

THE KRESGE FOUNDATION

Health-related Inequities Among Hired Farm Workers and the Resurgence of Labor-intensive Agriculture

2012
Health Program
The Kresge Foundation
Troy, Michigan

Preface

This paper's goal is to describe the current health status of the farm labor workforce from a national perspective and to suggest future directions for interventions. Ideally, data would be derived from nationally representative cross-sectional studies of hired farm workers that included comprehensive physical examinations by third-party medical professionals. Because such national data does not exist, it was necessary to consider the few available statewide cross-sectional studies that included medical examinations and to forge a national perspective from them.

For this paper, a hired farm worker is a person who is employed to perform tasks on a farm to directly produce an agricultural commodity intended for sale. Workers engaged in off-farm packing, handling or processing of farm products are not included. Hired livestock farm workers are considered on an equal basis with hired crop farm workers. Among the latter are persons employed to produce ornamental commodities, including flowers, ornamental plants and other nursery farm products, whether in an open field or in a greenhouse.

The definition does not consider the nature of the employer. Traditional farm operators, farm labor contractors, farm management companies and a wide range of agricultural service businesses, as well as some food processing companies, regularly employ farm workers.

This paper focuses on health outcomes that are associated with occupational, environmental and individual risk factors, or are influenced by regulatory policy. Since there are no nationally representative studies of farm worker health that include comprehensive medical examinations, survey research about farm workers nationally is limited to self-reported health outcomes.

Reliable information about the health of U.S. hired farm workers is sparse. Most workers are foreign-born, which presents linguistic and cultural obstacles to survey research. Migrant status, high annual turnover in the farm labor force, and concerns of both employers and workers regarding immigration status also are major barriers to cross-sectional assessments of the health of this population.

Recent discourse in peer-reviewed literature warns of the limitations of health status findings concerning farm workers that are not based on probability sampling (Mage. 2006). In a persuasive argument in support of probability sampling in farm worker health studies, these authors cite U.S. Environmental Protection Agency guidelines regarding convenience samples: “The results only pertain to the sample itself, and should not be used to make quantitative statements about any population—including the population from which the sample was selected... probability sampling must be used at each stage of respondent selection...” (U.S. EPA. 2003).

The shortcoming inherent in attempting to extrapolate findings from cross-sectional surveys among wider population groups to farm worker participants has been examined (Mines et al. 2005). The authors demonstrated that the statewide sample of the California Health Insurance Survey (CHIS) includes a farm worker subset that bears little resemblance to the characteristics determined in cross-sectional survey research among farm workers alone.

Don Villarejo

Acknowledgements

The author is grateful for the opportunity provided by The Kresge Foundation to prepare this report, as well as for its generous support of the project. Numerous reviewers contributed constructive comments during successive stages of manuscript review and were invaluable contributors to the final product.

About the author

Don Villarejo worked as a United Farm Workers organizer with Cesar Chavez, and taught physics at the University of California, Los Angeles and Davis, in the 1960s and 1970s.

He is a consultant for public and private agencies, including the U.S. Department of Labor, National Institute for Occupational Safety and Health, Migrant Legal Action Program, California State Assembly, California Agricultural Labor Relations Board, California Department of Industrial Relations, and the International Brotherhood of Teamsters, Locals 601 and 890.

Villarejo received the 2000 National Service Award from the U.S. Department of Health and Human Services' Office of Minority Health for "exemplary commitment, dedication and service to the nation's migrant farm workers." He is co-author of "Suffering in Silence, A Report on the Health of California's Agricultural Workers," published by The California Endowment in 2000.

Chapter 1

Disparities in Occupational Health

“For U.S. hired farm workers, occupational health has to be understood to include a very broad systems context – including prevalent off-farm housing conditions, transportation, etc., because these are an inherent part of the farm labor recruitment and management system...the health hazards/injuries/deaths of U.S.-bound farm workers smuggled through the Sonoran desert, the highway accidents of immigrant-laden vans, and the health consequences of indentured servitude are all part of the system’s functioning, within...the transnational system of ‘factories in the fields.’”

- Dr. Ed Kissam¹, Private Communication
September 21, 2010

Key to understanding disparities in hired farm worker occupational health is the realization that a socially marginalized labor force faces risks that compound the usual workplace factors. The National Institute for Occupational Safety and Health (NIOSH) has described this issue as follows:

“One of the central features of the contemporary U.S. workforce is that it is increasingly diverse, reflecting the changing demographic characteristics of the country. Health disparities, including those resulting from work exposures, exist across racial and ethnic populations. These disparities arise both from overrepresentation of racial and ethnic minority workers in the most hazardous industries and from the incomplete penetration of occupational safety and health interventions to certain worker populations due to barriers created by social, cultural, and economic issues including language, literacy, and marginal economic status” (NIOSH. 2011)

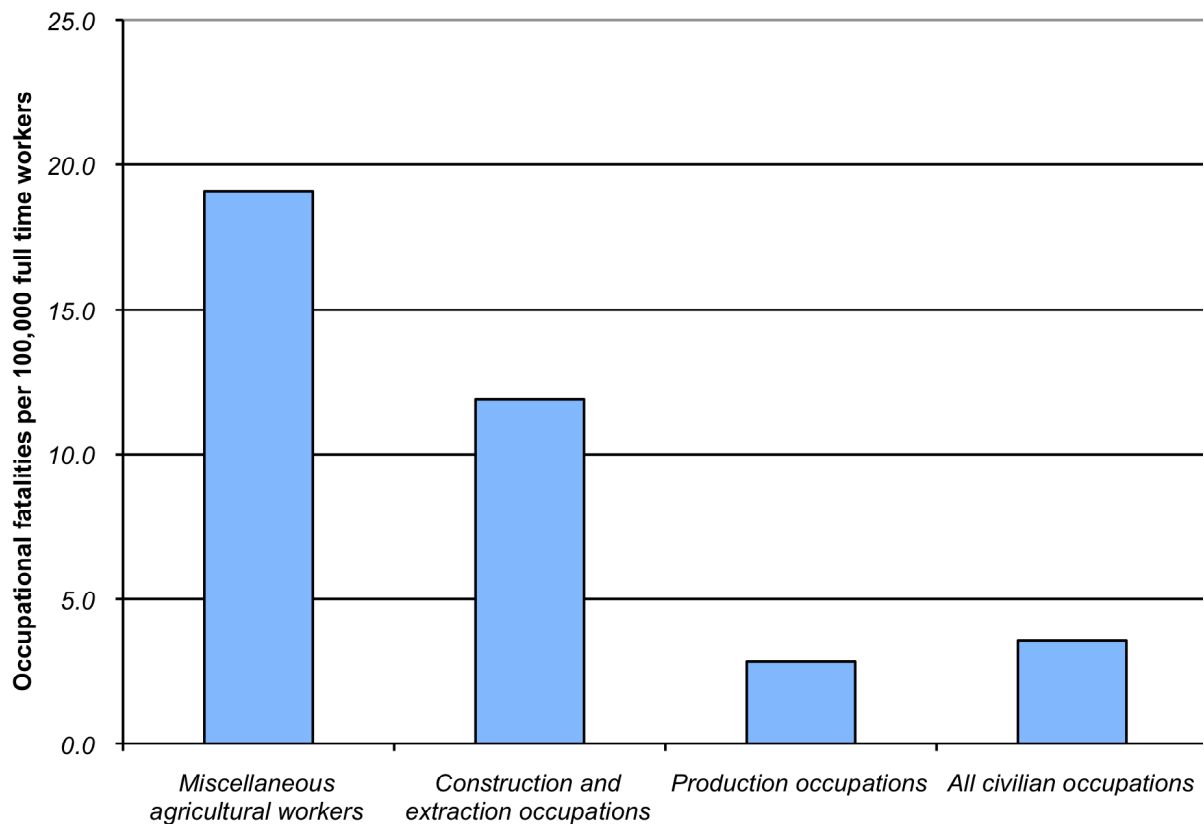
Occupational fatalities among hired farm workers

The only nationally valid measure of the occupational health status of U.S. hired farm workers, both crop and livestock workers, is the annual Census of Fatal Occupational Injuries (CFOI) initiated by the Bureau of Labor Statistics (BLS) in 1992. This report seeks to assemble the complete universe of available information about civilian workplace fatalities from a range of sources, including required reports to the Occupational Safety and Health Administration

¹ Dr. Ed Kissam is an independent scholar and consultant whose published research on immigrant farm laborers in the U.S. has been widely cited in academic and advocacy discourse on immigration policy.

(OSHA). Although there are undoubtedly some data limitations, CFOI is recognized as the most comprehensive body of information about U.S. occupational fatalities ever assembled.

Figure 1
Fatal Occupational Injuries, Hired Farm Workers (aka Misc. Ag. Workers) and Selected Occupations, United States, 3-Year Average (2008-10). Source: BLS.gov



During the three-year period 2008-2010, hired farm workers were five times more likely to have a fatal occupational injury than were workers in all civilian industries combined (U.S. BLS, 2012). The most recent CFOI data (Figure 1) indicated the occupational fatality rate for hired farm workers (termed “miscellaneous agricultural workers” in BLS data files²) exceeded that of construction and extraction occupations, including mining, as well as production occupations

² The Bureau of Labor statistics does not recognize the term “hired farm workers,” instead classifying these employees as “miscellaneous agricultural workers.”

such as manufacturing. The National Institute for Occupational Safety and Health (NIOSH) recommends that if an occupational category has a fatality rate exceeding 10 per 100,000 workers then OSHA should promulgate hazardous occupation orders restricting activity or requiring specific workplace safety measures. Obviously, the hired farm worker occupational fatality rate exceeds this criterion. The occupational categories in CFOI reports do not include more specific information regarding mortality rates for hired crop workers as compared with hired livestock workers.

The BLS CFOI also reports occupational mortality data for “Farmers and Ranchers.” During the three-year period 2008-2010, the rate of fatal occupational injuries among farmers and ranchers was 40 deaths per 100,000 full-time workers, somewhat more than twice the rate reported for hired farm workers. The largest single category of farm and ranch operator fatal occupational injuries resulted from tractor rollovers.

Heat illness fatalities, including heatstroke, have been identified as especially significant among hired crop farm workers relative to most occupational categories, at 0.39 per 100,000 full-time workers during 1992-2006, compared with 0.02 for all civilian workers (U.S. CDC. 2008). Heat illness fatalities among hired crop farm workers were concentrated in California, Florida and North Carolina, which accounted for 57 percent of all such fatalities.³ Extreme high-heat environments are found in all or portions of these three states during summer months when many hired farm laborers engage in strenuous, outdoor manual labor. Workers performing outdoor tasks in extreme heat or humid conditions are at risk for heat-related mortality and morbidity.

A retrospective study of proportionate mortality among current and former members of the United Farm Workers of America, AFL-CIO, in California (N = 139,662) found significantly elevated deaths from a variety of adverse health conditions, including tuberculosis, cirrhosis of the liver and malignant neoplasms (stomach, biliary passage, liver and gallbladder, and uterine cervix) (Mills et al. 2006). Significantly, lower proportionate mortality was found for HIV-related disease, ischemic heart disease and a number of other diseases. The authors concluded

³ These three states accounted for an estimated 54 percent of U.S. hired farm worker labor demand in 2007. Cf. Figure 3 in the present paper (p. 26).

that these variations in proportionate mortality could be understood in terms of Hispanic ethnicity and recent immigration of the cohort.

Findings of a long-term study of health among workers who apply agricultural pesticides may be relevant to the health of everyone who works on farms. Elevated standardized mortality ratios for a number of health outcomes have been reported in the Agricultural Health Study prospective cohort (N = 89,656) comprised of private applicators (farmers who apply pesticides) and professionally licensed applicators in Iowa and North Carolina (Waggoner et al. 2011). Overall, as compared with state specific mortality rates, the all-cause mortality rate for the period from participant recruitment (1993-1997) through 2007 was unexpectedly low, 0.54 (95 percent C.I.: 0.52, 0.55). However, mortality ratios were elevated for lymphohematopoietic cancers, melanoma, and digestive system, prostate, kidney and brain cancers relative to other causes.

Non-fatal occupational injuries and illnesses

Unlike CFOI, the BLS Survey of Occupational Injuries and Illnesses (SOII) is incomplete regarding hired farm workers. This is because the U.S. Congress has forbidden the federal government from including “small farms” in the annual occupational injury survey and has exempted “small farms” from the OSHA requirement that businesses maintain written records of occupational injuries and illnesses subject to OSHA inspection. The survey does not include farms with 10 or fewer employees.

The most recent federal occupational injuries and illnesses survey report finds the annual rate of non-fatal occupational injury and illness among direct-hire farm workers to be 4.6 injuries per 100 full-time equivalent (FTE) workers on crop farms and 5.2 injuries per 100 FTEs on livestock farms (U.S. BLS. 2010). These workplace injury and illness rates are higher than the corresponding rate of 3.5 injuries per 100 FTEs among all private industry workers.

Owing to the restriction on gathering information about occupational injuries and illnesses from farms with 10 or fewer employees, these rates are likely to be underestimates. More than 90 percent of U.S. farms with direct-hire farm labor are exempt from reporting owing to this

restriction⁴, and 46 percent of all direct-hire farm laborers reportedly work on farms with fewer than 11 employees.⁵ The fact that a large fraction of direct-hire farm laborers are employed on small farms has important implications under the “small employer” exemption from the employer insurance mandate of the Affordable Care Act, as discussed further later in this paper.

The BLS occupational injuries and illnesses survey was discussed in a General Accountability Office (GAO) review of occupational injury data reported by BLS and OSHA. The GAO report cites deficiencies in the reporting of occupational injuries and illnesses by both BLS and OSHA (U.S. GAO. 2009). The BLS SOII relies entirely on self-reports from employers. Some employers may have a financial incentive to underreport, possibly to lower their workers compensation insurance premiums. Also, some employees may fear job loss or other consequences if they bring injuries to their supervisor’s attention. The SOII lacked verification of employer self-reports by in situ audits of a representative sample of employers. Several researchers earlier brought attention to the undercount of workplace injuries and illnesses in government data (Boden & Ozonoff. 2008; Rosenman et al. 2006; Leigh et al. 2004).

Under a cooperative agreement with the National Institute for Occupational Safety and Health, the agriculture department’s National Agricultural Statistics Service conducted a survey to independently seek nationally valid information about non-fatal agricultural injuries in 2001 (U.S. USDA-NASS. 2004). Some 25,000 randomly selected farm operations were contacted by telephone and asked to report on agricultural-related injuries on their farms among persons age 20 years or older. Injuries sustained by members of the farm household (farmers and farm-resident family members) and injuries to hired workers were tabulated. An injury was defined as any condition occurring on the farm operation resulting in at least four hours of restricted activity or requiring professional medical attention.

The overall rate of injury among farm householders and hired adults in this survey was reported to be 13.1 injuries per 1,000 adults. From the findings presented in that report, the corresponding

⁴ United States. Department of Agriculture, *2007 Census of Agriculture. United States. Summary and State Data*, Volume 1. Geographic Area Series. Part 51, National Agricultural Statistics Service, February 2009. Cf. “Table 7. Hired Farm Labor – Workers and Payroll: 2007,” p. 336. As indicated by the table, of 482,186 farms reporting hired labor, there were 439,073 farms with fewer than 10 employees.

⁵ U.S. Department of Agriculture, *Farm Labor*, National Agricultural Statistics Service, Quarterly, 2010. Cf. February 2010 issue, table titled “Hired Workers: Distribution by Category, United States”, p. 14, and corresponding tables in the May 2010, August 2010, and November 2010 publications.

rate of hired farm worker injuries is inferred to be 21.8 per 1,000 adults.⁶ This compares with a rate of about 12.8 injuries per 1,000 adult members of farm households. Thus, the findings from this survey indicate the injury rate among hired workers was about 70 percent greater than among members of farm households. While these rates are lower than injury rates reported by the BLS SOII, it is important to note that this survey did not seek to determine the number of full-time equivalent workers on each farm. If the number of FTEs is substantially lower, as is likely, the corresponding calculated injury rates would be higher.

Incomplete reporting of occupational injuries and illnesses appears to be a widespread problem. In addition to possible underreporting by employers, many hired farm workers are ill-informed about the rights and responsibilities of employees. Findings from a California-wide cross-sectional health survey indicates only 40 percent of undocumented male hired farm workers were aware of the state's workers compensation insurance program, although coverage is universal for all workers in California (Villarejo et al. 2010a).

For hired crop farm workers, however, there is a substantial body of new knowledge, primarily from the Occupational Health Supplement of the U.S. Department of Labor's National Agricultural Workers Survey (NAWS), conducted during FY 1999, and newly reported (Steege et al. 2009). The survey relied on 3,613 face-to-face interviews with a nationally representative cross-section of hired crop workers.

NIOSH-NAWS survey findings indicate that musculoskeletal pain or discomfort was the most commonly reported health problem, affecting 15 percent of workers in the sample, including 6 percent reporting persistent back pain or discomfort. Nearly as large a share (14 percent) reported respiratory symptoms, and 7 percent reported dermatitis. Almost 20 percent of crop workers with 10 or more years of farm labor history reported pain in one or more body parts.

The NIOSH-NAWS survey is the only nationally valid published report to include findings concerning associations between farm size and hired crop workers' occupational health. Those

⁶ In the report (U.S. USDA-NASS. 2004), the authors report an injury rate during 2001 of about 12.8 injuries for every 1,000 adult members of farm households, and a total of 45,212 injuries among the same population. From this, it is possible to determine there were an estimated 3,532,188 such persons. Since the authors reported a total of 4,889,062 adults in both the hired farm worker and farm household populations, it can be deduced the number of hired farm worker adults was 1,356,874. The reported number of hired farm worker injuries was 29,612. Hence, the rate of hired farm worker injuries among adults was 21.8 injuries per 1,000 adults.

employed on farms with the smallest number of workers (fewer than 11) were more likely to report musculoskeletal pain or discomfort in the past 12 months than were workers on larger farms. They also were more likely to report respiratory discomfort, such as wheezing or whistling of the chest while breathing. Workers employed on farms with more than 150 workers were less likely to report dermatitis than workers on smaller farms, according to the study.

The California Agricultural Workers Health Survey (CAWHS), a cross-sectional survey of both crop and livestock hired workers throughout California (N=970), also based on face-to-face interviews conducted during 1999, found 41 percent of male workers and 40 percent of female workers reported persistent pain in one or more body parts (every day for more than a week) (Villarejo & McCurdy. 2008). The study also found 6 percent of male workers and 2 percent of female workers had experienced a workplace injury within the prior 12 months, and the prevalence of workplace injury was associated with increased years of farm work.\

Because the NAWS is an employment-based survey, only persons working during the survey period are eligible to participate. As a result, there is likely a “healthy worker” bias to the findings because workers too ill or injured to be on the job are not represented. Also, there may be a “healthy employer” bias owing to non-cooperation with the survey by some employers. In contrast, the CAWHS was a household-based survey, and included participants who were temporarily disabled from a workplace injury when interviewed.

The NIOSH-NAWS survey also found shortcomings in federally mandated pesticide safety training provided to field workers, including 11 percent of workers reporting a lack of presentation of important topics, such as limitations for re-entry into recently sprayed fields. The CAWHS survey found direct worker contact with pesticides from spray or drift was independently associated ($p < 0.01$) with several health conditions, including itchy or watery eyes (Villarejo & McCurdy. 2008).

Despite long-standing worker protection standards to protect hired farm workers from unhealthful risks of workplace exposure to pesticides, many workers are inadequately informed, trained or protected. Some workers report health conditions independently associated with workplace exposures to pesticides.

The proportion of workers in FY1999 in the NIOSH-NAWS study reporting access to field toilets (86 percent), drinking water (78 percent) and hand wash facilities (77 percent) was well below federal field sanitation standard requirements. The most recent NAWS findings, available as a public access file and based on interviews of 4,256 crop workers during FY 2005 and FY 2006, show improvement in field sanitation conditions (Aguirre International. 2008). In particular, 91 percent reported that drinking water was provided every day, 95 percent said their employer provided a field toilet every day and 96 percent said hand wash facilities were provided daily.

It is important to note that OSHA made enforcement and education concerning field sanitation a top priority from the mid-1990s through the mid-2000s. The improvement in worker reports of compliance with field sanitation standards indicates both employer cooperation and the value of OSHA enforcement.

A comprehensive study of workers compensation claims by hired farm workers (N=1,114) on Colorado livestock farms during the 10-year period 1997-2006 finds an especially high prevalence of musculoskeletal disorders, resulting in more time off work than in other farm work sectors (Doughrate et al. 2009). An earlier study of paid claims under workers compensation insurance among all categories of hired farm workers in California finds a significantly elevated injury rate among dairy and other livestock workers as compared with other sectors of farm work (Villarejo. 1998).

Agriculture is one of the few industries in which nearly all workers are directly exposed to chemicals used to kill pests, whether insects, weeds or fungi. Instances of acute pesticide poisoning in California are reported to state authorities, and these records recently were reviewed (Calvert et al. 2008). The authors studied all identified cases involving agricultural workers (N = 3,271) in 1998-2005, and computed incidence rates and incidence rate ratios relative to non-agricultural industries. Of all cases, hired farm workers accounted for 71 percent of acute pesticide poisonings, processing and plant workers for 12 percent, farmers for 3 percent, and other miscellaneous agricultural workers for 19 percent. Rates of illness varied among differing categories of agricultural workers. All, except farmers, showed risk for acute pesticide poisoning at least 10 times greater than among non-agricultural workers. The rate among female

agricultural workers was twofold higher than that of males. Men and women tend to be employed in different types of farm jobs, which may result in different workplace exposures and safety training. The CAWHS survey found a smaller proportion of female workers had been trained in pesticide safety (Villarejo & McCurdy. 2008).

Exposure to agricultural chemicals, along with other environmental and non-environmental exposures, is associated with a higher risk for some types of cancer among hired farm workers in California compared to the general population (Mills et al. 2009). Notably, elevated risks are found for lymphomas and prostate, brain, leukemia, cervix and stomach cancers.

The Agricultural Health Study, a prospective cohort of private pesticide applicators (farmers) and professionally licensed applicators, finds associations between some chemicals and several adverse chronic health conditions. Although hired farm workers are not included in the cohort, it is worth noting that adult-onset asthma and chronic bronchitis are associated with exposure to these specific materials (Hoppin et al. 2009; Hoppin et al. 2007).

Farm labor housing and health

“The U.S. Department of Labor today announced the assessment of \$36,134 in civil money penalties against eight growers in five Michigan counties for migrant housing and child labor law violations... James Smith, district director of the Labor Department’s Wage and Hour Division...called the violations ‘intolerable...workers living in unlicensed labor camps with sewage from a faulty septic system seeping up in close proximity to living units, untreated waste water spilling out of broken pipes, no hot water for hand washing, and infestation by insects and rodents.’”

- U.S. Department of Labor, October 27, 2009; OPA News Release Number 09-1256-CHI

The National Research Council/National Institute of Medicine expert panel convened to review agricultural worker occupational safety and health research programs recommended that new research to address health problems associated with farm labor housing be a NIOSH priority (National Research Council. 2008). The report stated that recent health survey research has “demonstrated that a large share of this workforce is still experiencing unwarranted risks to health that are associated with their housing conditions.”

Reports of hired farm workers residing in filthy conditions persist, despite government-supported initiatives to improve their housing. A recent report by the Michigan Civil Rights Commission found substandard and unhealthy housing conditions in farm labor camps throughout the five regions of the state where public hearings were held (Michigan Civil Rights Commission. 2010). A study of farm labor camps in North Carolina finds widespread violation of housing standards and that conditions worsen as the agricultural season progresses (Vallejos et al. 2011).

There has been a substantial change in the pattern of farm labor housing in recent years: fewer employers provide on-farm dwellings or labor camps, and more workers rely on private market housing in single-family dwellings and apartments. A report on the housing status of the nation's hired crop and livestock workers, based on the 2005-2007 Current Population Survey (CPS), finds about one-eighth lived in a rent-free dwelling, presumably employer-provided (Kandel. 2008). A study of farm labor housing two decades earlier, based on the 1984 CPS, found one-fourth lived in rent-free housing provided by the employer (Perloff. 1991). The NAWS findings that refer only to hired crop farm workers show a similar trend over time: more workers residing in private market rental housing and a corresponding decline in employer-provided housing.

There are considerable regional differences in this pattern. In North Carolina, for example, labor camps are the norm (Phelps. 2006). The majority of hired farm workers in California reside in market housing. Some regional differences in the supply of labor camp housing are likely attributable to the degree of variability of farm labor demand during the course of a year and in the corresponding proportion of migrant workers among a region's labor force.

Federal programs and regulation of farm labor housing

National health and safety standards of labor camp housing for migrant farm workers are described under OSHA regulations (cf. 29 CFR 1910.142 et seq.). The Migrant and Seasonal Agricultural Worker Protection Act (1983) requires registration of farm labor contractors as well as their supervisory employees who perform labor contractor activities, and includes mandatory disclosure by all agricultural employers of information pertaining to employer-provided housing.

However, there are substantive differences between the OSHA requirements for employer-provided farm labor migrant housing and minimum quality standards established by the U.S.

Department of Housing and Urban Development (HUD) for structures eligible for the Section 8, low-income voucher program (Vallejos et al. 2009). OSHA standards for hired farm worker housing allow more occupants per room used for sleeping, lesser availability of flush toilets and for multiple housing units to share toilet facilities.

The U.S. Environmental Protection Agency is responsible for assuring that labor camps have safe, potable water supplies under the Safe Drinking Water Act. Compliance oversight inspections conducted by the EPA have been limited. The only report concerning EPA compliance oversight of labor camp water quality in the last 20 years is unpublished, and limited to California (U.S. EPA. 1991). This report found widespread evidence of non-compliance with the Safe Drinking Water Act in the state's farm labor camps.

Various federal and state programs seek to provide private sector housing to eligible agricultural employees. These programs have strict housing quality standards to protect the health and safety of residents. The most notable of current efforts are the Rural Development Housing Assistance program of the U.S. Department of Agriculture and, in California, the Joe Serna, Jr. Farmworker Housing Grant Fund. Both programs provide grants to nonprofit agencies serving farm laborers.

The U.S. Department of Agriculture farm labor housing program limits eligibility for residence to nuclear families in which the head of household is either a citizen or is authorized for U.S. employment. Clearly, hired crop farm workers who are unaccompanied could not qualify for residence, nor could nuclear families in which the head of household is undocumented.

Health effects of substandard farm labor housing

The California Agricultural Workers Health Survey (CAWHS) is the only statewide, cross-sectional survey of farm labor dwellings to simultaneously examine the health status of worker residents and gather information about dwelling status. The CAWHS, a household survey of randomly selected dwellings in seven representative communities, relied on a multi-layered, stratified sampling procedure to assure that any person working as a hired farm worker in California at the time of the survey would have a known chance for participation (Villarejo & McCurdy. 2008).

Many hired farm worker families in California share their dwelling with other families in a residence intended for single-family occupancy. The CAWHS found two-fifths (41 percent) of male participants and nearly one-third (31 percent) of female participants shared housing with unrelated persons (Villarejo. 2011).

The CAWHS found overcrowding is commonplace and extremely overcrowded conditions are also prevalent when multiple families share an apartment or house. (Villarejo. 2011). Nearly one-half (48 percent) of CAWHS participants resided in a dwelling in which the number of persons per room (excluding bathrooms, but including kitchens) exceeded 1.0, corresponding to overcrowding.⁷ One-quarter lived in a dwelling in which the number of persons per room exceeded 1.5, the threshold for extreme overcrowding.

CAWHS found that about 5 percent of male participants lacked plumbing, food preparation facilities or both (Villarejo. 2011). The majority (75 percent) of those dwellings had no refrigerators, stoves, toilets or washing facilities.

Some of the living arrangements of workers also were associated with high-risk behaviors. Male participants who were unaccompanied by any family member and who resided with unrelated persons were two and one-half times more likely to engage in binge drinking (five or more drinks in a single episode) than accompanied workers (O.R. 2.6; 95 percent C.I. 1.4-4.8) (Villarejo. 2011). However, no association was found between self-reported drug use and unaccompanied status while residing with unrelated persons.

Most CAWHS participants were renters, and 11 percent resided in informal dwellings, defined as a place of residence not recognized by the U.S. Postal Service or by county tax assessors (Villarejo. 2011). Some of the informal dwellings were trailers or mobile homes with features comparable to permanent dwellings. Others were structures not intended for human habitation, such as garages, sheds, abandoned equipment or animal facilities, or autos used for transportation to and from work.

⁷ This is the widely quoted standard for overcrowding. However, overcrowding standards in housing are rather arbitrary. For additional discussion of this point, cf. Villarejo et al. 2010b.

Residence in an informal dwelling was associated with being unaccompanied by any member of the worker's immediate or extended family. Affordable housing presumably is not available for reasons associated with cost and other factors. Workers may be sending a large share of their earnings to family members in their country of origin so saving on housing costs is a high priority.

Male participants who lived in an informal dwelling were two and one-half times more likely to report experiencing nervios (feeling extremely anxious or agitated) as compared with workers residing in a single family house or apartment (O.R. 2.5; 95% C.I. 1.5-4.4; $p < 0.01$) (Villarejo. 2011).

Many workers must choose between accepting poor housing conditions and living without shelter. As rural areas of California experience increases of residents of Mexican origin, many homeowners and renters in these communities offer temporary shelter to seasonal migratory workers (Palerm. 1994).

There also are risks to health associated with occupational hazards from non-compliance with field sanitation standards combined with substandard housing conditions. The limited published evidence about sanitation conditions reported by hired farm workers compared with walk-through audits of housing and field sites found significant differences (Vela-Acosta et al. 2002). This suggests hired farm worker reports about sanitation conditions in both the fields and in labor camps might have limited validity.

Chapter 2

Disparities in Health Status and Access to Health Care

The prevalence of adverse health conditions

The paucity of research on the health status of the nation's hired farm workers is complicated by the high turnover in this workforce. Every year, large numbers of foreign-born newcomers enter the U.S. farm labor market as roughly equal numbers leave for non-farm jobs or to return to their native land. For this reason, there are no valid measures of mortality, including life expectancy, among hired farm workers.

The only nationally valid health survey of hired farm workers, limited to crop workers, was the Occupational Health Supplement to the NAWS in FY 1999 (NIOSH-NAWS), a national cross-sectional face-to-face survey that included queries about general health status (Steege et al. 2009). NIOSH-NAWS participants were asked to describe whether a physician had ever told them they had any of nine adverse health conditions. The most prevalent condition reported by NIOSH-NAWS participants was high blood pressure, reported by 3.5 percent of workers. The health condition with the next highest prevalence was diabetes, reported by 2 percent of respondents. All other specific health conditions—asthma, cancer, hepatitis, heart disease, thyroid disease, tuberculosis and urinary tract infections—had prevalences below 2 percent.

Elevated prevalence of respiratory disease among agricultural workers was found in a study from the Third National Health and Examination Survey (NHANES III), conducted in 1988-1994 (Greskevitch et al. 2007). Infectious diseases and respiratory disease were identified in case reports by medical professionals as among the top five adverse health outcomes in a statewide study of hired farm worker health in New York State (Emmi et al. 2010).

Sexually transmitted diseases and risk behavior in a 1999 statewide, population-based survey of hired farm workers in California found a low STD prevalence but a high prevalence of sexual risk behaviors, especially among males (Brammeier et al. 2008).

When observed cancer survival rates in a cohort of hired farm workers in California were compared with data for California Hispanics from the California Cancer Registry, it was found survival rates were similar for both groups. However, among the hired farm worker cohort there were lower crude survival rates for colorectal cancer and all sites combined (Dodge et al. 2007).

The only report of a statewide, cross-sectional health survey among hired farm workers to include a comprehensive physical examination was the CAWHS (Villarejo et al. 2010a). Participants were asked to complete a lengthy face-to-face interview, participate in a physical examination administered by third-party medical professionals and complete an interview concerning personal risk behaviors.

Especially significant were previously undiagnosed adverse health conditions discovered during the CAWHS physical examinations: cervical cancer, active syphilis, chlamydia, high blood glucose, high blood pressure, high serum cholesterol, obesity, anemia, untreated dentition problems and elevated diabetes risk. Lack of access to health care services for a significant proportion of CAWHS participants was a major reason these conditions had not been diagnosed and treated previously. Incidence rates for these conditions among hired farm workers in California were not reported in this study.

CAWHS findings indicate that if these conditions remain untreated, serious adverse health conditions, such as type 2 diabetes, heart disease and periodontal infections, will become more prevalent in this population (Table 1). Especially notable are the elevated prevalence of obesity (29 percent of males, 38 percent of females) and poor dentition. Curiously, the prevalence of both high blood pressure and high serum cholesterol were low among females, but higher among males.

Table 1
Selected Health Outcomes (Crude), Hired Farm Workers
CAWHS, California, 1999, N = 654

Health Outcome	Male (N = 416)	Female (N = 238)
Obese (BMI>30)	29%	38%
High cholesterol (>240 mg/dl; non-fasting)	17%	4%
High blood pressure (>140/90)	27%	4%
Dermatitis	11%	5%
Decayed teeth	36%	29%
Depression (physician diagnosis – ever)	2%	13%

To compare these findings with corresponding data in other populations, it is necessary to adjust for the age distribution of the CAWHS sample with reference to the Year 2000 U.S. Standard Population (Anderson & Rosenberg. 1998). The results can then be compared with recently published findings regarding the chronic health status of Mexican-American adults, age 20-74 years, from the National Health and Nutrition Evaluation Survey (NHANES) conducted during 1999 - 2006 (Fryar et al. 2012).

The age-adjusted CAWHS findings for all three chronic health indicators are less favorable than are found in the U.S. population of Mexican-American adults (Table 2), suggesting the male participants in the CAWHS are at somewhat higher risk for serious illness. However, only for high blood pressure is the finding for the CAWHS population statistically significantly different from that of the adult Mexican-American population.

Table 2
Selected Health Outcomes (age-adjusted), Percent (Standard Error)
Hired Farm Workers, Male, CAWHS, California, 1999
vs. Mexican-American Adults, Male (age 20 – 74)
National Health and Nutrition Examination Survey, 1999-2006

	CAWHS, 1999, Male (N = 416)	NHANES, 1999-2006, (N = 3,516)
Obese	33% (2.3)	29.0% (1.17)
High cholesterol	22% (2.1)	21.5% (0.98)
High blood pressure	29% (2.3)	21.6% (1.00)

Access to health care services among hired farm workers

The most direct measure of health care access is the extent of recent use of these services and how utilization varies among population subgroups. A nationwide study of health care access among hired crop farm worker participants in the NAWS during FY 2007 and FY 2008 (N = 2,884) identified factors associated with health care use in a logistic regression analysis (Hoerster et al. 2011). Approximately half (55 percent) of hired crop farm workers obtained health care services during the two-year period prior to participating in the NAWS. This includes visits to clinics, hospitals, dentists, chiropractors and nurses.

In this study, personal factors found to be independently associated with health care use were gender, immigration status, migrant status, English proficiency, access to transportation, health status and access to health care services outside the U.S. (Hoerster et al. 2011). Additional factors associated with health care utilization were proximity to the U.S.-Mexican border, health insurance status and workplace payment structure.

The presence of a federally qualified health center in the NAWS participants' county was not independently associated with health care utilization. But increased distance to the nearest center was positively associated with use in bivariate tests. The authors suggest that community health care centers are not yet adequately overcoming hired farm workers' personal barriers to accessing care. The authors offer suggestions for improving access to care, such as targeting

workers at greatest risk for unmet needs. The latter were identified as men, non-U.S. citizens, migrant workers, with limited English proficiency and lacking transportation.

The authors report that half of health care visits among hired crop farm workers were with private practice physicians (Hoerster et al. 2011). Payments to these providers are often made out-of-pocket, sometimes on an installment basis, if the worker lacks health insurance.

At the same time, more than half (55 percent) of hired crop farm workers in FY2007/FY2008 indicated they had a health care visit during the previous two years. This represents an improvement in health care access over the corresponding finding of 36 percent in the NIOSH-NAWS study in FY1999.

In a separate report on utilization, factors associated with overcoming health care system barriers were identified (Hoerster et al. 2010). This study used NAWS data to test a modification of the Behavioral Model for Vulnerable Populations regarding health care use and the type of care used. Health care use in the prior two years was more likely among women, those with more than six years of education, who earned more than \$15,000 annually, were authorized for U.S. employment, non-migrant, insured and who reported living in the U.S. for more than two years.

The NAWS findings for interviews conducted in FY 2005 and FY 2006 indicated 75 percent of hired crop farm workers lacked any form of health insurance (Aguirre International. 2008). Among those with health insurance, most were enrolled in an employer-paid program. Only 11 percent of workers had coverage.

A substantially larger proportion of U.S.-resident family members of hired crop farm workers were found to have health insurance: 40 percent of spouses and 67 percent of children (Aguirre International. 2008). It is likely that a large number of children of hired crop farm workers qualified for the Children's Health Insurance Program (CHIP) or other social insurance programs.

In another study using NAWS data, minor children's parent-reported health insurance status was examined in a multivariate analysis that included a number of parental characteristics (Rodriguez et al. 2008). It was found that minor children of hired crop farm workers were uninsured at three

times the rate of all other minor children, and almost twice the rate of those at or near the federally defined poverty level.

Dental care among hired farm workers has not been extensively studied, but the CAWHS found a high prevalence of tooth decay among hired farm workers. Given the poor dentition status of both male and female workers found in the CAWHS physical examination, the reported absence of dental visits — close to 50 percent of men and women reported they had never visited a dentist — is alarming. Healthy dentition requires routine daily care and regular dental care visits.

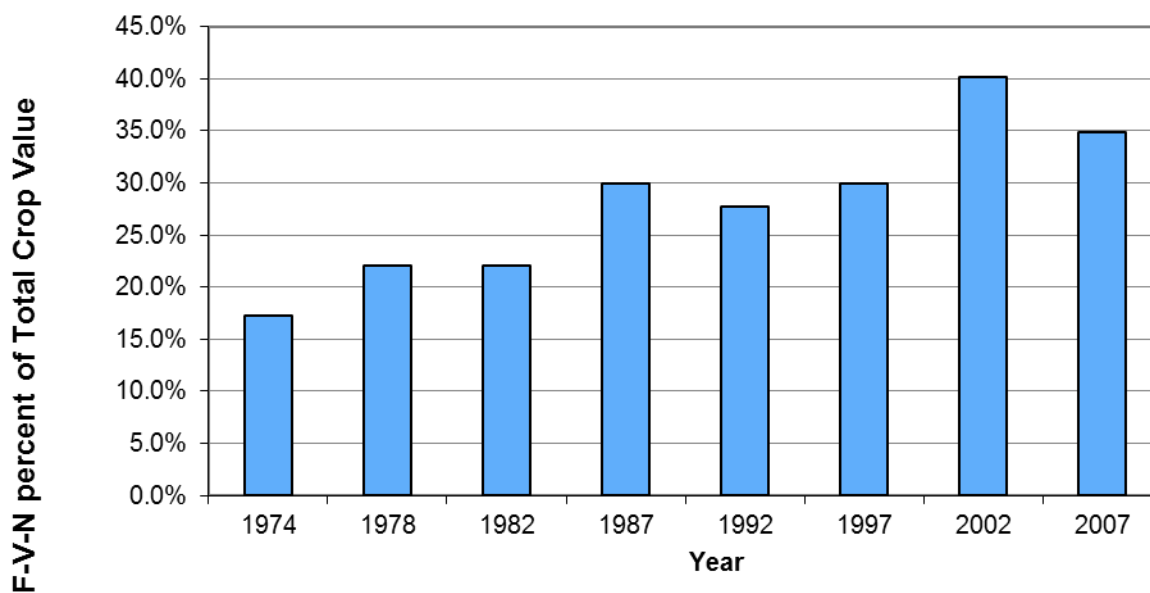
Self-care of injuries is reportedly common among migrant hired farm workers. One recent study examined how migrant hired farm workers decide to seek professional care (Anthony et al. 2010). Musculoskeletal injuries were the most commonly reported injuries, followed by injuries of the skin and chemical exposures. Self-care with over-the-counter remedies was the predominant method of treating injuries.

Chapter 3

Hired Farm Workers and the Growth of Labor-intensive Agriculture

Crops requiring substantial hand labor to grow and harvest have become the most successful component of our nation's agricultural system. Since 1974, U.S. production of vegetables, melons, tree fruits, vine crops, berries, tree nuts, and nursery, greenhouse and floriculture crops (F-V-N) has dramatically increased (Figure 2). In 1974, farm cash receipts from the sale of these "specialty crops" amounted to one-sixth of the total for all crops combined. By 2007, the specialty crop share of all crop farm cash receipts had doubled, to more than one-third of the farm gate value.

Figure 2
Fruit-Vegetable-Nursery Crops as Percent of Total U.S.
Crop Production (Value)
1974-2007, Source: Census of Agriculture



Specialty crops typically command higher prices per cultivated acre than grain or forage crops. These high-value crops have become more important because of rising domestic demand and increased exports, which bring higher returns to farm operators. However, commodity prices for

most specialty crops also are volatile. For that reason, it is useful to describe specialty crop production in physical terms — the number of tons of fruits and vegetables harvested each year.

During the three-year period 1973-1975, the annual average amount of fruits and vegetables harvested in the U.S. was 45.9 million tons per year.⁸ By 1994-1996, the annual average was 69.8 million tons per year and has remained constant for the past 15 years.

The most important development in U.S. vegetable and melon production in the past two decades has been the increase of crops destined for the fresh market. During the period 1986-1988, the annual harvested volume of fresh market vegetables averaged about 10.9 million tons per year. Twenty years later, during 2006-2008, the total had more than doubled, to an annual average of 23.7 million tons per year.

Growth in the fresh vegetable industry is mainly attributable to changes in consumer preferences. New products such as bagged salads and salad mix entered the marketplace during the past two decades. Today, dining establishments, from fast food outlets to hotels and restaurants, as well as colleges and hospitals, offer salad bars or highlight fresh produce choices.

Although there have been some concerns about imported fresh produce replacing domestic production, for most fresh produce crops, evidence indicates that such concerns may be misplaced. During the past 20 years, imports of fresh market and processed vegetables and melons, mostly from Mexico and Central America, have increased. The overall net increase of these imported commodities during the period 1987-2007 was 4.2 million tons per year, substantially smaller than the corresponding net increase of 18.1 million tons per year of domestic fresh market and processed vegetables and melons. Moreover, most fresh produce imports are counter-seasonal, coming at a time when winter weather precludes growing these crops in most of the United States.

In summary, recent substantial increases in F-V-N production are associated with corresponding increases in hired labor demand, but these increases are sometimes offset by technological change. Mechanization can sharply curtail the need for hand labor, e.g. half of the California

⁸ USDA, *Agricultural Statistics*, Annual, Washington, D.C.

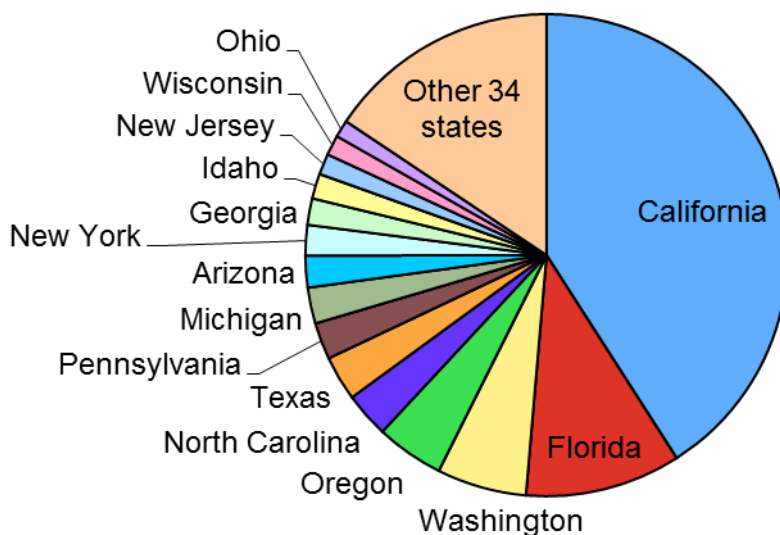
raisin grape crop is now harvested with machines, cutting by half the number of hired harvest workers who previously had numbered as many as 60,000.

Labor-intensive crop production is unevenly distributed among U.S. states

While the national increase of F-V-N crop production is substantial, only a few states have the favorable combination of conditions for growing these commodities: climate, soil, irrigation water, available labor and access to markets. Especially favorable conditions exist on portions of the two principal coasts and nearby valleys.

The chart in Figure 3 represents the estimated relative shares of annual farm labor demand, measured by the number of work hours required to grow and harvest labor-intensive crops, in each of the top-ranked 15 states as well as for all other states combined.

Figure 3
Labor Demand, Labor-Intensive Crop Agriculture Total Annual Hours, Top 15 States, 2007
Source: USDA



California led the nation during 2007 in estimated labor demand for labor-intensive crops with

41 percent of the U.S. total, followed by Florida (10 percent), Washington (6 percent), Oregon (5 percent) and North Carolina (3 percent). These five states alone accounted for 65 percent of all U.S. farm labor demand for the production of specialty crops and tobacco. The next five states (Texas, Pennsylvania, Michigan, Arizona and New York) together account for an additional 12 percent of total labor demand.

California's share of U.S. production of labor-intensive crops has increased substantially during the last 20 years. The state's share of national fruit and vegetable production was 46 percent during 1994-1996. It had increased to 57 percent by 2006-2008.

Corresponding to California's greatly increased share of labor-intensive crop production, the proportion of all U.S. crop workers employed in the Golden State increased by 12 percentage points in 10 years (Aguirre. 2005). California's share of U.S. hired crop farm workers employed in the nation's F-V-N crops was estimated to be 44 percent as of 2003-2004.

Farm size in labor-intensive crop production and farm labor

Farm size in labor-intensive crop production affects hiring patterns and the ability of the farm to compensate employees, especially benefits such as health insurance or sick leave pay. Measures of scale size in agriculture are difficult because the United States produces a variety of crops and livestock. For example, referring only to land area, a livestock ranch in the arid West needs thousands of acres of rangeland to sustain enough livestock to earn a modest livelihood, but a mushroom farm in Pennsylvania needs only a tiny amount of land to earn a comparable livelihood.

In 1987, the largest 39,081 specialty crop farms accounted for 75 percent of total specialty crop sales.⁹ Twenty years later, in 2007, just over half that number of specialty crop farms, the largest 23,003, accounted for 75 percent of specialty crop sales.¹⁰ The number of specialty crop farms of all sizes increased by 19 percent during this same time frame, from 194,957 in 1987 to 232,574 in 2007. Thus, the minimum percentage of specialty crop farms accounting for three-quarters of

⁹ Cf. 1987 Census of Agriculture, United States, Table 47. Farms by Concentration of Market Value of Agricultural Products Sold: 1987, p. 43.

¹⁰ Cf. 2007 Census of Agriculture, United States, Table 40. Farms by Concentration of Market Value of Agricultural Products Sold: 2007, p. 47.

specialty crop farm sales in 1987 was 20 percent, but by 2007 the corresponding share was halved to 10 percent.

The large farm share of farm labor demand has increased in recent years. In 2010, some 30 percent of direct-hire farm laborers worked on farms with more than 50 such workers. Correspondingly, the “small farm” share of direct-hire farm employment has decreased substantially during the past 20 years. In 2010, the USDA/NASS Farm Labor Survey (FLS) found 46 percent of direct-hire farm workers were employed on farms with 10 or fewer workers, a substantial decline from 1989 when 58 percent of all direct-hire workers were employed on farms with 10 or fewer workers.¹¹

Organic and sustainable agriculture

Organic production is an important emerging sub-sector of U.S. agriculture and increasingly accepted by consumers. Organic farming practitioners include both crop and livestock producers, and were the subject of a specialized survey conducted by USDA-NASS in 2008 (USDA. 2010).

A U.S. Department of Agriculture organic farm survey found 14,540 certified organic and exempt farms in 2008, less than 1 percent of all U.S. farms.¹² The combined total of cash receipts from the sale of certified organic or exempt farm products in 2008 was \$3.1 billion, about 1 percent of total U.S. farm output.

Despite the fact that nearly two-thirds of organic farms sell directly to the public, only 7 percent of their organic sales volume is marketed in this way. Organic direct-to-consumer sales totaled \$215 million in 2008, or about one-fourth of the \$812 million in direct sales by all U.S. farms. Most organic production is destined for traditional marketing channels, such as the large-scale wholesale/retail distribution system, food processing and food service industries.

¹¹ U.S. Department of Agriculture, *Farm Labor*, National Agricultural Statistics Service, Quarterly, 2010. Cf. February 2010 issue, table titled “Hired Workers: Distribution by Category, United States”, p. 14, and corresponding tables in the May 2010, August 2010, and November 2010 publications. For 1989 data, see corresponding tables in 1989 issues of *Farm Labor*.

¹² By statute, to qualify as “exempt” an organic farm must have less than \$5,000 in annual sales of organic products. USDA waives registration and fees for organic certification of such farms.

Another farm production concept that has emerged in recent years is termed “sustainable agriculture.” The term is vague and embraces a wide range of differing views of sustainable agricultural practices in contrast to USDA organic certification, which is clear and unambiguous with its strict regulations governing production practices.

Chapter 4

Hired Farm Workers: The Current Labor Force

Hired farm workers in U.S. agriculture

American agriculture relies on hired workers more now than at any time in the past century. Each year during the past decade, the number of U.S. residents self-identifying as farmers has been smaller than the corresponding number of farm laborers. The Census Bureau's 2009 American Community Survey (ACS) finds the annual average number of "farmers and farm managers" is 609,941 while 872,170 are "agricultural workers, including supervisors."¹³ Increased production of fruit, vegetable and ornamental crops over the past two decades, especially fresh vegetable crops, and the decline of family operated farms are the main factors contributing to this trend.¹⁴

Because no single source provides a direct determination of the number of U.S. farm workers¹⁵, it is necessary to use several different surveys and reports to make a reasonable estimate. The actual number of individual farm workers is far greater than the 12-month average reported by the ACS because many are employed only seasonally.

The U.S. has 1.4 million crop farm workers, according to a new, unpublished estimate.¹⁶ The number of livestock farm workers is estimated to be 429,000.¹⁷ The previous "official" estimate of the total number of farm workers was 2.5 million persons, and dates back to a 1993 report by the Commission on Agricultural Workers (U.S. CAW. 1993).

The only nationally representative survey of farm payroll employment is the Farm Labor Survey (FLS) conducted by the U.S. Department of Agriculture. The survey is conducted among a

¹³ U.S. Census Bureau, American Community Survey, 2009, Table B24010: Sex by Occupation for the Civilian Employed Population 16 Years and Over.

¹⁴ Chapter 5 of this present report describes these trends in more detail (cf. pp. 35ff).

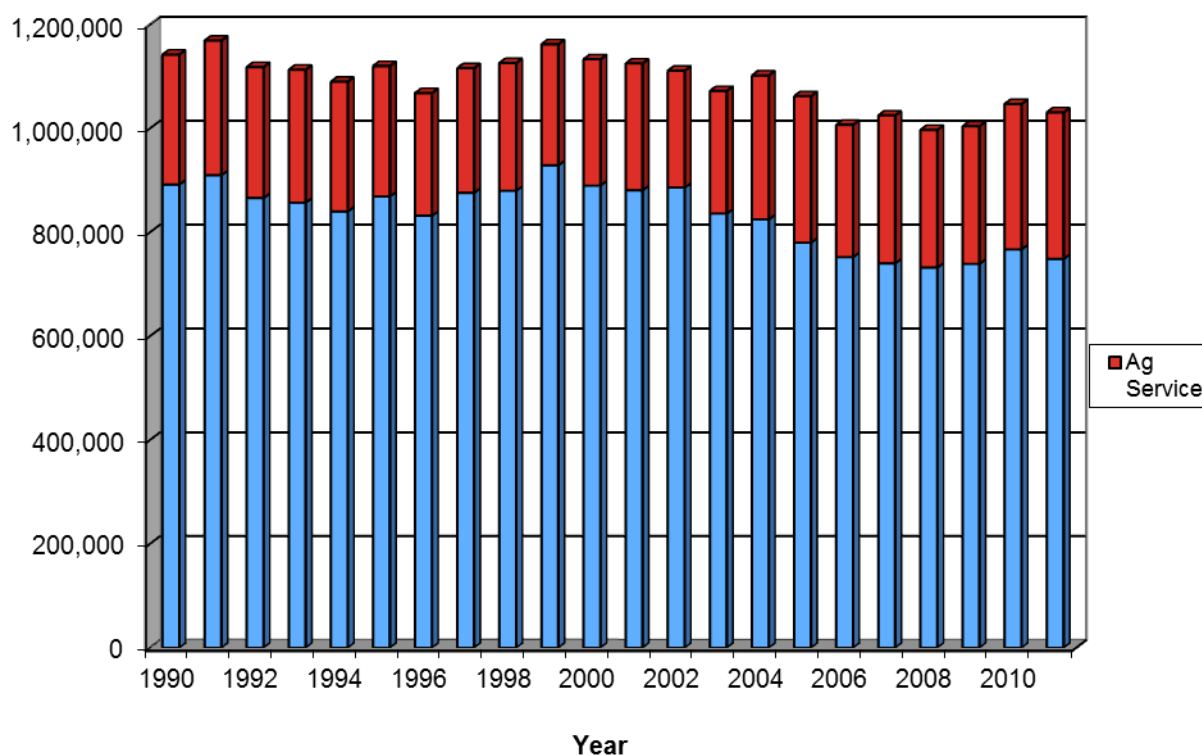
¹⁵ The generic term "farm workers" will be used in the present report to describe wage and salary workers who perform farm tasks for the purpose of producing an agricultural commodity intended for sale. See the Glossary in the this report for more information about other widely used terms, such as "migrant and seasonal farm workers".

¹⁶ This estimate was prepared by Dr. Susan Gabbard, JBS International, in collaboration with Daniel Carroll of the U.S. Department of Labor. The author gratefully acknowledges Dr. Gabbard for permission to quote the estimate in the present report.

¹⁷ This estimate is by Prof. Philip Martin. Cf. "Immigration Reform: Implications for Farmers, Farm Workers and Communities," paper presented at the May 12, 2011 Conference on Immigration Reform, Washington, D.C.

random sample of the nation's farm employers during each of four months — January, April, July and October — selected to represent the four calendar quarters. The FLS reports average wage rates, average weekly hours worked, and separate data for field workers and livestock workers. All workers on farm payrolls are represented, including office workers and children younger than 16 years of age. The FLS also measures the employment of agricultural service workers, such as contract laborers.

Figure 4
Farm Labor Employment (Annual average)
Direct Hire & Agricultural Services U.S., 1990-2011
Source: NASS/USDA Farm Labor Survey



During the past two decades, from 1990-1992 to 2009-2011, the FLS finds a 10 percent decline in the annual average hired crop and livestock farm worker employment to 1,027,000 (Figure 4). The 15 percent decline in employment by farm operators (direct-hire labor) during this period was partially offset by a 9 percent increase in agricultural service employment (contract labor).

The FLS finding of annual average hired farm worker employment of 1 million in 2011 appears to contradict the ACS finding of about 872,000. However, the FLS survey includes non-farm workers on farm payrolls. The ACS also likely misses an unknown share of foreign-born hired farm workers who lack authorization for U.S. employment.

The modest decline in annual average direct-hire and contract laborer employment subsequent to 1999 reflects the effects of stable U.S. fruit and vegetable output and technological change. Mechanization of some tasks has led to reduced employment (Calvin & Martin. 2010). In some crops, post-emergent herbicides have been substituted for hoe-wielding laborers to control weeds.

The FLS findings regarding farm labor employment are independently validated in this paper using farmer reports of production expenses for direct-hire and contract labor in the 2007 Census of Agriculture (see Appendix). Based on these reported production expenses, the inferred annual average farm labor employment for 2007 was 1,008,000, remarkably close to the 1,025,000 reported by the FLS for 2007.

The four major crop farm categories that can be characterized as “labor-intensive,” for which the total of hired and contract labor expenses are larger than any other major production cost category, are listed below. Labor expenses as a percent of total production expenses for each crop category are shown in parentheses.¹⁸

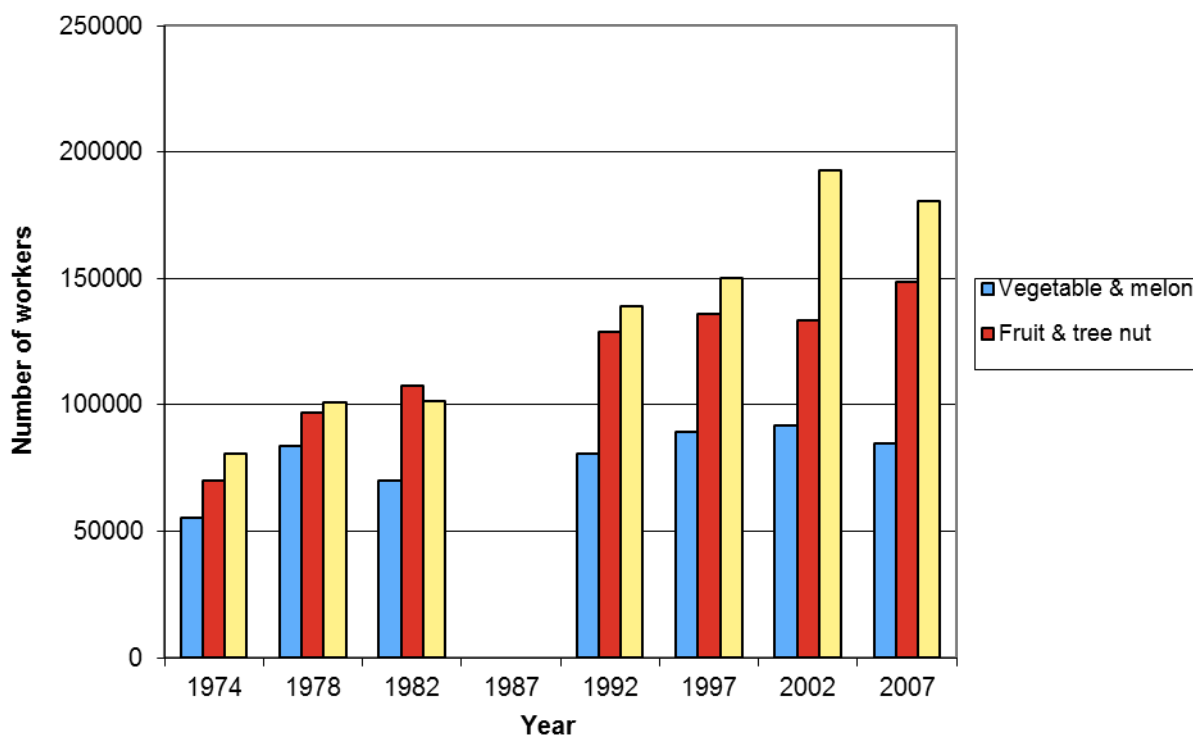
- Vegetable and melon farming (28 percent);
- Fruit and tree nut farming (39 percent);
- Greenhouse, nursery and floriculture farming (40 percent);
- Tobacco farming (23 percent).

¹⁸ U.S. Department of Agriculture, *2007 Census of Agriculture. United States Summary and State Data*, National Agricultural Statistics Service, February 2009. Cf. Table 62. Summary by North American Industry Classification System. 2007, pp. 178ff. See sub-heading “Farm Production Expenses” for “Hired Farm Labor” and “Contract Labor,” which are combined to arrive at the quoted percent values.

Increase of direct-hire regular and year-round workers in labor-intensive crops

Particularly useful is information concerning the number of filled direct-hire jobs that had a duration of 150 days or more as reported by farm operators.¹⁹ For labor-intensive agriculture, the aggregate number of these direct-hire jobs, filled by persons sometimes termed “regular and year-round workers,” has doubled since 1974, from 206,194 to 414,542 (Figure 5).²⁰

Figure 5
Hired Labor (direct-hire), Workers, 150 Days or More, U.S. Farms
Source: Census of Agriculture, 1974-2007



¹⁹ U.S. Department of Agriculture, *2007 Census of Agriculture. United States Summary and State Data*, National Agricultural Statistics Service, February 2009. Cf. Chapter 2. State Data. Table 7. Hired Farm Labor – Workers and Payroll: 2007, pp. 336ff. The reported count of the total number of farm workers is actually a count of farm jobs – one worker hired by one farm operator. Thus, the same worker hired by a second farm operator results in an over count of workers. However, the reported count of workers hired for 150 days or more very likely corresponds to a reasonably accurate count of such long-term jobs because it is unlikely that a single worker would have two jobs with distinct employers, each of which was of that duration. Of course, a worker might have a long-term job with one employer and a short-term job with a different employer.

²⁰ The agricultural census omitted queries relating to hired farm labor in the 1987 census, but they were restored in subsequent years.

The relationship of farm size concentration to farm labor within labor-intensive crop production is straightforward: bigger farms generally employ more workers than smaller farms.²¹

Contributing to the increase during the recent two decades of longer-term employment in specialty crop farming are the overall increase in U.S. production of these crops, the increase of size concentration among specialty crop farms, which tends to replace farmer and family labor with hired and contract labor, and sharply increased nursery and greenhouse crop production where year-round workers predominate. Also, some employers report the need for employees with significantly greater skills to operate and manage sophisticated equipment, which places a premium on training and retaining employees with those skill sets.²²

The U.S. farm labor market is becoming increasingly bifurcated into regular and year-round workers on the one hand, and temporary seasonal workers on the other. An estimated 45 percent of direct-hire jobs are for 150 days or more per year. Temporary and short-term seasonal workers are increasingly furnished through labor market intermediaries, typically an agricultural service business, such as a labor contractor or custom work service.

A labor-market consequence of these important developments for American agriculture is that 45 percent of direct-hire jobs are of long duration and are with a specific farm operator.²³ Workers who fill these jobs may no longer need to migrate. This factor encourages permanent settlement, community development and stability.

Crop farm workers: who are they?

The U.S. Department of Labor's National Agricultural Workers Survey (NAWS) of hired crop farm workers provides detailed information concerning the portion of the farm labor force directly engaged in crop production (U.S. DoL. 2005). About two-thirds of annual hired farm

²¹ We use terms relating to "farm size" as measured by annual cash receipts from the sale of agricultural commodities. USDA refers to "small farms" as those with annual sales less than \$250,000, and so on.

²² To help address the need for greater skills among direct-hire farm workers, West Hills College, Coalinga, California, has developed the "Farm of the Future" training program that includes both a demonstration farm and state-of-the-art classroom instruction. Farm businesses throughout the Western U.S. are now sending many of their supervisors and year-round employees to this facility for advanced training.

²³ Using the methods described in Appendix I, and that 150 days x 8 hours per day = 1,200 hours, the Census of Agriculture finding of 421,996 direct-hire workers employed for at least that duration in labor-intensive crops, leads to the estimate that at least 45 percent of the direct-hire labor demand for labor-intensive crop production is now supplied by regular and year-round workers.

worker labor demand is for crop production, so the NAWS provides nationally representative findings for a majority of the total farm labor workforce. The NAWS does not determine how many there are.

Historically, “seasonal workers” were persons who entered the labor force on a temporary basis to seek short-term jobs, and then left the labor force once the job ended.²⁴ In agriculture, “seasonal workers” typically included students, homemakers and schoolteachers, among others. This definition has been replaced by a new concept, for example, used in the NAWS, to refer to persons in the labor force year-round and whose employment consists mainly of seasonal tasks on farms.

The NAWS findings also indicate that between 1989-1991 and 2007-2009 a declining proportion of hired crop farm workers adhered to the follow-the-crop migrant family pattern. NAWS estimates the share of crop farm workers who migrated was about 26 percent in 2007-09, down from about 56 percent in 1995-1997.²⁵ Most of those who regularly travel do so from a permanent home base, either in the United States or abroad, to a single destination, and then return home after the season ends.

In this revised set of concepts, hired crop farm workers are either migrant, if they follow-the-crop or travel from a home base to find work, or seasonal, if they do not travel to find farm jobs but perform seasonal crop tasks. With this change of understanding, in the NAWS, all hired crop farm workers are either migrant or seasonal farm workers even if they are employed on a year-round basis.

Demographic and employment characteristics of hired crop farm workers

Most hired crop workers are foreign-born, predominately from Mexico and Central America. Typically Spanish-speaking, married and with limited formal education (average of eight years),

²⁴ As recently as 1969, “seasonal workers” in agriculture were defined as persons who were in the labor force for no more than 12 weeks in a year. Cf. *The California Farm Labor Force: A Profile*, A Report Prepared for the Assembly Committee on Agriculture, by Its Advisory Committee on Farm Labor, with the Assistance of the California Department of Employment, April 1969, Sacramento, California, 154 pp.

²⁵ Daniel Carroll, Annie Georges & Russell Saltz, “Changing Characteristics of U.S. Farm Workers: 21 Years of Findings from the National Agricultural Workers Survey,” Presentation to the Immigration Reform and Agriculture Conference: Implications for Farmers, Farm Workers and Communities, University of California, D.C. Campus, May 12, 2011.

nearly all have come to the U.S. to work, and often send money to family members who remain in their home country. Women now comprise 20 percent of hired crop farm workers,²⁶ a significant decline from the 29 percent share reported by the NAWS in 1990 (U.S. DoL. 1991). Over time, in an established migration pattern, spouses and children come to the U.S. to live together as a family.

Although women are about 20 percent of this workforce, their overall share of hired labor in crops is quite a bit smaller. On average, in 1999, female crop workers in California had just 60 percent of the number of workdays on farms as their male counterparts (Villarejo & McCurdy. 2008). In California during 1999, women accounted for about 13 percent of all hired crop farm work hours.

During 2007-2009, the NAWS determined that 48 percent of hired crop farm workers were not authorized for U.S. employment.²⁷ The NAWS previously found that nearly all of the most recent immigrants (termed “newcomers” by NAWS) were undocumented (U.S. DoL. 2005).

Annual turnover among hired crop farm workers is substantial. Those leaving farm work are most frequently replaced by foreign-born “newcomers,” defined by the NAWS as individuals who had been in the U.S. less than a year when interviewed. However, since the onset of the Great Recession, some who had been able to obtain jobs in construction have returned to agricultural employment.

During 2007-2009, NAWS finds 35 percent of hired crop farm workers were foreign-born newcomers.²⁸ Nearly all foreign-born newcomers (99 percent) were not authorized for U.S. employment (U.S. DoL. 2005). NAWS reports that 90 percent of foreign-born newcomers are male (U.S. DoL. 2005). Of hired crop farm workers who are parents, newcomers were twice as likely as others to be living away from their children.

The most important recent demographic change among hired crop farm workers is the rapidly increasing number of newly arrived indigenous migrant workers from southern Mexico or Central America (Zabin et al. 1993; Mines et al. 2010). It is sometimes difficult to identify

²⁶ Ibid.

²⁷ Ibid.

²⁸ Ibid.

indigenous hired farm workers because, like many Native Americans, their mother tongue may not be English or Spanish. Most often, they grew up speaking Mixteco, Zapoteco, Triqui, Nahuatl, Purépecha or another of the many languages of their home villages. Some indigenous migrant workers are not fluent in Spanish or English and have their own distinctive cultural traditions. As is true of U.S.-born Native Americans, indigenous hired farm workers face discrimination by some Americans and Mexicans.

The percentage of indigenous hired crop farm workers in the nationwide farm labor force is estimated to be about 15 percent as of 2007-2009,²⁹ according to the NAWS. An estimated 29 percent of California's crop workers today are indigenous migrants (Mines et al. 2010).

Indigenous migrant newcomers are at higher risk of exploitation; some have been trapped in perpetual debt-bondage, characterized in various reports as akin to slavery (Human Rights Center. 2004; Bowe. 2007; Southern Poverty Law Center. 2007). Some employers have inserted indigenous migrant newcomers into their own established labor force at lower pay or to discipline other workers (Zabin et al. 1993).

Newcomers are not the only group facing higher risks. Adolescent youth subject to workplace harassment and intimidation are especially vulnerable (Vela-Acosta & Lee. 2001).

The NAWS finds that hired crop farm workers averaged 190 days of farm employment during the 12 months preceding their interview (newcomers were excluded from this measure), and more than three-quarters had at least 100 days of farm work (U.S. DoL. 2005). More recent NAWS findings, for 2007-2009, find hired crop farm workers averaged 35 weeks of farm jobs per year, and that 81 percent reported they had only one farm employer.³⁰ These findings are in accord with the previously described Census of Agriculture reports of the large number of direct-hire workers employed for 150 days.

While attention often focuses on wage rates paid to farm laborers, annual earnings are of greater importance to workers and their families. During 2007-2009, NAWS finds individual hired crop

²⁹ Ibid.

³⁰ Ibid.

farm workers' annual earnings averaged \$12,500 to \$14,999, while their total family earned income averaged \$17,500 to \$19,999.³¹

Federal poverty guidelines for 2007-2009 indicated that about 23 percent of NAWS participants had family incomes below the poverty line.³² Many hired crop farm worker families meet the income test for needs-based federal and state assistance programs, such as Medicaid, WIC and food stamps. Despite the large portion of the labor force with poverty-level incomes, fewer than 1 percent of hired crop farm worker families received payments from welfare programs such as Temporary Assistance for Needy Families (TANF). Many who meet the TANF income test fail to qualify owing to a lack of authorization for U.S. employment. Also, it is not known how many hired crop farm worker families who meet all criteria to qualify would apply for benefits.

A substantial majority (57 percent) of all hired crop farm workers in 2001-2002 were unaccompanied while working in the U.S., residing without any other member of their nuclear family. A majority of unaccompanied workers were single, but a significant minority (39 percent) were married. Most of those who were married also had children. For many foreign-born workers, remittances sent home are vital for the support of their families.

Hired livestock workers

There are no nationally representative surveys of hired livestock workers. However, estimated annual labor demand for hired livestock farm workers is substantial, representing more than one-third of the national total for all hired farm workers (see Appendix).

A recent survey of dairy farm operators finds annual average employment of hired farm workers on dairies is 138,000 (Rossen et al. 2009). An estimated 40 percent of hired farm workers on dairies are foreign-born.

Anecdotal and limited-scale studies indicate that hired livestock workers are similar in a number of aspects to hired crop workers, but with two important differences. First, most livestock tasks are year-round, not seasonal. Whether milking cows or handling eggs, production is continuous,

³¹ Ibid. Income based only on responses by the 80 percent of NAWS participants who reported U.S. income in the calendar year preceding the interview. The remaining 20 percent, including newcomers, did not report U.S. income in that prior year and were excluded from the computation.

³² Ibid.

every day, throughout the year. Second, because work is mostly year-round, few workers migrate to secure short-term jobs. Thus, many hired livestock workers are not “migrant and seasonal farm laborers” as defined in regulations for government-supported assistance programs.

Farm labor wage rates

The FLS reports annual average direct-hire farm worker wage rates for the U.S. and for 15 crop regions, each of which shares similar crop patterns (additionally, findings for California, Florida and Hawaii are individually reported). Separately, U.S. wage rate findings are reported for direct-hire field workers, direct-hire livestock workers and for all direct-hire workers combined.

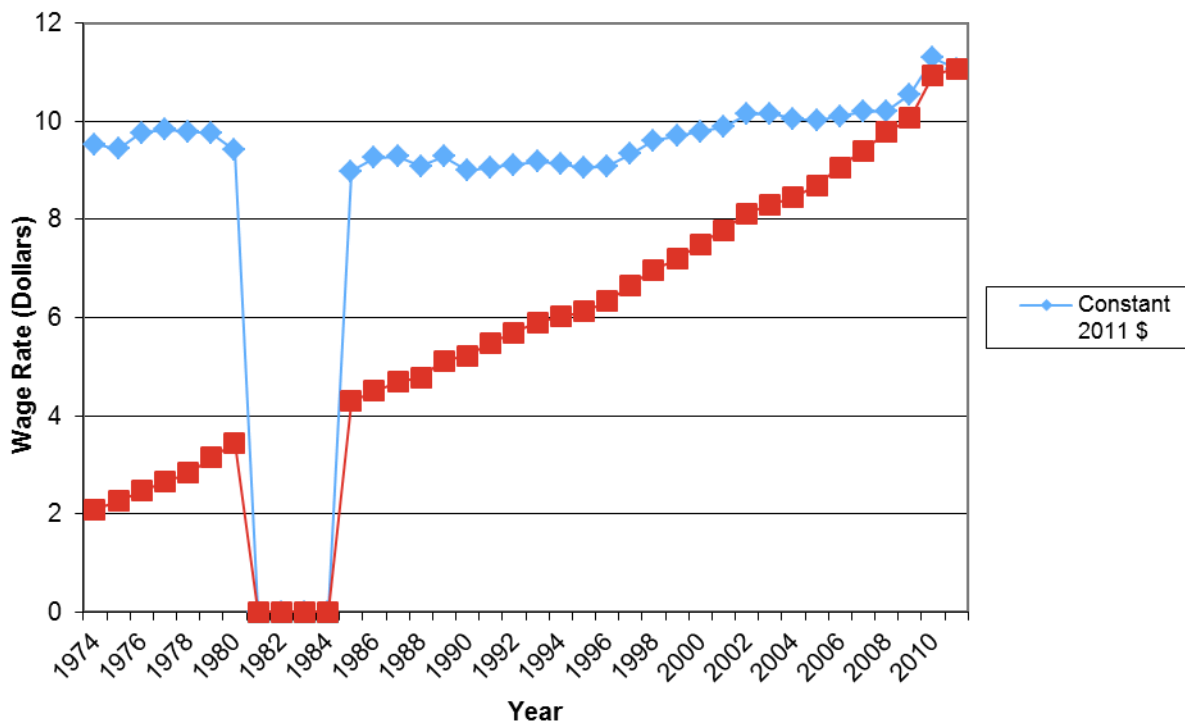
Nominal wage rates for U.S. direct-hire field workers have increased continually from 1974 through 2011 (Figure 6).³³ In 1985, the annual average nominal wage rate was \$4.30 per hour. By 2011, it was \$11.07 per hour.

However, when inflation is taken into account using the Consumer Price Index, real annual average wage rates for direct-hire field workers were relatively flat throughout the 12-year period 1985-1996, and were below rates that prevailed during the middle and late 1970s. Subsequent to 1996, real wage rates slowly increased, and by 2000 slightly exceeded 1970s values. From 2009 to 2011 there was an uptick in wages, in part attributed to increases in the federal minimum wage and increases in state minimum wage rates, notably in California, Florida and Washington, which together account for more than half of all hired farm worker labor demand (see Appendix).

³³ The FLS did not report annual average wage rates for 1982-84.

Figure 6
Annual Average Direct-Hire Field Worker Wage Rates
(Nominal, and Constant 2011 Dollars) United States

Source: USDA-NASS *Farm Labor*



Average wage rates for direct-hire field workers reported by employers in the FLS can be compared with rates reported by hired farm workers in the NAWS (U.S. DoL. 2005). During 2001-2002, the average hourly wage rate reported by NAWS participants, both direct-hire and contract labor, was \$7.25, about 8 percent lower than the \$7.87 reported for direct-hire field workers in the FLS.

Wage rate findings of the FLS vary greatly among crop regions. The highest annual average direct-hire field worker wage rates reported during 2011 were \$12.04 for the Northern Plains region (Kansas, Nebraska, South Dakota and North Dakota).³⁴ The lowest annual average direct-hire field worker wage rates were \$9.31 reported for the Southeast region (Alabama, Georgia and South Carolina). The variance of wage rates for these states from the corresponding 2011 U.S. average of \$10.33 is quite substantial: +16 percent for the Northern Plains region to -10 percent

³⁴ Cf. USDA-NASS *Farm Labor* report dated November 2010. The table of interest is titled “Annual Average Wage Rates by State: 2009 and 2010,” p. 18. This table was not included in the November 2011 report.

for the Southeast region. Differences in the types of crops grown in the various states and local labor market supplies likely account for variances in wage rates.

Wage rates paid to direct-hire workers are generally higher on larger farms. According to FLS findings, wage rates paid by farms with annual sales exceeding \$1 million averaged \$11.40 per hour during 2011, while farms with annual sales between \$50,000 and \$100,000 paid the lowest wages, averaging \$9.96 per hour.³⁵

Little is known about paid or in-kind benefits received by hired farm workers. An analysis of the Current Population Survey (CPS)³⁶ findings for 2005-2007 indicated only 5.8 percent of hired farm workers received overtime pay, tips or commissions (Kandel. 2008).

The most recent NAWS report of national findings concerning hired crop workers finds 22 percent received a cash bonus as part of their compensation, and about 8 percent -12 percent said they had health insurance as a paid benefit of their current employment (U.S. DoL. 2005). Additionally, 17 percent lived in employer-provided housing without charge.

Unpublished NAWS findings available as a public access file provide more recent information about health insurance coverage (Aguirre International. 2008). About 11 percent of hired crop farm workers indicated they had employer-paid health insurance.

Larger farms are somewhat more likely than small farms to provide benefits, including health insurance, to seasonally employed workers. Information about benefits paid by farm employers of differing size is limited to California. The Farm Employers Labor Service (FELS) sponsors an annual, statewide wage and benefits survey that includes both crop and livestock farm employers (Farm Employers Labor Service. 2010). The 2010 findings from California's FELS survey indicate few seasonal workers have employer-paid benefits, but farms with more than 25 year-round workers are more likely to provide benefits.³⁷ FELS also finds farms of all employment sizes were equally likely to pay a bonus or yearly profit sharing.

³⁵ Cf. USDA-NASS *Farm Labor* reports dated 2/11, 8/11 and 11/11. The table of interest is titled "All Hired Worker Wage Rates, by Economic Class of Farm by Region and 48 States." USDA-NASS did not report in 5/11.

³⁶ The Census Bureau conducts the CPS on behalf of the Bureau of Labor Statistics.

³⁷ To illustrate this point, the FELS survey finds among farm employers with five or fewer employees, less than 4 percent offered employer-provided health insurance to seasonal workers, but among farm employers with more than

Contract farm labor

The single most important development in the structure of the farm labor market during the past 25 years has been the gradually increasing replacement of direct-hire short-term workers by contract laborers. Labor-market intermediaries have gained a larger share of the farm labor market. Described as “agricultural services” in the National Agricultural Statistic Services’ quarterly *Farm Labor* report, these are primarily, but not exclusively, farm labor contractors and also include businesses that provide custom on-farm services.

One of the most frequently cited factors associated with this transition away from direct hiring of short-term workers is the “employer sanctions” provision of the 1986 Immigration Reform and Control Act (IRCA). IRCA imposed new recordkeeping requirements as well as civil and, possibly, criminal penalties for employers who hire persons not authorized for U.S. employment. Thus, a farm operator can potentially avoid the risk of sanctions by contracting with a labor market intermediary to supply labor. As the employer of record, the latter would be responsible for complying with IRCA obligations, including recordkeeping requirements.

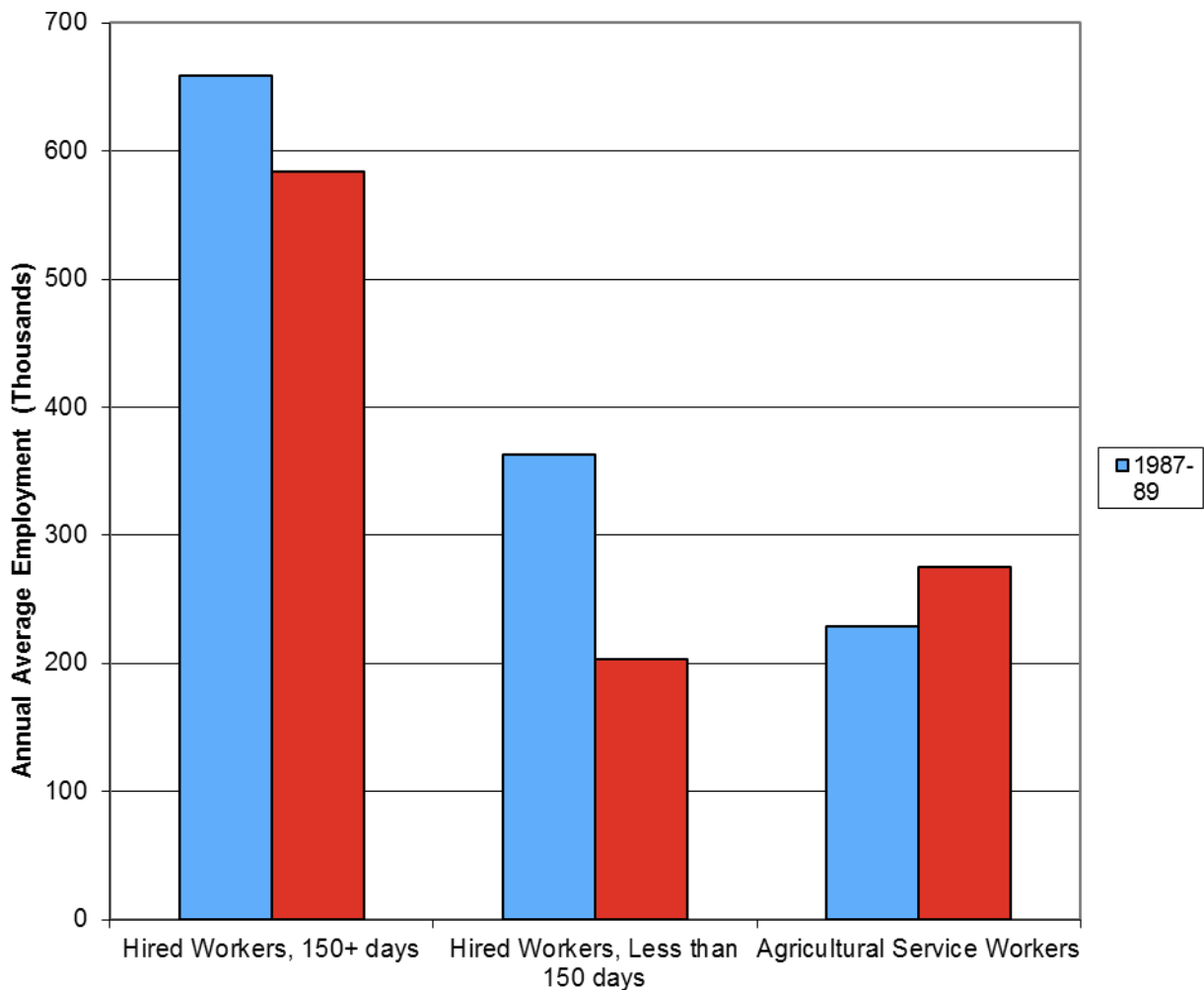
On a national basis, current FLS reports indicate the number of agricultural service jobs on farms exceeded the number of short-term direct-hire jobs (Figure 7). For example, during the week of July 10-16, 2011, agricultural service jobs on U.S. farms totaled 350,000, whereas the number of direct-hire jobs of less than 150 days was 230,000.

This pattern of farm labor usage is the reverse of the pre-IRCA employment pattern. In 1985, the number of direct-hire jobs of less than 150 days was greater than the number of agricultural service jobs for each of the survey weeks.³⁸

25 employees, at least 12 percent offered employer-provided health insurance to seasonal workers and their family members. Similarly, just 3 percent of FELS survey participants with five or fewer employees offered holiday pay to seasonal workers, but among employers with more than 25 employees, 23 percent offered holiday pay to seasonal workers.

³⁸ The difference was greatest during July 1985 when there were 678,000 direct-hire workers employed for less than 150 days and 345,000 agricultural service workers, a ratio of very nearly 2:1. By July 2011, the corresponding ratio had reversed, to 0.7:1 (230,00 to 350,000, respectively).

Figure 7
Direct-hire Farm Employment, by Days Worked, vs. Agricultural Service
Employment, United States, 3-year Averages, 1987-89 and 2009-11



Another factor leading to the increased importance of labor market intermediaries is their central role in the recruitment of foreign-born workers. Finally, expanded administrative requirements of ever more complex regulations encourage some farm operators to rely on outsourced labor.

Chapter 5

Disparities in Legal Workplace Protections

Background

Employee workplace rights are protected under federal and state laws enacted over many decades, most notably during the New Deal in the 1930s. Only a few sources provide comprehensive summaries of federal laws affecting agricultural labor (Craddock. 1988; Runyon. 2000). However, by explicit language embodied in the most important statutes, agricultural and domestic workers were denied rights granted to all other workers.

The National Labor Relations Act (NLRA), enacted in 1935, granted workers, for the first time in U.S. history, a federally protected right to engage in concerted action against their employers for the purpose of seeking improvements in wages and work conditions. The NLRA created a new body of law that defined unfair labor practices, set up a system of financial and other sanctions to be assessed against violators of those practices, and established an agency to adjudicate disputes.

Later, the Fair Labor Standards Act (FLS) of 1938 set workplace standards, which, for the first time, required private sector employers to compensate workers with overtime pay for hours of labor beyond 40 per week, set a minimum wage rate for non-supervisory employees, restricted child labor, required employers to provide each employee with a written statement of earnings and deductions, and stipulated sanctions to be enforced by the U.S. Department of Labor.

The NLRA and FLSA both explicitly excluded agricultural and domestic workers. The exclusions pertained to workers who were employed by farm operators as well as to agricultural workers employed by non-farmers.

Agricultural exclusions today

Over subsequent decades, the NLRA has retained this “agricultural exemption.” However, the FLSA has been modified to partially extend its protections to hired farm workers. For example, the federal minimum wage provision was amended to include agricultural workers in 1966,

partly in response to the rise of the United Farm Workers labor organization. But the federal exemption of agricultural workers from the overtime pay requirement for non-supervisory workers remains as written. California is the only state requiring overtime time pay for hired farm workers, but it applies on the seventh workday after six consecutive 10-hour workdays, or after more than 10 hours on any workday.³⁹ Overtime pay is mandatory after eight hours on any workday for all other non-supervisory, private sector workers in the state.

Only 5.8 percent of farm worker participants in the Current Population Survey (CPS) reported receiving tips, commissions or overtime pay (Kandel. 2008). But more than 15 percent of the same workers reported working more than 50 hours during the week prior to their participation in the CPS, and another 52 percent said they worked between 40 and 50 hours. The very small percentage receiving overtime pay despite working more than 40 hours in a week reflects the fact that FLSA excludes farm workers from receiving overtime pay.

The treatment of non-supervisory hired farm labor under three major federal labor laws is summarized in Table 3, which indicates how they fare as compared with non-supervisory domestic and other private sector workers. This “agricultural exceptionalism” has been a model for federal laws that protect workers. In recent decades, however, the exclusion has been partial, with the intent of protecting “small farms” from possibly burdensome regulation.

³⁹ Rosenberg HR Horwitz VJ Egan DL. *Labor Management Laws in California Agriculture*. Agricultural Personnel Management Program, Cooperative Extension, Publication No. 21404, University of California, Division of Agriculture and Natural Resources, Oakland, CA, Second Edition, 1995, 179 pp.

Table 3 Federal Labor Laws for Non-supervisory Employees: Selective Applicability

	<i>National Labor Relations Act</i>	<i>Fair Labor Standards Act (Overtime Pay)</i>	<i>Occupational Safety and Health (Enforcement)</i>
<i>Hired Farm Workers</i>	No	No	Yes, except farms with less than 11 employees
<i>Domestic Workers</i>	No	Yes, except live-in household employees	Yes, except domestic household employees
<i>Other Private Sector Hired Workers</i>	Yes (1)	Yes (2)	Yes (3)

Notes: (1) Excludes employers subject to the Railway Labor Act. (2) Covers a private employer if at least two employees are directly engaged in interstate commerce and if the annual volume of the business is at least \$500,000. (3) Excludes workers explicitly covered by other federal laws, such as the Federal Mine Safety and Health Act.

When OSHA was approved by Congress and signed into law by President Nixon in 1970, the law did not include an explicit agricultural exemption. Instead, Congress attached a stipulation in the appropriations language exempting “small farms” from OSHA regulation, a stipulation that remains in place today. Federal OSHA cannot enforce workplace safety standards on farms with 10 or fewer workers. OSHA also is not permitted to conduct surveys of farms that enjoy this exclusion. The requirement that employers keep a written record of workplace injuries and illnesses subject to OSHA inspection is also waived for “small farms.”

Some 21 states, including those with the largest farm labor demand, have stronger state-level workplace safety standards than those provided at the federal level. Each of these states has entered into a memo of understanding with OSHA to carry out the education and enforcement functions in those states. Cal-OSHA is the largest such state agency.

There is new evidence that the “small farm” exemption costs workers’ lives. Only three states—California, Oregon and Washington—enforce state-level workplace safety standards on all farms, regardless of the number of employees. A recent study finds occupational fatality rates during 1993-2007 on farms in those three states were lower than corresponding rates in states that conform to the federal “small farm” exemption (Somervell and Conway. 2011). In states

observing the exemption, occupational fatality rates on farms were 1.6 to 3 times higher than the three states that enforce safety standards on all farms. However, the authors point out that variations in cropping patterns and other factors may partially account for the observed differences.

Independent evidence strongly suggests that OSHA education and enforcement are the most important factors in preventing serious occupational injuries and fatalities. A Workers Compensation Insurance Rating Bureau of California multivariate analysis of the state's workers compensation insurance indemnity claims⁴⁰ found this factor was the most important among all factors associated with reductions in claim frequency (WCIRB. 2002). California requires universal workers compensation.

The Migrant and Seasonal Agricultural Worker Protection Act (MSAWPA) enacted in 1983 requires labor contractors and farmers who provide housing or transportation for their employees to register. The Department of Labor's Wage and Hour Division is responsible for registration and compliance. OSHA developed the MSAWPA housing standard.

Many thousands of foreign-born hired farm workers are brought to the United States to work on farms under a special visa program. U.S. immigration law provides for the issuance of temporary agricultural guest worker visas under carefully controlled circumstances that include:

- A determination of the lack of available citizen or legally authorized alien workers.
- A written contract for guest workers that sets the terms of employment and a wage rate that would not adversely impact wages paid in the local farm labor market.
- Employer-provided housing subject to pre-occupancy inspection and approval.
- Transportation expenses for each guest worker.

This guest worker program is known as H-2A, a reference to the section of immigration law authorizing the program. During FY 2010, 139,406 H-2A admissions to the U.S. were

⁴⁰ An indemnity claim is for an injury that results in permanent disability, hospitalization or a medically certified inability to resume work for at least three days following the incident.

authorized, mostly for employment in agriculture.⁴¹ Because a specific individual may have been approved for multiple admissions to fill two or more different seasonal jobs for different employers, the number of H-2A workers is believed to be substantially smaller than the number of admissions approved. There are an estimated 1.4 million hired crop farm workers in the U.S. It is likely that H-2A guest workers represent less than 5 percent of this workforce.

As previously discussed, most hired farm workers are regularly exposed to agricultural chemicals while working. After a long period of litigation brought by farm labor advocates who were seeking to protect hired farm workers from workplace exposures to toxic pesticides, the federal Worker Protection Standard (WPS) was adopted in 1992. WPS regulations require that workers who are likely to be exposed to these chemicals be trained in protective measures, warned if fields have been sprayed, barred from immediately re-entering fields that have been recently sprayed with especially toxic chemicals, and provided access to health-related information about the materials being used. The Environmental Protection Agency, the same agency that registers agricultural chemicals, was given authority to enforce the standard.

Child labor in agriculture is subject to federal and state regulations. However, a comprehensive review of child labor law and regulation on farms found serious inadequacies (U.S. GAO. 1998). Discrepancies under federal law with respect to agricultural workers were described as follows.

“...a 13-year-old may not, under federal law, be employed to perform clerical work in an office but may be employed to pick strawberries in a field. A 16-year-old may not operate a power saw in a shop or a forklift in a warehouse but may operate either on a farm. Finally, under current law, a 14-year-old hired to work in a retail establishment may work only between the hours of 7 a.m. and 7 p.m. (9 p.m. in the summer) and may not work more than 18 hours in a school week or three hours in a school day; the same child may work an unlimited number of hours picking grapes as long as he or she is not working during school hours.”

Federal law also allows farm employers to petition the Secretary of Labor to grant exemptions to allow the hiring of child workers in circumstances otherwise prohibited by regulation.

⁴¹ Cf. U.S. Department of Homeland Security, *2010 Yearbook of Immigration Statistics*, Table 25. Nonimmigrant admissions by class of admission, 2001-2010, pp. 63ff.

A new, stricter federal child labor standard for agriculture was proposed by the U.S. Department of Labor (DoL) and published in the Federal Register in 2011.⁴² Although the proposed regulations would have applied only to hired farm workers under age 16, the DoL withdrew them from the approval process in early 2012 in response to objections from farm operators.

A primary concern of farmers and ranchers was that the language of the proposed regulations seeking to extend the pre-existing exemption of family-operated farms from child labor regulations failed to take into account recent changes in the legal organization of many family-owned businesses. Today, many family-operated farm businesses are organized as limited liability entities, not sole proprietorships or general partnerships, and children performing farm tasks, even if unpaid, on such farms would have subjected the businesses to the new regulations.

A comprehensive review of state laws and regulations is beyond the scope of this report, but the most important of these laws concerns Workers Compensation Insurance. Because states regulate the insurance industry, each state's laws and regulations determine whether all farm laborers are required to be covered by workers compensation or if there are significant exemptions.

At present, 12 states, including California, require universal workers compensation insurance for every worker who earns at least \$100 in a calendar quarter without any exemption for farm workers. States lacking universal coverage typically provide an exemption for "small farms."

Unemployment insurance coverage also is limited for agricultural workers. California is among a few states that have universal coverage for all workers. A number of important agricultural states have some form of "small farm" exclusions.

Underlying all these laws and regulations is the exclusion of foreign-born workers lacking employment authorization from receiving many benefits afforded other workers. For example, unauthorized foreign-born workers are excluded from unemployment benefits even though their employer must pay unemployment insurance taxes based on the total amount of wages paid to such workers. Similarly, Federal Insurance Contributions Act (FICA) payroll taxes that provide funding for Social Security and Medicare exclude unauthorized workers from receiving benefits, but employers and workers each contribute substantial sums to both programs.

⁴² Federal Register, Volume 76, Number 171, pp. 54836-54885, September 2, 2011.

The most recent comprehensive review of federal and state laws and labor standard regulations affecting hired farm workers was published in 1988 (Craddock. 1988). The 875-page document includes the citation to each state's regulatory code for every law; it is the only source of its kind.

Chapter 6

Health Care Reform and Hired Farm Workers

Health care reform legislation did not explicitly address agricultural employment, nor did it seek to redress the lack of health insurance among U.S. farm laborers. However, the Patient Protection and Affordable Care Act (the Affordable Care Act), Public Law 111-148, enacted on March 23, 2010, and the Health Care and Education Reconciliation Act (the Reconciliation Act), Public Law 111-152, enacted on March 30, 2010, have several requirements that likely will affect farm laborers. However, statutory exemptions intended to limit obligations of employers of seasonal workers also will likely limit the effects of the new requirements.

Health care reform will not help workers who are not authorized for U.S. employment due to the prohibition on direct or indirect federal subsidies under several of the newly created programs to assist individuals who presently lack health insurance.⁴³ Even so, regardless of immigration status, many farm workers will not have the opportunity to obtain health insurance through an employer. This is because most farm employers will be exempt from the employer mandate due to the combined effects of the small business exemption and the exclusion of seasonal workers from a firm's full-time equivalent (FTE) employment count. Some employers may choose not to offer health insurance even if they would qualify for the small business tax credit. As a consequence, a large number of farm laborers, especially seasonally employed workers, will not have an opportunity to obtain health insurance through their place of employment.

The following health care reform provisions are important to agricultural employers:

- Small business tax credit beginning with the 2010 tax year for firms offering qualifying health insurance to employees.
- Employer mandate to provide health insurance for employees, starting January 1, 2014, and penalties for non-compliance, but with a small business exemption.
- Seasonal worker exclusion from the law's formal determination of an employer's number of FTE and otherwise eligible employees, which serves as a trigger for the small business tax credit eligibility and employer insurance mandate.
- New, strict criteria defining minimum health insurance policy benefits.

⁴³ Cf. Public Law 111-148, Sec. 1411 (b) (2).

- Waiver process for delaying compliance with the newly required minimum dollar amounts of annual insurance coverage that must be provided by health insurance.
- Mandated preventive care services to be provided as of September 23, 2010, on the first subsequent policy renewal date for those currently insured.

Community health centers and migrant clinics will continue as before, insofar as health care reform is concerned, but anticipate that many of their patients who lacked health insurance previously will be eligible for subsidized coverage. Thus, these government-supported health clinics may experience a substantial increase in patient revenue once the full program gets underway.

The exclusion of undocumented workers from health care reform is specifically delineated in the provisions describing tax credits for health insurance premiums, cost-sharing subsidies and the availability of insurance through the anticipated state-administered health insurance “exchanges.” Eligibility will be enforced through reporting and review of each enrollee’s social security number and citizenship status. On the other hand, workers who are not authorized for U.S. employment are exempted from the “individual responsibility” mandate requiring workers not covered through their employer to purchase coverage.

Even health care reform treats documented immigrants poorly. The law leaves in place the five-year waiting period for documented immigrants to qualify for Medicaid or the Children’s Health Insurance Program (CHIP). Although documented immigrants will be eligible to purchase health insurance through the exchanges, some otherwise qualified recent immigrants will not be eligible for direct or indirect subsidies. Individuals who are required to purchase their own health insurance will face a substantial financial penalty if they fail to do so.

Seasonal worker exclusion from the employment size count

Under health care reform, any seasonal worker who is employed for 120 days or less in the employer’s tax year is to be excluded from the FTE count that determines a firm’s eligibility for small business tax credits. Seasonal workers are defined by the Migrant and Seasonal Agricultural Worker Protection Act under the health care reform law.⁴⁴

⁴⁴ Cf. Sec. 500.20(s)(1) of Title 29 of the CFR.

It is possible that a large share of farm laborers would not be excluded as seasonal workers under the health care reform criteria. Although there are no published reports of the proportion of the farm labor force that has annual employment of 120 days or less for a specific employer, the NAWS finds the average number of farm workdays among hired crop workers was 190. However, many workers reach that total by working on two or more farms. NAWS for 2007-2009 also finds 81 percent of all crop workers had only a single farm employer, whether a farm operator or labor contractor.⁴⁵ It is not possible to use published NAWS data to infer the fraction of hired crop farm workers who would not be counted in the FTE total of employers under the seasonal worker exclusion.

Small business tax credit

An employer with fewer than 25 FTE employees can apply for the small business tax credit under health care reform, which is intended to encourage small businesses to provide health insurance for their full-time employees. For tax years 2010 through 2013, a qualified small business employer may claim a tax credit of up to 35 percent of the annual amount of the employer's share of health insurance premiums paid on behalf of eligible employees. Beginning in 2014, the tax credit rate will increase to as much as 50 percent.

There is indirect evidence that many direct-hire farm workers would not be considered "seasonal workers" under health care reform. This is an important factor for qualification for the small business tax credit since seasonal workers are excluded from the FTE count. As previously described, the NAWS finds a majority of direct-hire crop farm laborers were employed for more than 120 days, the health care reform criterion for exclusion.

There are additional criteria for tax credit eligibility, such as a limit on the annual average wages per employee, presently \$50,000 per worker. Also, owners, partners and certain categories of shareholders are excluded from the FTE count, as are their corresponding wages. Most farm employers would likely satisfy these additional criteria.

There is no information available in the literature about the size or distribution of employment among agricultural service employers, such as labor contractors. However, farm operators may

⁴⁵ Daniel Carroll et al. op. cit.

be liable for paying the cost of health insurance for employees of farm labor contractors if the contract laborers work on a specific farm for more than 90 days.⁴⁶ Of course, detailed regulations, when promulgated, are expected to address this and many other issues of interest to farm operators who directly hire workers or rely on contract labor.

Mandate for employers to provide health insurance

In 2014, health care reform will require employers with more than 50 employees to provide health insurance for their full-time workers. Employers with more than 200 employees will be required to provide coverage for new employees on the date of hire.

The effect of this mandate on access to employer-provided health insurance for farm laborers is unclear. The USDA-NASS *Farm Labor* survey finds annual average direct-hire employment by farm operators with 51 or more workers accounts for 30 percent of the total direct-hire farm employment. It is not known how many of these workers are employed full-time on a year-round basis, but it is likely to be a smaller share owing to seasonal hiring practices.

Many farm operators whose peak annual employment exceeds 50 workers will be exempt from the health insurance mandate because of the seasonal worker exclusion. On the other hand, more than a few farm labor contractors and other agricultural service businesses will find they are not exempt, especially those who presently provide their employees with 120 days or more of work each year.

Penalty provisions under the employer mandate are substantial, amounting to \$2,000 per full-time worker or as much as \$3,000 per worker, depending on a complex set of factors. For example, if the employer is required to provide health insurance under the mandate and fails to do so, then the employer will be required to pay a penalty if at least one qualified employee seeks and obtains subsidized health insurance.

Some employers will find it less expensive to discontinue insurance coverage for their employees and instead pay the penalty for non-compliance with the employer mandate. A recent Western Growers Association webinar on the effects of health care reform on agricultural

⁴⁶ Western Growers Association webinar concerning health care reform and agriculture, October 28, 2010.

employers included an example of a hypothetical employer who provided health insurance coverage for all 100 full-time employees, including undocumented workers, at an annual cost of \$600,000. The same employer could choose not to provide insurance and pay a penalty of only \$60,000 if the employer had 20 eligible employees who received a federal tax credit for enrolling in insurance on their own.

Coverage requirements and premium guidelines of employer-provided health insurance

As of September 23, 2010, health care reform requires elimination of lifetime limits on the amount of health insurance coverage for individuals and establishes \$750,000 as the lowest annual limit of coverage allowed. The latter figure ratchets up in the following years. By 2014, “unreasonable” annual limits on coverage will be phased out. The new minimums become effective for “grandfathered” plans upon the first renewal date after September 23, 2010.

These aspects alone are of concern to agricultural employers whose potentially “grandfathered” health insurance policies often have limits on annual or lifetime coverage that are quite small compared to the new health care reform requirements. These types of policies, sometimes described as “mini-med” policies, have low annual premiums. Along with a number of non-agricultural groups, the Western Growers Assurance Trust recently has requested and received an annually renewable waiver from the new restrictions on coverage limits.⁴⁷ If this waiver had not been granted, some farm employers likely would have terminated their health insurance coverage because of higher premium costs.

Mandate for preventive care services

The mandate for preventive care services is important to promote hired farm worker health. As is clear from the discussion of disparities in hired farm worker health status (cf. Chapter 3), investment in preventive care could help stave off an epidemic of diabetes, hypertension and periodontal disease in this population. But the social determinants of health specifically affecting hired farm workers, or the access barriers they face, were not explicitly considered in health care reform.

⁴⁷ Western Growers Association, *Spotlight*, November 18, 2010. The newsletter states, “Western Growers Assurance Trust Receives Waiver Under Health Reform Law.”

Nevertheless, one of the most innovative features of health care reform concerns preventive care more broadly. As of September 23, 2010, “grandfathered” health insurance must provide preventive care services without charge, effective on the first subsequent policy renewal date. Curiously, the specific services that qualify as “preventive care” are not defined in health care reform, but presumably will be explained when regulations are promulgated.

Some insurance programs serving hired farm workers already have moved ahead to provide additional services. The Western Growers Assurance Trust (WGAT) opened the new Cedar Health and Wellness Center on May 6, 2010, in Salinas, California. The center serves up to 80 patients per day, and offers “...plan participants a local, friendly, bilingual, confidential and cost-effective health care option...”⁴⁸ Patient co-pays are a modest \$5 per visit.

A few large farms have responded partially to the challenge of inadequate hired farm worker access to health care by providing company-funded medical clinics for their employees. Reiter Affiliated Companies, a large, California-based strawberry operation whose products are marketed through Driscoll Strawberry Affiliates, recently opened two clinics to serve its several thousand farm laborers. One of the important innovations of these clinics is a new bilingual program, staffed by community health workers (called promotoras in this and certain other settings), to encourage weight-reduction behaviors intended to reduce the prevalence of obesity in this population. All of Reiter’s employees are eligible to use the services provided by these clinics. As with the WGAT clinic, co-pays are modest.

Another large farm operator, Stemilt Growers, Inc., a major producer of apples, cherries and pears, provides an on-site medical clinic for its several thousand employees in the state of Washington. Because the clinic serves only the company’s employees, no elaborate paperwork or health insurance documentation is required to obtain health care services.

⁴⁸ Western Growers Association, *Spotlight*, August 5, 2010.

Chapter 7

Conclusions and Recommendations

By every measure, hired farm workers are a vulnerable population. They are disproportionately impacted by inequities in health and legally protected workplace rights. These inequities, along with low socioeconomic status, create a “perfect storm” of health risks.

To reduce health disparities among hired farm workers, the following policy initiatives could be initiated, without changes in U.S. law:

- Enhance participation of eligible farm laborers and their families in Medicaid, WIC, food stamps, federal earned income tax credits and other programs.
- Enhance safety and labor law enforcement by adding a substantial number of new field inspectors to the staff of U.S. DoL’s Wage and Hour Division and OSHA, and create an independent public oversight review board focused on agriculture.
- Initiate a substantial new effort to provide basic information to farm laborers about their rights and responsibilities under U.S. law.
- Expand the nation’s commitment to housing opportunities for unaccompanied male farm laborers, especially through long-term funding commitments and related measures.
- Focus public and private attention on the greater reliance of agriculture on contractors and custom agricultural service businesses, including increased disclosure requirements for farm labor contractors and other parties required to register under the Migrant and Seasonal Agricultural Worker Protection Act.
- Expand and strengthen the public health workforce that serves farm families and hired farm workers.

Disparities in legally protected workplace rights should be eliminated, although this would require political change. All provisions of federal labor standards that govern conditions of employment in the private retail sector, wholesale trade, transportation, construction and manufacturing industries should apply to hired farm workers on an equal basis. Exceptions to federal labor law should be allowed for family farms, but only as defined in the Food Security Act of 1985, namely, a family farm is a place on which agricultural production tasks are performed by the farm operator families, including household members, and no more than 1.5 equivalent years of hired or contract labor per annum.

More thorough research among hired farm workers linking legal protections to health outcomes is needed to better inform policy discourse. The NIOSH-NAWS survey is one of the few studies that included information about farm size, and reported that workers on farms with 10 or fewer employees, exempt from OSHA regulation under the “small farm” Congressional directive, had significantly higher rates of self-reported health problems as compared with larger farms. The effects of the “small farm” exemption under OSHA could be better informed from new research on farm labor occupational health stratified by farm size.

The National Labor Relations Act should stop excluding agricultural and domestic workers from the federally protected right to engage in concerted action to improve wages and working conditions. However, exceptions should be allowed, under memorandum of understanding agreements with the federal agency, for states that have stronger labor relations statutes for agricultural and domestic workers.

The consequences of the fact that half of hired crop farm workers and perhaps one-third of hired livestock workers lack authorization for U.S. employment are more difficult to address. Despite efforts for more than a decade to persuade Congress to enact legislation to allow a path for adjustment of the status of undocumented farm laborers, no progress has been made toward this goal. Many agricultural employers favor a guest worker program, but also say they do not find the present provisions of the H-2A visa program for agricultural guest workers acceptable.

Recently, the Farm Foundation and AGree sponsored a national symposium among farm employers, farm labor advocates and researchers resulting in a consensus that employers and workers can and must cooperate to change immigration law as it affects agriculture.⁴⁹ What is needed is fresh thinking about how to adjust the immigration status of hired farm workers currently in the U.S. labor force as well as allow replenishment of the labor force by newly admitted foreign-born workers. It is apparent that recycling what is basically the same agricultural immigration reform proposal year after year has not brought a satisfactory result for employers or workers.

⁴⁹ Press Release, “Foreign-born labor in agriculture focus of symposium,” AGree and Farm Foundation, July 16, 2012. Cf. forthcoming summary to be available via www.farmfoundation.org and www.foodandagpolicy.org.

The poverty status of employed persons is likely best addressed by setting a suitable floor on wage rates. In fact, the recent increase in reported national annual average farm labor pay rates is at least partly attributable to increases in the federal minimum wage, and the setting of even higher minimum wage rates by several states with large farm labor populations. Average annual earnings of hired crop workers from their farm work are about one-third the average for workers in other industries, which is why nearly one-fourth of crop farm worker families live in poverty. This follows from the fact that crop farm workers average 35 weeks of farm employment each year (approximately two-thirds of full-time employment), and are paid an average hourly wage rate about half the average for all U.S. hourly workers.

Raising the federal minimum wage to \$10 per hour would help many families, including hired farm workers, who are in poverty even though employed. Already, the state of Washington, ranking third nationally in total annual hours of hired farm labor demand, has set its minimum wage at \$9.05 per hour. Several important farm states, including California, have set state minimum wage rates higher than the federal standard of \$7.25 per hour.

Federally funded services for hired farm workers require independent program evaluation

The traditional federal policy approach to assisting farm laborers was to fund private, nonprofit agencies, which, in turn, provide low-cost social services to eligible persons. Starting in 1962, federal programs were created to provide much-needed services for this population: Migrant Education, Migrant Legal Services, Migrant Head Start and Migrant Health, among others. Together, these programs receive approximately \$1 billion per year in federal funding, equivalent to about 10 percent of total U.S. hired farm worker wages.

Early evidence suggested stratification of access to federal programs, described by some as “creaming,” was likely to occur. The term refers to the notion that better paid and educated crop farm workers were best able to access needs-based services (Martin & Martin. 1994). However, there is only limited nationally valid evidence regarding this assessment.

A recent study of utilization of health care services in a large, nationally representative sample of hired crop farm workers finds no association with having federally qualified health center resources located in the same county (Hoerster et al. 2011). Half of those who obtained health

care services reported using private practice physicians; many travel to Mexico for care. Those who do access health care services are more likely to be better educated and more proficient in English, better paid, have health insurance, and have transportation to providers.

Hired crop farm workers who do not fit this profile, including the poorest of the poor as well as crop farm workers who speak an indigenous Mexican or Central American language at home, are at greatest risk for inadequate access to care. The Migrant Health program is making substantial efforts to reach this high-risk population.

Various authors have offered recommendations to improve access to health care services (Hoerster et al. 2011; Arcury and Quandt. 2007). Among the suggestions most likely to improve services are the following:

- Tailor services to the needs of migrant farm workers to increase their use of mobile clinics.
- Provide transportation services to improve access for workers lacking access to vehicles or public transportation.
- Address language and cultural barriers to health care access that have become more formidable with increased numbers of indigenous migrants from southern Mexico and Central America in the labor force.
- Educate workers about their rights and responsibilities while working in the U.S., including eligibility for and access to services.

In one study, a review of the impact of differential community resources designed to improve access to health care services found no independent impact on utilization (Hoerster et al. 2011). The authors concluded that while "...increasing resources for the public health sector is needed, improvements in how those resources are spent is needed as well." This brief discussion suggests that formal, third-party, external evaluation of the quality of existing programs and the adequacy of their number and regional penetration is overdue and could provide information essential to secure improvements.

There are some reports in the literature of controlled trials of interventions that seek to assess effectiveness. One of the most thorough studies provides a model for how to objectively evaluate an intervention in this population: The four-year, prospective cohort study among a cross-

sectional sample of hired farm workers in 24 communities randomly assigned communities to intervention or control (Thompson et al. 2008). This study design meets the rigorous standards necessary for obtaining reliable results in the hired farm worker population (Mage et al. 2006).

It appears that health care reform will not begin to address the problem of huge numbers of uninsured hired farm workers, nor assure access to care. It is possible that regulations to implement health care reform might correct some of its apparent weaknesses, and it is important that knowledgeable authorities play an active role in the development of regulations. However, health care reform likely will not reduce the major disparities described in this report.

In this context, private organizations have an unparalleled opportunity to find new ways to develop effective interventions. Some of these innovations will be costly, requiring cooperative support by public agencies. Other initiatives will rely on private sector support as well as cooperation among nonprofit agencies, labor organizations, farm businesses and philanthropic organizations.

One of the most significant shortcomings of health care reform is that there is no provision for dental care or preventive oral health services. As this paper and other research on the hired farm worker population demonstrates, this is a health disparity of considerable magnitude that needs attention, possibly in promulgation of regulations, but more likely in changes in statutes.

Major changes in hired farm worker well-being historically began with worker insurgencies

Historically, the greatest improvements in farm labor conditions and earnings were associated with successful mass organizing for change among workers themselves. Most notably, the United Farm Workers of America gained prominence by successfully waging a multi-year campaign in the 1960s that led to the first, large-scale collective bargaining agreements in U.S. agriculture. Later, in the Midwest, the Farm Labor Organizing Committee achieved some notable successes by focusing on farm operators and on food processing companies, which receive the major share of revenue from the food chain.

Policy changes at the federal or state level affecting farm laborers historically have been achieved only when liberal or progressive legislative and executive branches of government responded to the political force of successful farm labor organizations. Whether extending the federal minimum wage to agricultural workers (1966), banning use of the short-handle hoe (el cortito) first in California (1975) and later in several other states, or enacting the Agricultural Labor Relations Act in California (1975), the insurgent farm labor movement successfully partnered with liberal political leadership at the federal or state level (Ganz. 2009; Bardacke. 2011).

Efforts by farm labor unions have waned in recent decades, and only a small portion of farm laborers are covered by union contracts today. Although the number of workers involved is not accurately known, it is likely that fewer than 30,000 agricultural workers out of a labor force of about 1.8 million are presently working under the terms of a union contract.

Organizations of farm workers, both labor unions and less formal groups, recently have joined with advocacy groups to advance their own agenda for changing workplace conditions and improving earnings and benefits. As one of the first steps of this initiative, under the umbrella of Oxfam America, the groups have promulgated an “inventory of farm worker conditions.”⁵⁰ The two most prominent farm labor unions, the United Farm Workers of America and the Farm Labor Organizing Committee, are leading this effort. At this writing, none of the organizations of indigenous migrants from southern Mexico or Central America are among the leading participants in this initiative.

⁵⁰ Released on March 31, 2011.

Glossary: Terminology Describing Hired Farm Workers

The various terms used to describe persons who work on farms have differing histories. The following are the most common; the source or authority is described.

"Farm worker" - This term was used for many decades by USDA's official quarterly agricultural labor report, published under the title *Farm Labor*. Included within this term are self-employed farm workers (farmers and ranchers), unpaid family workers (mostly farm resident members of farmer or rancher families), workers directly hired by farm operators, and contract workers furnished by labor contractors or other agricultural service businesses. More recently, with the decline of family farming, USDA discontinued efforts to report information about self-employed workers and unpaid family workers.

"Hired labor" - For many decades, the Census of Agriculture has used this term to describe persons who are hired directly by farm operators (farmers or ranchers). It applies to workers on crop and livestock farms. It originally was defined in this way by the U.S. Department of Commerce, Bureau of the Census. The definition was retained when USDA took over administration of the Census of Agriculture for 1997 and subsequent years.

"Hired farm workers" - This is another term used in the Census of Agriculture, also for many decades, to describe persons who are hired directly by farm operators (farmers or ranchers) and applies to workers on both crop and livestock farms. It originally was defined by the U.S. Department of Commerce, Bureau of the Census. The definition was retained when USDA took over administration of the Census of Agriculture for 1997 and subsequent years. It appears in reference to persons who are on the farm payroll.

"Contract labor" - This is the term used in the Census of Agriculture, also for many decades, to describe persons who work on farms but are hired by farm labor contractors and, thus, do not appear on the farm payroll. It originally was defined by the U.S. Department of Commerce, Bureau of the Census. The definition was retained when USDA took over administration of the Census of Agriculture for 1997 and subsequent years.

"*Hired workers*" - This term has been used for more than 75 years by USDA in its official publication *Farm Labor*. It refers to any person on the payroll of a farm, whether crop or livestock. The publication is the authoritative source on farm employment based on a quarterly survey of farm employers. The survey is analogous to the Current Employment Survey (CES) that provides monthly and annual estimates of U.S. employment (and unemployment). Agriculture is excluded from the CES.

"*Agricultural service workers*" - This term has been used by USDA since July 1978 to refer to wage and salary farm workers who are on the payroll of agricultural service businesses, such as labor contractors, packer and shippers, farm management companies, and pest control operator businesses.

"*Migrant and seasonal farm workers*" - This term is defined in various statutes and regulations of agencies within the U.S. Department of Labor, U.S. Department of Education, and U.S. Department of Health and Human Services. Unfortunately, different agencies have different definitions.

Historically, as defined by the U.S. Department of Labor, the term "*seasonal worker*" referred to persons who temporarily entered the labor force to obtain a short-term job and left the work force once the job ended, e.g., students, housewives, schoolteachers, etc., who took on summer jobs to supplement family income. But this meaning was altered in statute and regulation when "*seasonal farm worker*" was defined to refer to persons who are in the labor force year-round but obtain short-term jobs performing crop services that are seasonal in nature, e.g., planting crops, hoeing weeds, thinning crops, harvesting crops, etc.

"*Migrant worker*" similarly was adapted for use in statute and regulation when migrant farm worker was defined to refer to persons who leave their usual place of residence, travel to seek or obtain a job on a crop farm, and remain in the new location overnight for the duration of the job. For some, an immigrant worker can claim to be a migrant during the first two years of year-round residence in the U.S. under these definitions. Note that the nature of the employer is not defined. Hence, all wage or salary crop workers are either migrant farm workers or seasonal farm workers. Livestock workers, by definition, cannot be migrant and seasonal farm workers.

Confusion arises because some federally funded programs, such as Migrant Education, have chosen to include food processing workers (workers in canneries, wineries, etc.) within their definition of migrant and seasonal farm workers. Various federally funded programs include forestry planters, fishery workers or wholesale nursery workers (even if the nurseries do not grow or tend ornamental crops). A farm worker who is eligible for services at one agency might find he or she is not eligible for services at a different agency. There is currently discussion among some federal agencies about whether to include livestock workers in their definition because so many are immigrants.

In one documented instance in Santa Barbara County, a cashier in a high-end winery tasting room qualified for USDA-funded farm worker housing because the definition used by the agency includes food processing workers in establishments such as wineries.

These definitions were developed to enable agencies to capture the broadest possible populations of workers with similar demographic profiles who are low-income or disadvantaged. Also, federal funding of some service agencies are based on a fixed dollar amount per eligible migrant and seasonal farm worker. If that number is larger, the agency's grant is larger.

"Settled out workers" - This is an arbitrary term, not defined in federal statute or regulation, or U.S. Department of Labor or USDA publications. Some authors think the term refers to non-migrant farm workers who were once migrant farm workers. But many non-migrant farm workers are persons who have never migrated and, if they work on a crop farm, are considered seasonal farm workers.

Appendix

Estimate of Farm Labor Employment

Annual Average U.S. Farm Labor Employment, 2007

The computation that follows is an effort to estimate annual average U.S. farm labor employment in 2007, based on reports of hired and contract labor expenses reported in the Census of Agriculture, together with the Farm Labor Survey (FLS) report of annual average wage rates for labor in 2007. The purpose of the computation is to independently test the accuracy of the FLS reported annual average employment for 2007.

The 2007 Census of Agriculture reports total U.S. hired labor production expense was \$21,877,661,000. The corresponding value of total U.S. Contract Labor production expense was \$4,514,166,000. Thus, the total direct-hire and contract labor expense was \$26,391,827,000.

As clearly stated in the description of Census of Agriculture definitions and instructions to respondents, the hired labor production expense includes cash wages paid as well as employment taxes and paid employee benefits. For some farms, especially farms with a large direct-hire payroll or farms operating in the relatively few states with mandatory coverage, a significant portion of this total labor expense comprises employment taxes (FICA, Medicare, Federal Unemployment Tax, state unemployment insurance taxes), workers compensation insurance premiums, and employee benefit costs (pension, medical insurance, and paid holidays and vacation).

Prior to 1992, USDA's Farm Production Expense report, based on the Farm Costs and Returns Survey, provided nationally valid findings of the value of these non-wage expenses as well as regional values. In 1991, these non-wage expenses were about 12 percent of the total direct-hire farm labor cash wage expenses incurred by farm operators. For California, the percentage was 17 percent in the 1991 survey. Taking into account increased non-wage labor expenses in the past

two decades, the figure of 17.5 percent is estimated to be the more accurate percentage to apply to 2007 total hired and contract labor expenses.⁵¹

Applying the non-wage percentage (17.5 percent) to the total direct-hire and contract labor expense reported in the 2007 Census of Agriculture, the estimated total of direct-hire and contract wages is \$21,773,257,000. Of course, there may be slightly different percentages of non-wage amounts appropriate to direct-hire and contract labor employers, but there is not sufficient evidence available to pursue this point. USDA reports of farm production expenses do not separately report cash wages and non-wage expenses paid by farm labor contractors or other types of agricultural service employers.

Total annual cash wages represent the product of the average annual wage rate and total hours of labor. The FLS reports the average annual wage rate for direct-hire farm workers. In 2007, the rate was \$10.21. Hence, the total hours of farm labor, both crop and livestock production, in 2007 is calculated to be 2,132,542,000 hours.

The next step in estimating annual average farm employment is to determine the annual average work hours per full-time equivalent (FTE) worker. The FLS reports average farm labor hours per week of direct-hire workers was 40.7 hours. The average total hours per year per FTE worker is the latter figure multiplied by 52 weeks per year, or 2,116 hours per year per FTE worker.

Note carefully that some states reported annual average farm labor hours per week as low as 34.9 hours while others reported figures as high as 45.7 hours. Thus, the FTE worker in agriculture is not referred to the usual 40-hour week but instead to the weekly time period appropriate to actual farming conditions. Moreover, since most farm jobs are of short duration, the typical worker may only be able to find jobs for a portion of the year. If each worker found employment for just 1,058 hours in the year (equivalent to 26 weeks of work), then one FTE would actually represent two workers.

⁵¹ The author is grateful to Dr. Susan Gabbard, Aguirre Division, JBS International, for useful discussion of this point and for suggesting the 17.5 percent as the most likely current value of the non-wage share, mostly payroll taxes, of total hired and contract labor expenses reported in the 2007 Census of Agriculture.

Finally, annual average farm labor employment is calculated to be the total hours of farm labor in 2007 (2,132,542,000) divided by the average hours per year per FTE worker (2,116), or 1,007,627 FTE workers.

Annual Average U.S. Labor-intensive Farm Labor Employment, 2007

The methodology described above can be applied to determine the annual average employment in labor-intensive agriculture. USDA kindly agreed to provide the author with a custom data set derived from the 2007 Census of Agriculture consisting of summary data of specialty crop hired and contract labor production expenses for each state and for the U.S. To these data, published hired and contract labor expenses for tobacco farms (NAICS 11191) were added to yield total farm labor expenses for labor-intensive agriculture. The total U.S. hired and contract labor production expense for labor-intensive agriculture was determined to be \$15,173,501,000.

The cash wage share is computed using the same figures discussed previously, namely a non-wage percentage of 17.5 percent. This yields a cash wage total for hired and contract labor production expense of \$12,518,138,000 for labor-intensive agriculture.

Annual average wage rates for field labor reported by the FLS for 2007 were used to determine total hours of labor demand in labor-intensive agriculture, both for the U.S. and for individual states. The 2007 annual average wage rate finding for U.S. field workers was \$9.40. From this, the estimated total labor demand during 2007 in labor-intensive agriculture is determined to be 1,331,717,000 hours. This figure represents 62.4 percent of all U.S. hired and contract farm labor demand, whether livestock or crop production, which justifies the characterization as labor-intensive agriculture.

The USDA FLS does not publish annual average hours per week specifically for field workers, so the average for all direct-hire workers, 40.7 hours per week, discussed above, is used in the following computation. The estimated annual average employment in labor-intensive agricultural production in 2007 is 629,237.

State-level Labor Demand, Labor-intensive Agriculture, 2007

The custom data set of state-level hired and contract labor production expenses provided by USDA, supplemented with state-level tobacco farm hired and contract labor production expenses for 2007, can serve as a basis for determining state-level hired farm worker labor demand, expressed in the annual total number of work hours. The FLS provides an annual average field worker wage rate for the U.S. and for 15 crop regions, as well as separately for California and Florida.

To illustrate, for California, the total hired and contract labor expense for labor-intensive agriculture reported in the 2007 Census of Agriculture was \$6,322,610,746, and the corresponding annual average field worker wage rate in California during 2007 reported by the FLS was \$9.57 per hour. Taking into account non-wage expenses, the total annual hired and contractor farm worker labor demand in California during 2007 was 545,053,000 hours. This figure represents 41 percent of the national total for labor-intensive agriculture.

A similar computation for each state yields the total annual labor demand, in hours, for labor-intensive agriculture in that state (Table A-I). The relative importance of various states for labor-intensive agriculture can be inferred from the results.

Table A-I
Labor Demand, Labor-intensive Crop Agriculture
Total Annual Hours, Top-ranked 15 States & U.S., 2007

State	<i>Hired & Contract Labor Expense (millions) (1)</i>	<i>Annual Average Wage Rate, Field Labor (2)*</i>	<i>Annual Hired and Contract Labor Demand (Hours)</i>
California	\$6,322.6	\$9.57	545,053,000
Florida	\$1,486.3	\$8.82	139,025,000
Washington	\$956.9	\$9.87	79,984,000
Oregon	\$725.4	\$9.87	60,633,000
North Carolina	\$430.2	\$8.78	40,423,000
Texas	\$405.8	\$8.38	39,951,000
Pennsylvania	\$393.4	\$9.88	32,850,000
Michigan	\$394.6	\$10.12	32,168,000
Arizona	\$283.4	\$8.26	28,306,000
New York	\$327.2	\$9.92	27,212,000

Georgia	\$243.6	\$8.50	23,644,000
Idaho	\$230.4	\$8.50	22,362,000
New Jersey	\$222.8	\$9.88	18,605,000
Wisconsin	\$220.3	\$10.12	17,959,000
Ohio	\$188.2	\$10.08	15,404,000
United States	\$15,173.5	\$9.40	1,331,717,000

Sources: (1) USDA-NASS Custom Data Set, Requested by Author, July 2010; values quoted above multiplied by 0.825 to take account of non-wage labor expenses in the computations that follow. (2) USDA NASS, Farm Labor, November 2007, p. 15.

**Note: Wage Rates only published for two individual states: California and Florida. For all other states, appropriate Regional Wage Rates are quoted for the individual states. For example, Washington and Oregon comprise the entirety of Pacific Region, so the average annual wage rates quoted for these states are the value reported for the Pacific Region.*

References

- Aguirre International. 2008. *National Agricultural Workers Study: Public Access Data; Weighted Variables – Periods of 2 Fiscal Years*. Burlingame, CA, 161 p (January 3).
- Aguirre Divison. JBS International. 2005. *The California Farm Labor Force. Overview and Trends from the National Agricultural Workers Survey*. (June).
- Anderson RN Rosenberg HM. 1998. "Age Standardization of Death Rates: Implementation of the Year 2000 Standard." *National Vital Statistics Reports*; 47(3): 1-20 (October 7).
- Anthony MJ Martin EG Avery AM Williams JM. 2010. "Self care and health-seeking behavior of migrant farm workers." *J Immigr Minor Health*; 12(5): 634-9.
- Arcury TA Feldman SR Schulz MR Vallejos QM Verma A Fleischer AB Jr Rapp SR Davis SF Preisser JS Quandt SA. 2007. "Diagnosed skin diseases among migrant farm workers in North Carolina: prevalence and risk factors." *J Agric Saf Health*; 13(4): 407-18.
- Arcury TA Grzywacz JG Talton JW Chen H Vallejos QM Galvan L Barr DB Quandt SA. 2010. "Repeated pesticide exposure among North Carolina migrant and seasonal farm workers." *Am J Ind Med*; 53(8): 802-13.
- Arcury TA Quandt SA. 2007. "Delivery of health services to migrant and seasonal farm workers." *Ann Rev Pub Health*; 28: 345-63.
- Bardacke F. 2011. *Trampling Out the Vintage. Cesar Chavez and the Two Souls of the United Farm Workers*. Verso, an imprint of New Left Books. London and New York. viii + 836 pp.
- Boden LI Ozonoff I. 2008. "Capture-Recapture Estimates of Nonfatal Workplace Injuries and Illnesses." *Annals of Epidemiology*; 18(6).
- Bowe J. 2007. *Nobodies: Modern American Slave Labor and the Dark Side of the New Global Economy*. Random House. New York NY.
- Bradman A Whitaker D Quiros L Castorina R Henn BC Nishioka N Morgan J Barr DB Harnly ME Brisbin JA Sheldon LS McKone TE Eskanazi B. 2007. "Pesticides and their Metabolites in the Homes and Urine of Farm Worker Children Living in the Salinas Valley, CA." *J Expo Sci Environ Epidemiol*; 17(4):331-49.
- Brammeier M Chow JM Sammuell MC Organista KC Miller J Bolan G. 2008. "Sexually transmitted diseases and risk behaviors among California farm workers: results from a population-based survey." *J Rural Health*; 24(3): 279-84.
- Calvert GM Karnik J Mehler LN Beckman J Morrissey B Sievert J Barrett R Lackovic M Mabee L Schwartz A Mitchell Y Moraga-McHaley S. 2008. "Acute pesticide poisoning among agricultural workers in the United States, 1998-2005." *Am J Ind Med*; 51(12): 883-98.

Calvin L Martin P. 2010. *The U.S. Produce Industry and Labor: Facing the Future in a Global Economy*, United States Department of Labor, Economic Research Service, Economic Research Report Number 106, Washington, DC, 51 p (November).

Cameron L Lalich N Bauer S Booker V Bogue HO Samuels S Steege AL. 2006. "Occupational health survey by camp health aides." *J Agric Saf Health*. 12(2):139-53 (May).

Craddock BR. 1988. *Federal and State Employment Standards and U.S. Farm Labor, Motivation Education and Training Inc.*, Austin, TX, 857 p (April).

Curl CL Fenske RA Kissel JC Shirai JH Moate TF Griffith WC Coronado GD. 2002. "Evaluation of take-home organophosphorus pesticide exposure among agricultural workers and their children." *Environ Health Perspect* 110(12):A787-92.

Dodge DL Mills PK Riordan DG. 2007. "Cancer survival in California Hispanic farm workers, 1988-2001." *J Rural Health*; 23(1): 33-41.

Douphrate DI Rosecrance JC John C Stallones L Reynolds SJ Gilkey DP. 2009. "Livestock-Handling Injuries in Agriculture: An Analysis of Colorado Workers' Compensation Insurance Data." *Am J Ind Med*; 52(5): 391-407.

Emmi KE Jurkowski KM Codru N Bell EM Kacica MA Carter TP. 2010. "Assessing the health of migrant and seasonal farm workers in New York State: statewide data 2003-2005." *J Health Care Poor Underserved* 21(2):448-63

Farm Employers Labor Service. 2010. *2010 Agricultural Wage and Benefits Survey*, Sacramento, CA, 26 p (August).

Feldman SR Vallejos QM Quandt SA Fleischer AB Jr Schulz MR Verma A Arcury TA. 2009. "Health care utilization among migrant latino farm workers: the case of skin disease." *J Rural Health*; 25(1): 98-103.

Fenske RA Lu C Barr D Needham L. 2002. "Children's exposure to chlorpyrifos and parathion in an agricultural community in central Washington State." *Environ Health Perspect* 110():549-53.

Fryar CD Wright JD Eberhardt MS Dye BA. 2012. "Trends in Nutrient Intakes and Chronic Health Conditions Among Mexican-American Adults, a 25-year Profile: United States, 1982-2006." *National Health Statistics Reports*; 50:1-20 (March 28).

Ganz M. 2009. *Why David Sometimes Wins. Leadership, Organization, and Strategy in the California Farm Worker Movement*. Oxford University Press, New York. xii + 344 pp.

Gentry AL Grzywacz JG Quandt SA Davis SW Arcury TA. 2007. "Housing quality among North Carolina families." *J Agric Saf Health*; 13(3):323-37.

- Greskevitch M Kullman G Bang KM Mazurek JM. 2007. "Respiratory disease in agricultural workers: mortality and morbidity statistics." *J Agromedicine*. 12(3):5-10.
- Hoerster KD Beddawi S Michael Peddecord K Ayala GX. 2010. "Healthcare use among California farm workers: predisposing and enabling factors." *J Immigr Minor Health*; 12(4): 506-12.
- Hoerster KD Mayer JA Gabbard S Kronick RG Roesch SC Malcarne VL Zuniga ML. 2011. "Impact of Individual-, Environmental-, and Policy-Level Factors on Health Care Utilization Among US Farm workers." *Am J Public Health*; 101(4): 685-92.
- Hoppin JA Umbach DM London SJ Henneberger PK Kullman GJ Coble J Alavanja MC Beane Freeman LE Sandler DP. 2009. "Pesticide use and adult-onset asthma among male farmers in the Agricultural Health Study." *Eur Resp J*; 34(6): 1296-303.
- Hoppin JA Valcin M Henneberger PK Kullman GJ Umbach DM London SJ Alavanja MC Sandler DP. 2007. "Pesticide use and chronic bronchitis among farmers in the Agricultural Health Study." *Am J Ind Med*; 50(12): 969-79.
- Horton S Barker JC. 2010. "Stigmatized biologies: Examining the cumulative effects of oral health disparities for Mexican American farm worker children." *Med Anthropol Q*. 24(2): 199-219.
- Human Rights Center. 2004. *Hidden Slaves: Forced Labor in the United States*. Free the Slaves and Human Rights Center, University of California, Berkeley. San Francisco CA.
- Kandel W. 2008. *Profile of Hired Farm workers, A 2008 Update*. Economic Research Report Number 60, Economic Research Service, United States Department of Agriculture, Washington, D.C., iv+59 p (July).
- Leigh JP Marcin JP Miller TR. 2004. "An Estimate of the U.S. Government's Undercount of Nonfatal Occupational Injuries." *J Occup Environ Med*; 46(1).
- Magaña CG Hovey JD. 2003. "Psychosocial Stressors Associated With Mexican Migrant Farm workers in the Midwest United States." *J Immig Health*; 5(2):75-86.
- Mage DT Wallace LA Kollander M Ott WR. 2006. "Statistical issues in farm worker studies." *Environ Health Perspect*; 114(12): A688-9.
- Martin PL. 2011. *Immigration Reform: Implications for Farmers, Farm Workers and Communities*, Paper presented at National Research Conference, Washington, DC, May 12-13, 2011.
- Martin PL Martin D. 1994. *The Endless Quest: Helping America's Farm workers*. Westview Press, Boulder, CO. 258 p.

Mayer B Flocks J Monaghan P. 2010. "The role of employers and supervisors in promoting pesticide safety behavior among Florida farm workers." *Am J Ind Med*; 53(8): 814-24.

Michigan. Michigan Civil Rights Commission. 2010. *2010 Report on the Conditions of Migrant and Seasonal Farm workers in Michigan*, Executive Summary, Full Report and Appendix, 110 p, (April 22).

Mills PK Beaumont JJ Nasser K. 2006. "Proportionate mortality among current and former members of the United Farm Workers of America, AFL-CIO, in California 1973-2000." *J Agromedicine*;11(1): 39-48.

Mills PK Dodge J Yang R. 2009. "Cancer in migrant and seasonal hired farm workers." *J Agromedicine*; 14(2): 185-91.

Mines R Nichols S Runsten D. 2010. *California's Indigenous Farm workers*. 134 pp. See www.indigenousfarmworkers.org

Mines R Hausman J Tabshouri L. 2005. *The Need for Targeted Surveys of Farm workers: A Comparison of the California Health Insurance Survey (CHIS) and the California Agricultural Workers Health Survey (CAWHS)*. California Institute for Rural Studies, Davis, CA. 38 p. (April).

Mirabelli MC Quandt SA Crain R Grzywacz JG Robinson EN Vallejos QM Arcury TA. 2010. "Symptoms of heat illness among Latino farm workers in North Carolina." *Am J Prev Med*; 39(5): 468-71.

National Institute for Occupational Safety and Health. 2011. NIOSH Program Portfolio, Occupational Health Disparities, Program Description. Cf. <http://www.cdc.gov/niosh/programs/ohd>, Accessed 4/18/2012.

National Research Council and Institute of Medicine of the National Academies of Sciences. 2008. *Agriculture, Forestry and Fishing Research at NIOSH: Reviews of Research Programs of the National Institute for Occupational Safety and Health*. Committee to Review the NIOSH Agriculture, Forestry and Fishing Research Program: Paul Gunderson, Maria T. Correa, R. Alan Davis, James A. Dosman, William A. Groves, Ronald L. McAllister, James D. McGlothlin, Susan H. Pollack, Lorann Stallones, Don Villarejo, Susanna G. Von Essen and James J. Zuiches, The National Academies Press, Washington, D.C., xxv + 327 p.

Palerm JV. 1994. *Immigrant and Migrant Farm Workers in the Santa Maria Valley, California*. Bureau of the Census, Center for Survey Methods Research, Washington, DC (September).

Perloff JM. 1991. "Choice of Housing Tenure and Wage Compensation of Hired Agricultural Workers." *Land Economics* 67(2):203-12 (May).

Phelps E. 2006. *North Carolina Migrant Housing & Safety Standards: An Empirical Assessment of Compliance & Enforcement Standards*. Farm Worker Advocacy Network, Raleigh, NC, 41 p.

Quandt SA Arcury TA Rao P Snively BM Camann DE Doran AM Yau AY Hoppin JA Jackson DS. 2004 A. "Agricultural and residential pesticides in wipe samples from farm worker family residences in North Carolina and Virginia." *Environ Health Perspect* 112(3):382-7.

Rodriguez RL Elliott MN Vestal KD Suttorp MJ Schuster MA. 2008. "Determinants of health insurance status for children of Latino immigrant and other US farm workers: findings from the National Agricultural Workers Survey." *Arch Pediatr Adolesc Med*; 162(12): 1175-80.

Rosenman KD et al. 2006. "How Much Work-Related Injury and Illness is Missed by the Current National Surveillance System?" *J Occup Environ Med*; 48(4).

Rosson P Adcock F Susinto D Anderson D. 2009. *The Economic Importance of Immigration on U.S. Dairy Farms*, National Milk Producers Foundation, 16 pp (June).

Runyon JL. 2000. *Summary of Federal Laws and Regulations Affecting Agricultural Employers*. Food and Rural Economics Division, Economics Research Service, U.S. Department of Agriculture. Agricultural Handbook No. 719, 63 pp.

Schenker MB. 2010. "Inorganic agricultural dust exposure causes pneumoconiosis among farm workers." *Proc Am Thorac Soc*; 7(2): 107-10.

Schenker MB Pinkerton KE Mitchell D Vallyathan V Elvine-Kreis B Green FH. 2009. "Pneumoconiosis from agricultural dust exposure among young California farm workers." *Environ Health Perspect*; 117(6): 988-94.

Somervell PD Conway GA. 2011. "Does the small farm exemption save lives?" *Am J Ind Med*; 54(6):461-6. E-pub Mar 11.

Southern Poverty Law Center. 2007. *Close to Slavery: Guestworker Programs in the United States*, 48 p, (March)

Steege A Baron S Chen X. 2009. *Occupational Health of Hired Farm Workers in the United States. National Agricultural Workers Survey Health Supplement, 1999*. National Institute for Occupational Safety and Health, NIOSH Publication No. 2009-119, (February).

Thompson B Coronado GD Vigoren EM Griffith WC Fenske RA Kissel JC Shirai JH Faustman EM. 2008. "Para niños saludables: a community intervention trial to reduce organophosphate pesticide exposure in children of farm workers." *Environ Health Perspect*; 116(5): 687-94.

United States. Bureau of Labor Statistics. 2011. Census of Fatal Occupational Injuries, "Fatal occupational injuries, total hours worked, and rates of fatal occupational injuries by selected worker characteristics, occupations, and industries, civilian workers, 2010," and tables with the

same title for 2008 and 2009. Arithmetic average of published rates of fatal occupational injuries were computed by the author. Cf. <http://www.bls.gov/iif/oshcfoi1.htm>, Accessed 4/15/2012.

United States. Census Bureau. *American Community Survey 2009*, <http://www.census.gov/acs/www/>

United States. Centers for Disease Control and Prevention. 2008. "Heat-related deaths among crop workers – United States, 1992-2006," *Morbidity and Mortality Weekly Report*, 2008 Jun 20;57(24):649-653.

United States. Centers for Disease Control and Prevention. 1992. "Prevention and control of tuberculosis in migrant farm workers. Recommendations of the Advisory Council for the Elimination of Tuberculosis," *MMWR Recomm Rep*. 41(RR-10):1-15 (Jun 5).

United States. Commission on Agricultural Workers. 1993. *Report of the Commission on Agricultural Workers*.

United States. Department of Agriculture. *Agricultural Statistics*, National Agricultural Statistics Service, Washington, DC, Annual.

United States. Department of Agriculture. *2001 Adult Agricultural-Related Injuries*, National Agricultural Statistics Service, Washington, DC, December 30, 2004. 1 page.

United States. Department of Agriculture. *Census of Agriculture 2007. Volume 1. U.S. Summary and State Reports*, National Agricultural Statistics Service, http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp

United States. Department of Agriculture. *Farm Labor*, National Agricultural Statistics Service, Washington, DC, Quarterly.

United States. Department of Agriculture. *2008 Organic Survey*, National Agricultural Statistics Service, Washington, DC, http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/Organics/index.asp

United States. Department of Labor. 2005. *Findings from the National Agricultural Workers Survey (NAWS) 2001-2002*. Report Number 9. (March).

United States. Department of Labor. 1991. *Findings from the National Agricultural Workers Survey (NAWS) 1990*. Report Number 1. (July).

United States. Environmental Protection Agency. 2003. *Survey Management Handbook Volume 1: Guidelines for Planning and Managing a Statistical Survey*. EPA-260-B-03-003. Washington, DC:U.S. Environmental Protection Agency, Office of Policy Planning and Evaluation. Available: <http://www.epa.gov/oamcinc1/0510667/hand-book.pdf> [accessed 24 October 2006].

- United States. Environmental Protection Agency. 1991. *An EPA Region 9 Survey of California Labor Camps in Violation of the Safe Drinking Water Act*. U.S. Environmental Protection Agency, Region 9, San Francisco, CA, n.p.
- United States. General Accounting Office. 1998. *Child Labor in Agriculture: Changes Needed to Better Protect Health and Educational Opportunities*, GAO/HEHS-98-193, (August).
- United States. Government Accountability Office. 2009. *Workplace Health and Safety. Enhancing OSHA's Records Audit Process Could Improve the Accuracy of Worker Injury and Illness Data*, GAO-10-10, (October).
- Vallejos QM Quandt SA Grzywacz JG Isom S Chen H Galvan L Whalley LE Chatterjee AB Arcury TA. 2011. "Migrant farm workers' housing conditions across an agricultural season in North Carolina." *Am J Ind Med*. E-pub Feb 28.
- Vallejos QM Quandt SA Arcury TA. 2009. "The Condition of Farm Worker Housing in the Eastern United States." Chapter 3, *Latino Farm Workers in the Eastern United States*. Arcury TA, Quandt SA (Eds.). Springer Science + Business Media.
- Vela-Acosta MS Bigelow P Buchan R. 2002. "Assessment of occupational health and safety risks of farm workers in Colorado." *Am J Ind Med*. Suppl 2:19-27 (Aug).
- Vela-Acosta MS Lee B. 2001. *Migrant and seasonal adolescent hired farm workers: A plan to improve working conditions*. Marshfield Clinic. Marshfield WI, 23 p (Nov)
- Villarejo D. 2011. "The Challenge of Housing California's Hired Farm Laborers," Book Chapter in Rural Housing, Exurban Expansion, and Amenity-Driven Development, David Marcoullieur, Mark Lapping and Owen Furuseth (Editors), Ashgate Publishing, Hampshire, United Kingdom, 300 p, January 2011.
- Villarejo D. 2009. "Health Care Access Among Unauthorized Migrant Farm Laborers in California," Paper for panel presentation on *Barriers to Health: Comparative Perspectives on Migrant Farm Workers' Access to Care Amidst Structural Constraints*, Society for Applied Anthropology, Annual Meeting, Santa Fe, NM, (March 21).
- Villarejo D. 1998. "Occupational Injury Rates Among Hired Farm Workers." *J Agric Saf Health*; 1(Special issue):39-46.
- Villarejo D McCurdy SA. 2008. The California Agricultural Workers Health Survey. *Journal of Agricultural Safety & Health*; 14(2):135-46 (April).
- Villarejo D McCurdy SA Bade B Samuels S Lighthall D Williams III DA. 2010a. The Health of California's Immigrant Farm Laborers. *American Journal of Industrial Medicine*; 53:387-97 (March).

Villarejo D Schenker MB Moss Joyner A Parnell A. 2010b. *(Un)Safe at Home: The Health Consequences of Substandard Farm Labor Housing. A Review of the Literature and Call for Papers*, Rural Justice Forum, California Rural Legal Assistance, Inc., San Francisco, CA, 61 p (June 3). <http://www.crla.org/node/9>

Waggoner JK Kullman GJ Henneberger PK Umbach DM Blair A Alavanja MC Kamel F Lynch CF Knott C London SJ Hines CJ Thomas KW Sandler DP Lubin JH Beane Freeman LE Hoppin JA. 2011. "Mortality in the agricultural health study, 1993-2007." *Am J Epidemiol*; 173(1): 71-83.

Whalley LE Grzywacz JG Quandt SA Vallejos QM Walkup MP Chen H Galvan L Arcury TA. 2009. "Migrant farm worker field and camp safety and sanitation in eastern North Carolina." *J Agromedicine*. 14(4): 421-36.

Workers Compensation Insurance Rating Bureau of California. 2002. *California Indemnity Claim Frequency Analysis*. San Francisco, CA. (April 25).

Zabin C Kearney M Garcia A Runsten D Nagengast C. 1993. *Mixtec Migrants in California Agriculture: A New Cycle of Poverty*. California Institute for Rural Studies, Davis, CA, 183 p (May).