACCESS TO SAFE, RELIABLE, AND AFFORDABLE TRANSPORTATION

As discussed in the Housing section of this report, 86% of farmworkers surveyed were not living on the farm where they currently worked, so farmworkers need safe and reliable transportation to get from their homes to the place where they work. Results of this assessment show that the majority (63%) of surveyed farmworkers drove a car to their job in Sonoma County. Implementation of California Assembly Bill 60 (AB60) began in January 2015, and this bill provides the opportunity to ensure that all Sonoma County farmworkers obtain a California driver's license [44, 45].

Results of this assessment suggest a shortage of safe, cost effective, and reliable transportation options for farmworkers that do not drive a car to work. Only 3% of surveyed farmworkers reported using public transportation, but this result is not surprising given the remote location of farms and vineyards in Sonoma County. Very few farmworkers reported using a labor truck, bus, van, or a company car to get to work. However, farmworkers did report using *raiteros*, and farmworkers that used *raiteros* were paying more for travel than farmworkers using other types of ride sharing. This result is consistent with other reports that *raiteros* often charge excessive and unreliable fare rates for their services [41, 42].

COST OF TRANSPORTATION

For surveyed farmworkers traveling the median of 25 minutes to get to work, the cost of travel to get to work was estimated to be \$4.25. During peak harvest season from May to September, farmworkers' transportation to and from their farmwork job was estimated to cost 6% of the total annual family

⁸ Other ride sharing includes riding with others, labor bus, truck, van, or public transportation and excludes *raiteros*

⁹ No ride sharing includes driving a car, walking, or bicycling

income of farmworker families earning \$20,000 per year. This 6% is significant when considering that this estimate does not address the transportation costs for the rest of the year or for other family members. These data highlight the need for low-cost transportation options in Sonoma County to relieve the financial burden of traveling to and from work [41]. Most surveyed farmworkers in Sonoma County reported living and working in the same geographic region of the county, so any transportation provided specifically to farmworkers should explore intra-city routes in addition to inter-city/region routes.

LIMITATIONS

Data on the safety and quality of the farmworker's transportation mode was not collected. For example, no data was collected on the experience of farmworkers utilizing *raiteros* in Sonoma County. No data was collected on the extent to which farmworkers had the qualifications (driver's license, insurance, registration) needed to drive to work.

CONCLUSIONS

Results of this assessment highlight the need for low-cost, reliable, and safe transportation services specifically serving the farmworker population in Sonoma County. There are many models for providing safe transportation to farmworkers, including the use of van pools. More research is needed to determine the extent to which farmworkers would utilize these transportation services. Additionally, undocumented farmworkers can now apply for a driver's license under AB60, which may change the transportation preference for many Sonoma County farmworkers.

Technical Notes

Ride sharing was defined as: *raitero*, rides with others, labor bus, truck, van, or public transportation. There were three levels of ride sharing in the trichotomous ride sharing variable: *raitero*, ride sharing other than *raiteros* (rides with others, labor bus, truck, van, or public transportation), or no ride sharing (driving a car, walking, or bicycling). The adjusted daily cost of transportation for each minute getting to and from work was calculated as: Total daily cost of transportation/(Minutes to get to current or previous farmwork job on a typical day in Sonoma County * 2). Since only time needed to get to work was measured, the assumption was made that travel time from work at the end of the day required the same number of minutes as were needed to get to work. An Analysis of Variance (ANOVA) was used to test for differences in the means between the trichotomous ride sharing variable at $\alpha=5\%$. Once differences between means were identified, the Tukey-Kramer test was used to test for significant differences in pairwise comparisons of all combinations of means at $\alpha=5\%$.

Tables

TABLE T1. Characteristics of surveyed farmworkers' reported transportation in Sonoma County -- FHS, 2013-14

	n	% [§]	median (min-max)
Transportation method farmworker took to work at current or most recent farmwork job[†]			
Drives car	183	62.9	--
<i>Raitero</i>	57	19.6	--
Rides with others	46	15.8	--
Walk	11	3.8	--
Labor bus, truck, van	10	3.4	--
Public transportation	9	3.1	--
Bicycle	3	1.0	--
Company car	2	0.7	--
Farmworker uses ride sharing^a to get to work at current or previous farmwork job			
Yes	116	39.9	--
No	175	60.1	--
Type of ride sharing worker used to get to work at current or previous farmwork job			
<i>Raitero</i>	57	49.1	--
Other ride sharing	59	50.9	--
On a typical day, travel time (minutes) to current or previous farmwork job in Sonoma County			
	--	--	25 (0-150)
Median daily cost of transportation[^]			
	252	--	\$8 (\$0-\$100)
Daily cost of transportation for each minute of travel to and from work[^]			
	246	--	\$0.17 (\$0.00-\$1.67)

Abbreviations: n=number; min = minimum; max = maximum

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Types of ride sharing were: *Raitero*, rides with others, labor bus, truck, van, or public transportation

TABLE T2. Surveyed farmworkers' daily transportation cost by farmworkers utilizing *raiteros*, other ride sharing, and no ride sharing -- FHS, 2013-14

	Total daily cost of transportation [^]		Daily cost of transportation for each minute of travel to and from work [^]	
	mean (sd)	ANOVA p	mean (sd)	ANOVA p
<i>Raitero</i>	\$13.60 (15.49)*	0.01	\$0.21 (0.20)*	0.001
Other ride sharing ^a	\$6.70 (8.39)		\$0.11 (0.11)	
No ride sharing	\$10.53 (10.51)		\$0.23 (0.22)**	

Abbreviations: n=number; sd = standard deviation; ANOVA p = Analysis of Variance p-value

Bold indicates p-value<0.05

*Significant difference in means between *Raitero* compared to Other ride sharing.

**Significant difference in means between No ride sharing compared to Other ride sharing.

[^] Greater than 10% of responses missing, so results should be interpreted with caution

TABLE T3. Closest city or town to where surveyed farmworkers reported living and working in Sonoma County -- FHS, 2013-14

	n	% [§]
Cities/towns where farmworkers reported living while working in Sonoma County		
Santa Rosa	109	38.1
Healdsburg	72	25.2
Cloverdale	22	7.7
Windsor	22	7.7
Sonoma	21	7.3
Geyserville	18	6.3
Petaluma	14	4.9
Sebastopol	4	1.4
South of Sonoma County	4	1.4
Cities/towns where farmworkers reported working while working in Sonoma County[†]		
Healdsburg	91	32.9
Geyserville or surrounding areas	43	15.5
Sonoma	41	14.8
Windsor	33	11.9
Santa Rosa	32	11.6
Sebastopol, Graton, or surrounding areas	19	6.9
Napa or surrounding areas	12	4.3
Cloverdale	11	4.0
Petaluma	11	4.0

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

TABLE T4. Top 10 most common living and working locations among surveyed farmworkers in Sonoma County -- FHS, 2013-14

	n	% [§]
Living to working locations[†]		
Healdsburg to Healdsburg	51	17.4
Santa Rosa to Santa Rosa	26	8.9
Sonoma to Sonoma	21	7.2
Santa Rosa to Healdsburg	17	5.8
Geyserville to Geyserville or surrounding areas	15	5.1
Santa Rosa to Windsor	12	4.1
Santa Rosa to Sebastopol, Graton, or surrounding areas	11	3.8
Santa Rosa to Geyserville or surrounding areas	9	3.1
Healdsburg to Geyserville or surrounding areas	9	3.1
Cloverdale to Healdsburg	9	3.1

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

[‡] Provides information on the city or town where farmworkers lived and where they reported working while in Sonoma County. Results for working locations were not mutually exclusive.

Economic Wellness

Main Findings

Income and poverty An estimated 92% of surveyed farmworker families did not earn enough to meet their family's basic needs in Sonoma County. Fifty-eight percent (58%) of farmworkers reported sending remittances in 2012, and the median remittance was \$3,000 annually among farmworkers that did send remittances. When compared to the median Sonoma County one-person household income in 2012 (\$35,510), single and childless farmworkers that permanently resided in Sonoma County were earning about half of Sonoma County one-person households overall (\$18,750). When compared to the median Sonoma County family household income in 2012 (\$69,920), farmworkers that permanently resided in Sonoma County and lived with a spouse/partner and/or children were earning about one-third of what Sonoma County family households were earning overall (\$23,750). These data suggest an economic disparity between farmworker and Sonoma County households, and farmworkers' low socioeconomic status may have deleterious effects on their health.

Non-wage sources of income Only 25% of surveyed farmworkers reported that their family received income from non-wage sources in 2012, such as CalFresh. Among farmworkers that did report other sources of income, 12% reported income from CalFresh, 12% reported income from the Women, Infants, and Children (WIC) Program, 6% reported income from unemployment benefits, and less than five individuals reported income from Earned Income Tax Credits. Data on immigration status was not collected, so eligibility for publicly-funded assistance programs was unknown.

Food insecurity Seventeen percent (17%) of surveyed Sonoma County farmworkers experienced food insecurity in the last 12 months, which was significantly higher than the 11% of Sonoma County adults at or below 200% of the Federal Poverty Level in 2011-12 that reported food insecurity in the last 12 months ($p < 0.0001$). Food insecurity in the US is primarily caused by a lack of financial resources, suggesting an economic disparity among Sonoma County farmworkers.

Background

Socioeconomic differences in health and mortality are well documented and recognized as a serious public health problem [46-51]. Longitudinal studies have shown that low income and low educational attainment, key socioeconomic indicators, are associated with increased mortality from cardiovascular disease, premature death, and other medical conditions [46-48, 52]. According to the National Agricultural Workers Survey in 2007-2009, the average total family income for farmworkers across the US was between \$17,500 and \$19,999, and 23% of farmworkers were living below federal poverty guidelines [53]. These data suggest that many farmworkers and their families have a low socioeconomic status that may increase risk of poor health outcomes.

Here, the economic wellness of farmworkers in Sonoma County, CA is described using data from the Sonoma County Farmworker Health Survey (FHS) 2013-14.



Results

FHS measured several aspects of economic wellness, including questions related to total family income for 2012, other sources of income, remittances¹⁰, bank accounts in the US, and food insecurity.

TOTAL FAMILY INCOME IN 2012

Farmworker family incomes as compared to Sonoma County

Surveyed farmworkers were asked about their total family income from employment in 2012 excluding publicly-funded benefits (e.g., Social Security). Among all farmworkers that did report a total family income for 2012, 81% earned \$29,999 or less in 2012¹¹ (Figure E1; Table E1).

The 2012 median total family income for surveyed farmworkers that considered Sonoma County their permanent residence was compared to the 2012 median incomes for Sonoma County households overall. The median 2012 total family income of single, childless farmworkers that considered Sonoma County their permanent residence (n=34) was \$18,750 (Figure E2; Table E1). When compared to the \$35,510 median income of Sonoma County one-person households in 2012, single and childless farmworkers were earning about half of one-person households in Sonoma County overall (Figure E2; Table E1).

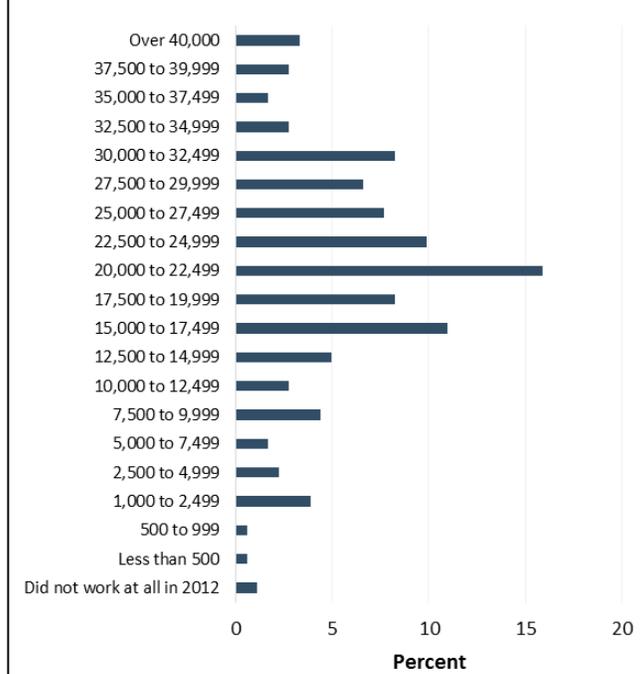
The median 2012 total family income of farmworkers that considered Sonoma County their permanent residence and were living with their spouse/partner and/or children (n=121) was \$23,750. When compared to the \$69,920 median income of Sonoma County family households in 2012, farmworkers were earning about one-third of what Sonoma County family households overall were earning in 2012 (Figure E2; Table E1).

Comparison Groups

Results of the FHS were compared to findings from other populations in order to identify health disparities among Sonoma County farmworkers. For the *Economic Wellness* section, comparison groups included:

Farmworker variable	Who are farmworkers compared to?	Where do the data come from?
Median total family income in 2012 for single and childless farmworkers who considered Sonoma County their permanent residence	The median incomes of Sonoma County one-person households in 2012	Median one-person household income inflation-adjusted dollars in the past 12 months in 2012 for Sonoma County, American Communities Survey (ACS) 2012 1-year estimate, Table B19019
Median total family income in 2012 for farmworkers living with their spouse/partner and/or children who considered Sonoma County their permanent residence	The median incomes of Sonoma County family households in 2012	Median family income in the past 12 months in inflation-adjusted dollars in 2012 for Sonoma County, American Communities Survey (ACS) 2012 1-year estimate, Table B19113
Food insecurity in the last 12 months	Sonoma County adults living at or below 200% of the Federal Poverty Limit (FPL) in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file

FIGURE E1. Farmworker total family income in 2012, excluding social benefits -- FHS, 2013-14



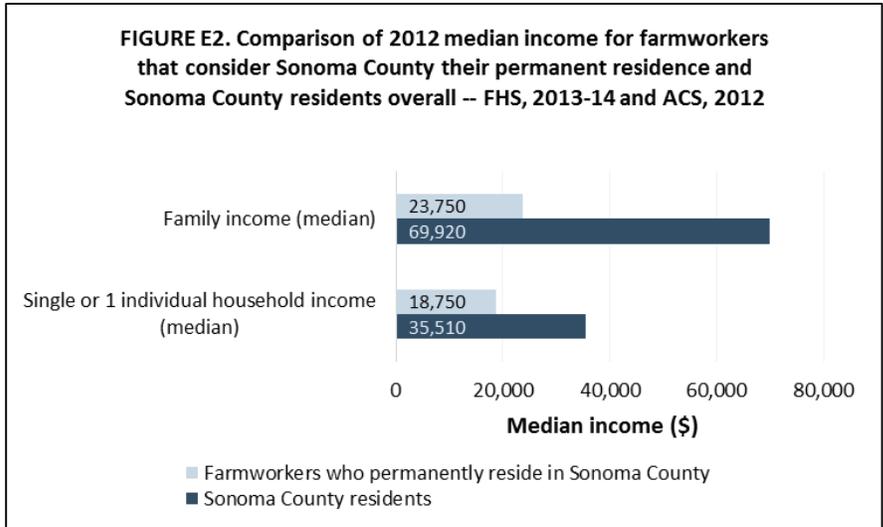
¹⁰ A remittance is defined as a transfer of money by a foreign worker to an individual in their home country.

¹¹ For all analyses of farmworker total family income, 38% of data is missing, so these data do not fully represent the incomes of farmworker families in Sonoma County.

Missing responses for total family income in 2012

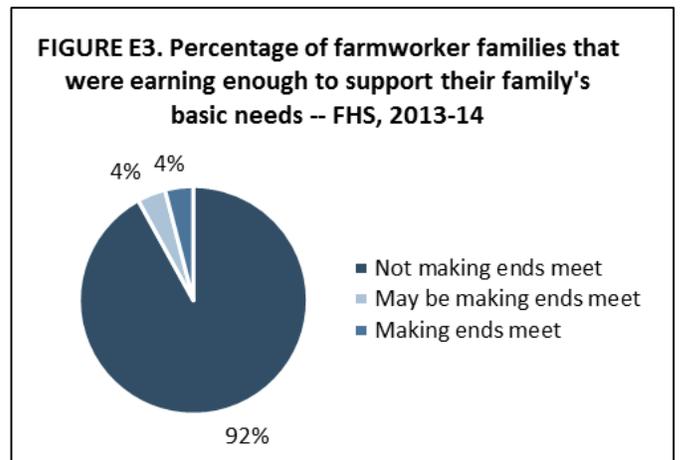
Over one-third (38%) of surveyed farmworkers did not report a total family income for 2012 (i.e., 38% of data was missing for total family income), including the 96 farmworkers that did not know or remember their total family income for 2012. Fifteen farmworkers skipped the question. The demographics of farmworkers with missing income data was explored. Women were significantly more likely than men to not report an

income ($p=0.03$), and individuals without a bank account in the US were significantly more likely to not report an income compared to individuals with a bank account ($p=0.01$). Single farmworkers were marginally significantly more likely to have missing income data when compared to farmworkers with other family structures ($p=0.08$). No association was observed between missing income data and age of farmworker, permanent residence in Sonoma County, or the method of payment for the farmworker's current or previous job (Appendix E1). Together, these data suggest that the total family incomes of single farmworkers, female farmworkers, and farmworkers without a bank account in the US were the most likely to be missing from the dataset, and more research is needed to determine if income data collected in the FHS is representative of the income of farmworkers.



MAKING ENDS MEET

The 2014 Self-Sufficiency Standard (SSS) for Sonoma County was used to estimate the percentage of farmworker families that had sufficient incomes to meet their family's basic needs in Sonoma County. Basic needs included housing, childcare, food, transportation, healthcare, and others. It was estimated that nine in ten (92%) farmworker families did not earn enough to meet their family's basic needs in Sonoma County (Figure E3; Table E2).



NON-WAGE SOURCES OF INCOME

Farmworkers were asked, "In 2012, did anyone in your family receive any additional money or income from...?" Farmworkers responded yes or no to the following non-wage sources of income: Earned Income Tax Credit or EITC; alimony; child support; unemployment benefits; food stamps or CalFresh; Social Security income or SSI; retirement from employer; disability; Women Infants Children Program or WIC.

Only 25% of surveyed farmworkers reported that their family had non-wage sources of income¹² in 2012. Among the 25% of farmworkers that did report other non-wage sources of income, 12% reported

¹² Non-wage income was defined as income not from current employment.
Sonoma County Farmworker Health Survey

income from CalFresh¹³, 12% reported income from the Women, Infants, and Children (WIC) Program, and 6% reported income from unemployment benefits. Less than five individuals reported income from EITC (Table E1). Immigration status was not accounted for in this analysis, so some farmworkers and their families may have been ineligible for publicly-funded benefits due to their immigration status.

REMITTANCES

A remittance is a transfer of money by an individual to her country of origin. Fifty eight percent (58%) of surveyed farmworkers reported remittances in 2012. Among farmworkers that did send remittances, the median remittance was \$3,000 (range: \$100-\$40,000) annually. For a farmworker family earning \$20,000 per year, this median \$3,000 annual remittance would account for about 15% of the annual total family income (Table E1).

BANK ACCOUNTS IN THE US

About two-thirds (64%) of surveyed farmworkers reported having a bank account in the US. Among those farmworkers without bank accounts in the US, the primary reason farmworkers reported not having an account included (Table E3):

- Do not have enough money (37%)
- Can't open an account due to lack of ID, lack of credit, or banking history problems (20%)
- Do not need or want an account (15%)

FOOD INSECURITY¹⁴

Farmworkers were asked, "In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?" to measure food insecurity.

Prevalence of food insecurity

Among Sonoma County farmworkers, the age-adjusted prevalence of food insecurity in the last 12 months was 17%. Eleven percent (11%) of Sonoma County adults at or below 200% FPL in 2011-12 who reported food insecurity in the last 12 months, so farmworkers were significantly more likely to report experiencing food insecurity ($p < 0.0001$; Table E4).

Farmworkers growing food for their own consumption

Thirty-one percent (31%) of farmworkers reported that they grew food for their own consumption on the farm where they currently worked (Table E5). Farmworkers that did report growing their own food trended towards¹⁵ experiencing less food insecurity ($p = 0.050$; Table E6), but this relationship was not adjusted for potential confounders. It should also be noted that many farmworkers did not live on or close to the farm where they currently worked, making it impractical for them to grow food on the farm for their own consumption.

¹³ In California, CalFresh is also known as the Supplemental Nutrition Assistance Program (SNAP), EBT, or Food Stamps. The program issues monthly electronic benefits that can be used to buy most foods at many markets and food stores.

¹⁴ Defined as going hungry in the last 12 months because they couldn't afford to buy enough food.

¹⁵ Association was marginally statistically significant ($0.05 \leq p\text{-value} < 0.10$).

Demographics of food insecure farmworkers

Because food insecurity was significantly higher among farmworkers when compared to the poorest Sonoma County adults (Table E4), exploratory analyses were conducted to identify the main predictors of food insecurity among farmworkers. Age, race, and sex of the farmworker were not associated with food insecurity, and the farmworker's family structure and having children in the US were not associated with food insecurity. However, farmworkers' total family income in 2012 was associated with food insecurity, with farmworkers that did not remember their income in 2012 and farmworkers earning up to \$9,999 in 2012 reporting the most food insecurity ($p=0.003$). Farmworkers that did not consider Sonoma County their permanent residence reported significantly more food insecurity when compared to farmworkers that did consider Sonoma County their permanent residence ($p=0.03$). These two results are consistent with the trend that migrant farmworkers (farmworkers that didn't consider Sonoma County their permanent residence) tend to be poorer. When compared to farmworkers that usually or always had fresh fruits and vegetables available in their neighborhood, farmworkers that never or only sometimes had fresh fruits and vegetables available in their neighborhood reported significantly more food insecurity ($p=0.02$; Table E6). Multivariable statistics that adjust for confounders were not calculated.

Discussion

POVERTY

An estimated nine in ten (92%) farmworker families did not earn enough to meet their family's basic needs in Sonoma County. Single and childless farmworkers that permanently resided in Sonoma County were earning half of Sonoma County one-person households overall in 2012, while farmworkers that were married/living with a partner and/or had children were earning about one-third the income of Sonoma County family households overall in 2012. Together, these data show that farmworker families in Sonoma County were earning very low incomes that prevented their families from meeting their basic needs. This is alarming for many reasons, including the documented poorer health outcomes and increased mortality correlated with a lower socioeconomic status [46-52]. Studies also find that economic strains consistently present across the lifespan are more deleterious to health than episodic periods of economic strain [54, 55].

Example Farmworker Family: An undocumented Sonoma County farmworker family (two adults and two children) earning \$20,000 per year

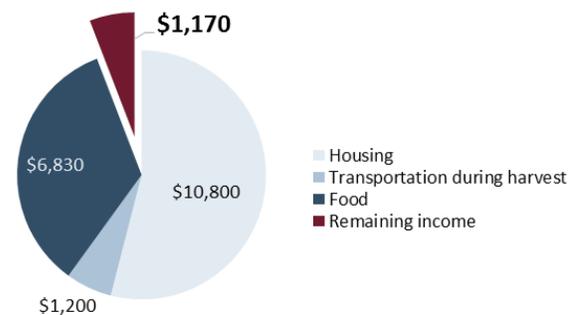
Ninety two percent (92%) of farmworker families in Sonoma County were not able to meet their family's basic needs with their current family income. The estimate below highlights the poverty of a typical Sonoma County farmworker family that earns \$20,000 annually. This family is comprised of two adults and two children, none of whom are US citizens or legally residing in the US.

The annual cost of housing, transportation during harvest, and food for this family is estimated:

- Apartment with two rooms used for sleeping = \$10,800¹
- Transportation cost during peak harvest season = \$1,200¹
- Healthy meals on the "thrifty" plan = \$6,800²

After these three expenses, this farmworker family would only have **\$1,170 remaining** to cover the **countless remaining expenses** that include big-ticket items like transportation for other family members, child care, health care, other bills, and remittances. Because all members of this family are undocumented, they would be ineligible for publicly-funded assistance programs to alleviate their poverty.

FIGURE E4. Remaining income after estimated expenses for a Sonoma County farmworker family of four -- FHS, 2013-14



¹ Data from the Farmworker Health Survey (FHS), 2013-14

² The US Department of Agriculture estimates a healthy meal on the "thrifty" plan for a family of four at about \$6,800 annually [67]

PUBLICLY-FUNDED ASSISTANCE PROGRAMS

Few farmworkers were receiving additional sources of non-wage income from publicly-funded assistance programs like EITC (0.3%). Given the low total family incomes of farmworkers, a higher participation in publicly-funded assistance programs would be expected. However, the immigration statuses of farmworkers and their families was not measured, so eligibility for programs was unknown. Studies find that there is a complex relationship between eligibility, immigration status, and enrollment in publicly-funded assistance programs [56, 57]. Proposed changes to immigration policies will increase eligibility of certain farmworkers for benefits like Medi-Cal, so more information is needed about farmworkers or family members that are eligible but not enrolled in publicly-funded assistance programs.

FOOD INSECURITY

Farmworkers were significantly more likely to experience food insecurity in the last 12 months when compared to the poorest Sonoma County residents. In the US, food insecurity is primarily caused by a lack of financial resources [59], and food insecurity has been shown to have deleterious effects on health [59-62]. Among youth, food-insecure children had nearly twice the odds of fair or poor health in general and a third higher odds of being hospitalized since birth [61]. Adults in food insecure households scored significantly lower on physical and mental health scales [60]. Studies have also suggested a relationship between food insecurity, consumption of inexpensive calorically dense and nutritionally poor foods, and increased risk of chronic diseases [59, 62-64]. More research is needed on the causes of food insecurity among Sonoma County farmworkers and, among those eligible, efforts should be made to increase enrollment in programs like CalFresh and WIC that provide support for food.

LIMITATIONS

No information was collected about farmworkers' and their families' immigration statuses. No data was collected on the economic assets (e.g., home ownership, stocks/bonds) held by farmworkers. Research indicates that economic assets, as opposed to educational attainment and income, may be more appropriate indicators of economic opportunity across the life course [65]. The data presented rely on retrospective self-report, which may be unreliable.

CONCLUSIONS

It was estimated that few Sonoma County farmworkers were earning sufficient incomes in 2012 to meet their families' basic needs, and farmworkers' low incomes may be leading to increased food insecurity. Only one-quarter of farmworkers (25%) were receiving additional sources of income from public assistance programs, and there may be additional farmworker families eligible for public assistance.

Technical Notes

Data tables B19019 and B19113 from the American Communities Survey 2012 1-year estimates were used to compare farmworker's income to incomes of Sonoma County residents overall. The Self-Sufficiency Standard (SSS) is a measure developed by the University of Washington School of Social Work for the Insight Center for Community Economic Development. The SSS calculates the income needed for families in specific geographic locations to adequately meet their basic needs without public or private assistance [72]. The basic needs incorporated into the SSS measure include food, housing, child care, medical care, and others. The SSS for the 2014 Santa Rosa-Petaluma, CA Metropolitan Statistical Area was obtained [73], and these data were used to estimate the percentage of farmworkers whose families had sufficient incomes to make ends meet. The SSS provides living wage estimates for a variety of different family structures and ages of children because children of different ages will have varying needs and costs associated with those age-specific needs. Among farmworkers in FHS with children, the median number of children was 2, but data on the specific ages of these children was not collected. For purposes of estimating the percentage of farmworker families making ends meet in Sonoma County using the SSS, it was estimated that all farmworkers with children had 2 children and the ages of these 2 children fell within the age categories of "infants" and "teenagers" as defined by the SSS. Data from the 2011-12 Sonoma County adult (≥ 18 years) California Health Interview Survey (CHIS) [74] was used as a comparison group for farmworker food insecurity. In CHIS, adults living at or below 200% FPL were asked questions about food insecurity.

Tables

TABLE E1. Selected income demographics among surveyed farmworkers -- FHS, 2013-14

	n	% [§]	Median
Total Family Income in 2012			
Up to \$9,999	26	9.4	--
\$10,000-\$19,999	49	17.6	--
\$20,000-\$29,999	73	26.3	--
\$30,000 and over	34	12.2	--
Don't Remember	96	34.5	--
Farmworker median family income in 2012 by family structure[^]			
<i>All farmworkers</i>			
Farmworkers with families in the US	137	--	\$21,249
Single farmworkers	42	--	\$18,750
<i>Farmworkers that consider Sonoma County their permanent residence</i>			
Farmworkers with families in the US	121	--	\$23,750
Single farmworkers	34	--	\$18,750
Farmworker family received additional sources of income in 2012			
Yes	72	24.6	--
No	189	64.5	--
Don't know	32	10.9	--
Type of additional income among farmworker families receiving additional sources of income in 2012[†]			
Food stamps or CalFresh	35	11.9	--
Women, Infants, and Children Program	34	11.6	--
Unemployment benefits	17	5.8	--
Social Security Income	4	1.4	--
Retirement from employer	3	1.0	--
Disability	2	0.7	--
Earned Income Tax Credit (EITC)	1	0.3	--
Alimony	1	0.3	--
Child support	1	0.3	--
Farmworker sent money to someone outside of the US in 2012[^]			
Yes, remittances ^a	147	58.1	--
No, no remittances	58	22.9	--
Don't know	48	19.0	--
Median annual remittances among farmworkers that sent money to someone outside of the US in 2012[^]			\$3,000 (min: \$100-max: \$40,000)

Abbreviations: n=number; min = minimum; max = maximum

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Remittance is defined as a transfer of money by a foreign worker to an individual in her home country

TABLE E2. Sonoma County farmworkers meeting the Self-Sufficiency Standard annual wage for Sonoma County 2014 -- SSS, 2014 and FHS, 2013-14

<i>Self-Sufficiency Standard (SSS) for Sonoma County 2014¹</i>					
	Adult	1 Adult + 1 infant + 1 teenager	2 Adults	2 Adults + 1 infant + 1 teenager	
Annual wage required to meet the SSS for Sonoma County for each family structure	\$26,065	\$59,523	\$37,581	\$67,365	
<i>Comparison of SSS for Sonoma County to annual total family income of farmworker² families where the farmworker considers Sonoma County their permanent residence</i>					
Estimation of farmworker families meeting the annual SSS wage for their family category[^]	n (%[§])	n (%[§])	n (%[§])	n (%[§])	Summary for all farmworker families n (%[§])
No, not meeting SSS	27 (79.4)	8 (100.0)	43 (95.6)	79 (94.0)	165 (91.8)
Borderline ^a	1 (3.0)	0 (0.0)	1 (2.2)	5 (6.0)	7 (4.1)
Yes, meeting SSS	6 (17.6)	0 (0.0)	1 (2.2)	0 (0.0)	7 (4.1)

Abbreviations: n=number

¹ Estimates are provided from the Self-Sufficiency Standard for Santa Rosa-Petaluma MSA, CA 2014

² Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

[§] Column percents shown; Percentages might not add to 100 because of rounding

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Borderline indicates that the SSS falls within the range of total family income for 2012 reported by the farmworker

TABLE E3. Surveyed farmworker's bank accounts in the US -- FHS, 2013-14

	n	% [§]
Bank account in the US		
Yes	176	64.0
No	99	36.0
Among farmworkers without a bank account in the US, reason for not having a bank account†		
Do not have enough money	35	37.2
Can't open an account due to ID, credit, or banking history problems	19	20.2
Do not need or want an account	14	14.9
Don't know	8	8.5
Bank account fees or minimum balance requirements are too high	7	7.4
Don't like dealing with and/or don't trust banks	7	7.4
Previously has an account but the bank closed it	2	2.1
Do not know how to open or manage an account	1	1.1
Other	1	1.1
Banks do not offer the needed products or services	0	0.0

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

† Respondent may have said yes to more than one category

TABLE E4. Food insecurity in the last 12 months among surveyed farmworkers as compared to Sonoma County adults ≤200% federal poverty level in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	<i>Farmworkers¹</i>			<i>Sonoma County²</i>			
	n	Adjusted %	95% CI	Weighted n	%	95% CI	p
Went hungry in last 12 months because couldn't afford to buy enough food ^b	65	17.4	13.2-21.7	10,000	10.5‡	3.7-17.4	<0.0001

Abbreviations: n=number; 95% CI = 95% confidence interval; p = p-value

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from the Sonoma County adult California Health Interview Survey (CHIS) 2011-12

Bold indicates p-value<0.05

‡ Estimate is unstable and should be interpreted with caution

^a Indirect standardization to CHIS population was used to develop age-adjusted prevalence

^b For Sonoma County estimate, only respondents ≤200% FPL were asked this question

TABLE E5. Surveyed farmworkers growing food for their own consumption on the farm where they worked -
 - FHS, 2013-14

	n	% [§]
Farmworker or other workers grow food for own consumption on farm where currently work		
Yes	88	30.7
No	199	69.3

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

TABLE E6. Food insecurity among surveyed farmworkers by selected farmworker characteristics -- FHS, 2013-14

	Farmworker DID go hungry in last 12 months because couldn't afford enough food	Farmworker DID NOT go hungry in last 12 months because couldn't afford enough food	χ^2 p
	n (Row %)	n (Row %)	
Total	66 (23.1)	220 (76.9)	
Sex			0.21
Male	58 (87.9)	204 (92.7)	
Female	8 (12.1)	16 (7.3)	
Race			0.70
Latino or Hispanic	62 (95.4)	206 (96.7)	
non-Latino or Hispanic	3 (4.6)	7 (3.3)	
Age			0.87
18-24	8 (12.3)	31 (14.3)	
25-34	18 (27.7)	69 (31.8)	
35-44	17 (26.2)	49 (22.6)	
45-54	20 (30.8)	64 (29.5)	
55+	2 (3.1)	4 (1.8)	
Highest educational attainment			0.06
8th grade or less	38 (60.3)	108 (51.9)	
High school equivalent	20 (31.8)	94 (45.2)	
More than high school	5 (7.9)	6 (2.9)	
Total Family Income in 2012[^]			0.003
Up to \$9,999	12 (18.2)	14 (6.8)	
\$10,000-\$19,999	11 (16.7)	38 (18.5)	
\$20,000-\$29,999	11 (16.7)	61 (29.6)	
\$30,000 and over	3 (4.6)	29 (14.1)	
Don't Remember	29 (43.9)	64 (31.1)	
Children living with farmworker in the US			0.50
Yes	29 (43.9)	107 (48.6)	
No	37 (56.1)	113 (51.4)	
Family structure			0.27
Married/living with partner and children	23 (34.9)	100 (46.1)	
Married/living with partner	18 (27.3)	49 (22.6)	
Single	25 (37.9)	68 (31.3)	
Considers Sonoma County permanent residence			0.03
Yes	51 (81.0)	194 (90.7)	
No	12 (19.1)	20 (9.4)	
Availability of fruits and vegetables in neighborhood			0.02
Never or sometimes	19 (31.2)	37 (17.3)	
Usually or always	42 (68.9)	177 (82.7)	
Farmworker or other workers grow food for own consumption on farm where currently work			0.050
Yes	14 (21.2)	73 (34.0)	
No	52 (78.8)	142 (66.1)	

	Farmworker DID go hungry in last 12 months because couldn't afford enough food	Farmworker DID NOT go hungry in last 12 months because couldn't afford enough food	χ^2 p
	n (Row %)	n (Row %)	ANOVA p
	Mean (s.d.)	Mean (s.d.)	
Number of times farmworker consumed fruits and vegetables per day	2.1 (1.8)	2.4 (1.7)	0.31

Abbreviations: n=number; sd = standard deviation; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value; ANOVA p = Analysis of Variance p-value;

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

^ Greater than 10% of responses missing, so results should be interpreted with caution

Access to Health-Related Care

Main Findings

Health insurance coverage among farmworkers Health insurance coverage among Sonoma County farmworkers (30% insured) was three-times lower than Sonoma County adults in 2011-12 (86%). Among farmworkers with health insurance, 32% reported their employer paid for their insurance, as compared to the 61% of insured Sonoma County adults in 2011-12 that were insured through their employer. These data suggest extremely low health insurance coverage among Sonoma County farmworkers.

Health insurance coverage for children of farmworkers Farmworkers reported that only three in four (77%) of their children had US-based health insurance, and 79% of insured children were insured through a government program. Every child in Sonoma County has access to some type of health insurance, including undocumented children. More information is needed to better understand the barriers to enrolling the children of farmworkers in health insurance.

Access to medical care Farmworkers reported the main barrier to receiving needed medical care in Sonoma County in the last 12 months was a lack of health insurance or cost. Eighty-five percent (85%) of farmworkers that delayed or did not receive needed medications reported that cost or lack of insurance was the barrier to receiving the medications, as compared to 41% of Sonoma County adults in 2011-12. Among those farmworkers that needed and received medical care in Sonoma County in the last 12 months, three in five (61%) reported going to a clinic or health center and one in five (21%) reported going to a hospital. Less than 5% of farmworkers reported going to the emergency room.

Cancer screenings Cancer is the leading cause of death among Sonoma County adults, and there is robust evidence that regular screenings can reduce death from cancers. Among Sonoma County farmworkers 50 to 75 years, only 49% of farmworkers had ever had any screening for colorectal cancer in their lifetime, and sample sizes were too small to determine mammography screening among female farmworkers. Since nearly all farmworker families were low-income in 2012 and most farmworkers were uninsured, farmworkers may lack access to cancer colorectal cancer screenings.

Background

Studies have shown that individuals without health insurance are more likely to die prematurely than individuals with private health insurance [1, 69, 70], and lack of health insurance was associated with as many as 44,789 deaths in the US each year prior to healthcare reform [1, 71]. Health insurance facilitates access to the medical system and safeguards against the costs of catastrophic illnesses [1]. Insured Americans are more likely to obtain health screenings and to receive care for chronic conditions [72], more likely to receive high-quality medical care, and less likely to suffer from undiagnosed conditions [1, 73].



The demographics and prevalence of the uninsured and underinsured has changed dramatically since the Patient Protection and Affordable Care Act (PPACA) [74] was passed in 2010. Projections predict as much as a 70% drop in underinsured Americans [75], and the Congressional Budget Office projects the PPACA will decrease the uninsured population by 26 million by 2017 [76]. Despite sweeping changes for other populations, health insurance options for undocumented immigrants will remain largely unchanged, as undocumented individuals cannot enroll in Medicaid or Medicare and are not eligible for tax credits or subsidies [56].

Results from the Farmworker Health Survey (FHS) 2013-14 describe health insurance, access to medical care, medications, and access to dental care among Sonoma County farmworkers.

Results

ACCESS TO HEALTH CARE

Health insurance

Surveyed farmworkers were asked, “I want to know who has health insurance in your family in the U.S.” “How about [you/your spouse/your children]?” For each family member(s), farmworkers were asked “Who pays for it?” Farmworkers that were single and/or did not have children living in the US skipped questions about their spouse and/or children.

Health insurance coverage: Farmworker families as compared to Sonoma County overall

About one-quarter (29%; unadjusted) of surveyed farmworkers reported having US-based health insurance, and 27% of farmworkers reported that their spouse living in the US had US-based health insurance. Among farmworkers with children living in the US, 77% reported that all or some of their children had health insurance (Table A1). To provide a frame of reference, 86% of Sonoma County adults in 2011-12 and 93% of the interviewed adults’ spouses had health insurance (Table A2). After adjusting for age, 30% of farmworkers had US-based health insurance as compared to the 86% of Sonoma County adults in 2011-12 ($p < 0.0001$; Table A3).

Payment for health insurance

Figure A1¹⁶ shows payment for any health insurance among farmworker families. For farmworkers with health insurance, 38% reported the government paid, 32% reported their employer paid, 17% reported they or their spouse paid, and 14% reported that both the farmworker and their employer paid for health insurance. Among farmworkers with insured spouses, the majority of farmworkers (53%) reported the government was paying for their spouse’s health insurance. The vast majority of farmworker’s children with US-based health insurance were insured by the government (80%; Table A1).

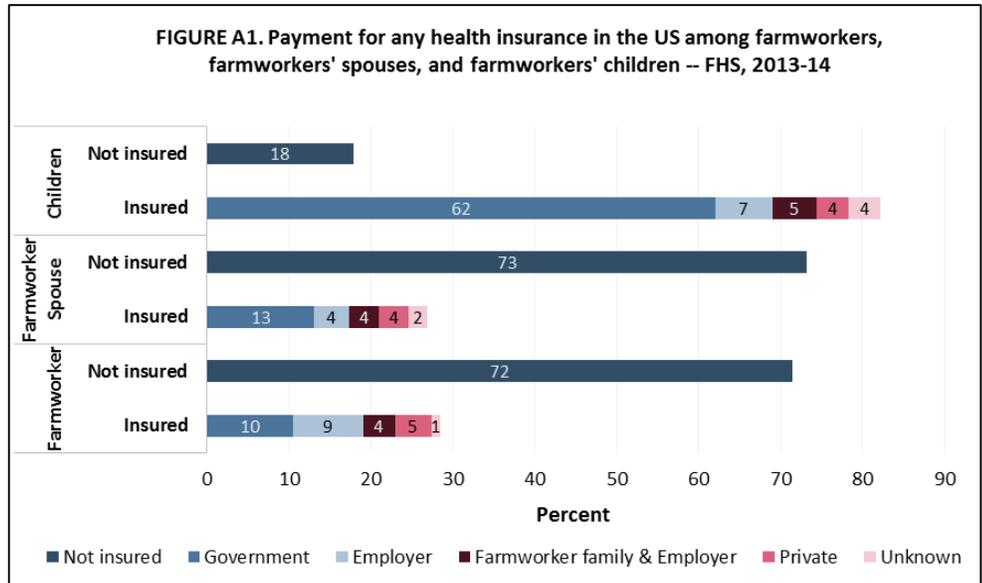
Comparison Groups

Results of the FHS were compared to findings from other populations in order to identify health disparities among Sonoma County farmworkers. For the *Access to Health-Related Care* section, comparisons groups included:

Farmworker variable	Who are farmworkers compared to?	Where do the data come from?
<i>Health insurance coverage</i>	Sonoma County adults in 2011-12 and their spouses	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Payment for health insurance</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Last routine check-up with a doctor</i>	California adults in 2010	Adult (≥18 years) Behavioral Risk Factor Surveillance System, 2010
<i>Access to medications</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Colorectal cancer screenings</i>	California adults in 2010	Adult (≥18 years) Behavioral Risk Factor Surveillance System, 2010

¹⁶ Percentages provided in Figure A1 will not match percentages presented in the subsequent text because Figure A1 calculates payment for insurance including those that are not insured.

To provide a comparison, the majority (61%) of insured Sonoma County adults in 2011-12 were insured through their employer, 32% were insured through the government, and 8% were privately-insured (Table A2). While direct comparisons between farmworkers and Sonoma County adults cannot be made, trends suggest that insured farmworkers were paying for health insurance differently than Sonoma County adults overall (i.e., less farmworkers were provided health insurance by their employer). However, this analysis did not account for the number of hours each week that farmworkers worked for their employer(s).



Demographics of farmworkers with health insurance

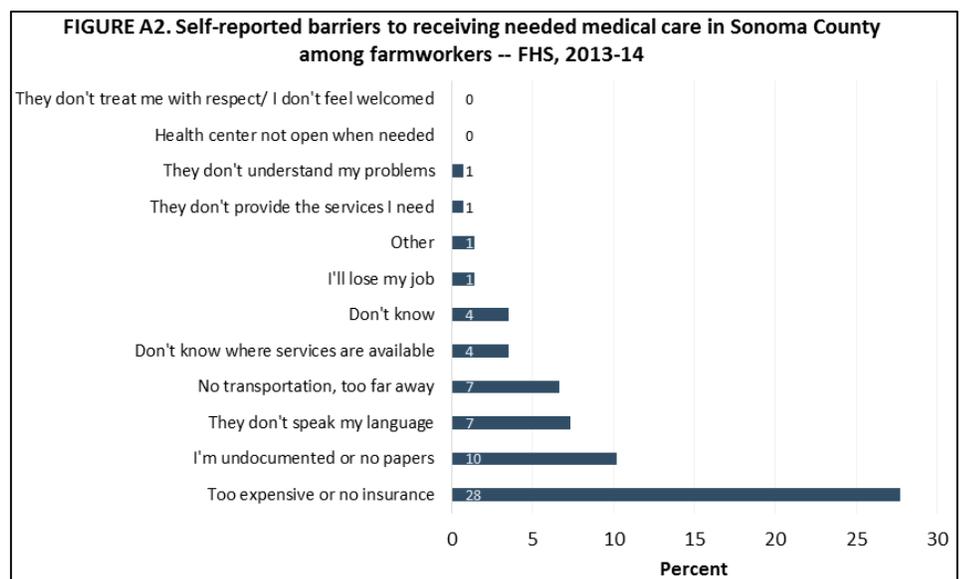
Bivariate statistics were calculated to identify factors related to farmworkers having health insurance. Farmworkers with health insurance were significantly more likely to be female ($p=0.003$), married or living with their partner and children in the US ($p=0.03$), and to have higher educational attainment ($p=0.048$). While only marginally statistically significant, farmworkers categorized as doing farmwork full-time where their current or previous boss was the owner or grower were more likely to have health insurance ($p=0.07$). Farmworker's age was also marginally associated with health insurance, where farmworkers 25 to 34 years were less likely to have health insurance when compared to other age groups ($p=0.06$; Table A4).

Utilization and access to medical care

Farmworkers were asked questions about time since their last routine check-up with a doctor and the location of any check-up; location of any medical care in the last 12 months in Sonoma County; and barriers to needed medical care in Sonoma County.

Access and barriers to medical care in Sonoma County

Three in ten (29%) farmworkers reported needing medical care in Sonoma County in the last 12 months. Among farmworkers that needed medical care in Sonoma County in the last 12 months, 67% went to a clinic or health center and 23% went to a hospital.



Less than 5% of farmworkers reported going to a hospital emergency room. No farmworkers reported visiting a *curandero*¹⁷. Among all farmworkers, the main barrier farmworkers faced in accessing needed medical care in Sonoma County was that the medical care was too expensive or they did not have insurance (28%). Other barriers included “I’m undocumented or no papers” (10%), and “they don’t speak my language” (7%; Figure A2; Table A5).

Demographics of farmworkers utilizing “clinic/health center” for medical care

Bivariate statistics were calculated to describe the demographics of farmworkers that used clinics/health centers when they needed medical care in Sonoma County in the last 12 months. Sample sizes were small (n=85) for this analysis, so results should only be used to indicate general trends. Overall, there were very few demographics associated with utilizing a clinic/health center. Farmworker sex, total family income, family structure, and residence in Sonoma County were not associated with utilizing a clinic/health center. Health insurance was not significantly associated with farmworkers using a clinic/health center. However, farmworkers that were between 35 to 44 years (76%) and 45 to 54 years (92%) were significantly more likely to utilize clinics/health centers when compared to younger farmworkers ($p=0.01$; Table A6).

Last routine check-up with a doctor

About half (52%) of surveyed farmworkers reported seeing a doctor for a routine check-up during the preceding 12 months, 20% reported their last check-up 24 months or more ago, and 14% had never seen a doctor for a routine check-up. Among farmworkers that had ever had a routine check-up with a doctor, 73% reported their last check-up was at a clinic in Sonoma County. An estimated 64% of California adults in 2010 had seen a doctor for a routine check-up in the last 12 months [77]. Thus, the percentage of farmworkers that had a routine check-up in the last 12 months was lower than 2010 California adults overall (Table A7). It should be noted that farmworker estimates were not adjusted for age, which may play a role in the frequency of check-ups.

Access to medications

Among surveyed farmworkers, about 14% reported delaying or not receiving medication that was prescribed by a doctor in the last 12 months. For Sonoma County adults in 2011-12, 12% reported delaying a medication that was prescribed, which is statistically the same as farmworkers. Among farmworkers that delayed or did not get their prescription, 85% reported that cost or lack of insurance was the reason. For Sonoma County adults in 2011-12 that delayed or did not get their prescription, an estimated 41% reported that cost or lack of insurance was the reason, indicating that farmworkers were roughly twice as likely to report cost or lack of insurance as a barrier to receiving medications (Table A8).

Colorectal cancer (CRC) screenings

Questions regarding CRC screenings were asked of farmworkers between 50 and 75 years (n=60). About half (49%) reported they had ever had any type of screening for CRC (colonoscopy, sigmoidoscopy, or fecal occult blood test (FOBT)), 35% had ever had a sigmoidoscopy or colonoscopy, and only 8% of farmworkers that had never had a sigmoidoscopy or colonoscopy had ever taken a FOBT (Table A9). The United States Preventive Services Task Force (USPSTF) considers individuals between 50 and 75 years to be up to date on their CRC screening if they have had FOBT within 1 year, or sigmoidoscopy within 5 years with FOBT within 3 years, or colonoscopy within 10 years [78]. Data on the percentage of farmworkers that were up to date on their colorectal cancer screening as defined by the USPSTF [78] was not available. In California in 2010, an estimated 62% of adults between 50 and 75 years were up to date on their CRC screening as defined by USPSTF [79]. Only 49% of farmworkers between 50 and 75 years had ever had any screening for CRC (Table A9), so the proportion of farmworkers between 50 and

¹⁷ *Curandero* = A traditional Native healer or shaman.
Sonoma County Farmworker Health Survey

75 years that were up to date on their CRC screening was likely much lower and lower than the proportion of California adults in 2010 that were up to date on their CRC screening.

Access to dental care

More than one-third (37%) of surveyed farmworkers reported needing dental care in Sonoma County in the last 12 months. Among farmworkers that needed dental care, 35% reported going to a community clinic, 30% reported going to a private dentist, and 13% reported having “no one place for care” (Table A10).

Discussion

HEALTH INSURANCE COVERAGE FOR FARMWORKERS

Health insurance coverage among surveyed Sonoma County farmworkers (30% insured after adjusting for age) was three-times lower than Sonoma County adults in 2011-12 (86%, $p < 0.0001$). Among farmworkers with health insurance, one-third reported their employer paid and another third reported the government paid for their insurance. To provide a comparison, two-thirds of insured Sonoma County adults in 2011-12 were insured through their employer. Together, these data suggest extremely low health insurance coverage among Sonoma County farmworkers and that farmworkers were less likely to be insured through their employer than Sonoma County adults overall. This may not be surprising given that many farmworkers were not full-time employees of their employer. However, further research is needed on health insurance coverage among Sonoma County farmworkers. Health insurance has been shown to improve access to healthcare and health outcomes in the US through three mechanisms: receiving care when needed, having a regular source of care, and continuity of health insurance coverage [1, 2]. Research shows that the uninsured are more likely to forgo needed medical care than insured individuals [1, 80], and uninsured US citizens are more likely to visit the emergency room or be admitted to the hospital for preventable illnesses [1, 81, 82].

HEALTH INSURANCE AMONG CHILDREN OF FARMWORKERS

Every child in Sonoma County can enroll in some type of health insurance [83], including undocumented children who are eligible for coverage through Kaiser Permanente Child Health Plan [84] and other safety net programs [85]. Yet farmworkers reported that only three in four (77%) of their children had US-based health insurance. This is consistent with prior research showing disparities in children’s health insurance coverage by race/ethnicity and income, among others, and these disparities in health insurance coverage lead to disparate access to healthcare and health status [86, 87]. Parents’ citizenship status also plays a strong role in children’s access to care, and children of immigrant families may have limited access to care based on their parents’ knowledge and understanding of available health care resources, as well as language barriers [86, 88, 89]. Disparities in access to care and health outcomes have also been observed between privately-insured and publicly-insured children. One national study finds that the prevalence, complexity, and severity of health problems were greater among publicly-insured children, yet publicly-insured children experienced a lower quality of care that included frequent gaps in health insurance and difficulties accessing specialist care [90]. Since the government was paying for the majority of farmworker children’s health insurance (79%), disparities may exist between privately-insured children and the children of farmworkers in Sonoma County. Due to these potential disparities, more research is needed on specific health insurance coverage for the children of farmworkers, as well as access to healthcare, a usual source of care, and health outcomes.

ACCESS TO CARE

Surveyed farmworkers reported that a main barrier to accessing needed medical care in Sonoma County in the last 12 months was a lack of health insurance or cost. Additionally, farmworkers were twice as

likely to report cost or lack of insurance as a barrier to receiving medications when compared to Sonoma County adults in 2011-12. This finding is supported by the low health insurance coverage among farmworkers compared to Sonoma County adults overall. Prior studies also support FHS findings by showing that health insurance increases access to medical care [1, 2] and the existence of disparities in access to healthcare based on race/ethnicity and income [91]. Among those farmworkers that needed and received medical care in Sonoma County in the last 12 months, three in five reported going to a clinic or health center and one in five reported going to a hospital. Less than 5% of farmworkers reported going to the emergency room. Farmworker sex, total family income in 2012, family structure, residence in Sonoma County, and health insurance status were not associated with utilizing a clinic/health center; however, farmworkers over 35 years were more likely to utilize a clinic/health center. In summary, this assessment indicates that cost or lack of health insurance were major barriers to farmworkers receiving needed health care in Sonoma County, and more information is needed about farmworkers' access to medical care, including presence of a medical home.

CANCER SCREENINGS

Cancer is the leading cause of death among Sonoma County adults [92]. Colorectal cancer is the third most common cancer in California among both men and women, and breast cancer is the first most common cancer among women [93]. The U.S. Preventive Services Task Force recommends specific screening tests for both of these cancers to reduce morbidity and mortality, and there is robust evidence that regular screenings can reduce death from cancers [94]. Unfortunately, socioeconomic disparities in cancer screening are well-established [95], with observed disparities for colorectal cancer screenings including household income, health insurance coverage, and having a usual source of care [95-97]. Among Sonoma County farmworkers 50 to 75 years, only 49% of farmworkers had ever had any screening for colorectal cancer in their lifetime, and sample sizes were too small to determine the mammography screening prevalence among female farmworkers. Nearly all farmworker families were low-income in 2012 and 72% of farmworkers were uninsured, indicating that farmworkers may have disparate access to cancer screenings.

LIMITATIONS

Data for this assessment relied on self-report of respondents. About 90% of farmworkers surveyed were male and may not have been the primary caregiver for their children, potentially limiting their knowledge about their child's health insurance. This assessment did not fully measure utilization of healthcare (e.g., last visit to a doctor), particularly care for chronic diseases. Little information was collected about health insurance type among farmworkers and their families. No data was collected about the immigration status of farmworkers and their families, so eligibility for Medi-Cal and Medicare was unknown. Sample sizes were too small for multivariable analyses.

CONCLUSIONS

Less than one-third of Sonoma County farmworkers reported having US-based health insurance, and data show that lack of insurance and prohibitive costs were major barriers to receiving needed medical care and medications in Sonoma County. This suggests health disparities in access to healthcare among the Sonoma County farmworker population. Similarly, only three in four children of farmworkers were insured despite the availability of health insurance for all children, suggesting that outreach should specifically target farmworker children for enrollment in health insurance programs.

Technical Notes

Outside data sources were analyzed to provide a frame of reference for the farmworker results. Data were analyzed from California Health Interview Survey (CHIS) for Sonoma County adults in 2011-12 to provide a comparison group for health insurance coverage and access to medications [74]. A comparison for the last routine check-up with a doctor and colorectal cancer screenings was obtained from the Behavioral Risk Factor Surveillance System for California adults in 2010 [83,85].

Tables

TABLE A1. US-based health insurance coverage among surveyed farmworkers and their families -- FHS, 2013-14

	n	% [§]
<u>Farmworker had health insurance in the US</u>		
No	206	71.5
Yes	82	28.5
Person paying for health insurance [among farmworkers with health insurance in the US][†]		
Government	30	38.0
Farmworker employer	25	31.7
Farmworker or spouse	13	16.5
Both farmworker and farmworker's employer	11	13.9
<u>Farmworker's spouse had health insurance in the US [among married farmworkers with spouses living in the US]</u>		
No	101	73.2
Yes	37	26.8
Payment for farmworker spouse's health insurance [among farmworker spouses living in the US that have health insurance in the US][†]		
Government	18	52.9
Spouse employer	6	17.7
Spouse or farmworker	5	14.7
Both spouse and spouse's employer	5	14.7
<u>All or some of farmworker's children had health insurance in the US [among farmworkers with children living in the US]</u>		
No	23	16.7
Yes	106	76.8
Don't know	9	6.5
Payment for farmworker children's health insurance [among farmworker children living in the US that have health insurance in the US][†]		
Government	80	79.2
Farmworker or spouse employer	9	8.9
Farmworker or spouse	7	6.9
Both farmworker or spouse and farmworker's employer	5	5.0

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

TABLE A2. Health insurance among Sonoma County adults in 2011-12 -- CHIS, 2011-12

	Weighted		
	n	% [§]	95% CI
Interviewee had health insurance			
No	321,000	14.3	9.6-18.9
Yes	53,000	85.7	81.1-90.4
Type of health insurance [among interviewees with insurance]			
Government-based	101,000	31.6	26.4-36.8
Employment-based	194,000	60.5	54.7-66.3
Privately purchased	25,000	7.9	4.8-11.1
Interviewee's spouse had health insurance			
No	14,000	7.2	2.5-11.9
Yes	185,000	92.8	88.1-97.5

Abbreviations: n=number; 95% CI = 95% confidence interval

[§] Column percents shown; Percentages might not add to 100 because of rounding

TABLE A3. Surveyed farmworkers' age-adjusted prevalence of US-based health insurance as compared to Sonoma County adults in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	<i>Farmworkers</i> ¹ Age-adjusted^a Adjusted			<i>Sonoma County</i> ² Standard			p
	n	%	95% CI	Weighted n	%	95% CI	
Interviewee had health insurance in the US	81	29.6	23.2-36.1	53,000	85.7	81.1-90.4	<0.0001

Abbreviations: n=number; 95% CI = 95% confidence interval; p = p-value

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from California Health Interview Survey (CHIS) 2011-12

Bold indicates p-value<0.05

^a Indirect standardization to CHIS population was used to develop age-adjusted prevalence

TABLE A4. US-based health insurance among surveyed farmworkers by selected farmworker demographics – FHS, 2013-14

	Farmworker HAD health insurance in US	Farmworker DID NOT have health insurance in US	χ^2 p
	n (Row %)	n (Row %)	
Total	82 (28.5)	206 (71.5)	
FARMWORKER DEMOGRAPHICS			
Age			0.06
18-24	13 (33.3)	26 (66.7)	
25-34	15 (17.1)	73 (83.0)	
35-44	22 (32.4)	46 (67.7)	
45-54	19 (38.0)	31 (62.0)	
55+	12 (32.4)	25 (67.6)	
Sex			0.003
Male	68 (26.0)	194 (74.1)	
Female	14 (53.9)	12 (46.2)	
Highest educational attainment			0.048
8th grade or less	35 (23.8)	112 (76.2)	
High school equivalent or more	44 (34.7)	83 (65.4)	
Total Family Income in 2012[^]			
Up to \$9,999	8 (34.8)	15 (65.2)	0.11
\$10,000-\$19,999	10 (20.4)	39 (79.6)	
\$20,000-\$29,999	18 (24.7)	55 (75.3)	
\$30,000 and over	15 (44.1)	19 (55.9)	
Don't Remember	23 (24.0)	73 (76.0)	
Considers Sonoma County permanent residence			0.56
No	8 (25.0)	24 (75.0)	
Yes	74 (30.0)	173 (70.0)	
FARMWORKER'S FAMILY STRUCTURE			
Children living with farmworker in the US			0.048
No	35 (23.5)	114 (76.5)	
Yes	47 (34.1)	91 (65.9)	
Farmworker family structure			0.03
Married/living with partner and children	45 (36.0)	80 (64.0)	
Married/living with partner	17 (25.0)	51 (75.0)	
Single	18 (19.8)	73 (80.2)	
FARMWORKER EMPLOYMENT DEMOGRAPHICS			
Characterization of farmworker			0.07
Full-time farmwork where current or previous boss was owner or grower	43 (35.3)	79 (64.8)	
Full-time farmwork where current or previous boss was contractor, labor management company or farmworker doesn't know	22 (23.9)	70 (76.1)	
Part-time or seasonal farmwork with any boss	16 (21.9)	57 (78.1)	

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

[^] Greater than 10% of responses missing, so results should be interpreted with caution

TABLE A5. Surveyed farmworker's self-reported access to medical care in Sonoma County -- FHS, 2013-14 and BRFSS, 2010

	n	% [§]
Farmworker needed medical care in Sonoma County in last 12 months		
No	205	70.7
Yes	85	29.3
Location of medical care among farmworkers that needed and received medical care in the last 12 months[†]		
Clinic/health center	52	61.2
Hospital	18	21.2
Private doctor's office	4	4.7
Hospital Emergency Room	3	3.5
Migrant Clinic	1	1.2
<i>Curandero</i>	0	0.0
Main difficulties faced by farmworkers that have needed medical care in Sonoma County[†]		
Too expensive or no insurance	79	27.7
I'm undocumented or no papers	29	10.2
They don't speak my language	21	7.4
No transportation, too far away	19	6.7
Don't know where services are available	10	3.5
Don't know	10	3.5
I'll lose my job	4	1.4
Other	4	1.4
They don't provide the services I need	2	0.7
They don't understand my problems	2	0.7
Health center not open when needed	0	0.0
They don't treat me with respect/ I don't feel welcomed	0	0.0

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

TABLE A6. Surveyed farmworkers that used clinics/health centers by selected farmworker demographics among farmworkers that needed medical care in Sonoma County in the last 12 months -- FHS, 2013-14

Needed medical care in Sonoma County in the last 12 months

	Farmworker DID USE clinic/health center n (Col %)	Farmworker DID NOT USE clinic/health center n (Col %)	χ^2 p
Total	52 (61.2)	33 (38.8)	
FARMWORKER DEMOGRAPHICS			
Age			0.01
18-24	5 (41.7)	7 (58.3)	
25-34	10 (43.5)	13 (56.5)	
35-44	16 (76.2)	5 (23.8)	
45-54	12 (92.3)	1 (7.7)	
55+	8 (57.1)	6 (42.9)	
Sex			1.00
Male	44 (61.1)	28 (38.9)	
Female	8 (61.5)	5 (38.5)	
Highest educational attainment			0.49
8th grade or less	25 (64.1)	14 (35.9)	
High school equivalent or more	21 (53.9)	18 (46.2)	
Total Family Income in 2012[^]			0.53
Up to \$9,999	4 (44.4)	5 (55.6)	
\$10,000-\$19,999	11 (73.3)	4 (26.7)	
\$20,000-\$29,999	10 (58.8)	7 (41.2)	
\$30,000 and over	4 (44.4)	5 (55.6)	
Don't Remember	19 (65.5)	10 (34.5)	
Farmworker speaks English...			0.49
Not at all or A little	29 (56.9)	22 (43.1)	
Somewhat, Well, or Very well	20 (64.5)	11 (35.5)	
Considers Sonoma County permanent residence			0.38
No	2 (40.0)	3 (60.0)	
Yes	47 (61.0)	30 (39.0)	
FARMWORKER'S FAMILY STRUCTURE			
Children living with farmworker in the US			0.15
No	20 (52.6)	18 (47.4)	
Yes	32 (68.1)	15 (31.9)	
Marital Status			0.44
Married	28 (68.3)	13 (31.7)	
Single	13 (52.0)	12 (48.0)	
Living with a partner	10 (58.8)	7 (41.2)	
Farmworker family structure			0.14
Married/living with partner and children	29 (72.5)	11 (27.5)	
Married/living with partner	9 (50.0)	9 (50.0)	
Single	13 (52.0)	12 (48.0)	
FARMWORKER HEALTH INSURANCE			
Farmworker has health insurance in the US			0.47
No	37 (64.9)	20 (35.1)	
Yes	15 (55.6)	12 (44.4)	

Abbreviations: n=number; Col % = column percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

[^] Greater than 10% of responses missing, so results should be interpreted with caution

TABLE A7. Surveyed farmworker's last check-up as compared to California adults in 2010 -- FHS, 2013-14 and BRFS, 2010

	n	% [§]	95% CI
FARMWORKERS¹			
Time since visited a doctor for a routine checkup during the preceding 12 months			
Less than 12 months	150	52.1	--
12-23 months	40	13.9	--
24 months and over	57	19.8	--
Never	41	14.2	--
Location of last check-up [among farmworkers that have ever had a routine check-up]			
Clinic in Sonoma County	174	73.1	--
Clinic in the US but outside of Sonoma County	35	14.7	--
Clinic in your home country outside of the US	29	12.2	--
	Weighted n	%	95% CI
CALIFORNIA ADULTS, 2010²			
Visited a doctor for a routine check-up during the preceding 12 months	17,741	63.7	62.7–64.7

Abbreviations: n=number; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Behavioral Risk Factor Surveillance System (BRFSS) 2010 found at <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6201a1.htm>

[§] Column percents shown; Percentages might not add to 100 because of rounding

† Respondent may have said yes to more than one category

TABLE A8. Access to medications among surveyed farmworkers as compared to Sonoma County adults in 2011-12 -- FHS, 2013-14

	<i>Farmworkers</i> ¹		<i>Sonoma County adults</i> ²		
	n	% [§]	Weighted n	% [§]	95% CI
Delayed or did not get medicine that was prescribed by doctor in the last 12 months					
Yes	41	14.2	45,000	12.1	8.6-15.5
No	248	85.8	329,000	87.9	84.5-91.4
Cost or lack of insurance was reason medicine was delayed or not received [among individuals that delayed or did not get prescription]					
Yes	35	85.4	18,000	40.7	25.2-56.2
No	6	14.6	27,000	59.3	43.8-74.8

Abbreviations: n=number; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from California Health Interview Survey (CHIS) 2011-12

[§] Column percents shown; Percentages might not add to 100 because of rounding

TABLE A9. Colon cancer screenings among surveyed farmworkers 50-75 years as compared to adults 50-75 years in the US in 2010 -- FHS, 2013-14 and BRFSS, 2010

	Colorectal cancer screening		
	n	Row %	95% CI
FARMWORKERS 50 TO 75 YEARS, SONOMA COUNTY, 2013-14¹			
Ever had screening for colon cancer - colonoscopy, sigmoidoscopy, or fecal occult blood test			
Total	23	49.2	
Colonoscopy or sigmoidoscopy			
No	34	61.8	
Don't know	2	3.6	
Yes	19	34.5	--
Time since last colonoscopy [Among those that have never had sigmoidoscopy or colonoscopy]			
Within the last year	9	50.0	
Between 1 and 2 years	7	38.9	
More than 2 years	2	11.1	
Fecal occult blood test [Among those that have never had sigmoidoscopy or colonoscopy]			
No	30	75.0	--
Yes	3	7.5	
Not answered/Don't know	8	20.0	--
ADULTS 50-75 YEARS, CALIFORNIA, 2010²			
Up-to-date with colorectal cancer screening^a			
Total	--	62.2	60.8–63.6
ADULTS 50-75 YEARS, UNITED STATES, 2010²			
Up-to-date with colorectal cancer screening^a			
Total	--	64.5	64.1-64.9
<i>By sex</i>			
Men	--	63.9	63.3–64.5
Women	--	65.0	64.6–65.5
<i>By race/ethnicity</i>			
White	--	66.3	65.9–66.7
Black	--	65.0	63.8–66.3
Hispanic	--	51.6	49.7–53.4
Asian/Pacific Islander	--	55.1	51.8–58.4
American Indian/Alaska Native	--	55.3	51.4–59.2
Other	--	61.3	58.7–63.9

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); 95% CI = 95% confidence interval

¹Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

²Data from the Behavioral Risk Factor Surveillance System (BRFSS) 2010 found here:

http://www.cdc.gov/mmwr/preview/mmwrhtml/su6102a9.htm?s_cid=su6102a9_w

^a Fecal occult blood test within 1 year, or sigmoidoscopy within 5 years with FOBT within 3 years, or colonoscopy within 10 years as recommended by United States Preventive Services Task Force, 2008

TABLE A10. Access to dental care among surveyed farmworkers -- FHS, 2013-14

	n	% [§]
Farmworker needed dental care in Sonoma County in the 12 months		
Yes	107	37.0
No	182	63.0
Location of dental care in Sonoma County [among farmworkers needing dental care in Sonoma County in the last 12 months][†]		
Community clinic	37	34.6
Private dentist	32	29.9
No one place	14	13.1
Hospital Emergency Room	1	0.9
Other	1	0.9

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

Health Behaviors and Health Conditions

Main Findings

Binge drinking Sonoma County farmworkers were three-times more likely to binge drink in the last 30 days when compared to US adults in 2011 (47% vs. 18%). Farmworkers that were younger, male, and not living with their spouse/partner and children had the highest prevalence of binge drinking. Among farmworkers that did binge drink in the last 30 days, the frequency of binge drinking was 4.1 occasions, and this was the same frequency as estimates for US adults in 2011. In sum, data show that three-times more farmworkers were binge drinking in Sonoma County, but farmworkers were binge drinking at the same amount as 2011 US adult binge drinkers. Research indicates that excessive alcohol consumption has been associated with serious health problems like liver cirrhosis, cancers, and stroke, so farmworkers may be at increased risk of these poor health outcomes.

Self-rated health in general Many studies have demonstrated that an individual's own appraisal of his or her general health is a powerful predictor of future morbidity and mortality. Forty-four percent (44%) of Sonoma County farmworkers reported their own general health as *Poor* or *Fair*, as compared to 13% of Sonoma County adults in 2011-12. Research shows that an individual's appraisal of her general health is a powerful predictor of future morbidity and mortality, so these data identify a health disparity between Sonoma County farmworkers and Sonoma County adults in 2011-12.

Obesity and soda consumption Twenty-five percent (25%) of Sonoma County farmworkers were categorized as obese. Regular soda consumption was more than three-times higher among Sonoma County farmworkers when compared to Sonoma County adults in 2011-12 (drank regular soda 5.5 vs. 1.6 times per week). Both obesity and regular soda consumption are contributors to type II diabetes mellitus and cardiovascular disease; therefore, Sonoma County farmworkers may be at increased risk of chronic diseases.

Diabetes The prevalence of farmworkers ever diagnosed with diabetes (15%) was three-times higher than Sonoma County adults in 2011-12 (5%). About one in five (21%) farmworkers that had ever been diagnosed with diabetes were currently taking medications for diabetes. Research shows that access to medical care, medications, and diabetes self-management education are critical components of diabetes care. Given the threefold higher prevalence of diabetes and lack of health insurance among Sonoma County farmworkers, this population should be prioritized for further diabetes research and intervention efforts.

High blood pressure One in four (26%) farmworkers had ever been diagnosed with high blood pressure, nearly the same prevalence as Sonoma County adults in 2011-12 (25%). Fewer farmworkers ever diagnosed with high blood pressure were currently receiving high blood pressure medications when compared to Sonoma County adults overall (45% vs. 77%). Studies have shown that health insurance status is associated with blood pressure monitoring and control, and the majority of Sonoma County farmworkers were uninsured. These trends suggest a possible health disparity in the control of hypertension among Sonoma County farmworkers, and more research is needed on barriers to high blood pressure care among this population.

Healthy aging Sonoma County farmworkers were three-times more likely to report their own health as *Poor* or *Fair* when compared to Sonoma County adults in 2011-12 (44 vs. 13%), and farmworkers that were 55 years and older were the most likely to report *Poor* or *Fair* health. The majority of Sonoma County's farmworkers are assumed to be undocumented immigrants who are ineligible for benefits like Social Security and Medicare that provide support for aging. Without income from Social Security, undocumented farmworkers may continue working, often in manual labor, as they age, which may negatively impact their health. Also, most Sonoma County farmworkers did not have health insurance, which would increase access to preventative services like cancer screenings. Together, these data suggest a disparity in healthy aging among older Sonoma County farmworkers.

Background

Cancers, coronary heart disease, and stroke are all leading causes of death among Sonoma County residents [92]. Engaging in healthy behaviors such as quitting smoking, reducing alcohol consumption, and eating a healthy diet, as well as accessing preventative care services like having regular check-ups and having blood pressure checked, can reduce the morbidity and mortality associated with these diseases [98, 99]. Regular and on-going surveillance of these conditions is essential to monitoring health disparities and to develop programs and policies to address identified disparities [98].

The prevalence of select health behaviors and health conditions among Sonoma County farmworkers was assessed using data from the Farmworker Health Survey (FHS) 2013-14.

Results

HEALTH BEHAVIORS

Farmworkers were asked questions related to sugar-sweetened beverage consumption, fruit and vegetable consumption, smoking, and alcohol consumption.

Current cigarette use

About one in five (21%) farmworkers reported currently smoking cigarettes, with 9% reporting smoking cigarettes every day and 13% reporting smoking some days¹⁸. Among current cigarette smokers, two-thirds (66%) of farmworkers wished to quit smoking and 24% maybe wanted to quit smoking. An estimated 8% of Sonoma County adults in 2011-12 were currently smoking cigarettes every day and another 6% of adults were smoking cigarettes some days. As such, the prevalence of cigarette smoking some days among farmworkers was higher than Sonoma County adults in 2011-12, and the prevalence of daily smoking among farmworkers was similar to Sonoma County adults in 2011-12 (Table H1).



Comparison Groups

Results of FHS were compared to findings from other populations in order to identify health disparities among Sonoma County farmworkers. For the *Health Behaviors and Health Conditions* section, comparison groups included:

Farmworker variable	Who are farmworkers compared to?	Where do the data come from?
<i>Cigarette use</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Binge drinking</i>	US adults in 2011	Adult (≥18 years) Behavioral Risk Factor Surveillance System, 2011
<i>Fruit and vegetable consumption</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Access to fruits and vegetables in neighborhood</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Sugar-sweetened beverage consumption</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Prevalence of ever being diagnosed with high blood pressure</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Medications for high blood pressure</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Prevalence of ever being diagnosed with diabetes</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Prevalence of obesity</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file
<i>Binge drinking</i>	California adults in 2011	Adult (≥18 years) Behavioral Risk Factor Surveillance System, 2011
<i>Prevalence of Poor or Fair self-rated general health</i>	Sonoma County adults in 2011-12	Adult (≥18 years) California Health Interview Survey, 2011-12, local data file

¹⁸ The addition of 9 and 13 is greater than 21 due to rounding.
Sonoma County Farmworker Health Survey

Binge drinking¹⁹

Prevalence of binge drinking

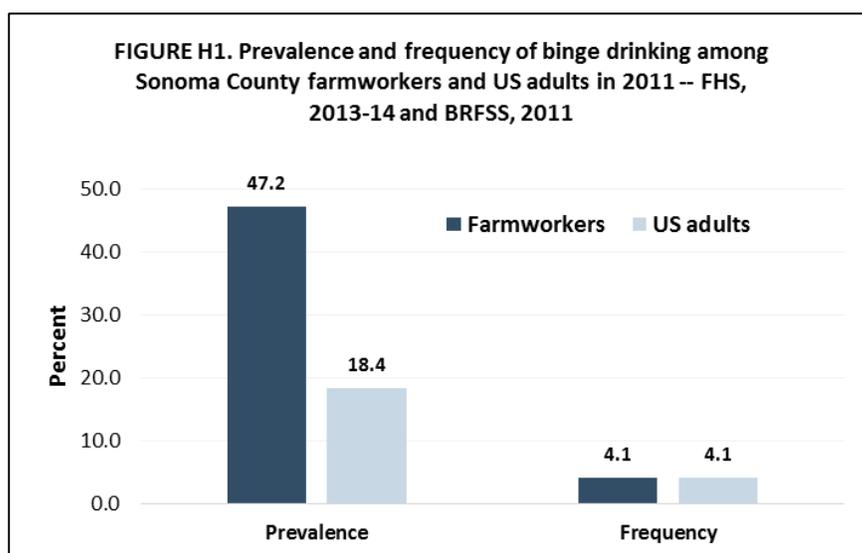
Prevalence of binge drinking was defined as binge drinking on at least one occasion in the last 30 days, and roughly half (47%) of farmworkers reported binge drinking on at least one occasion in the last 30 days. Male (51%) farmworkers were significantly more likely to binge drink when compared to female farmworkers (9%, $p < 0.01$). Farmworkers that were 25 to 34 years (61%) followed by those 18 to 24 years (49%) had the highest binge drinking prevalence when compared to farmworkers 55 years and older (10%, $p < 0.05$). Farmworkers that were married/living with a partner and had children (39%) had the lowest prevalence of binge drinking as compared to single (52%) or married/living with a partner only (57%) farmworkers ($p < 0.05$; Table H2).

Among US adults in 2011, the prevalence of binge drinking was an estimated 18%, roughly three-times less than farmworkers in Sonoma County (Figure H1). Consistent with trends in farmworker prevalence of binge drinking, men and younger US adults in 2011 were more likely to binge drink (Table H2) [100].

Frequency of binge drinking

Frequency of binge drinking was calculated as the average number of binge-drinking episodes reported by all binge drinkers during the past 30 days. Among farmworkers that binge drank, the average number of occasions when farmworkers binge drank was 4.1 occasions (standard deviation (sd) = 5.5). There were no significant differences in frequency of binge drinking among binge drinkers in the last 30 days by farmworker sex, age, or family structure.

Among US adults in 2011, the average frequency of binge drinking among binge drinkers was an estimated 4.1 occasions, so the frequency of binge drinking among binge drinkers was the same in Sonoma County farmworkers as compared to US adults in 2011 (Figure H1; Table H2).



Nutrition

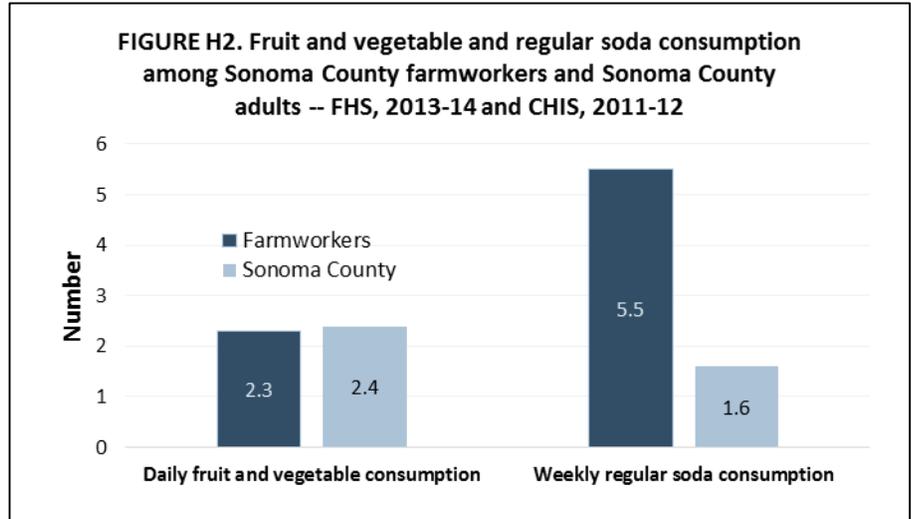
Fruit and vegetable consumption

On average, farmworkers consumed fruits and vegetables 2.3 times per day (sd = 1.7). Sonoma County adults in 2011-12 were estimated to consume fruits and vegetables an average of 2.4 times per day. Thus, farmworkers and Sonoma County adults overall were consuming fruits and vegetables about the same number of times each day on average, but both farmworkers and Sonoma County adults in 2011-12 may not have been consuming sufficient quantities of fruits and vegetables each day (Figure H2; Table H3). The Centers for Disease Control and Prevention (CDC) recommendations for daily fruit and vegetable consumption vary by sex, age, and physical activity level. To provide a frame of reference, a 37 year-old male who exercises 30-60 minutes daily should consume 2 cups of fruit and 3.5 cups of vegetables daily [101].

¹⁹ Binge drinking was defined as 4 drinks on one occasion for women and 5 drinks on one occasion for men.
Sonoma County Farmworker Health Survey

Access to fruits and vegetables in neighborhood

One-fifth (20%) of farmworkers reported never or sometimes having fresh fruits and vegetables available in their neighborhood, which is twice the estimated 9% of Sonoma County adults in 2011-12 reporting never or sometimes having fresh fruits and vegetables available in their neighborhood (Table H3).



Sugar-sweetened beverage consumption

Average weekly soda consumption among farmworkers was more than three times greater than Sonoma County adults overall. On average, farmworkers reported drinking regular soda (i.e., non-diet soda) 5.5 times per week (sd = 5.4), whereas Sonoma County adults in 2011-12 were estimated to drink regular soda an average of 1.6 times per week (Figure H2; Table H3). Farmworkers were asked about beverages that they consumed on the job. Four in five (79%) farmworkers reported drinking sugary-sweetened beverages²⁰ while at work (Table H3).

Diet on the job

Farmworkers were asked about their diet while they were at work. Ninety-three (93%) of farmworkers reported eating traditional Mexican food. Farmworkers also reported eating American-style sandwiches (31%), fruit (21%), and vegetables or salad (19%). Few farmworkers reported eating hamburgers or hot dogs (6%) or french fries (6%). When asked where they got food consumed while at work, nearly all (95%) farmworkers reported that they brought this food with them from home (Table H3).

Women's health

Female farmworkers (n=26) reported their access to services needed to prevent pregnancies in Sonoma County. Fifty-nine percent (59%) reported they were able to access services, 9% reported they hadn't tried to access services, and 32% of women did not wish to prevent pregnancies. No women reported being unable to access services needed to prevent pregnancies in Sonoma County (Table H4).

HEALTH CONDITIONS

Farmworkers were asked questions about their current health, including high blood pressure, diabetes, obesity, mental health, self-reported health in general, and access to medications.

²⁰ Includes regular soda, juice, sports drinks, and *aguas* like Jamaica
Sonoma County Farmworker Health Survey

High blood pressure

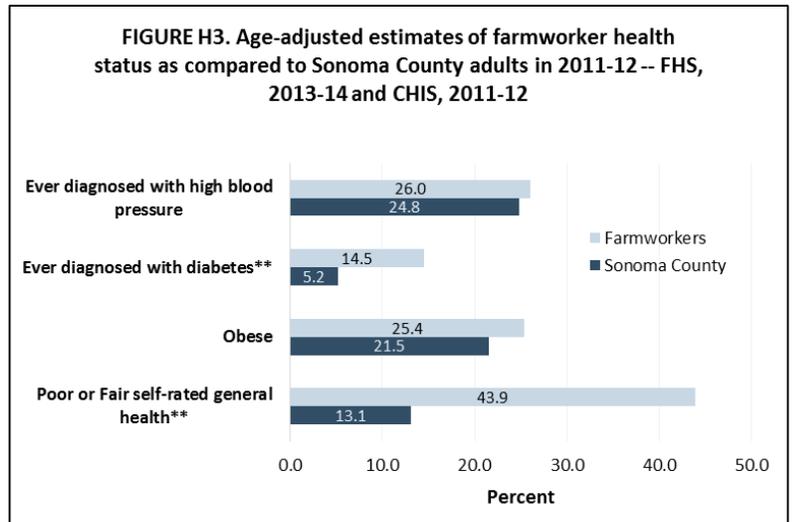
Farmworkers were asked, “Has a doctor ever told you that you have high blood pressure?” Farmworkers that had ever been diagnosed with high blood pressure were then asked, “Are you currently taking medication for your high blood pressure?”

Prevalence of ever being diagnosed with high blood pressure

After adjusting for age, 26% of farmworkers reported ever being diagnosed with high blood pressure. Prevalence of ever being diagnosed with high blood pressure was 25% among Sonoma County adults in 2011-12, indicating there was no statistically significant difference in ever having a high blood pressure diagnosis between Sonoma County farmworkers and Sonoma County adults overall (Figure H3; Table H5).

Medications for high blood pressure

Forty-five percent (45%) of farmworkers that had ever been diagnosed with high blood pressure were currently taking medications for high blood pressure. As a comparison, an estimated 77% (95% CI: 68-87%) of Sonoma County adults in 2011-12 that had ever been diagnosed with high blood pressure were currently taking medication to control their hypertension (Table H6); however, difference in age of farmworkers and Sonoma County adults in 2011-12 may play a role in this difference. Farmworkers were not asked if they were currently diagnosed with high blood pressure or what type of high blood pressure medication they were taking.



**p-value<0.05

Demographics of farmworkers ever diagnosed with high blood pressure

Bivariate statistics were calculated to identify demographic factors associated with farmworkers ever diagnosed with high blood pressure. Farmworker’s age was significantly associated with high blood pressure, with farmworkers 55 years and older (46%) being the most likely to ever have been diagnosed with high blood pressure ($p<0.0001$). Farmworker’s sex, total family income in 2012, residency in Sonoma County, and family structure were not associated with ever being diagnosed with high blood pressure. Farmworkers that had binge drank in the last 30 days (10%) were less likely to have ever been diagnosed with high blood pressure when compared to non-binge drinkers (22%, $p=0.01$); however, this association is likely confounded by the age of farmworkers. Younger farmworkers were more likely to binge drink in the last 30 days (Table H2) but less likely to have ever been diagnosed with high blood pressure. Farmworkers that needed additional screening for depression (36%) were more likely to have ever been diagnosed with high blood pressure ($p=0.03$), and obese (34%) farmworkers were more likely to have ever been diagnosed with high blood pressure ($p=0.002$; Table H7). It should be noted that none of these bivariate statistics were adjusted for potential confounders.

Diabetes

Farmworkers were asked, “[Other than during pregnancy,] has a doctor ever told you that you have diabetes?” Farmworkers that had ever been diagnosed with diabetes were then asked, “Are you currently taking medication for your diabetes?”

Prevalence of ever being diagnosed with diabetes

After adjusting for age, 15% of farmworkers reported ever being diagnosed with diabetes. The prevalence of ever being diagnosed with diabetes was 5% among Sonoma County adults in 2011-12, so Sonoma County farmworkers had a statistically significant three-fold higher prevalence of ever being diagnosed with diabetes ($p=0.002$; Figure H3; Table H5).

Medications for diabetes

Four in five (79%) farmworkers that had ever been diagnosed with diabetes were currently taking medication for diabetes. Farmworkers were not asked what type of medication they were taking for diabetes or about other management plans for diabetes (Table H6).

Demographics of farmworkers ever diagnosed with diabetes

Bivariate statistics were calculated to identify demographic factors associated with farmworkers ever diagnosed with high blood pressure. The number of farmworkers ever diagnosed with diabetes was small ($n=49$), so all bivariate statistics should only be used to provide direction for future research. Farmworkers 55 years and older (24%) and female (27%) farmworkers were significantly more likely to be ever diagnosed with diabetes when compared to farmworkers that were younger and male (7%), respectively ($p<0.0001$ and $p=0.001$, respectively). Farmworkers with total family incomes in 2012 up to \$9,999 (23%) were significantly more likely to ever be diagnosed with diabetes when compared to higher income farmworker families ($p=0.04$). Farmworkers that were married/living with a partner and children had marginally significantly higher (13%) prevalence of ever being diagnosed with diabetes when compared to single (4%) or farmworkers only married/living with a partner (8%, $p=0.07$), but this association is likely confounded by age. Farmworkers that smoked cigarettes every day (17%) and farmworkers that did not binge drink (12%) in the last 30 days were significantly more likely to ever have been diagnosed with diabetes ($p=0.04$ and $p=0.02$, respectively), but these relationship may be confounded by age. Average daily fruit and vegetable consumption (3.0 times per day) was higher among farmworkers ever diagnosed with diabetes when compared to never diabetics (2.2 times per day, $p=0.04$), but this relationship may be confounded by age, income, or other factors. Obesity among farmworkers was not significantly associated with ever being diagnosed with diabetes (Table H8).

Obesity

Farmworkers were asked, “How tall are you without shoes?” and “[When not pregnant, how/How] much do you weigh without shoes?” These responses were used to calculate body mass index (BMI).

Prevalence of obesity

After adjusting for age, 25% of farmworkers were categorized as obese, as compared to 22% of Sonoma County adults in 2011-12. There was no significant difference in obesity between farmworkers and Sonoma County adults overall (Figure H3; Table H5). Twenty-one percent (21%) of BMI data was missing, which may bias obesity results. Appendix H1 provides results for three categories of weight: under and normal weight, overweight, and obese. However, the trends presented in Appendix H1 require further research to validate the results.

Mental Health

The Patient Health Questionnaire (PHQ-2) was used to assess the frequency of depressed mood and anhedonia over the past 2 weeks and to identify farmworkers that required additional screening for depressive disorders [102].

Prevalence of depressive disorders

About one in ten (9%) of farmworkers required additional screening for a depressive disorder. Among California adults in 2011, an estimated 12% had ever been told by a health professional that they had a

depressive disorder (Table H9) [98]. Data from farmworkers and California adults in 2011 should not be directly compared because they were measured differently; however, these data suggest that depressive disorders among farmworkers may be close to overall estimates for California adults in 2011.

Demographics of farmworkers that needed additional screening for a depressive disorder

Bivariate statistics were calculated to identify demographic factors associated with farmworkers needing additional screening for a depressive disorder. Sample sizes were small for this analysis, so more information is needed to fully understand these relationships. Female farmworkers (22%) were significantly more likely than male farmworkers (7%) to need additional screening for a depressive disorder ($p=0.03$), and non-Latino or Hispanic farmworkers (38%) were significantly more likely than Latino or Hispanic farmworkers (7%) to need additional screening for a depressive disorder ($p=0.02$; Table H10).

Self-rated health in general

Farmworkers were asked, “Would you say that in general your health is excellent, very good, good, fair, or poor?” Many studies have demonstrated that an individual’s own appraisal of her general health is a powerful predictor of future morbidity and mortality [103, 104].

Prevalence of Poor or Fair self-rated general health

After adjusting for age, 44% of farmworkers reported *Poor* or *Fair* health in general. Thirteen percent (13%) of Sonoma County adults in 2011-12 reported *Poor* or *Fair* health in general; therefore, Sonoma County farmworkers were three-times and significantly more likely to report *Poor* or *Fair* health in general when compared to Sonoma County adults in 2011-12 ($p<0.001$; Figure H3; Table H5).

Demographics and health behaviors of farmworkers reporting Poor or Fair self-rated general health

Bivariate statistics were calculated to identify demographic factors related to self-reported health in general. Farmworker age was significantly associated with self-reported health in general with farmworkers 55 years and older (62%) the most likely to report *Poor* or *Fair* health in general when compared to younger farmworkers ($p=0.002$). Farmworker sex, total family income in 2012, and family structure were not associated with self-reported health in general. Risk factors for chronic diseases, including cigarette smoking, binge drinking in the last 30 days, weekly soda consumption, and daily fruit and vegetable intake were not significantly associated with self-reported health in general (Table H11).

Associations between self-rated general health and selected health outcomes

The relationship between self-reported health in general and diabetes, high blood pressure, depression, and obesity was assessed to determine if *Poor* or *Fair* health in general was correlated with poorer self-reported health outcomes in this population. Farmworkers ever diagnosed with diabetes (72%) were significantly more likely to report *Poor* or *Fair* health in general when compared to non-diabetic farmworkers (37%, $p=0.001$). Similarly, farmworkers ever diagnosed with high blood pressure (80%) were significantly more likely to report *Poor* or *Fair* health in general when compared to farmworkers never diagnosed with high blood pressure (31%, $p<0.0001$). Farmworkers that were obese (52%) were significantly more likely to report *Poor* or *Fair* health in general when compared to non-obese farmworkers (34%, $p=0.02$). No association was observed between farmworker depression and self-rated health in general (Table H12). These results suggest that self-reported general health may be a good overall indicator of farmworkers’ general health status, except for depression.

Discussion

BINGE DRINKING

Surveyed Sonoma County farmworkers were more likely to binge drink in the last 30 days when compared to US adults in 2011 [100]. Farmworkers that were younger, male, and not married/living with a partner and children had the highest prevalence of binge drinking. However, the frequency, the actual number of binge drinking episodes, of binge drinking (mean = 4.1 occasions) among Sonoma County farmworkers that binge drank in the last 30 days was the same as estimates for US adults in 2011 [100]. These data suggest that there were roughly three-times more farmworkers binge drinking in Sonoma County than US adults in 2011 who binge drank, but farmworkers that binge drank were binge drinking the same amount as binge drinkers in the US in 2011. Excessive consumption of alcohol is the third leading preventable cause of death in the US [3, 4]. Binge drinking increases risk of liver cirrhosis, stroke, unintentional injuries, motor vehicle crashes, hypertension, acute myocardial infarction, poor control of diabetes, and others, as well as having social and economic costs (e.g., interpersonal violence, child neglect, and lost productivity) [3, 5, 105]. Individuals who binge drink may do so repeatedly, so both the prevalence of binge drinking and the frequency are important. Results here indicate that the prevalence of binge drinking among farmworkers was high, suggesting that interventions among this population should be considered.

OBESITY AND SUGAR-SWEETENED BEVERAGES (SSBs)

About one in four (25%, adjusted for age) Sonoma County farmworkers were categorized as obese. Excess body weight has far-reaching implications on health, including increasing risk of type II diabetes mellitus, cardiovascular disease, cancer, and premature death [106]. Regular soda consumption was more than three-times higher among Sonoma County farmworkers when compared to Sonoma County adults in 2011-12, and nearly four in five farmworkers reported drinking SSBs on the job. SSBs are the primary source of added sugars in Americans diets [106, 107], and soda consumption is also a significant contributor to long-term weight gain, type II diabetes mellitus, and cardiovascular disease [106, 108, 109]. The frequency of regular soda consumption and prevalence of obesity among farmworkers, as well as other data, suggest that farmworkers may be at increased risk of chronic diseases.

HIGH BLOOD PRESSURE

Over one-quarter (26%, adjusted for age) of farmworkers had ever been diagnosed with high blood pressure (i.e., hypertension). High blood pressure is a major risk factor for heart disease and stroke [110, 111], which are two leading causes of death among Sonoma County residents [92]. Proper hypertension treatment and control reduces the incidence of heart attacks, strokes, heart failure, and chronic kidney disease [110, 112-114]. Yet, FHS results indicate that fewer hypertensive farmworkers were currently receiving hypertension medications when compared to Sonoma County adults in 2011-12 (45% vs. 77%). Studies have shown that health insurance status is associated with blood pressure monitoring and control, and uninsured hypertensive adults are less likely to have adequate control of blood pressure [115, 116]. Research also shows that uninsured individuals who pay out-of-pocket are less likely to adhere to medications, especially expensive brand-name medications [116-118]. Many uninsured individuals with hypertension rely on healthcare provider-donated samples to control their blood pressure, leaving patients dependent on the physician receiving regular and timely supplies of the medications and doses they need [116, 119]. The majority (70%) of Sonoma County farmworkers were uninsured, and cost or lack of insurance was the primary reason farmworkers reported delaying or not receiving medications. Together, FHS trends and prior research indicate a possible health disparity in hypertension control among Sonoma County farmworkers, and more research is needed to assess farmworkers' access to care to control hypertension.

DIABETES

The prevalence of diabetes among farmworkers (15%, adjusted for age) was three-times higher than Sonoma County adults in 2011-12 (5%), and data suggests that the lowest-income farmworkers may have been at the most increased risk of diabetes. About 79% of farmworkers that had ever been diagnosed with diabetes were currently taking medications for diabetes. Access to medical care, medications, and diabetes self-management education are critical to the care of diabetes and are necessary to improve patient outcomes [120]. Uninsured adults with diabetes have been shown to be mostly low-income minorities, and these individuals are less likely to access needed medical care for diabetes control [115, 121, 122]. Estimates also indicate that about half of uninsured diabetics are undiagnosed. Undiagnosed or undertreated diabetes place the uninsured at a higher risk for debilitating, expensive, or fatal complications [115]. Given that farmworkers had a higher prevalence of diabetes, most farmworkers were uninsured, and nearly all farmworkers were low-income, the Sonoma County farmworker population should be prioritized for further diabetes research and prevention efforts.

HEALTHY AGING

Healthy aging is a key public health initiative across the US that strives to help people live long, productive, and high-quality lives [123]. Data here show that Sonoma County farmworkers were more likely to report *Poor* or *Fair* health in general when compared to Sonoma County adults in 2011-12, and farmworkers that were 55 years and older were the most likely to report *Poor* or *Fair* health. Prior research has shown that an individual's appraisal of her general health is a powerful predictor of future morbidity and mortality [103, 104]. The majority of California's farmworkers are undocumented immigrants [124], and these undocumented farmworkers are ineligible for benefits like Social Security and Medicare that support individuals as they age. Without income from Social Security, undocumented farmworkers may continue working, often in manual labor, as they age. FHS data showed that older Sonoma County farmworkers had poorer self-rated health in general than their younger peers, so more information is needed on the extent to which continued work among older farmworkers is negatively impacting their health. Additionally, most Sonoma County farmworkers did not have US-based health insurance, including Medicare. For aging farmworkers, this lack of health insurance may decrease access to preventative services like cancer screenings, a trend supported by the FHS finding that farmworkers between 50 and 75 years were unlikely to be up to date on colorectal cancer screenings. In sum, these data highlight a potential disparity and unhealthy aging process among older Sonoma County farmworkers that warrants further research.

LIMITATIONS

The included measures of health conditions here were high-level, brief, and relied on self-report. No information was collected on type of diabetes (Type I or II), and no data was collected on the specifics of diabetes management among diabetics. Data was collected on pre-diabetes or borderline diabetes, but sample sizes were too small to present results. Many risk factors for chronic diseases were only minimally measured or were not measured at all (e.g., physical activity). Sample sizes for Sonoma County adults in 2011-12 were too small to allow for comparison of farmworkers to Latino/Hispanic men in Sonoma County, which may have been a more appropriate comparison group than all Sonoma County adults in 2011-12. FHS sample sizes were too small to allow multivariable analyses to adjust for potential confounders in bivariate statistics.

CONCLUSIONS

Surveyed Sonoma County farmworkers were three-times more likely to report *Poor* or *Fair* health in general when compared to Sonoma County adults in 2011-12, suggesting dramatic health disparities among the farmworker population. This disparity among farmworkers is particularly concerning because 70% were uninsured, which decreases the likelihood that farmworkers were able to access medical care to prevent and treat health conditions. Additional research is needed about access, utilization, and prevention of chronic illnesses among farmworkers in order to develop informed interventions to decrease health disparities.

Technical Notes

Other data sources were analyzed to provide a frame of reference for the farmworker results. Data was analyzed from California Health Interview Survey (CHIS) 2011-12 for adults ≥ 18 years in Sonoma County [74] to provide a comparison group for chronic diseases and nutrition. Comparison binge drinking statistics for adults ≥ 18 years in the US in 2011 were obtained from a report summarizing data from Behavioral Risk Factor Surveillance System (BRFSS) 2011 [105]. For farmworkers, the Patient Health Questionnaire (PHQ-2) was used to assess the frequency of depressed mood and anhedonia over the past 2 weeks and to identify farmworkers that required additional screening for depressive disorders [107]. A comparison for depression prevalence for California adults ≥ 18 years in 2011 was obtained from a report describing BRFSS 2011 results [103]. Data on the number of California and US adults 50-75 years in 2010 that were up-to-date on their colorectal cancer screening was obtained from a report on BRFSS 2010 [85].

Tables

TABLE H1. Prevalence of current cigarette smoking among surveyed farmworkers as compared to Sonoma County adults in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	Cigarette smoking		
	n	% [§]	95% CI
FARMWORKERS, SONOMA COUNTY, 2013-14¹			
Current frequency of smoking cigarettes			
Not at all ^a	231	78.8	--
Every day	25	8.5	--
Some days	37	12.6	--
<i>Among current cigarette smokers, desire to quit smoking</i>			
Yes	39	66.1	--
Maybe	14	23.7	--
No	6	10.2	--
ADULTS, SONOMA COUNTY, 2011-12²			
Current frequency of smoking cigarettes			
Not at all ^b	323,000	86.5	82.0-90.9
Every day	29,000	7.8	4.3-11.2
Some days	22,000	5.8	2.9-8.6

Abbreviations: n=number; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Sonoma County adult California Health Interview Survey (CHIS) 2011-12

[§] Column percents shown; Percentages might not add to 100 because of rounding

^a Category represents farmworkers that are currently not smoking cigarettes at all. No screening question about smoking 100 cigarettes in their lifetime was asked of farmworkers.

^b Category combines individuals that have never smoked 100 cigarettes in their lifetime and individuals that have smoked 100 cigarettes in their lifetime but are current not smoking cigarettes at all.

TABLE H2. Prevalence and frequency of binge drinking among surveyed farmworkers as compared to US adults in 2011 -- FHS, 2013-14 and BRFSS, 2011

	Prevalence of binge drinking ^a			Frequency of binge drinking ^b		
	n	Row %	95% CI	n	Mean (sd)	95% CI
FARMWORKERS, SONOMA COUNTY, 2013-14¹						
Binge drank at least once in the last 30 days						
<i>Total</i>	128	47.2	--	128	4.1 (5.5)	--
<i>By sex</i>						
Male	126**	50.8	--	127	4.6 (7.4)	--
Female	2	8.7	--	2	1.5 (0.7)	--
<i>By family structure</i>						
Married/living with partner and children	46*	39.0	--	46	3.2 (4.5)	--
Married/living with partner	38	56.7	--	38	5.1 (5.7)	--
Single	43	51.8	--	44	5.4 (10.5)	--
<i>By age (years)</i>						
18-24	17*	48.6	--	17	4.2 (6.9)	--
25-34	53	60.9	--	53	3.0 (3.4)	--
35-44	28	22.1	--	29	6.6 (11.5)	--
45-54	17	13.4	--	17	5.4 (7.4)	--
55+	12	9.5	--	12	3.2 (2.6)	--
ADULTS, UNITED STATES, 2011²						
Binge drank at least once in the last 30 days						
<i>Total</i>	457,555	18.4	18.1-18.6	59,553	4.1	4.0-4.2
<i>By sex</i>						
Men	179,224	24.6	24.2-25.0	34,859	4.6	4.0-4.7
Women	278,331	12.5	12.2-12.8	24,694	3.2	3.1-3.3
<i>By age (years)</i>						
18-24	20,016	30.0	28.9-31.1	6,210	4.4	4.1-4.6
25-34	44,441	29.7	28.9-30.5	12,167	3.8	3.7-4.0
35-44	58,980	21.1	20.5-21.8	11,781	3.9	3.8-4.1
45-64	187,811	14.1	13.8-14.5	23,710	4.2	4.1-4.3
65+	146,307	4.3	4.1-4.5	5,685	4.9	4.5-5.3
<i>By race/ethnicity^ϕ</i>						
White, non-Hispanic	363,127	21.1	20.7-21.4	47,879	4.1	4.0-4.2
Black, non-Hispanic	35,919	14.2	13.4-15.0	3,446	3.8	3.5-4.1
Hispanic	28,275	17.7	16.9-18.4	4,338	3.3	3.0-3.6
Asian/Pacific Islander	8,746	10.3	9.1-11.4	885	3.4	2.5-4.3
American Indian/Alaska Native	6,248	18.2	16.1-20.4	992	4.5	3.7-5.3

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); 95% CI = 95% confidence interval; sd=standard deviation

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from the Behavioral Risk Factor Surveillance System (BRFSS) 2011 found here:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/su6203a13.htm#Fig2>

* P-value<0.05, indicating a significant difference between groups

** P-value<0.05, indicating a significant difference between groups

^ϕ Age- and sex-adjusted to the 2000 US Census standard population

^a Total number of respondents who reported at least one binge drinking episode during the past 30 days divided by the total number of respondents

^b Average number of binge-drinking episodes reported by all binge drinkers during the past 30 days

TABLE H3. Nutrition among surveyed farmworkers as compared to Sonoma County adults in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	Farmworkers ¹			Sonoma County ²		
	n	% [§]	Mean (sd)	Weighted n	% [§] (95% CI)	Mean (95% CI)
FRUIT AND VEGETABLES						
Average number of times individual consumed fruits and vegetables per day	277	--	2.3 (1.7)	374,000	--	2.4 (2.6-2.9)
Availability of fruits and vegetables in neighborhood			--			
Never or sometimes	57	20.3	--	35,000	9.2 (5.6-12.9)	--
Usually or always	224	79.7	--	339,000	90.8 (87.1-94.4)	--
SODA CONSUMPTION						
Average number of times individual consumed regular soda per week	280	--	5.5 (5.4)	374,000	--	1.6 (1.0-2.3)
Farmworker drank sugary sweetened beverage on the job (regular soda, juice, sports drinks, and <i>aguas</i> like Jamaica)						
Yes	231	78.8	--	--	--	--
No	62	21.2	--	--	--	--
DIET ON THE JOB						
Brings food with them to work	272	95.4		--	--	--
Type of food farmworker consumes on the job among farmworkers that eat food on the job[†]						
Traditional Mexican food	265	93.0	--	--	--	--
American style sandwiches	89	31.2	--	--	--	--
Fruit	59	20.7	--	--	--	--
Vegetables or salad	53	18.6	--	--	--	--
Hot dogs or hamburgers	16	5.6	--	--	--	--
French fries	16	5.6	--	--	--	--

Abbreviations: n=number; sd=standard deviation; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Sonoma County adult California Health Interview Survey (CHIS) 2011-12

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

TABLE H4. Surveyed female farmworker's access to birth control -- FHS, 2013-14

	Female Farmworkers	
	n	% [§]
BIRTH CONTROL		
Accessed services needed to prevent pregnancies in Sonoma County		
Yes	13	59.1
No	0	0.0
Haven't tried	2	9.1
Does not wish to prevent pregnancies	7	31.8

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

TABLE H5. Surveyed farmworker’s age-adjusted prevalence of selected health conditions compared to Sonoma County adults in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	<i>Farmworkers</i> ¹ Age-adjusted ^a			<i>Sonoma County</i> ² Standard			
	n	Adjusted %	95% CI	Weighted n	%	95% CI	p
Poor or Fair self-rated general health ^b	115	43.9	45.9-51.9	49,000	13.1	9.4-16.8	<0.001
Obese ^c	54	25.4	18.6-32.2	80,000	21.5	16.5-26.5	0.26
Ever diagnosed with diabetes	23	14.5	8.6-20.4	19,000	5.2	3.0-7.4	0.002
Ever diagnosed with high blood pressure	49	26.0	18.6-33.3	93,000	24.8	20.2-29.3	0.71

Abbreviations: n=number; 95% CI = 95% confidence interval; p = p-value

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Sonoma County adult California Health Interview Survey (CHIS) 2011-12

Bold indicates p-value<0.05

^a Indirect standardization to CHIS population was used to develop age-adjusted prevalence

^b Farmworkers were asked to rate their health in general as excellent, very good, good, fair, or poor

^c Obesity was defined as a Body Mass Index (BMI) of 30.0 or more. Data was missing (21%) from the BMI variable, so estimates should be interpreted with caution.

TABLE H6. Among surveyed farmworkers ever diagnosed with diabetes or high blood pressure, percentage currently taking diabetes or high blood pressure medications as compared to Sonoma County adults in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	n	% [§]	95% CI
CURRENTLY TAKING HIGH BLOOD PRESSURE MEDICATIONS			
FARMWORKERS, 2013-14 ¹			
Currently taking medication for high blood pressure among those ever diagnosed with high blood pressure			
Yes	22	44.9	--
No	27	55.1	--
SONOMA COUNTY ADULTS, 2011-12 ²			
Currently taking medication to control high blood pressure among those ever diagnosed with high blood pressure			
Yes	72,000	77.4	67.8-87.1
No	21,000	22.6	12.9-32.2
CURRENTLY TAKING DIABETES MEDICATIONS			
FARMWORKERS, 2013-14 ¹			
Currently taking any medication for diabetes among those ever diagnosed with diabetes			
Yes	19	79.2	--
No	5	20.8	--

Abbreviations: n=number; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Sonoma County adult California Health Interview Survey (CHIS) 2011-12

[§] Column percents shown; Percentages might not add to 100 because of rounding

‡ Estimate is unstable and should be interpreted with caution

TABLE H7. Surveyed farmworkers ever diagnosed with high blood pressure by selected farmworker characteristics -- FHS, 2013-14

	NEVER diagnosed with high blood pressure n (Row %)	EVER diagnosed with high blood pressure n (Row %)	χ^2 p
Total	241 (83.1)	49 (16.9)	
FARMWORKER DEMOGRAPHICS			
Age			<0.0001
18-34	115 (89.8)	13 (10.2)	
35-44	56 (83.6)	11 (16.4)	
45-54	44 (88.0)	6 (12.0)	
55+	21 (53.9)	18 (46.2)	
Sex			0.78
Male	220 (83.3)	44 (16.7)	
Female	21 (80.8)	5 (19.2)	
Total Family Income in 2012[^]			0.40
Up to \$9,999	22 (84.6)	4 (15.4)	
\$10,000-\$19,999	39 (81.3)	9 (18.8)	
\$20,000-\$29,999	61 (84.7)	11 (15.3)	
\$30,000 and over	24 (70.6)	10 (29.4)	
Don't Remember	81 (85.3)	14 (14.7)	
Considers Sonoma County permanent residence			0.23
No	30 (90.9)	3 (9.1)	
Yes	201 (81.4)	46 (18.6)	
FARMWORKER'S FAMILY STRUCTURE			
Farmworker family structure			0.95
Married/living with partner and children	104 (83.2)	21 (16.8)	
Married/living with partner	55 (82.1)	12 (17.9)	
Single	79 (84.0)	15 (16.0)	
RISK FACTORS			
Cigarette Smoking			0.71
Every day	20 (83.3)	4 (16.7)	
Some days	31 (88.6)	4 (11.4)	
Not at all	190 (82.3)	41 (17.8)	
Binge drank in last 30 days			0.01
No	111 (77.6)	32 (22.4)	
Yes	112 (89.6)	13 (10.4)	
Depression screening^{^a}			0.03
Additional screening needed for a depressive disorder	14 (63.6)	8 (36.4)	
No additional screening for a depressive disorder needed	195 (84.4)	36 (15.6)	
Obesity^{^b}			0.002
No	151 (85.3)	26 (14.7)	
Yes	35 (66.0)	18 (34.0)	
	mean (sd)	mean (sd)	ANOVA p
Weekly soda consumption	5.2 (4.9)	6.1 (6.0)	0.19
Daily fruit and vegetable consumption	2.4 (1.7)	2.0 (2.1)	0.25

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value; sd=standard deviation; ANOVA p = Analysis of Variance p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Patient Health Questionnaire-2 (PHQ-2) was used to identify possible depression in a patient and the need for additional screening to diagnose a depressive disorder

^b Obesity was defined as a Body Mass Index (BMI) of 30.0 or more. Data was missing (21%) from the BMI variable, so estimates should be interpreted with caution.

TABLE H8. Surveyed farmworkers ever diagnosed with diabetes by selected farmworker characteristics -- CHIS, 2013-14

	NEVER diagnosed with diabetes n (Row %)	EVER diagnosed with diabetes n (Row %)	χ^2 p
Total	263 (91.3)	25 (8.7)	
FARMWORKER DEMOGRAPHICS			
Age			<0.0001
18-34	127 (99.2)	1 (0.8)	
35-44	58 (86.6)	9 (13.4)	
45-54	46 (92.0)	4 (8.0)	
55+	29 (76.3)	9 (23.7)	
Sex			0.001
Male	244 (93.1)	18 (6.9)	
Female	19 (73.1)	7 (26.9)	
Total Family Income in 2012			0.04
Up to \$9,999	20 (76.9)	6 (23.1)	
\$10,000-\$19,999	45 (95.7)	2 (4.3)	
\$20,000-\$29,999	69 (95.8)	3 (4.2)	
\$30,000 and over	29 (87.9)	4 (12.1)	
Don't Remember	85 (89.5)	10 (10.5)	
Considers Sonoma County permanent residence			0.75
No	31 (93.9)	2 (6.1)	
Yes	223 (90.7)	23 (9.4)	
FARMWORKER'S FAMILY STRUCTURE			
Farmworker family structure			0.07
Married/living with partner and children	108 (87.1)	16 (12.9)	
Married/living with partner	62 (92.5)	5 (7.5)	
Single	90 (95.7)	4 (4.3)	
RISK FACTORS			
Cigarette Smoking			0.04
Every day	20 (83.3)	4 (16.7)	
Some days	35 (100.0)	0 (0.0)	
Not at all	208 (90.8)	21 (9.2)	
Binge drank in last 30 days			0.02
No	126 (88.1)	17 (11.9)	
Yes	119 (96.0)	5 (4.0)	
Depression screening^{Aa}			0.11
No additional screening for a depressive disorder needed	212 (92.2)	18 (7.8)	
Additional screening needed for a depressive disorder	18 (81.8)	4 (18.2)	
Obesity^{Ab}			0.78
No	163 (92.1)	14 (7.9)	
Yes	48 (90.6)	5 (9.4)	
	mean (sd)	mean (sd)	ANOVA p
Weekly soda consumption	5.5 (5.1)	4.0 (4.8)	0.19
Daily fruit and vegetable consumption	2.2 (1.5)	3.0 (3.2)	0.04

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value; sd=standard deviation; ANOVA p = Analysis of Variance p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

^A Greater than 10% of responses missing, so results should be interpreted with caution

^a Patient Health Questionnaire-2 (PHQ-2) was used to identify possible depression in a patient and the need for additional screening to diagnose a depressive disorder

^b Obesity was defined as a Body Mass Index (BMI) of 30.0 or more. Data was missing (21%) from the BMI variable, so estimates should be interpreted with caution.

TABLE H9. Depression among surveyed farmworkers and California adults in 2011 -- FHS, 2013-14 and BRFSS, 2011

	Farmworkers ¹		
	n	%	95% CI
Depression screening^{^a}			
Additional screening needed for a depressive disorder	22	8.6	--
No additional screening for a depressive disorder needed	234	91.4	--
	California²		
Told by a health professional that they have a depressive disorder	16,898	12.3	11.7-13.0

Abbreviations: n=number; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Behavioral Risk Factor Surveillance System (BRFSS) 2011 found at http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6309a1.htm?s_cid=ss6309a1_w#Tab61

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Patient Health Questionnaire-2 (PHQ-2) was used to identify possible depression in a patient and the need for additional screening to diagnose a depressive disorder

TABLE H10. Surveyed farmworkers screening for depression by selected farmworker characteristics -- CHIS, 2013-14

	Farmworker DOES NOT NEED additional screening for a depressive disorder ^{^a}	Farmworker NEEDS additional screening for a depressive disorder ^{^a}	χ^2 p
	n (Row %)	n (Row %)	
Total	234 (91.4)	22 (8.6)	
FARMWORKER DEMOGRAPHICS			
Age			0.28
18-24	29 (87.9)	4 (12.1)	
25-34	75 (94.9)	4 (5.1)	
35-44	54 (87.1)	8 (12.9)	
45-54	44 (95.7)	2 (4.4)	
55+	29 (87.9)	4 (12.1)	
Race			0.02
non-Latino or Hispanic	5 (62.5)	3 (37.5)	
Latino or Hispanic	226 (92.6)	18 (7.4)	
Sex			0.03
Male	216 (92.7)	17 (7.3)	
Female	18 (78.3)	5 (21.7)	
Total Family Income in 2012			
Up to \$9,999	16 (80.0)	4 (20.0)	0.06
\$10,000-\$19,999	41 (91.1)	4 (8.9)	
\$20,000-\$29,999	66 (95.7)	3 (4.4)	
\$30,000 and over	30 (100.0)	0 (0.0)	
Don't Remember	71 (88.8)	9 (11.3)	
Considers Sonoma County permanent residence			0.25
No	21 (84.0)	4 (16.0)	
Yes	208 (92.0)	18 (8.0)	
HEALTH BEHAVIORS			
Binge drank on at least one occasion in the last 30 days			0.35
No	117 (89.3)	14 (10.7)	
Yes	103 (92.8)	8 (7.2)	
FAMILY STRUCTURE			
Farmworker family structure in the US			0.87
Married/living with partner and children	106 (92.2)	9 (7.8)	
Married/living with partner	53 (89.8)	6 (10.2)	
Single	72 (91.1)	7 (8.9)	

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Patient Health Questionnaire-2 (PHQ-2) was used to identify possible depression in a patient and the need for additional screening to diagnose a depressive disorder

TABLE H11. Surveyed farmworker's self-reported health in general by selected farmworker characteristics -- CHIS, 2013-14

	Farmworker reported Excellent, Very Good, or Good general health ^a	Farmworker reported Fair or Poor general health ^a	
	n (Row %)	n (Row %)	χ^2 p
Total	174 (59.8)	117 (40.2)	
FARMWORKER DEMOGRAPHICS			
Age			0.002
18-24	26 (66.7)	13 (33.3)	
25-34	64 (72.7)	24 (27.3)	
35-44	35 (50.7)	34 (49.3)	
45-54	31 (60.8)	20 (39.2)	
55+	15 (38.5)	24 (61.5)	
Sex			0.29
Male	161 (60.8)	104 (39.3)	
Female	13 (50.0)	13 (50.0)	
Total Family Income in 2012[^]			0.33
Up to \$9,999	12 (46.2)	14 (53.9)	
\$10,000-\$19,999	30 (61.2)	19 (38.8)	
\$20,000-\$29,999	47 (64.4)	26 (35.6)	
\$30,000 and over	22 (66.7)	11 (33.3)	
Don't Remember	51 (53.7)	44 (46.3)	
Considers Sonoma County permanent residence			0.63
No	21 (63.6)	12 (36.4)	
Yes	148 (59.2)	102 (40.8)	
FARMWORKER'S FAMILY STRUCTURE			
Farmworker family structure			0.92
Married/living with partner and children	73 (58.9)	51 (41.1)	
Married/living with partner	42 (60.0)	28 (40.0)	
Single	58 (61.7)	36 (38.3)	
HEALTH BEHAVIORS			
Cigarette Smoking			0.89
Every day	14 (56.0)	11 (44.0)	
Some days	23 (62.2)	14 (37.8)	
Not at all	137 (59.8)	92 (40.2)	
Binge drank in last 30 days			0.19
No	80 (55.9)	63 (44.1)	
Yes	81 (63.8)	46 (36.2)	
	mean (sd)	mean (sd)	ANOVA p
Weekly soda consumption	5.2 (4.7)	5.9 (6.3)	0.31
Daily fruit and vegetable consumption	2.3 (1.6)	2.3 (2.0)	0.72

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value; sd=standard deviation; ANOVA p = Analysis of Variance p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Farmworkers were asked to rate their health in general as excellent, very good, good, fair, or poor

TABLE H12. Surveyed farmworker’s self-reported health in general by selected farmworker health conditions -- FHS, 2013-14

	Farmworker reported Excellent, Very Good, or Good general health ^a	Farmworker reported Fair or Poor general health ^a	
	n (Row %)	n (Row %)	χ^2 p
Total	174 (59.8)	117 (40.2)	
HEALTH STATUS			
Ever diagnosed with diabetes			0.001
No	166 (63.4)	96 (36.6)	
Yes	7 (28.0)	18 (72.0)	
Ever diagnosed with high blood pressure			<0.0001
No	164 (68.6)	75 (31.4)	
Yes	10 (20.4)	39 (79.6)	
Depression screening^{Ab}			0.37
No additional screening for a depressive disorder needed	140 (60.1)	93 (39.9)	
Additional screening needed for a depressive disorder	11 (50.0)	11 (50.0)	
Obese^{Ac}			0.02
No	117 (66.5)	59 (33.5)	
Yes	26 (48.2)	59 (51.9)	

Abbreviations: n=number; Row % = row percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

[^] Greater than 10% of responses missing, so results should be interpreted with caution

^a Farmworkers were asked to rate their health in general as excellent, very good, good, fair, or poor

^b Patient Health Questionnaire-2 (PHQ-2) was used to identify possible depression in a patient and the need for additional screening to diagnose a depressive disorder

^c Obesity was defined as a Body Mass Index (BMI) of 30.0 or more. Data was missing (21%) from the BMI variable, so estimates should be interpreted with caution.

Worksite Conditions and Wellness

Main Findings

Injuries and poisonings Nine percent (9%) of farmworkers in Sonoma County reported having an injury or poisoning while working in Sonoma County in the last 12 months, and about half of these resulted in a workers' compensation claim. The most common cause of injury was being struck by or against an object. Farmworkers working for a contractor or labor management company were significantly more likely to report a poisoning or injury when compared to farmworkers working for a grower or owner.

Worksite conditions The majority of farmworkers reported having daily access to clean drinking water and disposable cups (90%), a toilet (96%), toilet paper (95%), water for washing hands (92%), breaks from work (95%), and a place for shelter from heat and weather (86%). Farmworkers working for contractors or labor management companies were significantly less likely to have access to shelter than those working for a grower or owner.

Background

Agriculture is one of the most dangerous industries in the US [125-128]. In 2007, the fatality rate for crop production agricultural workers (27.9 per 100,000 workers) was more than seven-times higher than the fatality rate for all US industries combined (3.8 per 100,000 workers) [129]. During work, farmworkers are often exposed to hazards that cause serious health problems, including: hazardous chemicals [130, 131]; plants that can cause allergic reactions [132-134]; tasks that take a toll on the musculoskeletal system [135, 136]; machinery and livestock that may cause serious injuries [137]; and injuries or illness from exposure to the heat and elements [125]. Unfortunately, surveillance on these occupational hazards specifically for farmworkers is severely lacking [138], due in part to the challenges of enumerating and locating farmworkers [125] and inaccuracies in reporting due to employer-based reporting [139].



Below, findings on the agriculture worksite conditions of Sonoma County farmworkers are presented using data from the Sonoma County Farmworker Health Survey (FHS) 2013-14.

Results

Surveyed farmworkers were asked questions related to worksite conditions and wellness at their Sonoma County farmwork positions. Questions included information on injuries or poisonings, causes of those injuries or poisonings, worker's compensation claims, and access to water, toilets, and shelter from the weather.

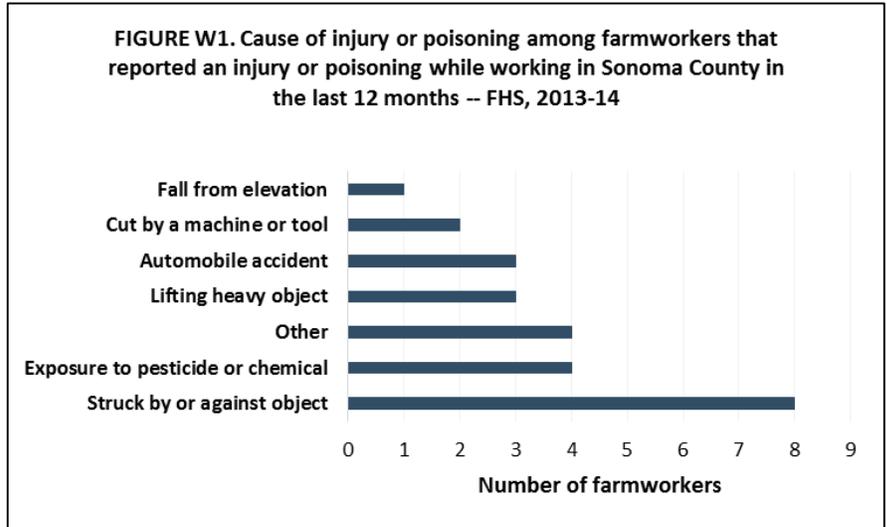
INJURIES OR POISONINGS

Farmworkers were asked, "During the last 12 months, have you suffered any injuries or poisonings while working in Sonoma County?" Farmworkers that had ever had an injury or poisoning were then asked a series of questions about the cause, training for the task that caused the injury, and workers' compensation claims.

Prevalence

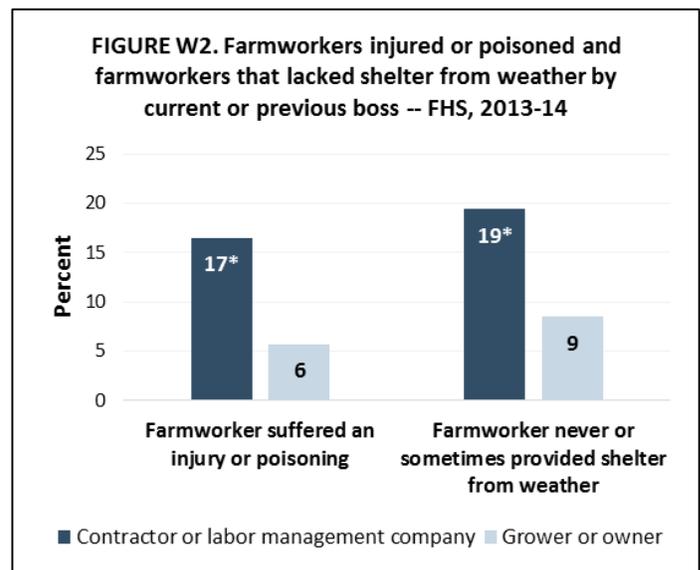
About 1 in 10 (9%) of farmworkers reported an injury or poisoning while working in Sonoma County in the last 12 months. Among farmworkers that did report an injury or poisoning, 8 farmworkers reported

being struck by or against an object, and fewer than 5 farmworkers each reported exposure to a pesticide or chemical, lifting a heavy object, automobile accident, cut by a machine or tool, or fall from elevation as the cause of their injury (Figure W1). Sixty-five percent (65%) of farmworkers responded that they did have experience doing the specific task with the specific commodity that led to an injury or poisoning. About half of farmworkers with injuries or poisonings reported filing a workers' compensation claim (Table W1); however, it should be noted that the severity of the injury or poisoning was not assessed.



Injuries or poisonings by employer type

Farmworkers' self-report of injuries or poisonings while working in Sonoma County in the last 12 months was compared to their employer at their current or previous farmwork position (contractor or labor management company vs. grower or owner). Farmworkers working for a contractor or labor management company at their current or previous farmwork position were significantly more likely to report a poisoning or injury while working in Sonoma County in the last 12 months when compared to farmworkers working for the grower or owner at the current or previous farmwork job²¹ (17% vs. 6%; $p=0.005$; Figure W2; Table W3).



* p -value<0.05

Surveillance of pesticide poisonings in Sonoma County

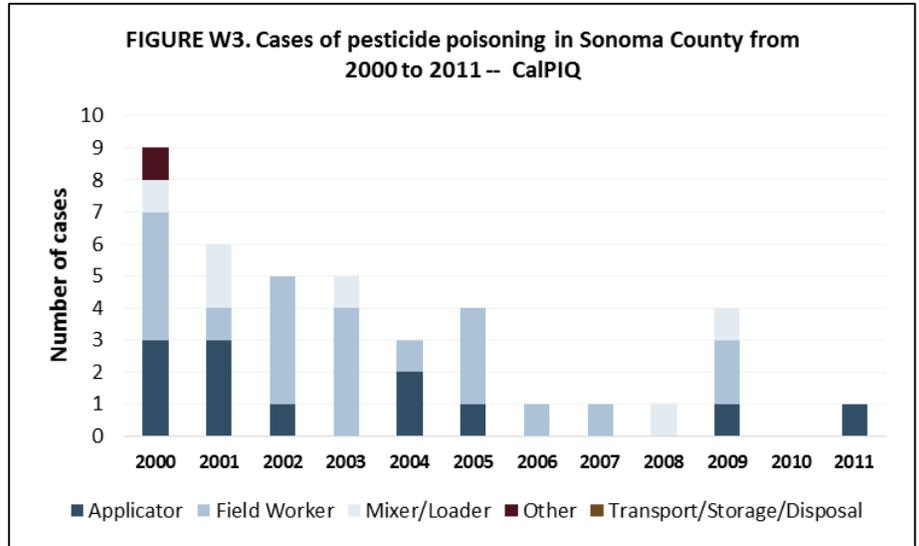
Data on pesticide poisonings from the California Department of Pesticide Regulation was analyzed. The number of agriculture pesticide poisonings in Sonoma County has decreased from 2000 to 2011. Overall, field workers had the most pesticide poisonings, followed by pesticide applicators (Figure W3). It should be noted that pesticide poisonings may not always be reported or diagnosed, so these estimates may provide an underestimate of the true prevalence of pesticide poisonings.

²¹ 11% of data is missing for this analysis, so these findings may not provide a complete picture of the relationship between injuries and poisonings and boss type.
Sonoma County Farmworker Health Survey

WORKSITE CONDITIONS

Reported worksite conditions

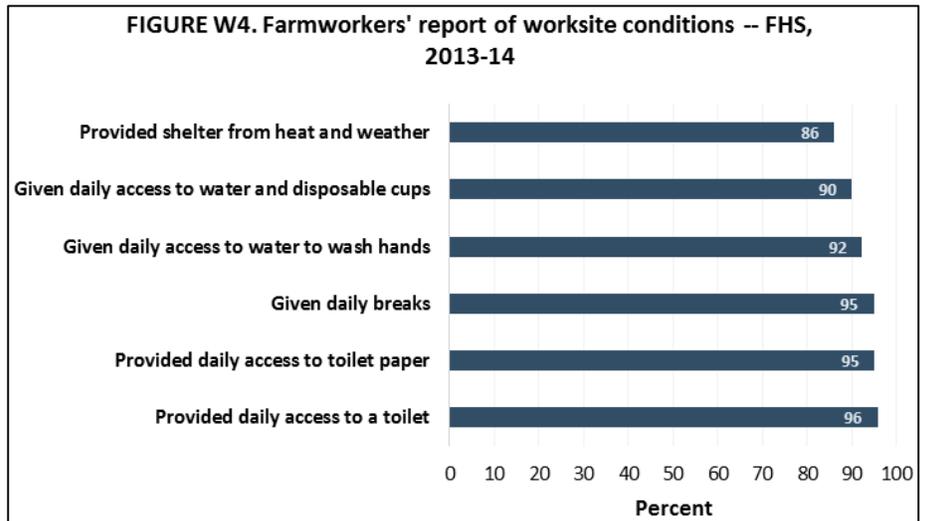
Farmworkers were asked about worksite conditions at their current or previous farmwork job. The majority (90%) of farmworkers reported having access to daily clean drinking water and disposable cups; 96% reported daily access to a toilet and 95% reported daily access to toilet paper; 92% reported access to water for washing hands; and 95% were given daily breaks from work by their current or previous employer. Thirteen percent (13%) of farmworkers were never or only sometimes provided a place for shelter from heat and weather by their current or previous employer (Figure W4; Table W2).



Cases of pesticide poisonings for Sonoma County between 2000 and 2011 are provided from CalPIQ. Only data for Crop/Livestock Processing Facility, Farm, and Livestock Production Facility are provided. Data includes definite, probable, and possible cases.

Access to shelter from the weather by employer type

Farmworkers’ self-report of access to shelter from the weather was compared by their employer (contractor or labor management company vs. grower or owner) at their current or previous farmwork position. Farmworkers working for a contractor or labor management company at their current or previous farmworker position were significantly more likely to report never or sometimes being provided shelter when compared to farmworkers working for the grower or owner²² (19% vs. 9%; $p=0.01$; Figure W2; Table W3).



²² 12% of data is missing for this analysis, so these results may not provide a complete picture of the relationship between shelter and employer type.

Discussion

INJURIES AND POISONINGS

One in ten surveyed farmworkers in Sonoma County reported having an injury or poisoning while working in Sonoma County in the last 12 months, and only about half of these resulted in a worker's compensation claim. The most common cause of injury was being struck by or against an object. More research is needed to completely understand the frequency, causes, and subsequent treatment of injuries and poisonings among farmworkers in Sonoma County. In this assessment and others [128, 140], farmworkers lacked access to healthcare, suggesting that farmworkers may struggle to access affordable healthcare to treat these occupational health problems. More information is also needed about worker's compensation for these injuries, since only half of reported injuries or poisonings ended in a worker's compensation claim in the FHS.

ACCESS TO SHELTER FROM THE WEATHER

About 13% of farmworkers reported not always having access to shelter from the weather at their current or previous farmwork position, and farmworkers working for contractors or labor management companies were significantly less likely to have access to shelter than those working for a grower or owner. Shelter provides protection from heat and other weather, so lack of access to protections from the weather may have potentially serious health consequences. Workers in outdoor occupations, such as agriculture, are exposed to hot and humid environments that put them at risk of heat-related illnesses and death. In the US between 1992 and 2006, 68 crop workers died in the US from heat stroke, a rate more than 20 times greater than all US civilians. Additionally, farmworkers often don't drink sufficient quantities of water during the work day, further increasing the risk of heat-related illnesses [141].

LIMITATIONS

The occupational injury and poisoning questions in this survey were brief, so details on the frequency, causes, medical treatment, severity, and compensation for these events was not collected. No data was collected on musculoskeletal injuries, which is known to be a significant problem among farmworkers [136, 142]. Many farmworkers were surveyed on the farm where they worked, which may have caused biases in the self-reported injuries and poisonings of farmworkers.

CONCLUSIONS

About 10% of farmworkers reported an injury or illness on the job, and farmworkers working for contractors or labor management companies had the highest prevalence of injuries or poisonings. Some surveyed farmworkers in Sonoma County, especially those working for contractors or labor management companies, were not always able to access adequate shelter from the heat and weather, increasing workers' risk of heat-related illnesses. More research is needed to understand the causes of, compensation for, and medical treatment of these injuries and poisonings, as well as the risks of not having adequate shelter.

Technical Notes

Data from the California Pesticide Illness Query (CalPIQ) [148] from the California Department of Pesticide Regulation was queried for Sonoma from 2000 to 2011. Only data for crop/livestock processing facilities, farms, and livestock production facilities were included. CalPIQ data for Sonoma County was used to determine for surveillance of reported pesticide poisonings in Sonoma County from 2000 to 2011.

Tables

TABLE W1. Self-reported prevalence of injuries and poisonings among surveyed farmworkers -- FHS, 2013-14

	n	% [§]
Farmworker suffered an injury or poisoning while working in Sonoma County in the last 12 months		
Yes	26	9.0
No	263	91.0
Cause of injury or poisoning among farmworkers reporting an injury or poisoning[†]		
Struck by or against object	8	32.0
Exposure to pesticide or chemical	4	16.0
Other	4	16.0
Lifting heavy object	3	12.0
Automobile accident	3	12.0
Cut by a machine or tool	2	8.0
Fall from elevation	1	4.0
Experience doing specific task that led to injury or poisoning		
No, never done this task	7	26.9
Yes, in this commodity	17	65.4
Yes, in another commodity	2	7.7
Workers' compensation claim was filed for farmworker		
Yes	12	48.0
No	13	52.0

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

[†] Respondent may have said yes to more than one category

TABLE W2. Self-reported descriptions of worksite conditions among surveyed farmworkers -- FHS 2013-14

	n	% [§]
Daily clean drinking water and disposable cups provided by current or previous employer		
Yes, water and disposable cups	252	90.0
Yes, water but no cups	7	2.5
No water, no cups	5	1.8
Don't know	16	5.7
Daily access to a toilet provided by current or previous employer		
Yes	271	95.8
No	10	3.5
Don't know	2	0.7
Daily access to toilet paper provided by current or previous employer		
Yes	267	95.0
No	9	3.2
Don't know	5	1.8
Daily access to water to wash hands provided by current or previous employer		
Yes	259	92.2
No	18	6.4
Don't know	4	1.4
Given daily breaks from work by current or previous employer		
Yes	265	95.0
No	14	5.0
Provided a place for shelter from heat and weather by current or previous employer		
Yes	247	86.1
No or sometimes	37	12.9
Don't know	3	1.0

Abbreviations: n=number

[§] Column percents shown; Percentages might not add to 100 because of rounding

TABLE W3. Surveyed farmworkers' injuries or poisonings and access to shelter from weather by farmworkers current or previous employer -- FHS, 2013-14

	<i>Farmworker reported boss for current or previous farmwork position was...</i>				
	Contractor or labor management company		Grower or owner		χ^2 p
	n	Col %	n	Col %	
Farmworker suffered an injury or poisoning while working in Sonoma County in the last 12 months[^]					
Yes	17	16.5	9	5.7	0.005
No	86	83.5	148	94.3	
Farmworker provided a place to get away from the heat or weather at their current or previous farmworker position[^]					
Never or Sometimes	20	19.4	13	8.5	0.01
Always	83	80.6	140	91.5	

Abbreviations: n=number; Col % = column percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05

[^] Greater than 10% of responses missing, so results should be interpreted with caution

Methods

Farmworker Health Survey

The Farmworker Health Survey (FHS) was a cross-sectional assessment of farmworkers in Sonoma County, CA conducted in the fall of 2013. This assessment had the goal of identifying preventable health and wellness disparities among the farmworker population. More specifically, this assessment aimed to:

1. Describe the prevalence of health and overall wellness indicators among Sonoma County farmworkers.
2. Identify preventable occupational concerns and health disparities among Sonoma County farmworkers.

Sample

Eligibility to participate was limited to individuals that spoke either English or Spanish, were 18 years or older, and had done any farm work in the last 12 months. Venue-based and convenience sampling were used to survey farmworkers in Sonoma County from September 2013 to January 2014. Venue-based sampling was conducted at key sites where farmworkers were located, which included day labor centers, community health clinics, and farms in geographic locations throughout Sonoma County. Among the 29 venues approached to participate in Sonoma County, 18 (62% participation rate) agreed to allow data collection. Since sampling sites were non-randomly selected, it is unknown if this sample is representative of Sonoma County farmworkers overall. Local experts consider the sites where farmworkers were surveyed to be important and representative locations, so it is believed that this sample is fairly representative of Sonoma County farmworkers as a whole. More research is needed to confirm this assumption.

Data Collection Procedures

The FHS instrument was available in English and Spanish. The survey was piloted with eight farmworkers to determine the appropriateness of survey length and to test responses to questions. After adjusting the survey based on the pilot, data collectors contacted potential survey venues for permission to enter and survey farmworkers. Eighteen sites approved, and 300 farmworkers were surveyed between September 2013 and January 2014 at these venues. The survey was administered in-person by trained, bi-lingual interviewers, and the survey took between 15 and 30 minutes to complete. Interviewers were trained on appropriate interview techniques and cultural sensitivity. All volunteer interview participants were given a \$10 gift card and a packet with local resources for referrals at the end of the interview. This protocol was approved by an Institutional Review Board.

Measurement

The FHS instrument was developed by a team of local experts and was modeled after national and state surveys including the California Agricultural Workers Health Survey (CAWHS), the National Agricultural Workers Survey (NAWS), the Behavioral Risk Factor Surveillance System (BRFSS), and the California Health Interview Survey (CHIS). There were eight question domains: employment history, housing and transportation, health and health behaviors, access to healthcare, worksite health and conditions, quality of life, personal information and demographics, and mental health. More information on specific measures is provided in the content-specific sections (e.g., the Economic Wellness Section). The vast majority of questions in FHS were valid and reliable measures used from CAWHS, NAWS, BRFSS, or CHIS. New questions were developed and piloted to confirm clarity. To ensure the confidentiality of each participant, surveys were assigned a unique identification number and no identifying information was collected.

Statistical Analyses

Seven survey responses were excluded due to missing or unreliable data during data analyses. The remaining surveys from 293 farmworkers were analyzed. SAS statistical software (Cary, NC) was used for all statistical analyses. Since this analysis was primarily descriptive and exploratory in nature, analyses focused on developing univariate descriptive statistics to provide prevalence estimates. For select variables, bivariate descriptive statistics were produced using chi-squared or analysis of variance (ANOVA) tests to analyze differences in proportions and means, respectively. A statistical significance of 5% was used for all statistical testing. For select outcomes, age-adjusted prevalence estimates were developed using indirect standardization. The standard population was the adult (≥ 18 years) California Health Interview Survey 2011-12 [68] Sonoma County sample. Due to limitations of indirect standardization [144], age-adjusted estimates for farmworkers should only be compared to the adult CHIS 2011-12 Sonoma County standard population. Age-adjusted estimates included adjusted prevalence estimates (%), 95% confidence intervals (95% CIs), and p-values. Where possible, the findings of FHS were compared to the findings from studies of other populations to identify health disparities among Sonoma County farmworkers. Data specifically from Sonoma County was used as the comparison group whenever possible. However, often no data was available specifically for Sonoma County, so data from California or the US overall was used. These comparison data were obtained from sources including the California Health Interview Survey (CHIS), Behavioral Risk Factor Surveillance System (BRFSS), and others.

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Appendices

APPENDIX E1. Demographics of surveyed farmworkers with missing total family income 2012 data -- FHS, 2013-14

	Not missing income data n (Col %)	Missing income data n (Col %)	χ^2 p
Considers Sonoma County permanent residence			0.67
Yes	157 (87.7)	93 (89.4)	
No	22 (12.3)	11 (10.6)	
Family structure			0.08
Married/living with partner and children	84 (46.9)	41 (37.3)	
Married/living with partner	45 (25.1)	25 (22.7)	
Single and children	8 (4.5)	3 (2.7)	
Single	42 (23.5)	41 (37.3)	
Bank account in the US			0.01
No	54 (30.3)	45 (46.4)	
Yes	124 (69.7)	52 (53.6)	
Payment at farmworker's current or last job			0.26
By the hour	125 (69.1)	86 (77.5)	
By the piece	32 (17.7)	11 (9.9)	
Combination hourly and piece rate	21 (11.6)	11 (9.9)	
Salary	2 (1.1)	3 (2.7)	
By the group	1 (0.6)	0 (0.0)	
Sex			0.03
Male	171 (94.0)	96 (86.5)	
Female	11 (6.0)	15 (13.5)	
Age			0.27
18-24	22 (12.3)	17 (15.7)	
25-34	61 (34.1)	28 (25.9)	
35-44	45 (25.1)	24 (22.2)	
45-54	26 (14.5)	25 (23.2)	
55+	25 (14.0)	14 (13.0)	

Abbreviations: n=number; Col % = column percents shown (Percentages might not add to 100 because of rounding); χ^2 p = Chi-squared p-value

Bold indicates p-value<0.05; Fisher's Exact test used when observed cell size < 5

Appendix H1. Body Mass Index among surveyed farmworkers and Sonoma County adults in 2011-12 -- FHS, 2013-14 and CHIS, 2011-12

	Farmworkers ¹		Sonoma County ²		
	n	% [§]	Weighted n	% [§]	95% CI for %
Body Mass Index					
Underweight and Normal Weight (<25.0)	28	12.1	171,000	45.7	39.7-51.6
Overweight (25.0-29.9)	149	64.5	123,000	32.8	26.8-38.8
Obese (30.0+)	54	23.4	80,000	21.5	16.5-26.5

Abbreviations: n=number; 95% CI = 95% confidence interval

¹ Data from Sonoma County Farmworkers Health Survey (FHS) 2013-14

² Data from Sonoma County adult California Health Interview Survey (CHIS) 2011-12

[§] Column percents shown; Percentages might not add to 100 because of rounding

‡ Estimate is unstable and should be interpreted with caution