



Improving the health of agricultural workers and their families in California

Current status and
policy recommendations

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Contents

Abbreviations	i
Executive summary	1
Social and economic factors	1
Health status of farm workers	2
Health care and preventive health services for farm workers	2
Recommendations to improve farm worker health	2
Policy recommendations	2
Background	4
Definitions	4
Agriculture in California	4
California farming—a spectacular success story, but not for farm workers	5
California’s farm workers—demographics and health insurance	6
New migrants: indigenous farm workers from Mexico and Central America	8
Health status	9
General health status	9
Acute injury	9
Chronic disease	11
Pesticide illness	11
Housing	12
Hunger	14
Family	15
Health care availability	16
The Affordable Care Act—often excludes farm workers	16
Other health care options	17
Current policy towards occupational health of farm workers	20
Labor contractors dominate the supply of seasonal farm jobs in California	20
Policy recommendations	22
Expand health insurance/access	22
Improve public health infrastructure	23
Increase the number of health workers and occupational safety employees	23
Establish fairness across industry	23
Improve living conditions	24
Promote agricultural safety and health education	24
References	25

Abbreviations

ACA	Affordable Care Act
AFL-CIO	American Federation of Labor and Congress of Industrial Organizations
ALRA	California Agricultural Labor Relations Act
ALRB	California Agricultural Labor Relations Board
CA	California
Cal-OSHA	California Division of Occupational Safety and Health
CAWHS	California Agricultural Workers Health Survey
CHC	Community Health Center
CRLA	California Rural Legal Assistance, Inc.
CRLAF	California Rural Legal Assistance Foundation
DIR	California Department of Industrial Relations
DLSE	California Division of Labor Standards Enforcement
DOL	United States Department of Labor
DPR	California Department of Pesticide Regulation
EDD	California Employment Development Department
EPA	United States Environmental Protection Agency
FQHC	Federally Qualified Health Center
Fed-OSHA	Federal Occupational Health and Safety Act
FICA	Federal Insurance Contributions Act
FLSA	United States Fair Labor Standards Act
FTE	Full-time equivalent
HCD	California Department of Housing and Community Development
NAWS	National Agricultural Workers Survey
NLRA	National Labor Relations Act
UFW	United Farm Workers of America
UI	Unemployment Insurance
US	United States
WGAT	Western Growers Assurance Trust

Executive summary

Many factors affect the health of farm workers, and improving the health of this population will require a diversity of approaches. Health status is affected by economic factors, environmental conditions including workplace hazards and home environment, personal behaviors influencing acute and chronic disease risks, social factors including immigration status, reduced access to health care and limited public health services. Cultural factors, lack of English speaking and low education may further affect health status. Improving the health of this population will ideally address multiple factors and involve regulatory changes, economic improvements and educational efforts. Ultimately the goal is to eliminate the disparities in health status, health care access and public health efforts that exist between farm workers and other populations.

Papers addressing the increased prevalence of poor health outcomes among farm workers are not new. This paper presents the current literature on the health of farm workers and their families and paints a picture of the social and economic context in which policy changes can be made to improve health outcomes. Importantly, we believe there are three factors that make this an opportune time to take action:

1. **The Patient Protection and Affordable Care Act (ACA)** provides the framework to provide health insurance and increase health care access for all individuals who live and work in the US. It is a political choice to determine what segments of the population are included or excluded from the ACA.
2. **Changes in migration patterns**—fewer people are migrating from Mexico to the US and there is less movement across the border. This has resulted in the agricultural sector facing worker shortages. Employers that provide safe work conditions and much needed health benefits will be better positioned to attract workers.
3. **Changes in the character of the agricultural workforce** put new immigrants at greater health risk. An increasing proportion of new immigrants are from Southern Mexican and Central American villages where indigenous languages are spoken. These indigenous workers are less likely to speak English or Spanish and face greater challenges in navigating the health system in the US.

Social and economic factors

Agriculture is a major driver of California's economy, with commodity sales of over \$42.6 billion in 2012. California farms grow over a third of all US-produced vegetables and two-thirds of all US-produced fruits and nuts. Yet, most farm workers are immigrants with low levels of education and socioeconomic status, live in poor housing conditions, and have less access to health care, fewer legal protections, and higher rates of occupational injuries and chronic diseases than workers in other occupations. Because the health status of farm workers and their families is understudied, communities are poorly equipped to advocate for improvements. The vast majority of crop workers in California are male (80.1%), Spanish speaking (92.9%) and born in Mexico (91.4%). Most workers are married (68.0%) and are parents (61.1%). Nearly 60% of hired crop workers in California are not authorized to work in the US. Over 20% of farm worker families live below the poverty level. The average age of farm workers is 37.9 years; however, those authorized to work in the US are dramatically older than their unauthorized counterparts (45.1 and 32.9 years, respectively). "Indigenous farm workers" from Southern Mexican and Central American villages where indigenous languages are spoken and for whom Spanish may be a second language, are replacing young *mestizo* adult residents from historically important farm worker sending regions of Mexico. The number of indigenous farm workers in California is not known, but may be as high as 29% of the state's farm labor workforce.

Health status of farm workers

Farm workers are subject to the same range of illnesses and chronic diseases as is the general population, however, there is evidence that they are at increased risk for occupational acute injury, certain chronic diseases, and pesticide illness. Farm workers are at increased risk for a number of important non-occupational conditions (e.g., obesity, diabetes) and occupational conditions (e.g., injury, respiratory disease, chemical injury). The major underlying factor affecting chronic disease risk is low socio-economic status. This may be further influenced by low educational levels, poor housing conditions, and reduced public health services. For example, obesity rates and associated health problems have been shown in several studies of California farm workers to be increased, reflecting in part the general rise in these conditions among low-income immigrant Latino populations.

Health care and preventive health services for farm workers

Many farm workers cannot afford medical, dental or vision care or pay for health insurance because of low hourly wages and seasonal or part-time jobs. Further, many farm workers are unauthorized to work in the US; thus, they are ineligible for health insurance through the ACA. Some California farm workers and their families may have other health care options, including subsidies through Covered California, expanded Medi-Cal, non-profit community clinics, *promotores de salud*, and private insurance through certain large agricultural employers and those with union contracts. However, providing farm workers with access to health care can be challenging due to language and education barriers, work authorization status, cultural resistance, and lack of facilities or transportation. They also suffer from reduced preventive health services. While children of hired crop workers in California have relatively high rates of health insurance (84.2%), nearly 70% of their parents are uninsured and 95% of crop workers employed by labor contractors have no health insurance through their job. This lack of health insurance is associated with lower rates of preventive health services (e.g., vaccinations, dentistry). Complications from poor housing conditions and living in remote, agricultural areas lacking basic amenities may also contribute to health disparities in this population.

Recommendations to improve farm worker health

The ACA, through comprehensive health insurance reforms, seeks to make health care more affordable and dramatically reduce the number of uninsured in the US. Farm workers are a vulnerable population with low rates of health insurance that could benefit greatly from such reforms. However, despite the millions of individuals now eligible for (often subsidized) health insurance, farm workers have largely fallen through the cracks. Important steps are being taken at the state level in California to fill these gaps for the primarily immigrant agricultural workforce. Additional action is needed to improve the health outcomes and reduce health disparities experienced by California's farm workers and their families.

Through appropriate policy interventions at the state level, it might become possible for farm workers and their families to secure a living wage and health insurance. If such efforts are successful, a healthy farm labor force will benefit the state's agricultural industry and also benefit the people of California. Fewer days of work lost to injury or illness translates to lower medical and related costs as well as improved worker productivity.

Policy recommendations

Expand health insurance/access

1. **Establish adequate dedicated state funding for access to health care** for the state's indigent and unauthorized workers and for their uninsured family members.
2. **Create solutions not in conflict with the ACA for providing health insurance** to all farm workers and their families, including enhancing workplace-based plans.

Improve public health infrastructure

3. **Strengthen California's public health infrastructure** with an emphasis on agricultural areas.
4. **Enhance preventive and primary care services** for farm workers and their families by expanding and strengthening the public health workforce in rural areas of need.

Increase the number of health workers and occupational safety employees

5. **Increase the number, cultural knowledge and involvement of mid-level health practitioners**, including nurses, physician assistants and other mid-level providers, and promotores de salud in farm worker communities.
6. **Hire more Cooperative Extension agents** specializing in occupational health and safety.
7. **Augment safety and labor law enforcement** by adding a substantial number of new field inspectors to the staff of Cal/OSHA, county Agricultural Commissioners, and the Division of Labor Standards Enforcement.

Establish fairness across industry

8. **End exceptionalism for the agricultural industry:** Eliminate the agricultural exemption for overtime pay requirements; strengthen enforcement of labor code regulations for tools and travel time; and raise the state minimum wage to \$15 per hour by 2018.

Improve living conditions

9. **Improve access to quality food and safe drinking water** for farm workers and their families.
10. **Develop sustainable affordable housing** for farm workers and their families by establishing new, dedicated state funding sources.

Promote agricultural safety and health education

11. **Create farm labor advisory committees to county-based Agricultural Commissioners** to promote cooperation and occupational safety and health education in agricultural regions of the state.

Background

Nearly half of the world's population lives in rural areas where agriculture is the primary source of livelihood (Food and Agriculture Organization of the United Nations 2013). Globally, the agricultural workforce is made up of the working poor, women, and child laborers (paid and unpaid). In many countries, farm workers occupy one of the lowest economic strata and experience the associated negative health effects. The same is true in California, where agriculture is a major driver of the state's economy, and most farm workers experience low socioeconomic status. Farm workers also face disparities in reduced access to health care and higher rates of occupational injuries and certain chronic diseases. Most farm workers are immigrants with low levels of education, live in poor housing conditions, and have little access to health care and legal protections. Because the health status of farm workers and their families is understudied, communities and their leaders are generally poorly equipped to advocate for improvements. This paper's goal is to describe the health of California's farm workers and their families and to make policy recommendations with the aim of improving health outcomes. We draw upon academic research, industry newsletters, government reports, and a variety of county, state and federal data sources.

Definitions

Terminology used to describe farm workers (e.g., agricultural worker, farm laborer) vary depending on several factors: regulatory definitions, specific workers being described, and author preferences. We adopt the term "farm worker" unless data are specific to a sub-group of workers (e.g., seasonal workers). These distinctions become particularly important when interpreting local, state and national reports about farm production, cash receipts, and worker earnings because the inclusion or exclusion of segments of the industry or types of workers can dramatically affect the figures being reported. Similarly, data collection methods vary significantly depending on the topic, agency, and report.

In this paper we indicate how figures were derived (e.g., employer report, worker self report) and the population being represented (e.g., currently employed workers, crop workers, livestock workers). Studies and surveys documenting the health status of farm workers and agricultural communities often focus on segments of the industry or a specific geographic region, are based on self-reported health outcomes, or do not provide a representative sample. We make note of these limitations when reporting findings.

Agriculture in California

California farms grow over a third of all US-produced vegetables and two-thirds of all US-produced fruits and nuts (California Department of Food and Agriculture 2014). Figures estimating the number and demographic characteristics of farm workers, number of farms, and worker earnings vary widely. According to the 2012 USDA Census of Agriculture, there were 77,857 farms in California with over 25.5 million acres of farmland, generating a market value of products sold of over \$42.6 billion (United States Department of Agriculture 2014). California has ranked first for US agricultural production for more than four decades. The top ten crop and livestock commodities in California, based on their annual cash receipts, are milk and cream, grapes, almonds, cattle and calves, nursery products, berries, hay, lettuce, walnuts, and tomatoes (California Department of Food and Agriculture 2014). In general, these are labor-intensive commodities that require significant input of manual labor. Approximately 50% of California's agricultural employment is in the San Joaquin Valley, followed by the South Coast and Central Coast regions (California Employment Development Department 2014).

Despite the fact that most California farms are small, as measured by the value of production of agricultural commodities, large California farms with at least \$5 million in annual sales (2.4% of California farms) dominate farm production in the state (Table 1). In 2012, California's large farms had a combined sales share reported to

Table 1. Share of market value of agricultural products, California vs. other 49 states combined, 2012

Size group by market value of production	Percent of California farms	Percent of California sales	Percent of other 49 states' farms	Percent of other 49 states sales
\$5 million or more	2.4%	63.2%	0.3%	27.9%
\$100,000 to \$4,999,999	24.0%	34.5%	17.8%	66.4%
Less than \$100,000	73.6%	2.3%	81.9%	5.7%
Total	100%	100%	100%	100%

Source: 2012 Census of Agriculture. Table 2. Market Value of Agricultural Products Sold Including Landlord's Share and Direct Sales. 2012 and 2007; United State & California reports.

be 63.2% of the state's total. In contrast, the combined sales share for large farms in the other 49 US states was only 27.9%.

Roughly three-fourths of California farms reported less than \$100,000 in agricultural product sales in 2012. Their combined sales amounted to only 2.3% of the total for all farms in the state (Table 1). Middle-size farms, with sales between \$100,000 and \$5,000,000, comprised nearly a quarter of farms and had a 34.5% share of the state's agricultural output. This is in contrast to the other 49 states combined that had the majority of their farm production sales in the middle-sized category.

California farming—a spectacular success story, but not for farm workers

California's farm sector consistently out-performs all other US farms. In the period 1992–2012, California's farmer cash receipts from the sale of agricultural commodities grew from \$17.1 billion to \$42.6 billion in nominal US dollars (United States Department of Agriculture 2014), an increase of 64% when adjusted for inflation.¹ This rate of growth exceeded the state's manufacturing sector as well as other industries and occurred despite the severe economic recession of 2008–2009, drought, freezes, and labor shortages.

During the same twenty-year period, net cash income from California farm operations (gross profits) increased from \$3.2 billion to \$8.5 billion in nominal US dollars, a growth of 79% in inflation-adjusted dollars. The inflation-adjusted average annual increase in gross profits was 3% per year.

In contrast to the California farm sector's economic success, during the same two decades, inflation-adjusted average wage rates for California hired farm workers lagged behind, increasing at *one-fifth* the rate of the

Tulare County

The contrast between farm production earnings and farm worker living standards is most striking in Tulare County. The 2013 *Tulare County Annual Crop and Livestock Report* reported that the county, "Leads the nation in agricultural production—\$7.8 billion," as measured by farm cash receipts from the sale of agricultural commodities. In 2012, the Census Bureau reported that 25% of families in Tulare County had incomes below the federal poverty guideline. Nearly half of all families in Tulare County receive CalFresh (Supplemental Nutrition Assistance Program, a.k.a. SNAP or food stamps) support, and an estimated majority of families receive food parcels from community food pantries.¹¹ Tulare County also ranks poorly among all counties for standard measures of health status, including 3-year average, age-adjusted death rates due to diabetes, coronary heart disease, chronic liver disease or cirrhosis, homicide, and stroke. Tulare County ranks worst in the state in the rate of births among adolescent mothers, age 15–19 years old (California Department of Public Health 2014).

¹ We accessed the GDP deflator (11 Sept 2014), published by Federal Reserve Bank of St. Louis, to adjust the reported 2012 sales and cash income. See research.stlouisfed.org/fred2/series/GDPDE

¹¹ As of the April-June 2014 Quarter, 51,229 families were enrolled in the CalFresh (SNAP) program. For the period January-September 2014, an unduplicated total of 60,664 families received food distributed by food pantries served by FoodLink, the county-wide wholesale agency. This total does not include food bundles distributed to 13,725 families by Nutrition on the Go, which provides food at school sites in the county

increase in farmers' gross profits: 0.6% per year. Field worker annual average wage rates in California rose from \$6.00 per hour to \$10.56 in nominal US dollars during the twenty-year period, or 12% overall when adjusted for inflation.ⁱⁱⁱ A major factor of the rise in average field worker wage rates were the six successive increases in the California minimum wage, from the 1992 rate of \$4.25 per hour to the current \$9.00 per hour.^{iv}

Average farm worker wages vary depending on the reporting mechanism, but generally fall in the \$9.00–\$11.00 per hour range. At full-time equivalent (FTE) work (2,000 hours), these wages would translate to annual pre-tax earnings of \$18,000–\$22,000, but can vary based on geography, commodity, and worker experience. However, actual income for California farm workers is far less than the hourly rate would suggest because many farm workers fill seasonal, short-term, and/or temporary jobs and only obtain an average of 41 weeks of farm work a year, which would result in annual pre-tax income of \$14,760–\$18,040.

Mendota

The small San Joaquin Valley city of Mendota is the site of the long-term MICASA study of farm worker family health (discussed in Section 2 of this report). Mendota's overriding characteristic is poverty, which affects 45% of town residents. The Census Bureau estimates per-capita-income in 2012 was \$8,947, or \$1,000 lower than the per-capita-income of Mexico. There were sixteen additional small communities in the three-county Fresno-Kings-Tulare region in which the Census Bureau reported 2012 per-capita-income was below that of Mexico. In each of these communities, a majority of private sector workers were employed in agriculture.

ⁱⁱⁱ California hired field labor annual average wage rates from the November edition of the NASS-USDA publication *Farm Labor* (annual series), and the California CPI from the Division of Labor Statistics and Research of the California Department of Industrial Relations (11 Sept 2014). dir.ca.gov/OPRL/CPI/EntireCCPI.pdf

^{iv} The recent history of the California minimum wage: 1996, \$4.75; 1997, \$5.15; 2000, \$6.25; 2002, \$6.75; 2007, \$7.50; 2008, \$8.00; 2014, \$9.00.

Low wages and part-time work contribute to farm workers' low socioeconomic status. An estimated 21% of farm worker families in California live in poverty according to the federal poverty standard, and this proportion would be greater if California's higher cost-of-living were taken into account (Dubay et al. 2013, Legislative Analyst's Office: The California Legislature's Nonpartisan Fiscal and Policy Advisor 2014). While farm worker employment in California averaged 400,000 FTE positions in 2012, with peak employment of over 470,000 FTE in June (Martin 2014), approximately two workers accounted for each agricultural FTE job. This occurs because despite California's year-round growing season, agricultural work is often temporary and/or short-term. Factors such as the California drought have the potential to greatly impact the agricultural industry and negatively affect farm worker employment. It is estimated that the 2014 drought caused a total loss of 17,100 seasonal and part-time agricultural jobs (Howitt et al. 2014).

California's farm workers—demographics and health insurance

Low income and high poverty rates among California's farm workers are widely recognized as health risks and contribute to economic and social vulnerability. Many workers cannot afford medical, dental or vision care or the cost of medical insurance. Status as an ethnic and linguistic minority, lack of authorization for US employment, ineligibility for most needs-based government programs, low educational attainment, and poor social networks, especially in the form of extended family, all exacerbate farm workers' precarious economic and social conditions.

Several surveys and studies have sought to document the demographic profile of agricultural workers, nature of their work, access to services, and health outcomes. This can be difficult as agricultural workers are a hard-to-reach population due to long work hours, migratory work patterns, and potential distrust of data collectors. Two of the most comprehensive farm worker surveys are the California Agricultural Workers Health Survey (CAWHS) and the National Agricultural Workers Survey (NAWS). CAWHS is a cross-sectional household survey of hired farm laborers conducted in 1999 by two of this paper's authors that currently provides the most in-depth picture of the health of California's crop and livestock farm workers and also included a comprehensive physical examination conducted by medical professionals (Villarejo et al. 2008, Villarejo et al. 2010). The CAWHS employed a multistage random sampling

scheme that yielded 654 adults (> 18 years of age) who performed paid farm work during the preceding year from seven representative communities across California's six agricultural regions. The CAWHS participants included some farm laborers who were not working at the time of the survey, including a few who had experienced temporary disabling occupational injuries. With the NAWS, the US Department of Labor conducts face-to-face interviews with a nationally representative sample of hired crop workers. Livestock workers or workers not currently employed are excluded. In California, livestock workers are estimated to be 7.5% of the agricultural workforce (State of California Employment Development Department 2012).

The most recent NAWS data show that the vast majority of crop workers in California are male (80.1%),

Spanish-speaking (92.9%) and born in Mexico (91.4%) (Table 2: FY 2008–2012). Most workers are married (68.0%) and are parents (61.1%). The CAWHS told a similar story in 1999, finding the vast majority of workers to be male and foreign-born (primarily in Mexico), married, and with an average age of 34 years. The average age of the NAWS workers was 37.9 years; however, those authorized to work in the US were dramatically older than their unauthorized counterparts (45.1 and 32.9 years, respectively). According to the NAWS (Table 2), nearly 60% of hired crop workers in California, both male and female, are not authorized to work in the US. This is higher than the national average of 50% reported for the 2010–12 period (United States Department of Labor 2014) and a dramatic shift from the approximately 60% of CAWHS respondents reporting their immigration status as citizen or permanent resident in 1999.

Table 2. Demographic characteristics by work authorization status and gender, National Agricultural Workers Study, 2008–2012, California

	All	Authorized	Unauthorized	Male	Female
N (%)	3,389 (100)	1,367 (40.6)	1,998 (59.4)	2,742 (80.9)	647 (19.1)
Gender: Male	2,742 (80.9)	1,105 (80.8)	1,618 (81.0)	--	--
Authorized to work in US	1,367 (40.6)	--	--	1,105 (40.6)	262 (40.8)
Age (years, mean)	37.9	45.1	32.9	38.1	37.1
Age at US entry (years, mean)	21.3	19.9	22.1	21.0	22.7
Birthplace: US	168 (5.0)	168 (12.3)	0 (0.0)	142 (5.2)	26 (4.0)
Birthplace: Mexico	3,116 (91.4)	1,146 (83.8)	1,955 (97.9)	2,526 (92.1)	590 (91.2)
Indigenous	369 (10.9)	71 (5.2)	297 (14.9)	282 (10.3)	87 (13.5)
Migrant	541 (16.0)	185 (13.5)	355 (17.8)	475 (17.3)	66 (10.2)
Migrant type: Follow the crop ^{a,b}	178 (32.9)	35 (18.9)	142 (40.0)	159 (33.5)	19 (28.8)
Migrant type: International shuttler	344 (10.2)	135 (9.9)	209 (10.5)	304 (11.1)	40 (6.2)
Dominant language: Spanish	3,142 (92.9)	1,214 (89.1)	1,908 (95.7)	2,536 (92.7)	606 (93.8)
Education level (median attainment)	6th grade	6th grade	6th grade	6th grade	6th grade
Married	2,301 (68.0)	1,043 (76.4)	1,245 (62.4)	1,869 (68.2)	432 (67.0)
Parent	2,072 (61.1)	828 (60.6)	1,231 (61.6)	1,601 (58.4)	471 (72.8)
Family income below poverty level	645 (21.0)	200 (15.6)	439 (24.8)	480 (19.2)	165 (28.7)

^a Type of migrant: follow the crop (have two farm work locations greater than 75 miles apart) or shuttle but not follow the crop (international shuttle or have US home base more than 75 miles apart).

^b Percentage of migrant workers who follow the crop or are international shuttlers.

Table 3. Health insurance by work authorization status and gender, National Agricultural Workers Study, 2008–2012, California

N (%)	All	Authorized	Unauthorized	Male	Female
Farm worker has insurance	1,069 (31.7)	675 (49.4)	388 (19.4)	849 (31.1)	220 (34.3)
Spouse has insurance	868 (45.7)	541 (55.4)	324 (35.0)	726 (49.2)	142 (33.4)
Children (some or all) have insurance	1,406 (84.2)	616 (80.3)	780 (87.4)	1,040 (84.8)	366 (82.4)

A higher proportion of women (28.7%) and unauthorized (24.8%) workers reported family income below the poverty level than did their male and authorized counterparts in the NAWS.

The NAWS and CAWHS also surveyed workers about health insurance. NAWS data (Table 3) indicate that children of hired crop workers in California have relatively high rates of health insurance (84.2%) compared to their crop worker parent (31.7%). Just over a quarter of CAWHS respondents reported having health insurance in 1999. Those who do have health insurance are often covered through their employer. Less than 5% of crop workers employed by labor contractors had health insurance through their job.

New migrants: indigenous farm workers from Mexico and Central America

The most important recent development in California's farm labor market is the increase in the number of workers from Mexican and Central American villages where indigenous languages are spoken, such as Mixtec,

Triqui and Perepecha, and for whom Spanish may be a second language. New research indicates that “indigenous farm workers” are replacing young mestizo adult residents of historically important sending regions of Mexico, such as Michoacán and Jalisco, who are no longer willing to migrate to perform farm work in US agriculture (Taylor et al. 2012). The number of indigenous farm workers in California is not known, but has been estimated to be 29% of the state's farm labor workforce during 2006–08 (Mines et al. 2010). This is much higher than the 11% of NAWS respondents (Table 2) and 8% of the CAWHS respondents who identified as indigenous. This discrepancy may have occurred due to unfamiliar ethnicity categories in the surveys as well as the reluctance of some workers to identify their ethnic origin. The indigenous farm worker population is more likely to be unauthorized to work in the US than non-indigenous workers (80% of indigenous workers are unauthorized as compared to 60% of all California farm workers). Indigenous workers also face unique language barriers, as many indigenous individuals prefer to speak their own language, and some do not speak English or Spanish.

Health status

General health status

The heterogeneity of the agricultural workforce poses a major challenge for understanding the health of its members. For example, health issues for a 60-year-old third-generation White farmer differ markedly from those of a 35-year-old Mexican immigrant working to support family in the US and from an 18-year-old indigenous Mexican villager, monolingual in Mixteco and unauthorized to work in the US. Many published reports, while focusing on specific populations (e.g., farmers, immigrant workers), do not account for the underlying heterogeneity of the target population.

Of the many occupational and non-occupational determinants of health in the California farm worker population, low socioeconomic status is arguably the most important underlying factor. This translates ineluctably to poor health outcomes and inadequate access to preventive and health care resources. Most male workers do not have a regular family doctor and rarely visit a clinic. A significant proportion has never had a medical visit since coming to the US. In contrast, female workers and children are far more likely than men to seek and obtain care, often around pregnancy or gynecological issues. For example, unauthorized pregnant women have access to care through California's restricted scope Medi-Cal program, which covers pregnancy and emergency conditions. Community health centers throughout California provide some of the needed care to farm workers and their families.

There is evidence that farm workers are at increased risk for a number of important non-occupational conditions (e.g., obesity, diabetes, hypercholesterolemia) and occupational conditions (e.g., injury, respiratory disease). Here we provide an overview of major occupational and non-occupational conditions that negatively impact the health of farm workers and their families. Where possible, we draw upon California-specific data.

Acute injury

Injury among farm workers has been the subject of increasing interest over the past two decades and more, as investigators and the public have learned about increased overall injury mortality and morbidity in this group (McCurdy et al. 2000).

The Census of Fatal Occupational Injuries recorded 225 deaths for the agriculture, forestry, and fishing major occupational group in 2013, yielding an occupational fatality rate of 23.1/105 FTE—the highest among all major occupational groups and over seven-fold greater than for all private workers combined (United States Department of Labor 2014). However, because this is an aggregate of several industries, we are not able to compute national fatality rates for agriculture alone. The secular trend for fatal injuries in agriculture is downward; the fatal injury rate was 29.9/105 FTE (based on 297 deaths) in 2006 (United States Department of Labor 2006). Rates prior to 2006 were calculated based on the number of persons employed, regardless of their full- or part-time status and are not directly comparable to current rates, which reflect hours worked. However, the annual total number of deaths in farming occupations has drifted steadily downward from 680 in 1992 (United States Department of Labor 1992); thus, it is likely that rate comparisons across this time period, were they possible, would also reflect this reduction.

The California Division of Occupational Safety and Health (Cal-OSHA) publishes annual reports of the Census of Fatal Occupational Injuries by industry for California. We are able to compute the fatality rate of farm workers by drawing upon annual average employment reported by the California Employment Development Department (EDD) (Table 4). There is a downward trend of occupational fatalities for farm workers in California. In the recent past, the highest rate of fatalities occurred in 2006, with 12.23 deaths per 100,000 FTE, and the lowest in 2012, with 5.02/10,000.

Table 4. Hired farm worker occupational fatalities by year, California Division of Occupational Safety and Health and the Employment Development Department, 2005–2012

Year	Hired farm worker deaths	Ag employment (EDD)	Rate per 100,000 FTE
2012	18	358,217	5.02
2011	23	349,608	6.58
2010	26	344,583	7.55
2009	20	336,833	5.94
2008	36	353,975	10.17
2007	21	349,658	6.01
2006	42	343,308	12.23
2005	34	347,300	9.79

Circumstances contributing to increased injury risk in agriculture are obvious: physically demanding labor, dangerous machinery, large animals, chemicals, and other hazards; short but intensive employment periods determined by the agricultural production schedule; and work in changing environments according to season and task. Social, economic, and linguistic marginalization, often complicated by lack of work authorization, contribute to a reluctance among workers to press for improved working conditions (Donham et al. 2006).

Studies of agricultural workers generally show an overall nonfatal injury risk around 10/100 person-year and ranging between approximately 3 and 20/100 person-year (McCurdy et al. 2000). Risk is increased for young and old, and males have 2–3-fold increased risk compared to females. Other risk factors include a history of previous injury, education (increased risk with post-high school education), use of certain medications, farm ownership and residence, and commodity (with increased risk for work in cattle production and tree fruit). Musculoskeletal injuries predominate among nonfatal injuries, often involving extremities or the back (McCurdy et al. 2013). The major sources of injury include machinery, animals, and falls. The most common source of fatal injury nationally is tractor-related events, often involving a turnover (Hard et al. 2011).

Efforts to reduce the toll of agricultural injury generally involve engineering improvements, regulatory enforcement, and education (Aherin et al. 1990). Engineering improvements (e.g., protective guards around moving machinery parts) tend to be highly effective if they reduce or eliminate exposure to hazards. Moreover, well-designed engineering improvements protect workers despite language ability, inattentiveness, or skill level. A major limitation for engineering controls is that they may be overridden, often to speed maintenance or related tasks. For example, the operator may remove protective shielding around a tractor's power take-off device to facilitate maintenance and adjustment. Regulatory enforcement depends on the acceptability of a regulatory regime by the farmer and the financial and human resources available for enforcement. For example, California reported 77,857 farms in 2012 (United States Department of Agriculture 2014), and providing sufficient personnel for periodic inspections of all those farms through the annual farm production cycle would be prohibitively expensive. Cal-OSHA, the agency charged with protecting workers from health and safety hazards in the workplace, has approximately 170 full-time equivalent inspectors for all industries in the state, and none are dedicated to agriculture. There is evidence that Cal-OSHA enforcement is independently associated with reductions of indemnity-qualified, paid workers compensation insurance claims for occupational injuries in California (Workers Compensation Insurance Rating Bureau of California 25 April 2002). UC Cooperative Extension has historically provided outreach, education and research on farm employment concerns. There continues to be an important role for UC Cooperative Extension in health and safety outreach and education, though staffing to deliver this education has been reduced.

Education in injury prevention is an attractive option because of its relative low cost and acceptability to farm employers. However, there is little evidence that safety education programs alone have resulted in improvements in safe behaviors or reduced injury rate (Rautainen et al. 2008). The policy implication is that safety education, while arguably necessary, is in itself insufficient for reducing risk. Therefore, it is inappropriate to ignore engineering and regulatory approaches (which unfortunately tend to be expensive) in favor of educational measures alone.

Chronic disease

Mills and colleagues studied proportionate mortality (a statistical method relating the number of deaths from a particular condition to all deaths within the same population group for the same period) among members of the United Farm Workers of America, AFL-CIO union in California from 1973–2000 (Mills et al. 2006). Farm workers experienced increased proportionate mortality from respiratory tuberculosis and gastrointestinal and uterine cervix malignancies. A separate comparison with the California Latino population showed elevated proportionate mortality for tuberculosis, cerebrovascular disease, and unintentional injury. Reduced proportionate mortality was noted for all cancer deaths combined, heart disease, and HIV-related deaths.

There have been several studies in California addressing the health of hired farm workers. The CAWHS, described above (Villarejo et al. 2010), documented elevated overweight prevalences (men: 79%; women: 74%), obesity (men: 29%; women: 38%), and cholesterol > 240 mg/dL (men: 17%; women: 4%). The CAWHS survey identified numerous previously undiagnosed health conditions among participants, such as uterine cancer, sexually transmitted diseases, hyperglycemia, high blood pressure, and poor dentition. CAWHS data revealed that unaccompanied males were more likely than married males to engage in risky sexual behaviors, such as having sexual relations with commercial sex workers and not protecting themselves against sexually transmitted diseases (Brammeier et al. 2008).

Hubert et al. conducted a survey among adult farm workers in Monterey County, California (Hubert et al. 2005). Two-thirds of participants were born in Mexico. Of the total 1,005 participants, self-reported height and weight were available for 901 (90%) persons: 380 men and 335 women living in the general community and 186 migrant men living in local agricultural labor camps. Obesity prevalence (BMI > 30) was 24% in women and 20–21% in men. The true prevalence of obesity is likely higher, as the results were based on self-report rather than objective measurement. Obese participants in the community sample had lower levels of physical activity and acculturation along with a poor diet. Men living in the agricultural labor camps had lower BMI and were healthier and less acculturated than those living in the community for all age strata.

The Mexican Immigration to California: Agricultural Safety and Acculturation (MICASA) Study is an ongoing longitudinal investigation among Latino, largely

Mexican, farm workers in Mendota, a small agricultural community in California's Central Valley (URL: micasa.phs.ucdavis.edu) (Stoecklin-Marois et al. 2011). The study focuses on a number of chronic health conditions, including respiratory disease (Rodriquez et al. 2014), injury (McCurdy et al. 2013, Xiao et al. 2013), reproductive health (McCurdy et al. 2014), psychosocial outcomes (O'Connor et al. 2013), pesticide exposure (Trunnelle et al. 2013, Trunnelle et al. 2014), and dental disease (Finlayson et al. 2010).

Self-reported mental symptoms (e.g., depression, *nervios*) were common in the MICASA population and were associated with workplace injuries. Higher acculturation level was associated with higher level of dietary fat intake, and being born in Latin America was associated with more fruit and vegetable intake. Dental care levels were poor, with the majority not having dental insurance or coverage of any kind and almost half having untreated caries. The study evaluated many illness and injury outcomes from agricultural work. For example, the use of personal protective equipment was uncommon except for work with pesticides. Chronic hip pain was associated with frequent stooping/bending at work and with long hours of tractor driving. Most participants had received training about heat illness at work, but knowledge about the need for acclimatization was low, and reported water intake was below recommendations for all subjects. Women were noted to drink less water at work than were men.

Measurements of dust exposure at work sites showed high levels of inhalable particles, with levels varying by different crops. Pesticide residues were measured inside the houses of study participants. Permethrin, a common insecticide, was detected in over half the households (Trunnelle et al. 2013). This result is similar to what has been found in other farm worker communities.

Pesticide illness

Pesticide-related illness has been a topic of enduring interest in the agricultural community and society at large. Interest is driven by the array of adverse health effects that have been associated with pesticide exposure: cancer, reproductive harm, and involvement in many organ systems, including skin, respiratory, cardiac, liver, kidneys, blood-forming organs, and neurological. In addition, modern Western agriculture is heavily dependent on pesticides; there were 186 million pounds (active ingredient) applied in California in 2012 (California Department of Pesticide Regulation et al. 2014). Farm

workers may be exposed during the application process, tending crops, harvest, or post-harvest activities. Pesticide illness is reported much less frequently than traumatic injury, although true rates are unknown owing to underreporting, especially for mild cases. The California Pesticide Illness Surveillance program reported 1,067 cases of pesticide-associated illness in 2011 (California Department of Pesticide Regulation 2011). Less than one-quarter of these cases involved agriculture. The actual number of cases is unknown because mild cases are unlikely to be recognized and reported.

Recent work has focused on neurodevelopmental risk to children of farm workers associated with pesticide exposure. The Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS; URL: cerch.org) study has followed since 1999 a birth cohort in Salinas, a predominantly Latino agricultural community in California's northern coastal region. The study focuses on exposures to pesticides and other environmental chemicals and various health outcomes, including neurodevelopment, in children from the local low-income, Spanish-speaking population, among whom agriculture is the predominant employment. Investigators have shown that prenatal exposure to organophosphate pesticides (indicated by maternal urinary metabolite levels during pregnancy) is associated with adverse neurodevelopmental outcomes in the offspring, including inattention during childhood (Marks et al. 2010), poorer cognitive functioning at age 2 (Eskenazi et al. 2007), and lower IQ at age 7 (Bouchard et al. 2011).

While the mechanism by which prenatal exposure to organophosphates may affect neurological function in childhood is unknown, pregnancy is an important time for neurodevelopment of the fetus, and exposures during this time could plausibly disrupt neurotransmitter function and development. Moreover, the study findings are consistent with a number of other similarly focused investigations. Further research is necessary to exclude potential confounders, clarify mechanisms, and identify high-risk groups, such persons with certain genetic polymorphisms (e.g., paraoxonase-1).

Pesticide exposure from agricultural spraying has potential health implications for communities in close proximity to farm land. The Childhood Autism Risks from Genetics and Environment (CHARGE) California-based case-control study investigates environmental factors contributing to autism and developmental delay (URL: beincharge.ucdavis.edu). Investigators recently found that mothers residing 1.5km–1.75km from pyrethroid

insecticide applications during their third trimester had a significantly increased risk of having a child with autism spectrum disorder compared to mothers without such exposure (Shelton et al. 2014). Another study found that mothers living 500 meters from an organochlorine agricultural spray area were 6.1 times more likely to have a child diagnosed with autism spectrum disorder compared to mothers who did not live near field sites with those compounds applied (Roberts et al. 2007). Organophosphate use has decreased in recent decades, and pyrethroids are largely replacing them in agricultural applications. Additional research is needed on the potential health effects from long-term pyrethroid exposure.

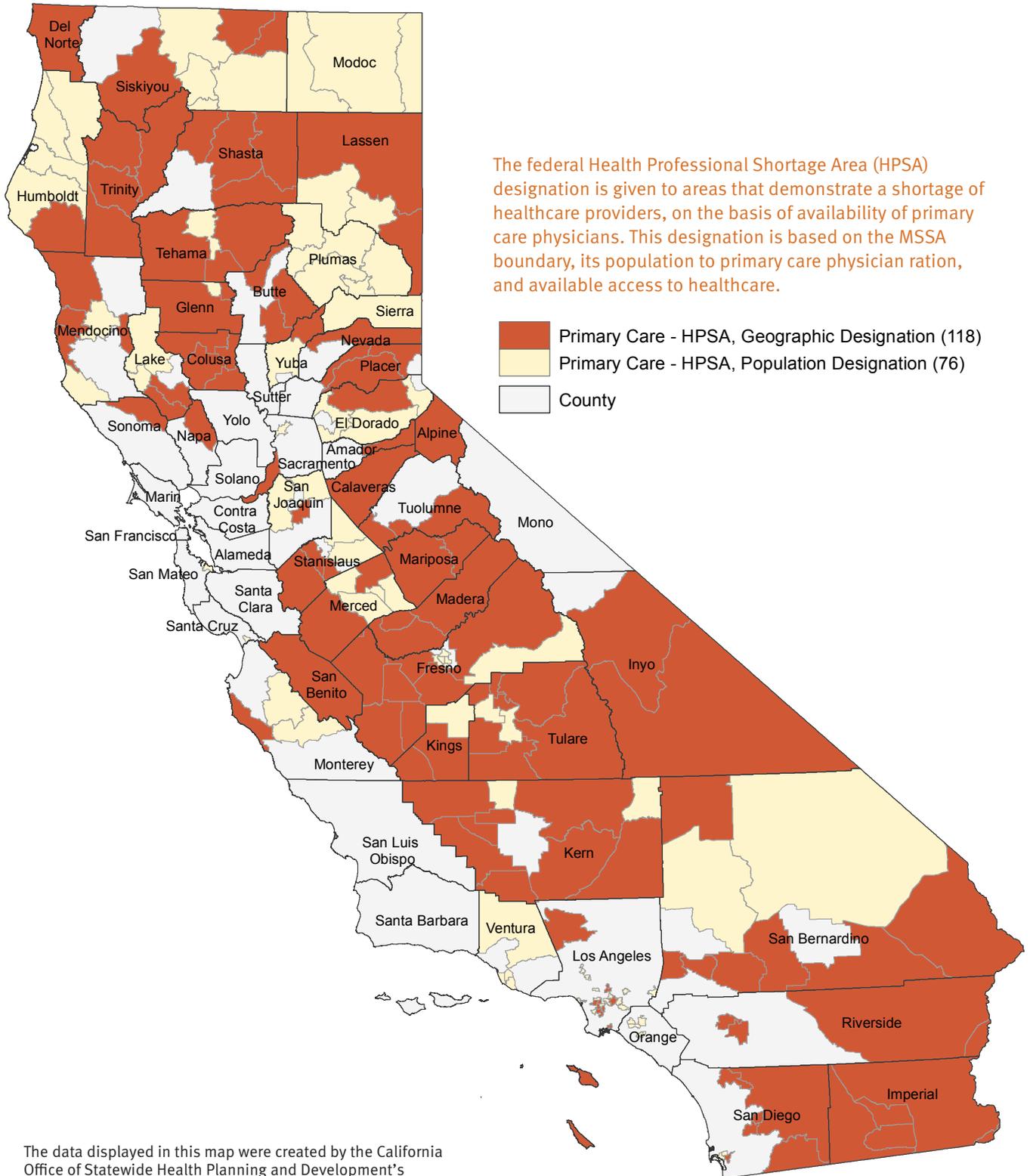
Housing

The majority of farm workers in the state live in California's small and medium sized cities, with the greatest concentrations in the largest cities of agricultural regions: Oxnard, Santa Maria, Bakersfield, Fresno, Modesto, Stockton and Salinas. These cities are attractive destinations for foreign-born farm workers because their populations include substantial numbers of residents from the workers' regions of origin, generally in Mexico, allowing them to speak their own language, follow traditional customs, and readily obtain important amenities of urban life, including access to health care in community and county-based clinics (Villarejo 2014).

Many small farm worker towns in agricultural regions lack basic amenities. An estimated one-third of the state's farm workers are residents of small cities or unincorporated rural areas, closer to farm jobs. In many of these areas, farm workers comprise a plurality, if not an absolute majority, of private sector wage and salary workers. These small cities and communities are the poorest in the state, as measured by earned income. In 2014, vast swaths of agricultural regions throughout the state were classified as Health Professional Shortage Areas for Primary Care (HPSA), according to the California Office of Statewide Health Planning & Development (see map). The lack of primary care services is most apparent in the San Joaquin Valley, especially south of San Joaquin County (State of California Office of Statewide Health Planning and Development 2013).

The San Joaquin Valley has a long history of housing discrimination against some ethnic minority groups and immigrant workers. Less known are the Valley's rural slums, hidden in farming regions and sometimes even

Primary care Health Profession Shortage Areas



The data displayed in this map were created by the California Office of Statewide Health Planning and Development's (OSHPD) Healthcare Workforce Development Division (HWDD). To obtain more information about the federal designations shown on the map, see oshpd.ca.gov/HWDD/HPSA.html.

difficult to locate. Even less well known is the manner in which these slums developed: racial and ethnic discrimination relegated many to obscure, unincorporated locations, such as Three Rocks (Ramirez et al. 2012). Some unincorporated communities, such as Teviston, home to the “Black Okies,” (African-Americans displaced from their Great Plains farmland in the Dust Bowl era), are recognized by the US Census Bureau as a “Census-Designated Place,” but not by the US Postal Service, and their names do not even appear on commercial maps. Even more obscure are places like “The Jungle,” located a few miles outside of the city of Parlier, California, and known to residents of the city as a place where numerous migrant farm workers live in shacks or “under the trees.”

No matter the city or community where farm workers reside, the most dominant feature of their homes is crowding. At a meeting of the 2013 Task Force on Farm Labor Housing and Transportation in California, Sergio Sanchez, with the California Strawberry Commission, described his visits with workers in East Salinas, a low-income, mostly Latino neighborhood where many farm workers live.^v He visited a number of homes where the rooms had lines of mattresses leaning against the walls. This arrangement of mattresses during daylight hours was necessary because it would not be possible to walk through the rooms without stepping on someone’s mattress in their sleeping space on the floor. He described sanitation problems as “devastating” in these conditions of extremely crowded housing.

Sharing of dwellings among strangers is an accepted farm worker practice. More than 40% of dwellings surveyed in the CAWHS had two or more unrelated families, often with children as well as adults, sharing a single-family dwelling or apartment. In communities with high housing costs, such as Vista, in San Diego County, more than 80% of formal dwellings occupied by farm workers were found shared by two or more unrelated families. This degree of crowding presents health risks, such as transmission of infectious disease, effects of the lack of adequate sanitary facilities needed by a large number of individuals, stressors owing to the absence of sufficient privacy, and behavioral challenges for active young children.

^v Presentation by Sergio Sanchez on 8 May 2013, at the forum on farm worker housing and transportation, sponsored by AgInnovations, California Department of Food and Agriculture, Sacramento.

The problem of providing housing for non-immigrant, temporary agricultural workers is addressed in the H-2A visa program available, upon authorization of the US Department of Homeland Security, to farm employers, whether a farm operator or labor contractor. The conditions of issuance of such visas is contingent on the employer providing housing that is subject to pre-occupancy inspection that meets strict OSHA standards. The expense involved is considerable. For this reason, there are relatively few California employers relying on workers through the H-2A visa program.

California drought

California’s drought is a health risk for some rural residents. Residents of some small Californian cities and many living in unincorporated areas who rely on private wells face losing their water supply. Emergency water supplies are needed for residents who have already lost their source of water, or who will soon lose it. The loss of irrigation water for many farms, especially those on the west side of the San Joaquin Valley, has idled hundreds of thousands of acres of farmland. Some farms have already gone out of business, and untold thousands of farm laborers are out of work. The demand for CalFresh and basic foods distributed by food pantries has increased this year in farm areas, although the program is only available to US citizens and lawful permanent residents.^{vi}

Hunger

More than a twenty years ago, a report on childhood hunger in the San Joaquin Valley was published indicating the extent of children’s nutritional deficiency in the nation’s leading agricultural region (True et al. 1999). Among the findings was that the food stamp program (now known as the CalFresh program in California) was badly underutilized among families in which the need

^{vi} Information based on anecdotal news reports and interviews with knowledgeable persons.

was greatest. An important subsequent response was expansion of the Federal Women Infants and Children nutrition program and better outreach to recruit eligible participants for CalFresh. Today, the situation still remains serious and challenging. In the eight-county San Joaquin Valley, 19.9% of the entire population relies on food stamps, including 44.3% of children under age 18.^{vii} By contrast, in the rest of the state (40 counties combined), just 10.6% of all persons and 27.4% of children under age 18 rely on food stamps. It is one of the terrible ironies that California's cornucopia of production remains unaffordable to so many of the workers whose labor helps to create this bounty. A recent Congressional cutback in funding for the Federal food stamp program has resulted in reduced benefits. This has contributed to expanded demand for food at local food banks and pantries. A novel approach has unfolded in Pixley, California, a small San Joaquin Valley community in Tulare County. Local residents have started a volunteer-based nutrition education and community garden program, supplemented by gleaning of back-yard fruit trees that otherwise may be neglected in which local high school youths provide the majority of labor.^{viii}

Family

There is little information about health of farm worker families *per se*. Rather, nearly the entirety of available research on the health of farm workers focuses on the individual rather than the family unit. This is unfortunate because the family is the crucible in which the individual is formed. The character and health of the family influence not only the health and future of its individual members, but also of the society at large. Outcomes relevant to family health include the following: stability of the nuclear family consisting of parents and minor children, children's school attendance and success, savings and investment for the future, presence or absence of domestic violence, and marriage or divorce. Economic pressures are of key importance for these outcomes.

Unfavorable economic circumstances have powerfully centrifugal effects, potentially forcing one or both parents to leave the home to seek work, child labor to augment family income, a migrant lifestyle preventing consistent school attendance and reinforcing low expectations, inability to save and plan for a better future, and stresses contributing to domestic violence and divorce. Thus, the social determinants of health, well known to be important for the health of the individual, are of even greater importance for the health of the family unit. In the case of farm workers, major stresses affecting family health include low income, unstable and part-time employment owing to agriculture's seasonal character, unsettled lifestyle and living arrangements, social and linguistic marginalization, lack of access to preventive and health care, and, for many, chronic anxiety related to lack of authorization for work and residency. Many families have mixed immigration status, where US-born citizen children are dependent on one or more non-citizen or unauthorized parents responsible for family income and who labor under the threat of discovery and deportation, auguring disaster for the family unit. Many of our recommendations implicitly recognize the importance of the social and economic circumstances affecting individual and family health.

Many federal subsidies exist to reduce the negative impact of widespread poverty among immigrant farm workers. The most recent estimate of the annual overall cost of these subsidies to provide services for US farm workers and family members is close to \$1 billion. *Rural Migratory News* reported, "There were a dozen federal programs assisting migrant and seasonal farm workers (MSFWs) and their children in 2010, and the federal government spent almost \$1 billion on the so-called Big 4 programs: Migrant Education Program (\$395 million in FY10), Migrant Health, Migrant Head Start, and the National Farmworker Jobs Program (\$78 million in FY10)" (Martin 2011). Among all 50 states, California received 34% of federal Migrant Education Program funds (Martin 2011). Thus, we estimate that federal funding for California services was approximately \$340 million in 2010 (exact amount is unknown).

^{vii} See the CalFresh case summary files: <http://www.cdss.ca.gov/research/PG3575/htm>, accessed 12/23/14. Annual data for the eight San Joaquin Valley counties was compiled and compared with statewide results.

^{viii} Dr. Sarah Ramirez, Executive Director of Tulare County's non-profit distributor of foods to individual food pantries in the county, a resident of Pixley, and her husband are leading this new effort.

Health care availability

The Affordable Care Act—often excludes farm workers

The federal Patient Protection and Affordable Care Act (ACA), through comprehensive health insurance reforms, aims to increase the number of individuals insured, control health care costs, and improve health care delivery. Vulnerable populations with low rates of health insurance, such as farm workers, have the potential to benefit greatly from health reform. ACA continues to be debated in the political sphere, which will result in important changes to the regulations guiding implementation of the law. Here we discuss in general terms how farm workers are affected by ACA.

Under ACA, individuals have several options for obtaining health insurance. In some cases, individuals are eligible for subsidies. Workers with an annual income 138% above the federal poverty level (FPL) who are currently uncovered and legally present in the US can acquire health insurance through their employers, as individuals through Covered California (the California state-based insurance exchange), or by purchasing it out-of-pocket without subsidy. Low-income workers with annual incomes under 138% of the FPL are eligible for full coverage under Medicaid (Medi-Cal in California) expansion if they are citizens or green card or HB-1 visa holders. Other groups of immigrants, including legal permanent residents under the five-year immigrant exclusion for federal services, are eligible for state-only Medi-Cal coverage.

Employers have requirements under ACA to provide health insurance to their employees. ACA's coverage requirements and penalties differ depending on the size of the employer, as determined by number of FTE.^{ix} Seasonal employees are excluded from the definition of FTE and do not need to be offered coverage. Moreover, the coverage is only available during the working season

for a particular employer. Taken together, a substantial portion of the agricultural workforce is excluded from the employer mandate.

ACA limits the employee share of premium payments for health insurance provided by employers such that they must not exceed 9.5% of the employee's income for their own coverage. The cost of family coverage is not included in the calculation, thus making family coverage unaffordable for many farm workers. Proffered employer offered coverage may have substantial annual deductibles and co-payments at the time of service, reducing its value to the low-income farm worker.

ACA has the potential to improve low-income Californians access to health care services. However, some provisions of the ACA present barriers to obtaining health insurance for a significant portion of farm workers (Kissam 2014). Temporary workers, including seasonal farm workers, typically lack the same opportunities to acquire health insurance through their employer as do full-time, year-round workers. Individuals lacking authorization to work in the US, regardless of poverty status, are excluded from the federal subsidies available to all other workers and even from unsubsidized participation in ACA's health insurance exchanges. It is estimated that about 60% of California's farm workers are unauthorized. This means that a significant portion of farm workers is not able to gain access to federally subsidized health insurance through ACA implementation. The minority of farm workers likely to benefit from ACA—individuals authorized to work in the US, with stable employment, and higher incomes—are those who already have a leg up (Kissam 2014).

There is the possibility of creating a new agricultural health plan under an ACA section 1322 innovation waiver. The concept of the agricultural health plan is to provide year-round coverage for participating farm workers with care provided through migrant health

^{ix} The employer mandate extends to farm labor contractors since they are the legal employer in many cases.

clinics. Funding would be from participating employers (who would receive a waiver of the employer-mandate), state funds that would have been spent on full- and restricted-scope Medi-Cal, and other program funds. California must apply for the waiver, which could begin as early as 2017.

Other health care options

There are hundreds of non-profit community clinics—mostly Federally Qualified Health Centers (FQHCs) and Community Health Centers (CHCs)—and other types of service organizations, particularly county supported organizations, whose mission includes assisting farm workers and their families. These agencies often face substantial challenges, including funding and difficulties in recruiting and retaining qualified medical staff, particularly for those located outside cities. All of these clinics, including those designated as Migrant Health Centers, have health promotion as a goal of their services. Under ACA, federal support for community clinics, including those serving farm workers, was expanded in expectation of meeting the needs of newly insured workers and family members. Their five-year expansion funding through ACA is expected to lapse by the end of this year.

Ironically, state funding for indigent care to the counties has been sharply curtailed in large part due to the ACA. Prior to implementation of the ACA, the state's counties had responsibility for indigent care, but \$1 billion of state support for the counties' programs has been withdrawn over three years under the presumption that millions of formerly uninsured persons would enroll in Medi-Cal or other programs of Covered California under ACA.^x (Many county programs in agricultural areas exclude unauthorized persons from the “medically indigent adult” program.)

A relatively recent expansion of health promotion among US hired farm workers has been through the recruitment and training of *promotores de salud*, community-based health promoters who directly provide information and education to individuals and families. *Promotores* are based in community clinics, non-profit service organizations and county-based health agencies. Many *promotores* focus their work in their home neighborhoods, going door-to-door. Most are women, playing the traditional role of taking responsibility for family

health. Major shortcomings of relying on this approach to engage farm workers are that many *promotores* are either poorly paid, part-time employees of their agencies, or are unpaid volunteers.

Education and health promotion

Nearly all of the state's farm workers are foreign-born—largely from Mexico. A basic challenge in providing health to farm workers is the enormous cultural and linguistic gap that many face when they come from abroad to work on US farms and ranches. Misunderstandings can occur due to major differences in race/ethnicity, educational attainment, and economic class between farm workers and those who are seeking to promote health and well-being.

Oral communication is often the most successful form of discourse for promoting health to farm workers. Posters, printed handouts, video classes, *fotonovelas*, and other professionally produced materials, while useful to some workers, are often viewed as impersonal, “foreign” and suspicious. To effectively engage agricultural workers, conversations are best initiated in familiar settings, such as local churches, residences, clinics and work sites. Ideally, suitably qualified persons who seek to engage farm workers in conversations about health should be known, at least by name, in the community. It is best if this person knows the community's cultural norms, origin, core values, and primary concerns. If not already known, an in-person introduction by a trusted member of community is essential.

Education and health promotion initiatives benefit from cooperation with trusted local leaders. In the agricultural regions of California, there are a number of established community organizations whose members have earned the trust of many farm workers. These include, among others:

- **Center for Community Advocacy**, 25+ years in the Salinas Valley (cca-viva.org);
- **Proyecto Campesino, 50+ year program of the American Friends Service Committee**, now located in Farmersville (Tulare County) (afsc.org/office/farmersville-ca);
- **Project Voice**, a national program of the American Friends Service Committee, with California offices in Stockton, Fresno and San Diego (afsc.org/office/stockton-ca);

^x The authors are indebted to Gil Ojeda, California Program on Access to Care, Office of the President, University of California, for bringing this important change in health care funding to our attention.

- **Líderes Campesinas**, a volunteer network of women farm workers headquartered in Oxnard (Ventura County), with members from farm worker communities throughout the state (liderescampesinas.org/english);
- **Frente Indígena Oaxaqueña Binacional**, a network of Oaxacan-origin, hometown support organizations and individuals (fiob.org/en);
- **Ventanillas de Salud**, a health promotion, information and referral service provided at Mexican consulates (ventanillas.org/index.php/en);
- **Mixteco/Indígena Community Organizing Project** (MICOP) unites indigenous leaders and allies to strengthen the Mixtec and indigenous immigrant community of Ventura County, estimated at 20,000 people (mixteco.org).
- **Community health centers** in each rural county, largely funded by the federal government.
- **La Cooperativa Campesina** network of five agencies having over 80 offices covering California's 34 high impact agricultural counties (lacooperativa.org).

Experienced labor representatives are often in closest contact with the problems faced by workers. There are three labor unions representing hired farm workers that have labor agreements with various agricultural businesses: the United Farm Workers of America, with the largest number of farm workers under union contract (~3,300); Teamsters Local 890 (Salinas), with the longest duration union agreement representing US farm laborers (Dole Fresh Vegetables, Inc., since 1960); and the United Food and Commercial Workers Local 5 (San Jose). All three unions have labor agreements providing health insurance for all covered farm workers.

Western Growers Assurance Trust, United Agricultural Benefits Trust, and the Robert F. Kennedy Medical Plan (United Farm Workers of America: UFW) are the principal private sector insurers providing employment-based coverage for farm laborers.^{x1} Several very large agricultural employers self-insure their employees.

In past decades, many California farm operators offered so-called “mini-med” health insurance to some or most employees. These policies had caps on coverage, most commonly in the range of \$25,000, which made the

workers' share of the premium cost affordable. On the other hand, the caps exposed farm workers to potentially large out-of-pocket costs for health care. ACA requirements of minimal essential coverage and prohibiting caps on benefits have unavoidably resulted in substantially higher premiums, threatening the survival of these plans.

All health insurers in California must meet ACA's essential health benefits and other regulatory requirements by 1 January 2016, unless they fall under certain Employee Retirement Income Security Act and/or labor trust exemptions. If farm workers are citizens and/or otherwise “legally present” then their best choice is Medi-Cal, either expansion or state-only, or individual Covered California coverage. If farm workers do not meet those two immigrant statuses, then their best option remains with FQHCs, other CHCs, public hospitals, and emergency and/or obstetrics and gynecology special Medi-Cal coverage.

Western Growers Assurance Trust (WGAT), with Pinnacle Claims Management, has undertaken a substantial new initiative to respond to the changed policy requirements under ACA. They have opened two new clinics (Salinas and Santa María) staffed by physicians and support personnel serving employees of agricultural businesses with WGAT medical insurance. This approach emphasizes prevention and wellness and is a cost-effective approach in the transition from mini-med plans.

One of the most prominent service organizations is California Rural Legal Assistance, Inc. (CRLA), with a 48-year history of providing legal services to suitably qualified residents of rural regions, as well as supporting advocacy by farm workers. CRLA's sister organization, California Rural Legal Assistance Foundation (CRLAF), provides education, advocacy and litigation support. Of particular note is that CRLA attorneys succeeded in persuading California to ban the short-handled hoe in 1975, a major step in preventing back and other muscular-skeletal injuries among farm laborers. Today, CRLAF's staff industrial hygienist conducts education and advocacy on farm labor health and safety.

Under agreements that share responsibilities among various regions of California, other legal service organizations provide assistance to farm workers as well, such as Central California Legal Services, Inc., and Legal

^{x1} The authors are indebted to Joel Diringer and colleagues who organized meetings of farm worker stakeholders, including insurers, grower organizations, farm labor advocates and researchers, for the purpose of better informing all participants about the ACA and seeking cooperation to improve access to care. The most recent gathering was on 10 July 2014 in the State Capitol.

Services of Northern California, Inc.

Engaging male farm laborers, who are the vast majority of the state's farm labor force, in their health is a significant challenge. Access to care among male workers is limited by lack of health insurance, low family income, and cultural factors. Recently two farm operators have taken a leadership role in health promotion and education—Reiter Affiliated Companies and Paramount Farming Company—by establishing their own clinics in the communities where they farm and providing health services for their employees. Within these clinics, health promotion and education are major goals. Reiter has collaborated with University of California, Davis, investigators to reduce obesity and diabetes risk among their workers. It is a novel workplace-based approach to address a common and serious chronic health problem among Latino farm workers.

Several farms throughout the state have developed a different approach. Employees, on paid time, attend monthly meetings on topics of interest. At one such

meeting, a staff member of a local clinic visited a farm and led an hour-long discussion of health issues. More recently, several farmers have convened meetings of workers to address the issue of sexual harassment in the workplace. California recently passed legislation to address sexual harassment and assault experienced by female farm workers (SB 1087, signed by Governor Brown on 28 September 2014).

The state's indigenous farm workers present a linguistic and cultural challenge to the medical community because most indigenous languages do not have a written form and workers or family members who speak one or another of these languages often have limited fluency in Spanish and/or English. Therefore, cultural preferences among the new migrants favor oral communication over written forms, and information referrals to written instruction, or to Internet websites, might result in miscommunication. It is worth noting that California has the only indigenous translation service, Indigenous Interpreting Plus, sponsored by the Natividad Medical Foundation in Salinas. This service is an invaluable resource, but is limited in its ability to reach indigenous farm workers before they need medical care.

Current policy towards occupational health of farm workers

The occupational health of farm workers is a major concern of employers as well as of organizations directly representing farm workers. Most employers, including labor contractors and farm operators, seek to comply with existing labor standards. If accidents occur in which employees are injured, then premium payments paid by employers for workers compensation insurance will likely increase. Employers also understand that recruiting and hiring qualified workers, especially in the context of reported farm labor shortages, are crucial to their business success.

Workplace standards for farm workers under California law and regulation are highly complex and much stricter than federal standards require. California mandates workers compensation insurance benefits for virtually all laborers, even those who lack authorization to work in the US, and the state is one of the few to require this protection for all farm workers.

A veritable “alphabet soup” of agencies are responsible for enforcing employment standards: Division of Labor Standards Enforcement (DLSE), United States Department of Labor (DOL), United States Environmental Protection Agency (EPA), Department of Pesticide Regulation (DPR), Department of Housing and Community Development (HCD), California Employment Development Department (EDD) and Agricultural Labor Relations Board (ALRB). While each agency has clearly delineated responsibility for one or another aspect of employment law, with so many, it is not surprising that many farm workers are puzzled about who is responsible for protecting them.

Most agencies offer toll-free (800) telephone numbers and multi-lingual staff to receive complaints, leaving the initiative to workers to seek assistance. The California Division of Occupational Safety and Health (Cal-OSHA) is one of the few agencies that regularly conduct unannounced inspections on farm sites to encourage employers to maintain safe practices. But stringent budgets over many years have resulted in a lack of sufficient enforcement agents who have complete Spanish fluency (read,

write and speak) or who speak any of the languages of the new migrants, and over-reliance on complaints leaves most workers without adequate protection.

The Federal Occupational Health and Safety Act (Fed-OSHA: 1970) authorized enforcement of safety standards on the nation’s work sites, and Fed-OSHA provides direct financial support for Cal-OSHA inspections. However, Congressional action in the annual budget appropriation process exempts “small farms” (farms with fewer than 11 workers on-site at the time of inspection) from Fed-OSHA’s enforcement provisions. Even if the farm has more than 10 workers employed at the time of the inspection at all of its sites, but fewer than 11 at the site under review, the State of California is in effect penalized financially because the work-site being inspected is deemed to be subject to the “small farm” exemption. As a result, most US farms are under no regulatory obligation to meet workplace safety standards. In contrast, Cal-OSHA enforcement applies to all of the state’s farms, regardless of size. Nevertheless, federal statistical reporting of occupational injuries excludes California farms with 10 or fewer employees. A recently promulgated Fed-OSHA standard now requires prompt reporting by all employers, regardless of size, of all workplace fatalities and all workplace injuries in which any worker required inpatient hospitalization, or there was an amputation, or loss of an eye.

Labor contractors dominate the supply of seasonal farm jobs in California

There has been a trend in the recent past for migrant and seasonally employed farm workers to be employed by labor contractors, rather than directly by growers. In contrast, regular or year-round hired farm workers are typically employed directly by farm operators. AgSafe, a nonprofit organization that provides education and training on health and safety to the agriculture industry, estimates that there are 1,200 farm labor contractors in California. There is a wide range of estimates of farm worker employment by labor contractors. According to

Table 5. Employer type by work authorization status and gender, National Agricultural Workers Survey, 2008-2012, California

N (%)	All	Authorized	Unauthorized	Male	Female
Employed by: Grower	2,507 (74.0)	1,116 (81.6)	1,376 (68.9)	2,070 (75.5)	437 (67.5)
Employed by: Contractor	882 (26.0)	251 (18.4)	622 (31.1)	672 (24.5)	210 (32.5)

the NAWS, farm labor contractors employ one-quarter of hired crop workers in California (Table 5), and this figure has steadily increased in recent years. In 2009–2010, 15% of workers nationally were employed by a contractor (United States Department of Labor 2010). On the other hand, other data point to farm labor contractors employing 55% of California crop farm workers and 30% nationally (Martin 2014), though the proportion of workers hired by farm labor contractors varies widely by crop and location. Many growers are turning to labor contractors due to a shortage of workers caused by an improved economy in Mexico, the difficulty of crossing the US/Mexico border, and to avoid increased state and federal regulations that will not apply to them if they are no longer directly employing farm workers.

Labor contractors shield farm operators from liability for employment standards under federal and state law as well as for immigration law enforcement. As *de facto* employers of record, contractors have responsibility for the terms of employment for agricultural workers whom they employ, not just for wages, but also for working conditions, such as job safety. Although the farm operator determines the place, time and type of work performed by labor contractor crews, direct supervision on the job and compensation of the crews are the responsibility of the contractor. The farm operator pays the contractor for the crews’ wages, employment taxes, Workers’ Compensation insurance, supervision, and overhead.

There can be ambiguity as to who is responsible for the conditions of employment, or if a worker is shorted on wages due. In one tragic case, the alleged failure to exercise oversight by the farmer client of a contractor led to serious bodily harm. A mass pesticide poisoning of a labor contractor crew occurred when workers were sent

early one morning into a field that had been sprayed only a short time beforehand. A breakdown of communication between the farm operator, the pesticide applicator, also a contracted service, and the labor contractor resulted in the poisoning of thirty-three field workers, some of whom required hospitalization (United States Centers for Disease Control and Prevention 1999).

To protect workers, California recently enacted a law holding labor contractors and their client businesses jointly liable for wages and certain other labor standards, such as responsibility for providing Workers’ Compensation insurance (AB 1897, signed by Governor Brown on 28 September 2014). Important for the agricultural industry, small businesses, defined as those “with fewer than 25 workers, including those hired directly by the client employer and those obtained from, or provided by any labor contractor” are specifically exempted from joint liability, again illustrating the exceptionalism prevalent in the regulatory infrastructure for agriculture that effectively removes intended protections for a large number of farm workers.

As part of the effort to ensure protection of employees of labor contractors, California’s Division of Labor Standards Enforcement of the Department of Industrial Relations (DIR) has a series of tough requirements, including licensing, bi-annual license renewal, posting of cash bonds, and annual mandatory in-service training. The US Department of Labor’s standards for labor contractors, under authority of the Migrant and Seasonal Agricultural Worker Protection Act, requires registration, inspection of employer-provided housing, and regulation of other employer-provided services, such as transportation. The federal standard does not include licensing of the labor contractors.

Policy recommendations

The ACA, through comprehensive health insurance reforms, seeks to make health care more affordable and dramatically reduce the number of uninsured in the US. Farm workers are a vulnerable population with low rates of health insurance that could benefit greatly from such reforms. However, despite the millions of individuals now eligible for (often subsidized) health insurance, farm workers have largely fallen through the cracks. Important steps are being taken at the state level in California to fill these gaps for the primarily immigrant agricultural workforce. Additional action is needed to improve the health outcomes and reduce health disparities experienced by California's farm workers and their families.

The agricultural sector is experiencing dramatic changes the availability of workers and in the make-up of the workforce. Farm worker shortages have employers competing for a shrinking supply of laborers. Those individuals that are migrating for work are increasingly indigenous and culturally and linguistically different than previous waves of farm workers. As a society, we face a philosophical dilemma regarding our agricultural industry. On the one hand, we provide substantial resources to support our agricultural industry's workforce that, in effect, reduce the obligations of some farm employers. For example, the state's Migrant Housing Centers furnish very low-cost and safe housing for migrant farm worker families, thereby enabling some nearby employers to pay lower wages.^{xii} Similarly, in the recent past, the Joe Serna Jr. bond issue provided millions of dollars to subsidize permanent housing for a number of farm worker families. More fundamentally, by relying on foreign-born farm workers, our state has effectively "outsourced" the social cost of raising and educating this labor force. Concern over worker shortages and changing workforce provide an opportunity to evaluate and reform the existing system.

^{xii} See the discussion of housing costs for tomato pickers in Monterey County versus those of Stockton area workers in "The Tomato Industry in California and Baja California," David Runsten, Roberta Cook, Anna Garcia and Don Villarejo, US Commission on Agricultural Workers, *Case Studies and Research Reports*, Appendix I, February 1993.

Through appropriate policy interventions at the state level, it might become possible for farm workers and their families to secure a living wage, health insurance, and better health outcomes. If such efforts are successful, a healthy farm labor force will benefit the state's agricultural industry and also benefit the people of California. Fewer days of work lost to injury or illness translates to lower medical and related costs as well as improved worker productivity.

Expand health insurance/access

Recommendation 1. Establish adequate dedicated state funding for access to health care for the state's indigent and unauthorized workers and for their uninsured family members.

The size of this population is not accurately known, but it certainly includes many hundreds of thousands of farm workers and family members. The low annual income of farm workers is a significant barrier to accessing medical, dental, mental health and eye care. As demonstrated in this report, large numbers of farm workers are effectively excluded from existing programs and remain without any guarantee of access to care that is now available to those who have newly obtained health insurance and Medi-Cal coverage under ACA.

Recommendation 2: Create solutions not in conflict with the ACA for providing health insurance to farm workers and their families, including enhancing workplace-based plans.

State Senator Ricardo Lara (D-Long Beach) introduced SB 4 on 1 Dec 2014 that provides for Medi-Cal and ACA-like subsidies for all eligible persons regardless of authorization status, at state expense. The Lara legislation is consistent with this recommendation and should be supported. In addition, those who receive deferred action under the President's recent executive order, if implemented, should receive full-scope Medi-Cal as did those under the Deferred Action for

Childhood Arrivals program. However, the Governor has not included funding for this new group in his 2015–2016 budget proposal. Farm workers and their families should be educated about their eligibility.

Improve public health infrastructure

Recommendation 3. Strengthen California’s public health infrastructure through its counties with an emphasis on agricultural areas.

Preventive care, including vaccines, should be delivered in communities where farm workers live and work and should utilize linguistically and culturally appropriate approaches. Improved availability of evening and weekend non-urgent health services is needed as well as creative solutions to overcome significant transportation barriers experienced by rural community members in accessing health care.

Recommendation 4. Enhance preventive and primary care services for farm workers and their families by expanding and strengthening the public health workforce in areas of need.

Many community clinic medical staff leave for better employment opportunities after just a few years. The relatively high turnover of medical staff at some community clinics needs to be addressed. In addition, the demographic profile of California’s farm labor workforce presents significant challenges to clinic staff, particularly in the case of indigenous farm workers or family members who speak neither Spanish nor English and who also may regard Western medical practices with suspicion. Both of these challenges can be addressed through the development of a new generation of medical and nursing students whose training includes practicum field placements as part of the curriculum. An example of this is the Fresno-based teaching health center family medicine residency program.

Increase the number of health workers and occupational safety employees

Recommendation 5. Increase the number, cultural knowledge and involvement of mid-level health practitioners, including nurses, physician assistants and other mid-level providers, and *promotores de salud* in farm worker communities.

Federal money is available under ACA for innovative state-level programs that seek to expand health insurance coverage and participation in the health care

system. Mid-level practitioners could provide preventive care, health education, health screenings, and assist families with obtaining needed services.

Recommendation 6. Hire more Cooperative Extension agents specializing in occupational health and safety.

The University of California’s Cooperative Extension is in a period of growth and health and safety is part of its mission. More personnel are needed to serve agriculture, a high-hazard occupation.

Recommendation 7. Augment safety and labor law enforcement by adding a substantial number of new field inspectors to the staff of Cal/OSHA, county Agricultural Commissioners, and the Division of Labor Standards Enforcement.

While the number of filled Compliance Field Positions (CSHOs) in DOSH varies from year to year, between September 1989 and December 2013, the number of positions declined from 185 to 170. As a result, the ratio of Cal-OSHA DOSH positions to workers is less than half that of the ratio of Fed-OSHA and less than a third of the level in the neighboring states of Oregon and Washington. It would also be beneficial for Cal-OSHA to expand educational outreach to farmers and farm workers.

Establish fairness across industry

Recommendation 8. End “exceptionalism” for the agricultural industry: Eliminate the agricultural exemption for overtime pay requirements; strengthen enforcement of labor code regulations for tools and travel time; and raise the state minimum wage to \$15 per hour by 2018.

These recommendations, taken together, would reduce the number of farm workers in poverty and likely attract some individuals to farm employment, thus increasing the size of the farm labor workforce. On the other hand, raising the minimum wage may stress small farm operations and put many of them out of business. In addition, higher wage costs would be passed on to the consumer. A variety of social service programs have been undertaken by federal agencies in response to the widespread poverty among US farm workers and the absence of appropriate social services to serve this population. Of special concern is the instability that migratory work brings to the family, such as interrupted schooling for children. If farm workers earned a living wage, most

would have earnings that exceed the limits for eligibility to obtain the services and many federal subsidies would not be needed.

Improve living conditions

Recommendation 9. Improve access to quality food and safe drinking water for farm workers and their families.

There is an urgent need for emergency water supplies for communities expected to lose their municipal supply soon due to the continuing drought conditions, as well as for rural residents whose private wells have gone dry. Additional food supplies are needed in some communities where farm workers are a majority of the private sector workers. Food supplies are efficiently distributed through existing networks of food banks, churches and community-based organizations. Support for programs like CalFresh is important; however, individuals unauthorized to work in the US are ineligible for the benefit. By the last months of 2014, the impact of drought-related unemployment had drained supplies of many agencies. The highest priority needs are for safe drinking water and healthy food.

Recommendation 10. Develop sustainable affordable housing for farm workers and their families by establishing new, dedicated state funding sources.

The State of California, through the Office of the Governor and the Legislature should oppose the housing vouchers proposal that would replace the existing requirement that H-2A temporary contract farm workers be provided with employer-provided housing. The City of Napa provides a model for sustainable housing programs by assessing \$10/acre annual assessment of vineyard acreage allocated to a farm worker housing operating fund. In Washington State, approximately \$40 million was allocated over a 10-year period to develop safe and affordable housing for the state's farm laborers.

Promote agricultural safety and health education

Recommendation 11. Create farm labor advisory committees to county-based Agricultural Commissioners to promote cooperation and occupational safety and health education in agricultural regions of the state.

A voluntary initiative to establish such an advisory committee has already been undertaken in Monterey County with positive results.

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