

California's Hired Farm Workers Move to the Cities: The Outsourcing of Responsibility for Farm Labor Housing

Don Villarejo, Ph.D.

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At a meeting of the 2013 task force on farm labor housing and transportation in California, Sergio Sanchez, with the California Strawberry Commission, described his visits with workers in East Salinas, a low-income, mostly Hispanic neighborhood where many hired farm workers live.¹ He visited a number of homes where the rooms had lines of mattresses leaning against the walls. This arrangement of mattresses during daylight hours was necessary because it wouldn't be possible to walk through the rooms without stepping on someone's mattress in their sleeping space on the floor. He described sanitation problems as "devastating" in these conditions of extremely crowded housing.

The most significant recent development for housing hired farm workers in California is the very great increase in their reliance on unsubsidized, private-market, off-farm housing. But their housing conditions likely have not improved. This is a major shift in the responsibility, and the cost, for their housing to the workers themselves. Employers have sharply curtailed their on-farm housing: only 3.6% of farm employers participating in the 2012 annual survey of wages and benefits indicated they provided housing for seasonal employees; the 1986 survey of farm employers, the first to separately report benefits for seasonal and year-round employees, found 20.6% of employers said they provided housing for seasonal workers [Farm Employers Labor Service. 2012 and 1986]. The proportion of employers who provided housing for permanent, year-round workers was greater, but also showed a decline over this time frame.

Consistent with the findings of a decline in housing provided by farm employers are reports of a very substantial decrease in the number of registered farm labor camps in the state. From a high of an estimated 5,000 such camps at the end of the Bracero program on December 31, 1964, fewer than 1,000 remained by 2000 [Villarejo et al. 2009].² But no one has actually surveyed registered camps in recent years, so the total may even be smaller.

At the same time, there has been only a marginal increase of the number of subsidized, farm labor housing units developed by either government agencies or non-profit groups. Generally, housing developed by these groups is of good quality. USDA's Rural Housing Service Farm Labor Housing program has a continuing demand for farm labor housing, but the state's total of such units is just 5,579 [United States. GAO. 2011]. Philanthropy, notably The California Endowment, made a \$30 million commitment to farm labor housing some twelve years ago, but has ended its 10-year-long program to improve farm worker health.

¹ Presentation by Sergio Sanchez on May 8, 2013, at the forum on farm worker housing and transportation, sponsored by AgInnovations, California Department of Food and Agriculture, Sacramento.

² Manuel Mejia, California Department of Housing and Community Development, indicated farmer-operated labor camps in the state fell to 800 in 1989 from 1,504 in 1987, a result of enforcement of new regulations.

Today, most of hired farm workers reside in California's cities

Among most Americans, the image of farm labor housing is typically a labor camp, with bunkhouses and communal washrooms and dining rooms. But today's reality is very different.

The Census Bureau's American Community Survey (ACS) has produced new findings that contribute to a better understanding of the communities in California in which hired farm workers reside. A newly released five-year ACS report, for the period 2007-2011, provides summary data at the community level of average employment, by industry category, during this period [United States. Census Bureau. 2013]. The five-year ACS report is for all natural resource industries combined, namely, agriculture, forestry (including logging), fishing, hunting and mining, and it is not possible to obtain separate data for agriculture alone. For California, the 5-year 2007-2011 average employment by for-profit businesses in these five industries was reported to be 317,434.³ Fortunately, as further described below, it is known that, of those five industries, average employment in agriculture alone accounts for 92% of the total.⁴ Moreover, the communities in which the other four industries are located are mostly distant from the major centers of farm employment.

It is important to realize that ACS is a continuous, on-going survey. Thus, five-year "average employment" is a 60-month average of the number of persons employed in a specified industry category. For agriculture, with large seasonal variations in employment for each geographic area, "average employment" understates the actual number of persons in a given year, let alone the effect of new workers entering farm jobs for the first time, and others departing. The ACS is believed to under-count small communities and hard-to-reach populations. And the survey does not specifically identify farm labor employment as such.

On the other hand, because monthly and annual average California farm employment is reasonably well-known from administrative data compiled from employers' reports to the California Department of Employment Development (EDD), it proves possible to independently verify ACS's five-year statewide average employment against EDD's findings. Since ACS reports five-year average employment for all natural resource industries combined (agriculture, forestry, fishing, logging and mining, aka AFFHM), it is necessary to compare the EDD findings for the same set of industries.

EDD finds the five-year annual average for the AFFHM industries is 377,800.⁵ This latter figure is larger than the independently determined ACS finding by about 60,366, or roughly 19%, which is greater than the likely uncertainty of the ACS survey finding (+/-2%). It is likely the 5-year ACS undercounts foreign-born and non-literate workers and partially accounts for this

³ This total refers to wage and salary employees of private companies. Not included are employees of private not-for-profit companies, or employees of local, state and federal governments.

⁴ As reported by California EDD, annual average employment in California agriculture during the five-year period 2007-2011 was 348,941. The corresponding five-year annual average employment in California forestry (including logging), fishing, hunting and mining was just 28,859. Thus, agriculture represented 92% of the total for all five industries (377,800).

⁵ Ibid.

difference. A study of the 2010 Census undercount of hired farm workers in 33 hard-to-count California Census Tracts estimated the undercount to be 10% [Kissam. 2012].

The most surprising result of the ACS average employment findings is that most hired farm workers today likely reside in the state’s incorporated cities, especially those located in agricultural valleys outside of the Coastal region’s largest cities, and having sizeable Hispanic populations. Bakersfield, Salinas, Oxnard and Santa Maria each are likely to have more than 10,000 hired farm workers, as measured by the 5-year average employment. The top dozen farm region communities are listed in Table 1. Together, these twelve communities account for a full one-fourth of the state share of the reported 5-year average employment. Only Lamont is an unincorporated community.

Table 1. California farm region communities with the largest 5-year average hired worker employment in the Agriculture, Forestry, Fishing, Hunting and Mining industries.
Source: Census Bureau, 5-year 2007-2011 American Community Survey

<i>Community</i>	<i>5-year Average Employment (AFFHM industries)</i>
Bakersfield city	12,040
Salinas city	12,036
Oxnard city	10,647
Santa Maria city	10,154
Fresno city	8,374
Madera city	5,323
Delano city	5,054
Stockton city	4,656
Watsonville city	4,343
Arvin city	3,036
Avenal city	2,862
Lamont (Census Designated Place)	2,672
<i>Total</i>	<i>81,194</i>

As was true for earlier waves of immigrants to the U.S., newer arrivals tended to aggregate in communities with *paisanos* where their native language is spoken. It should not be surprising that cities of substantial size, located in the major center of U.S. fruit, vegetable and ornamental production, such as those listed above, became destinations for the latest groups of workers seeking jobs in agriculture to support their families.

The decline in the share of farm labor housing located in rural and unincorporated areas as homes for California's hired farm workers is striking. Of the 50 communities in farm regions for which the 5-year average AFFHM employment was 1,000 or more, just four are unincorporated communities (Earlimart, Lamont, Oasis and Orosi). In the other 46 communities, the reported AFFHM employment was entirely within city boundaries.

The estimated share of the statewide share of AFFHM 5-year average employment of workers residing in California's incorporated cities is 65%.⁶ Thus, an estimated 35% was in unincorporated areas. Even in the unlikely case that all of 60,366 difference in the 5-year average employment between the ACS findings and the EDD total were attributed entirely to unincorporated areas, the fraction within city boundaries would still have been 55%.

These measures likely underestimate the concentration of hired farm workers in cities. Several of the larger cities listed in Table 1 are identified by two or more postal zip codes, in some cases to reflect the continuity of residential neighborhoods across city boundaries into adjacent urbanized areas ("urban sprawl"). The city of Fresno comprises 19 zip codes with a combined five-year AFFHM annual average employment of 10,719, or 28% greater than the number within Fresno city limits (cf. Table 1). The present report does not take account of this factor for all cities in the state, but it would likely find the share of the state's farm laborers residing within zip-code boundaries identified with California cities would exceed 75%.

Several California counties with major agricultural production and hired worker employment have recently been designated "metropolitan" because they include a city with 50,000+ residents. Some rural communities near these cities are within the metropolitan area. Unless revised, a recently changed USDA operational definition of "rural" will likely exclude such places with appreciable numbers of farm laborers from eligibility for rural housing funds.

While the concentration of farm labor housing in cities is a notable recent trend, a sizeable share of the workforce resides in unincorporated areas as well as in a number of incorporated rural cities.⁷ Some farm labor housing is located in very remote areas of the state; a grower of strawberry "starter plugs" in far northeastern California reports renting temporarily idle buildings in that county's fair grounds to supply housing for many hundreds of people

⁶ The total 5-year average employment of AFFHM workers residing in California's incorporated cities was 207,452. For unincorporated areas the corresponding figure was 110,282. Thus, the total for cities represents 65% of the overall total of 317,434.

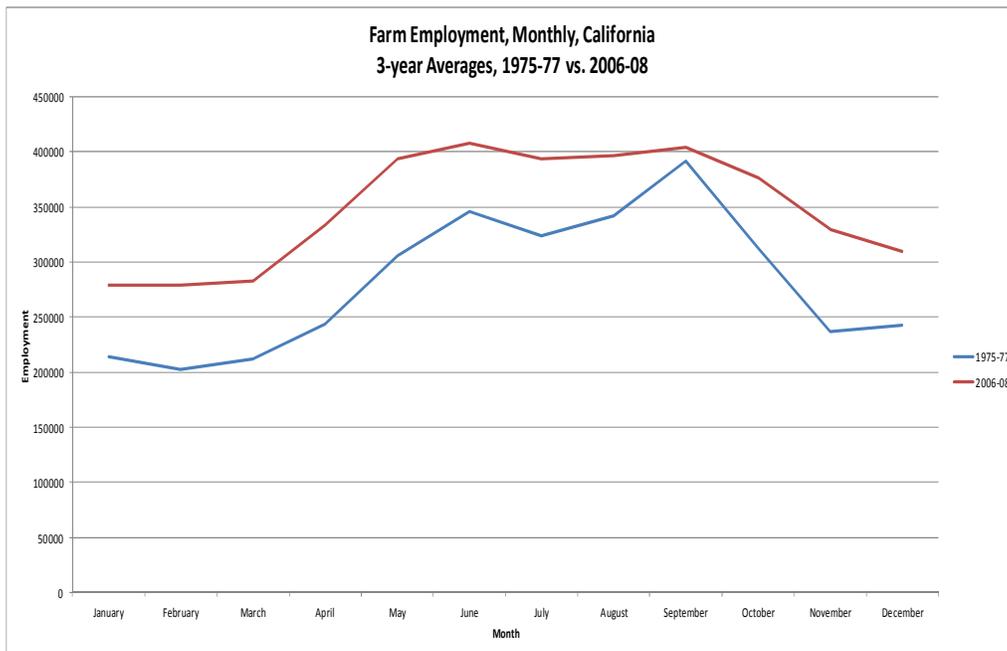
⁷ The necessary criterion for a city to be classified as "rural" is that its total population be less than 2,500, and that it be located out of any urbanized region of a larger city.

whose jobs entails loading these young plants for transport to coastal regions of the state where they are transplanted for eventual berry production.

The duration of seasonal farm employment has become longer, which encourages many workers to settle

A major factor in the urbanization of farmworker housing in California is the changed temporal pattern of labor demand that contributed to an increase in the number of settled workers: the lengthening of the duration of seasonal employment. Some four decades ago, the demand for hired farm workers in the state reached a peak during September of each year. Many thousands of workers were needed at that time to harvest an enormous quantity of fruits and vegetables. Today, the “peak” of farm employment in the state stretches over a five-month period, from May through September. Moreover, during the “off-peak” months, labor demand (measured by employment) is higher in every month than it was during the earlier period. This is shown in Figure 1 where the 3-year average monthly employment for 1974-76 (blue line) is compared with the corresponding values for 2006-08 (red line) [California. SDERS & EDD].

Figure 1. Employment, Hired Farm Workers, Monthly, 3-year Averages, California



Substantial changes in farm production have led to this important shift in the pattern of labor demand in California.

- More dormant season pruning is needed as the acreage of trees and vines has increased from 1.8 million acres in 1974 to 2.8 million acres in 2007.

- More hand-labor is needed to hand-transplant “starter plugs” of major fresh-market vegetables, and of processing tomatoes, formerly seed-planted by machine.
- More hand labor is needed to thin and weed a markedly greater acreage of vegetable crops, from 0.7 million acres in 1974 to 1.1 million acres in 2007.
- More hand labor is needed for berry crop production as harvested acreage has increased from 11,786 acres in 1974 to 40,471 acres in 2007.
- More year-round labor is required for ornamental (nursery) crop production as the area of commercial greenhouses under glass increased from 98 million sq. ft. in 1974 to 166 million sq. ft. in 2007.
- More year-round labor is needed in dairy farming as California has become the nation’s leader in fluid milk production, out-pacing Wisconsin in 2001.
- More hand labor is needed in every month owing to the development of new early-season or late-season crop varieties; strawberries are now produced at least ten months of the year, and sometimes even longer.
- More hand labor is needed for the production of premium varietal wines, especially red wine varieties, because intense flavors are produced from physically smaller grape berries which requires “canopy management” as well as other cultivation techniques in the pre-harvest season.

The combined effects of these and other changes in production practices have been termed “the relaborization of agriculture” by Prof. Juan Vicente Palerm. Despite simultaneous adoption of new, labor-saving technologies, California agriculture is more reliant on hired workers than at any time in the past one hundred years.

An analysis of the 2007-2009 NAWS findings for California indicates that 70% of the state’s hired crop workers are settled, living with family members in their homes [Kissam. 2013]. While a large share of these workers are undocumented, most households have mixed immigration status among its members, and the vast majority of children are citizens. The agricultural industry has managed to accommodate to the anomaly of reliance of persons who are not authorized for U.S. employment.

California's hired farm workers typically rent an apartment or house, but many live in informal dwellings, some of which are not intended for human habitation

Two cross-sectional surveys of the California farm labor population include some information about housing: the National Agricultural Worker Survey of crop farm workers (NAWS) and the California Agricultural Worker Health Survey of both crop and livestock workers (CAWHS). But neither survey was designed to determine possible associations between housing conditions and resident health.

The NAWS is an on-going, employment-based survey of persons working on crop farms at the time of the interview. The most recently published report from the California participants in the NAWS [Aguirre. 2005] was based on 2,344 face-to-face interviews with statewide, randomly selected California crop workers conducted during 2003-04. Workers were asked to report the type of housing in which they were residing at the time of the interview, the location of the living quarters relative to their work site, the number of rooms in the dwelling, the number of persons who sleep there, and the monthly or weekly housing costs. But no questions were asked about the physical conditions of the housing [U.S. DoL. NAWS Survey Instrument. 2002].

Nearly two-thirds (62%) of crop workers participating in NAWS reported their place of residence to be a single-family home. About a quarter (29%) said they resided in an apartment, six percent lived in mobile homes, two percent lived in dormitory or barracks-style housing, and one percent lived in duplexes or triplexes. Only three percent of workers lived on their employer's farm, and just one percent lived off-farm in housing owned by their employer.

The California Agricultural Worker Health Survey (CAWHS) was a one-time household survey that interviewed 970 randomly selected hired farm workers during the period March – December 1999. The sample was statewide and cross-sectional in seven representative communities⁸ [Villarejo et al. 2000]. All workers age 18 or older employed to perform farm tasks, crop or livestock, at any time in the previous 12 months were eligible to participate in face-to-face interviews. An 83% response rate was achieved in the main survey interview. The CAWHS included, in addition to the same housing-related inquiries from the NAWS, a series of questions that bear directly on the physical conditions of housing [CIRS, CAWHS Survey Instrument. 1999]. Copied from the 1990 U.S. Census of Population and Housing, those additional housing-related questions sought to determine the status of sanitation, washing, waste disposal and food preparation facilities in each dwelling visited by interviewers.

The CAWHS staff also sought to independently determine whether each dwelling was recognized by the local County Assessor as well as by the U.S. Postal Service as having a situs address. Nonresidential structures where some workers were found to be living, such as garages, sheds, barns, abandoned vehicles or squatter encampments, rarely have both a street

⁸ The seven communities in which the CAWHS was conducted were Arbuckle, Calistoga, Cutler, Firebaugh, Gonzales, Mecca and Vista.

address and recognition by the County Assessor as dwellings suitable for human habitation. Thus, the CAWHS was able to measure the extent to which some workers were residing in irregular, informal dwellings. By most contemporary measures, persons residing in such informal dwellings would be described as “homeless.” The CAWHS did not include direct, objective measures of housing health hazards.

All dwellings in the CAWHS sample were classified according to one of four categories:

Permanent structure – structure is recognized by the County Assessor for real estate tax purposes as suitable for human habitation and has a U. S. Postal Service situs address.

Informal dwelling – structure is neither recognized by the County Assessor real estate tax purposes nor has a U.S. Postal Service situs address. This category excludes “labor camps” and “vehicles utilized as dwellings.”

Labor camp structure – dwelling is located within a State- or County-registered farm labor camp, or residents themselves describe their dwellings as such.

Vehicle utilized as dwelling – an automobile, pickup truck with a camper shell, or other vehicle that is primarily used for transport to and from work, for shopping and similar essential transport purposes.

The CAWHS classification scheme did not determine whether there were health hazards in each dwelling in the sample nor assess dwelling quality. Thus, the category “informal dwelling” included garages, sheds and other structures not designed or intended for human habitation, but also includes various types of trailers and mobile homes, some of which were observed to be of good quality, certainly as good or better than some of the permanent structures surveyed.

Overall, respondents reported that 4.4% of dwellings in the CAWHS sample lacked plumbing and 3.8% lacked food preparation facilities. Some 20% were entirely without telephone service. The absence of plumbing or kitchen facilities was associated with the type of dwelling. Just 1% of permanent structures lacked such facilities, but 17% of informal or labor camp structures did not have either or both of these facilities. All of the vehicles that served as dwellings lacked both plumbing and kitchen facilities (100%).⁹

Dwellings in which hired farm workers were found to be residing were mostly permanent structures (81%). Informal dwellings ranked next in importance (10%), followed by labor camps (6%) and vehicles (2%).

Table 2 shows, for each category, the total number of dwellings enumerated in the seven communities, the number randomly selected and contacted in-person, the number with

⁹ In Mecca, many hired farm workers who reside in vehicles choose to park overnight in one or another vacant lot adjacent to a convenience store. Two portable chemical toilets were observed in one of the lots, and potable water was available. No cooking facilities of any kind were available in the vacant lots or store.

farm laborer residents, and, finally, the number in which qualified persons agreed to participate in the CAWHS. For the table, the two categories “informal dwelling” and “vehicles” have been combined.

**Table 2. Summary of Dwellings by Type of Dwelling and CAWHS Participation
Seven California Communities, CAWHS, 1999, N = 935**

<i>Type of Dwelling</i>	<i>Enumerated</i>	<i>Contacted</i>	<i>Farm Worker Resident</i>	<i>Participant in CAWHS</i>
Permanent	10,284	2,461	875	762
Labor Camp	554	227	110	60
Informal & Vehicle	1,038	301	185	113
<i>Totals</i>	11,876	2,989	1,170	935

In these seven communities, just over one-third (36%) of permanent structures contacted were dwellings in which farm laborers resided. But nearly half (48%) of labor camp dwellings were occupied by hired farm workers, and nearly two-thirds (61%) of informal structures or vehicles serving as dwellings were “home” for farm laborers.

The most extreme case of this was in Mecca, where an estimated 2,572 CAWHS-eligible workers were resident at the time of the survey, but an estimated three-fifths (60%) were living in labor camps, informal dwellings or vehicles. Of course, the survey in each community was timed to coincide with the likely peak period of hired farm labor demand. Thus, workers who migrate to a community with the intention of finding farm employment might be expected to reside in labor camps within or near the town, or in other informal quarters.

It is important to realize that timing the surveys in this manner had a major influence on the findings regarding housing occupancy: the influx of migrant workers tends to fill all available dwellings and some workers may choose to reside in irregular dwellings to avoid paying higher rental costs. While the results of the CAWHS study were heavily influenced by the survey timing, the housing circumstances of numerous migrant workers in each community could not have been determined at other times of the year.

CAWHS participants were asked to describe the type of housing in which they reside – single family (detached or attached), multi-apartment structure, mobile home or trailer – following designations used in the Census. But some workers described garages, sheds, personal autos, or other types of unconventional shelter not intended for human habitation. This classification scheme was independent of that used by CAWHS researchers described previously and may more accurately provide a description of farm worker housing.

The main findings of this self-reported classification is that nearly half of CAWHS participants (48%) said they resided in “single family dwellings,” and three-quarters of these said they were living in detached single family dwellings.

Another one-third (35%) reported residing in multi-unit apartment buildings, about one-eighth (12%) said they lived in a mobile home or trailer. Roughly one in fifty (2%) said they lived in their automobile, and about one in one hundred said they were homeless, living in the open or “under the trees.”

Housing tenure: most CAWHS participants were renters

Approximately two-thirds (67%) of CAWHS participants rented their dwelling. Roughly one in sixteen (5%) participants rented from their employer. Both of these findings were highly variable from site to site. The communities with the highest proportion of renters among hired farm workers were those with the highest real estate values, and were located near the coast of California (Calistoga, Gonzales and Vista). The communities with much lower proportions of renters were those with the lowest real estate values, and were located in the Central Valley or the Inland Desert (Arbuckle, Cutler, Firebaugh and Mecca).

CAWHS participants were also asked to report whether they, or a member of their household, owned the dwelling in which they resided. Nearly one-fourth of CAWHS dwellings (23%) were owned by the participant or another household member. In Arbuckle, half (51%) of CAWHS participants said they owned their home. But in Vista, just 6% were homeowners. About one worker in fourteen said they “Didn’t know” or otherwise declined to answer.

Home ownership among CAWHS participants was associated with increased family income (Pearson’s correlation coefficient = +0.410, $p < 0.01$). The higher the median self-reported family income, the greater the chance that a farm worker owned a home.¹⁰

Table 3 (below) indicates that most CAWHS participants reported low individual and family incomes in 1998, which limits housing choices. While female participants reported lower median income from farm employment than male participants, median total household incomes for both were identical.

The self-reported median family income was determined for each category of housing type described by CAWHS participants. Residents of single family detached units or of multi-unit apartment buildings reported the highest median incomes. Workers residing in a rented room in someone else’s home or apartment, recreational vehicles, or personal automobiles reported median family incomes half or less than persons who resided in single family detached units or apartment buildings.

¹⁰ It must be noted that participants were asked to report their total family income within a specified range, corresponding to Census categories. Median values correspond only to the range in which it is found.

Table 3. Hired Farm Workers: Farm Work and Income, CAWHS, California, 1999

<i>Characteristic</i>	<i>Male (N=627)</i>	<i>Female (N=343)</i>
Current hourly wage rate (Median)*	\$6.00	\$5.75
Income from farm work, 1998 (Median category)**	\$10,000 to \$12,499	\$5,000 to \$7,499
Total family income, 1998 (Median category)**	\$12,500 to \$14,999	\$12,500 to \$14,999

*Hourly wage rate difference is significant at the $p < 0.001$ level (Wilcoxon signed rank test).

**Income findings based on 534 male and 279 female respondents who reported 1998 U.S. earnings. Persons not in the U.S. labor force in 1998, including some newly arrived migrant workers, reported no 1998 U.S. earnings.

Dwelling vacancy rates in many CAWHS communities were very low

Another aspect of the CAWHS that addresses housing-related conditions in these seven communities is the vacancy rate. Interviewers directly determined through observation and inquiry which dwellings were vacant at the time of the survey. Dwellings found to be vacant were carefully distinguished from those that were occupied but in which the residents could not be contacted, despite repeated efforts to do so.

Table 4 summarizes findings regarding vacancies in permanent structures in the seven communities of the CAWHS sample. The very low vacancy rates in Cutler, Gonzales, Mecca and Vista likely partially accounts for the disproportionate share of workers residing in labor camps and informal dwellings. In a few communities with limited housing availability, some hired farm workers may face discrimination and live wherever they can find shelter. The long history of housing discrimination based on race/ethnicity in the southern San Joaquin Valley has been recently described [Ramirez & Villarejo. 2012].

**Table 4. Vacancy Rates in Permanent Structures
Seven California Communities, CAWHS, 1999**

<i>Community (CAWHS Site)</i>	<i>Vacancy Rate</i>
Calistoga	8.6%
Arbuckle	6.7%
Firebaugh	4.4%
Cutler	2.4%
Vista	1.8%
Mecca	1.7%
Gonzales	1.3%

Occupant density and crowding in CAWHS dwellings

CAWHS participants were asked to report the number of persons who sleep in the dwelling as well as the number of rooms in the dwelling. The highest number of persons residing in a single dwelling was 17, found in a five-room structure in Calistoga. Six or more persons were found to be resident in each of 227 dwellings, or one-fourth of the total number of dwellings in the survey. At the other size extreme, just 56 of the total of the 3,842 persons enumerated lived alone. Overall, the reported average number of residents per dwelling was 4.33.

The CAWHS finds that permanent dwellings are, on average, the least crowded whereas informal dwellings are the most crowded. In fact, informal dwellings had, on average, 26% more persons per room than did permanent dwellings. Labor camps were only slightly less crowded than informal dwellings.

CAWHS project field staff repeatedly presented anecdotal evidence of “crowding” which they observed in dwellings occupied by CAWHS participants. “Crowding” is described in the literature as corresponding to an average occupancy of 1.01 or more persons per room [Myers et al. 1996]. By this measure, 48% of all CAWHS dwellings were “crowded,” and 25% of CAWHS dwellings were “extremely crowded” (1.51 or more persons per room).

A surprising finding was that 42% of CAWHS dwellings were shared by two or more unrelated households. This figure varied greatly from site to site. In Vista, the community where the proportion of dwellings with families “doubling-up” was largest, this figure was a striking 87%. Shared dwellings could not be simply characterized. It was found that sharing arrangements in some instances involved groups of unaccompanied men while in other cases it was two or more families, in which spouses and children were present. It was also found that a “primary” renter would sometimes sub-lease a room, or a bed, to help meet the rental cost, which partly accounts for the large proportion of shared CAWHS dwellings.

Characteristics of hired farm worker households in the CAWHS sample

In 309 CAWHS dwellings (33%), the participant was *unaccompanied* by even one member of their nuclear family. In nearly all such instances, the other members of the participant’s family were residing in Mexico or Central America at the time of the survey.

In 626 CAWHS dwellings (67%), the participant was *accompanied* by at least one family member. No effort was made to further analyze the nature of the familial relationships of those residing with the CAWHS participant, although the data is available. This is because of the great variety of types of accompanying family members: spouses, parents, children, siblings, aunts, uncles, cousins and nephews were all mentioned. For example, it was not unusual to

find that a CAWHS participant was accompanied by his or her spouse, but that some or all of their children remained in Mexico.

Of CAWHS participants who were unaccompanied, 82% were male. Substantial differences were also found regarding the marital status of those who were unaccompanied as compared with those who were accompanied. Of married CAWHS participants, 82% were accompanied by at least one family member, but 66% of single participants were not.

Discussion of CAWHS findings

The CAWHS finds that during 1999 California's hired farm workers had very limited housing options available. Owing to the gap between the state's notoriously expensive real estate market and the low median income of hired farm workers, affordable housing is rare. The subsequent financial crisis of the mortgage industry likely had a disproportionate impact on farmworker families who were homeowners. Indeed, Stockton, one of the state's important centers for year-round, resident farmworker families, became the most notorious epicenter of foreclosures and displacement of families in the nation.

For settled workers and their families, some have become homeowners, but the rate of homeownership among CAWHS households was quite low. For those who are renters, the prospects for becoming homeowners in the future are almost non-existent. Only in a relatively remote, less desirable location, with low real estate valuations, such as Arbuckle, did the rate of homeownership among CAWHS households reach 50%, lower than the statewide average for all households. Where real estate valuations are high, such as the coastal city of Vista, just 6% of CAWHS participants in Vista were homeowners.

For many migrant farm workers, the challenges are even greater. Informal housing, such as the back houses or trailer parks of Mecca and Firebaugh, are often the only affordable choice. During peak season, when labor demand soars for migrant workers, the shortage of housing becomes acute. Unaccompanied male workers live crowded together in trailers, sheds or a rented room in someone's home.

One-fifth (18.5%) of CAWHS participants resided in informal dwellings, or labor camp structures, or in vehicles that were primarily used to go to work or for other necessary transportation purposes.¹¹ It is very likely that most irregular dwellings are not enumerated nor contacted by the U.S. Census, and not represented in Census findings.

¹¹ Of the randomly selected temporary, labor camp or vehicle dwellings that were contacted in-person by a CAWHS staff interviewer, fully one-fourth (25.2%) had a resident hired farm worker either eligible for the CAWHS, or possibly eligible, who was resident at the time of the survey (cf. Table 2: $(110+185)/1,170 = 0.252$). It could be argued that the proportion of hired farm workers residing in temporary, labor camp or vehicle dwellings was 25.2%, not 18.5%. The author prefers the smaller estimate because each CAWHS participant personally confirmed their eligibility whereas some of the persons contacted but who declined to be interviewed may have not been eligible.

The Census Bureau has repeatedly been asked to find, survey and evaluate irregular dwellings but has yet to fully comply.¹² The Master Address File (MAF) is the principal tool used to conduct the Census, but obviously does not reflect dwellings lacking a postal address. Quite literally, as in the CAWHS, as well as in the work of Rick Mines, Ed Kissam, Anna Garcia, and a few other colleagues, it proves necessary to walk through a community's many streets and alleys, or remote valleys, or patches of bushes and trees, looking for irregular dwellings.

One of the shortcomings of the CAWHS was the relative difficulty in finding workers who may have slept "under the trees," or "in the open." An effort was made to find such workers through day laborer gathering places in and near Vista. But the temporary nature of such quarters and the varied worker strategies in widespread use presented obstacles that were difficult to overcome. It can be argued that many persons residing in irregular dwellings lacking even a postal address are, in fact, technically homeless. After all, a homeless person, by definition, is someone without a residence in a dwelling intended for human habitation and having a permanent address.

A recent county-wide study of farm labor housing in California: Napa County

The most recent county-wide survey of farm labor housing was conducted in Napa County in 2012 [Bay Area Economics. 2013]. The authors summarized their observations as follows. "With the exception of vineyard supervisors, most farmworker households qualify as 'very low' or 'extremely low' income households relative to Napa County's area median income. The County has a limited supply of market-rate housing that is affordable at such income levels, which leaves many farmworkers with few options other than shouldering an excessive housing cost burden, living in overcrowded accommodations in order to share rent, or commuting in from lodging located outside of the county" (cf. p. vii).

This study relied on interviews with convenience samples of about 50 growers, 10 vineyard management companies and labor contractors, 350 workers and 20 key informants. The employer survey indicates the current labor force is evenly split among four categories of workers: employed less than 3 months, employed between three and six months, employed between seven and ten months, and employed more than ten months (cf. p. 13). Citing Prof. Robert Yetman's survey¹³, by comparison, that report found 40 percent of Napa grape farm workers were employed full-time, 15 percent part-time, and 45 percent migrant (cf. p. 14). Further, the BAE reported stakeholder and employer interviews suggested the greater reliance on farm labor contractors reduced the need for local farm labor housing and transportation

¹² Ilene Jacobs, California Rural Legal Assistance, Member of Census Advisory Committee, private communication, November 9, 2013.

¹³ Yetman, Robert. March 2009. Napa Valley Wine Industry Wages & Benefits. Prepared for the Napa Valley Grape Growers Association.

because those workers normally reside outside of Napa County and are transported by the FLC to their jobs (cf. p. 22). The report estimates that between 50 and 80 percent of farm workers have permanent homes outside of Napa County but within California (cf. p, 22); the employer survey suggests that just under half of workers reside in the county during most of the year, 25 percent live outside of the county but commute to jobs in the county, and 20 percent have homes outside of the county but reside temporarily in the county while working there, and 8 percent are migrant workers with no permanent place of residence (cf. pp. 22-23).

The survey of the convenience sample of 350 workers was described as constructed in such a way as to "...reflect a broad sampling of farmworkers who work in Napa County at different times of the year..." (cf. p. 37). Survey participants reported 31% lived in the county's Farmworker Centers, 37% resided in their permanent home in Napa County, 19% lived in temporary housing while working in Napa County, 10% reported commuting to a Napa County farm job from a permanent home outside of the county, and 3% did not provide sufficient information to determine where they lived (cf. p. 40, Figure 8). Nearly half (45%) of survey respondents said they were separated from a spouse or at least one of their children while working in Napa County (cf. p. 41). A majority of survey participants lived in apartments (34%) or Farmworker Centers (31%); 14% lived in mobile homes or trailers, 12% lived in single family homes, and 9% lived in bunk houses or dormitories (cf. p. 42). About three-fourths of survey participants responded to a question concerning problems with the current housing: the largest number of complaints was crowded conditions, followed by "cold and/or drafty; not enough heat" and "missing or torn window screen" (cf. p. 44, Figure 11). Overall, 61% of survey respondents said they were satisfied with their current housing, 27% were not satisfied, and 11% did not answer the question (cf. p. 44).

The BAE report concludes the supply of affordable housing in Napa County should be substantially increased. There is also a need for more family housing, as demonstrated by the large share of workers who were separated from their family members when working in Napa County. Also, the authors were quick to point out that the monthly income of Napa County farm laborer experiences large fluctuations presenting a significant challenge in seeking to add new housing to meet their needs. Obviously, being laid off during periods of low labor demand in the county's vineyards would mean that such workers would be unable to afford even a modest rental payment at such times. Interestingly, most Napa County farm workers who participated in the survey said they would prefer rental housing (57%) while just a minority wanted homeownership opportunities (26%).

Discussion of the BAE report on Napa County farm labor housing

The findings in the BAE report are generally in qualitative agreement with prior studies of farm labor housing in California. The relative absence of affordable housing, overcrowded

living conditions, and separation of family members owing to the lack of family housing are circumstances found throughout the state.

However, there are some significant problems with the specific findings of the BAE research, most of which are associated with the survey methodology. It is evident that the convenience sample of 350 farm workers likely did not accurately represent a cross-section of the county's farm workforce. This follows from the fact that 31% of the sample resided in the Farmworker Centers that can only provide a maximum of 180 beds at any given time. It is likely that fewer than 5% of the beds occupied by the county's hired farm workers during the course of a year were in the Farmworker Centers.¹⁴ Thus, the BAE farm worker sample included at least six times as many participants from those centers than would have been the case in a genuinely representative cross-section of the worker population. The authors of the BAE report made no apparent effort to weight the survey findings to take account of oversampling of the Farmworker Center residents

There is another problem with the report that arises from the authors' failure to ask survey respondents about their type of employer (grower, vineyard management company, farm labor contractor) and, where appropriate, about the location of temporary housing, i.e., within Napa County or in another county. The authors dismiss any responsibility of the County to even consider the housing needs of those who are employed by labor contractors. The BAE report argues that since most such workers are transported into the county on a daily basis by their employer, they obviously reside out-of-county, whether in permanent housing or temporary quarters. Therefore, in this view, the County has no responsibility for their housing needs. But the lack of suitable affordable housing for Napa County farm workers is the single largest factor as to why they must be transported into Napa County for their jobs in the first place.

Finally, the authors of the BAE report ignored a crucial fact of budgeting by foreign-born farm workers: remittances sent back to their home country to support their family members. In fact, the overwhelming majority of California's farm laborers came to this country to work and provide for their families, many members of whom remain in the sending country. The amount of such remittances is frequently the largest or second largest expenditure from such workers' after-tax earnings, which, in turn, may result in trade-offs with their housing budget.

¹⁴ Figure 5 of the BAE report (cf. p. 31) indicates that occupancy in the Farmworker Centers fluctuates on a seasonal basis from an average of 25% or so in January and December to 95% in May and June. The 12-month average is about 60%. Thus, even if each bed were successively occupied by three different persons during successive seasons of the year, there would be just $0.6 \times 3 \times 180 = 324$ persons each year. Since peak season employment is about 6,500, then the fraction of Napa County farm laborers residing in the Farmworker Centers is likely to be 4.98%.

Additional county-wide studies of farm labor housing in California

During the late 2000's there were two additional county-wide farm labor housing surveys that sought to determine the needs of this workforce as part of the housing element for county General Plan updates: Napa County [Strochlic et al. 2007] and Mendocino County [Strochlic et al. 2008]. Both surveys sought to estimate the counties' hired farm worker population as well as describe then-occupied housing for this workforce.

Nearly all workers interviewed were born in Mexico or Central America, and every one said they had come to the U.S. to find work to help support their families. Some 89% of the Napa County farm workers and 85% of Mendocino's sent remittances back to their family members who remained abroad, and it was an obligation to do so, not a choice. The average remittance amount was \$3,600 per year, representing a notable share of earnings.

The Napa County survey findings provided a reliable snapshot of where the county's farm laborers were living. Many lived in an adjacent county (18%), and more than a few lived in a non-adjacent county (17%), commuting to work on a daily basis. This is shown in Table 5, which presents findings about the residence location of workers according to whether they were *regular*, *seasonal*, or *temporary* workers on Napa County farms.

The most surprising findings are that whereas three-fourths (76%) of those who were employed for 7 months or more on the county's farms lived in Napa County, three-fourths (78%) of the county's farm laborers who were employed for less than 3 months in Napa County lived in non-adjacent counties and commuted to work on a daily basis. Most, if not all, of the latter group of farm workers had farm jobs at other times of the year in at least one other county.

Table 5. Napa County Farm Laborers, by Place of Residence and Duration of Napa County Farm Employment, N=189, 2006

<i>Place of residence</i>	<i>Regular (7 months or more)</i>	<i>Seasonal (3 – 6 months)</i>	<i>Temporary (less than 3 months)</i>
Napa County	76%	57%	0%
Adjacent counties	18%	17%	22%
Non-adjacent counties	6%	27%	78%
<i>Total</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

Napa County's wine grape harvest occurs later in the calendar year (October-November) than grape harvests in California's Central Valley, making it possible for some workers to have a

succession of harvest jobs in both areas. Many workers who commuted to Napa County’s wine grape harvest from the Stockton-Lodi area of the Central Valley were actually employed by growers, vineyard management companies, or labor contractors, who had operations in both regions.

California counties are very large, and long commutes are a way of life for many residents, not just farm workers. However, much policy discourse and decisions to provide services for farm laborers are based on the notion that jobs are located within the same county where workers reside. While this may have been true, even for migrant workers, at one time, the findings of the Napa study demonstrate that a large fraction of workers commute across county lines on a daily basis, and some commute as much as two hours each way every day.

When asked about living conditions, findings from the two counties reveal some interesting contrasts as well as similarities. As indicated in Table 6, crowded conditions were prevalent, and extreme crowding was widespread as well. Nearly half of the workers said they were living with unrelated persons, neither family nor significant others. While only a few Napa County farm laborers lived on farms (5%), nearly two-thirds of Mendocino County’s workers (61%) said they lived on farms while filling jobs there. And two-fifths of Mendocino County workers (40%) were provided free housing by their employer. Finally, rental costs were much greater in Napa County than in Mendocino County.

**Table 6. General Housing Conditions, Hired Farm Workers
Napa and Mendocino Counties, N=394, 2006/2007**

<i>Specific condition</i>	<i>Napa (N=189)</i>	<i>Mendocino (N=205)</i>
Persons per dwelling - mean	5.9	4.8
Crowded or severely crowded	61%	38%
Severely crowded	34%	21%
Resides with unrelated persons	46%	44%
Live on farm	5%	62%
Free housing	2%	43%
Rental expense - median	\$1,000	\$552

One of the factors for interpreting differences in farm labor housing conditions in the two counties is that Napa County’s wine grape industry was established more than a century ago, and successfully recovered from the devastating impacts of Prohibition and the Great Depression, while Mendocino county’s industry is much younger, having just one commercial winery until the late 1960s. Access to farm labor in Mendocino County has always been problematic, exacerbated by the fact that some vineyards and wineries were established in the county’s remote agricultural valleys where highway access is relatively limited. Thus, employers recognized that the provision of housing was a necessary inducement to attract workers.

A third survey of farm workers focused exclusively on the Coachella Valley, an important agricultural region of Riverside County. The survey of 525 hired farm workers conducted during the 2006 harvest season found that 40% said they lived in mobile homes, 24% lived in a house, 17% lived in an apartment, 5% lived in a car, and 3% lived “outdoors” [Colletti et al. 2007]. The study also reported that 2% of workers said they lived in quarters not intended for human habitation; among migrant farm workers in the area, some 30% said they lived in such quarters.

A study of rural, low-income neighborhoods in agricultural centers finds some similarities of housing conditions as were found in the CAWHS

A regional household survey intended to estimate the 2010 Census undercount among farmworkers and other low-income rural residents was conducted within 33 hard-to-count Census tracts in ten counties of California’s major agricultural centers. The survey included non-farmworkers as well as a substantial number of farmworker households [Kissam. 2012]. The study found that “housing unit” does not coincide with “household” when multiple family/social units reside in the same dwelling. Census enumeration procedures are likely unable to properly account for multiple unrelated families, each with children, sharing a single dwelling.

There were a considerable number of instances of informal clusters of dwellings on a single property (typically a main house and one or more “back houses”¹⁵). While this is a source of confusion for Census purposes, if not a likely source of enumeration error, the sharing of dwellings, both formal and informal, thought by Census enumerators to house a single family/social unit, was found to be widespread.

Of considerable importance, especially for the decennial Census that relies heavily on mail return response, the same study found a significant proportion of the dwellings enumerated by the research team did not have a postal address, either because the community lacked direct mail delivery (mail services exclusively to PO Boxes), or the dwelling itself was “low visibility,” i.e., an informal dwelling, possibly even a structure not intended for human habitation.

The survey found that 3.8% of the survey residences were back houses, camper shells, garages, or add-on rooms above garages. This figure did not include individual rooms in the main house that had been temporarily rented out to unrelated individuals, a widespread

¹⁵ The term “back houses” was used to describe some properties that had a main house as well as one or more additional dwellings, the “back houses,” that were used by farm laborers in Parlier, a community well-known to many Mexican immigrant and migrant workers. See the research report: Sherman J Villarejo D Garcia A McCurdy SA Mobed K Runsten D Siaki C Samuels S Schenker M. 1997. *Finding Invisible Farm Workers: The Parlier Survey*. California Institute for Rural Studies, Davis, CA, 44 pp. Apr.

practice to provide temporary shelter for sojourners on a cash-only basis. For some homeowners, the additional income may help to meet mortgage payments.

In this context, the on-going MICASA prospective cohort hired farm worker health survey reported 9.4% of dwellings enumerated in the city of Mendota, California, the study site, were “back houses” [Stoecklin-Marois. 2011]. The MICASA cohort was established by sampling a cross-section of all dwellings in the community, as enumerated by the research team.

Adverse health outcomes are associated with sub-standard farm labor housing conditions

Little is known about the health effects of housing conditions in which California’s farm laborers reside. No one has ever conducted a cross-sectional survey of farm labor dwellings in California and simultaneously measured housing conditions that pose a risk to resident health as well as conducted comprehensive physical and psychological examinations of all residents.

A comprehensive policy review that relied on the peer-reviewed academic literature, sponsored by California Rural Legal Assistance’s Rural Justice Forum, described adverse health conditions associated with sub-standard housing for U.S. as well as California’s hired farm workers¹⁶ [Villarejo et al. 2009]. Two additional review articles from the academic literature that focus on housing challenges and associated risks to health facing California’s hired farm workers have also been published [Villarejo. 2011; Villarejo & Schenker. 2007]. Therefore, with few exceptions, only the most recently published academic journal articles on associations between farm labor housing and health are discussed below.¹⁷ Finally, the main CAWHS findings linking specific health outcomes to identified housing conditions are briefly reviewed as well.

There are two principal types of studies of farm worker health: exposure studies, and health status studies. Reports in the published academic literature are typically based on one or the other type of research [Villarejo et al. 2009].

Most studies of farm labor housing are dwelling exposure studies, focusing on measurements of dwelling conditions known to present health risks to residents. For example, determining whether the paint in the rooms of a dwelling is lead-based, or whether dust or other residues show evidence of well-known environmental contaminants, such as restricted pesticides or cockroach feces, can provide quantitative evidence of exposure to health risks. Some exposure studies also collect biological specimens from residents to confirm that contaminants found in the dwelling have been absorbed into the residents’ bodies. For example, urine samples may have biomarkers identifying specific types of pesticides.

¹⁶ This policy research report relied on peer-reviewed academic journal articles published prior to June 2008.

¹⁷ Generally, peer-reviewed journal research reports published subsequently to July 2008.

A few research reports examined the built environment, such as resident access to retailers providing healthy food, or whether recreational facilities are available in the neighborhood. Exposures such as these have been shown in research on the general U.S. population to be associated with health status.

Recently published research continues this trend of primary reliance on exposure studies to inform policy discourse about health risks to hired farm workers associated with their living conditions. The heat index in migrant farmworker labor camp dwellings in North Carolina was directly determined to be a health risk for workers seeking recovery from work-related heat stress [Quandt et al. 2013]. Housing conditions, such as cooking and eating facilities as well as drinking water quality, frequency of violations of housing regulations, privacy, personal security and hygiene, all of which are believed to present risks to health, also in North Carolina migrant labor camps, were found to present in five additional reports [Quandt et al. 2013; Bischoff et al. 2012; Arcury et al. 2012; Arcury et al. 2012; Vallejos QM et al. 2011]. A review of risk factors for pandemic influenza suggested that the effects of hired farm worker employment, social and economic factors put this population at high risk for contracting the disease [Steege et al. 2009].

Substantial research has sought to determine the extent of household exposure to restricted-use pesticides, such as organophosphates, in farmworker housing in several agricultural regions of the U.S. It had been speculated that when such materials are applied to nearby fields, residues transported to the home, in workers' clothing, for example, present a risk to vulnerable populations, including pregnant women and young children. The CHAMACOS¹⁸ prospective cohort study of women and children in the Salinas Valley of California compared residue samples of six different restricted-use pesticides taken from urban Oakland homes with samples from farmworker households in Salinas. Except for chlordane-dimethyl, no differences were found in the concentration of the pesticides between urban or farmworker dwellings, but chlorpyrifos concentration was lower in all sites following its ban for residential use [Quiros-Alcala et al. 2011]. It is likely that household chemicals, such as pest control sprays, are more important sources of pesticide contamination in homes than are secondary exposures to five of the six pesticides that were applied in distant crop fields.

More recent research on possible associations between inferred pesticide exposure on population health has found a negative health effect on farmworker women's birth outcomes in agricultural areas where methyl bromide was applied within 5 km (~ 2 miles) of their place of residence [Gemelli et al. 2013]. Another study found no consistent association between children's or prenatal women's exposure to organophosphate residues in their homes and autonomic development of their children under the age of 5 [Quiros-Alcala et al. 2011]. A study of in-utero exposure to DDE or DDT among pregnant women found no association with obesity among their children at age 7 [Warner et al. 2013]. Similarly, no statistically significant decrease of average IQ of 7-year-olds was found in the same cohort of children who had been exposed in-utero to organophosphate pesticides found in their mothers [Bouchard et al. 2011].

¹⁸ CHAMACOS is an acronym for Center for the Health Assessment of Mothers and Children of Salinas.

An earlier study found associations between some diagnosed autism spectral disorders and maternal proximity to nearby agricultural pesticide applications in the San Joaquin Valley of California [Roberts et al. 2007]. But subsequent published comments pointed out several limitations of the finding. First, there were just 8 cases of ASD and 105 control cases, suggesting the association may be of limited statistical significance [McGovern. 2007]. A second published comment pointed out that, of the ASD cases, most were among non-Hispanic White or non-Hispanic African-American women, who were more likely to be of low-income families, socio-economic groups with an excess of cases of marginal iodine nutrition, which has been independently shown to be a risk factor for ASD [Sullivan. 2008].

Housing conditions and sleep quality in North Carolina migrant farmworker labor camps were studied: negative sleep quality was associated with poor housing conditions [Sandberg et al. 2012]. Use of personal protective equipment and appropriate pesticide safety practices were negatively associated with workplace and housing conditions in male workers residing in North Carolina migrant labor camps [Leveresque et al. 2010].

Several studies in North Carolina and Georgia found that migrant workers employed under the H-2A guest agricultural worker visa program had much better housing conditions as well as better working conditions, and lower food insecurity, than workers without H-2A visas [Quandt et al. 2013; Arcury et al. 2012; Arcury et al. 2012; Robinson et al. 2011; Hill et al. 2011; Mirabelli et al. 2010]. Under terms of the H-2A visa program, employers are obligated to provide housing, and these dwellings are subject to U.S. Department of Labor inspection prior to occupancy.

Research undertaken to determine the effectiveness of community-based interventions to reduce farmworker children's exposure to household organophosphate pesticide exposure yielded a negative result in the Yakima Valley of Washington State [Thompson et al. 2008]. There was no significant change in objective measures of children's exposure despite substantial community-based educational intervention.

The second type of farm worker health studies focus on individual health status, most often by a face-to-face interview with each participant. In a few studies, limited physical examinations are conducted, usually biometrics, respiratory function, blood pressure, and blood sugar concentration.

The largest such current research project of this type is the MICASA¹⁹ study in Mendota, California, in which a sample of hired farm workers (N~750) have been recruited to be participants in a long-term cohort study of population health [Stoecklin-Marios et a. 2011]. Among findings to date are a substantially high prevalence of muscle-skeletal disorders [Xiao et al. 2013], of the ethno-specific health condition *nervios* among male workers [O'Connor et al. 2013], and of various types of occupational and non-occupational injuries [McCurdy et al. 2013]. Also, it was found that knowledge of measures to protect against heat-related illness

¹⁹ MICASA is an acronym for Mexican Immigration to California: Agricultural Safety and Acculturation.

was lower than should have been the case, given the widespread educational and workplace training the workers had experienced [Stoecklin-Marios et al. 2013].

Recently, a community-based collaboration with academic and other researchers released the findings of a study of population health and local environmental risks in the agricultural East Coachella Valley of Riverside County, including neighboring toxic waste disposal sites [London J et al. 2013]. Another of this project’s research findings was a report on asthma prevalence and vital statistics [Villarejo et al. 2012]. This latter report finds a lower prevalence of adverse birth outcomes and of asthma ER cases than in statewide data.

The CAWHS made it possible to identify associations between some specific dwelling conditions and particular health outcomes. Among the substandard housing conditions reported by participants in the CAWHS, notable ones were the lack of complete plumbing, the absence of complete food preparation and refrigeration facilities, informal dwellings, crowded conditions, and sharing a dwelling with only unrelated persons.

Table 7 present CAWHS findings indicating the lack of complete sanitation or food preparation facilities is associated with an increased prevalence of persistent diarrhea.

Table 7. “In the last twelve months, have you had diarrhea for more than three consecutive days?”, Male Hired Farm Workers, California, CAWHS, 1999, N=627, p<0.01

<i>Dwelling facilities</i>	<i>Yes, had this problem</i>
Complete plumbing facilities	4%
Lacks complete plumbing facilities	25%
Complete kitchen facilities	5%
Lacks complete kitchen facilities	27%

Two adverse health outcomes were more often reported by residents of informal dwellings or persons who sleep in their automobiles than by residents of permanent structures or labor camps. These two conditions were diarrhea and *nervios*, an ethno-specific health condition characterized by extreme agitation. Table 8 presents findings indicating that residing in an informal dwelling or automobile used for sleeping was associated with both an increased prevalence of diarrhea and of *nervios*, as compared with residing in a conventional dwelling or labor camp.

Table 8. “In the last twelve months, have you had...?”, Percent Yes, by Residence Status, Hired Farm Workers, California, CAWHS, 1999, p<0.01 (or p<0.03*)

<i>Health condition, gender</i>	<i>Does not reside in informal dwelling or car</i>	<i>Resides in informal dwelling or car</i>
Diarrhea lasting more than 3 consecutive days, male (N=627)	5%*	12%*
Diarrhea lasting more than 3 consecutive days, female (N=343)	2%	11%
Nervios, Male (N=627)	12%	26%

Crowded living conditions may also result in evidence of adverse health outcomes. The CAWHS findings included self-reports of the number of persons sleeping in rooms used for that purpose (in addition to bedrooms, CAWHS participants reported that living rooms, dining rooms, and, in some cases, kitchens were also used for sleeping). Thus, it was possible to examine how crowding might contribute to some adverse health outcomes. Table 9 presents findings concerning *susto*, an ethno-specific condition characterized by extreme fright, and fear of surroundings and of other persons. The findings compare the prevalence of this condition among persons who slept in less-crowded conditions vs. those who slept in more crowded conditions. The CAWHS finds the prevalence of *susto* among male hired farm workers was more than twice as great when sleeping accommodations had a density of 2.5 or more persons per room.

Table 9. “In the last twelve months, have you had...?”, Percent Yes, by Residence Density Status, Male Hired Farm Workers, California, CAWHS, 1999, p<0.01

<i>Health Condition</i>	<i>Fewer than 2.5 persons per room used for sleeping</i>	<i>2.5 or more persons per room used for sleeping</i>
Susto	4%	10%

Additional findings from CAWHS of self-reported conditions by male workers who were residing only with unrelated persons as compared with those living with family members included the following.

- Binge drinking (five or more drinks per episode) was 2.5 times greater;
- Unprotected sex;
- Indicators of possible infectious disease: ear aches, stomach aches, oral health problems.

Housing conditions and health in the general population, and interventions

The literature on housing conditions and health in the general population is quite extensive and includes a considerable number of reports addressing associations between sub-standard housing conditions and health status.²⁰ Most of these studies concern populations markedly different from hired farm workers in California, making it somewhat problematic to extrapolate the findings, particularly from inner-city neighborhoods of Eastern U.S. metropolitan regions to California's agricultural valleys.

A cohort study of urban, low-income, young children, at 1-year, 3-year and 5-year intervals following birth found that homelessness and doubled-up family episodes were associated with poor health status, impaired cognitive development and increased use of health care services [Park et al. 2011]. A study of New York City residents whose dwellings had been contaminated with the pesticide chlorpyrifos many years earlier found that children had significantly lower scores of both psychomotor and mental development, and the disparity increased with each successive standard deviation of greater neighborhood poverty [Lovasi et al. 2011]. Both neighborhood poverty status and chlorpyrifos were independently associated with adverse neurodevelopment.

A recent, large-scale study of the sale and rental of housing in American cities found a significant prevalence of discrimination against several racial/ethnic minority groups [U.S. HUD. 2012]. Some 8,000 individuals were recruited from 28 American metropolitan areas and pairs of them were asked by researchers to separately seek home purchases or rentals in their communities. As compared with non-Hispanic White participants, in home sale offerings, the study found systematic, nationwide, discriminatory practices against African-American, Hispanic, and Asian-American participants. Discrimination in rental housing against African-American and Asian-American participants was also found, but not found against Hispanic participants.

There have also been a few notable studies seeking to determine the effectiveness of particular intervention strategies. A long-term, prospective cohort study (15+ years) examined the effectiveness of the HUD-sponsored Moving to Opportunity (MTO) program, an effort to relocate families from inner-city neighborhoods in five major American cities with elevated poverty rates to communities with less than 10 percent of families below poverty; relocation counseling was also provided [Ludwig et al. 2013]. Some 4,604 families, most headed by African-American or Hispanic women, were recruited and randomly assigned to one of three

²⁰ A special issue of the *American Journal of Public Health* included a comprehensive review article on the health of populations residing near environmental hazards [Brender et al. 2011]. Adverse health outcomes linked to specific environmental hazards were: adverse birth outcomes, childhood cancer, cardiovascular disease, respiratory illness, end-stage renal disease and obesity.

groups: the intervention group receiving an MTO voucher providing financial assistance, a second group receiving Section 8 vouchers without constraints, and a third group that did not receive MTO assistance. The findings include the absence of improved family self-sufficiency (employment) among the intervention group, despite the pronounced decline of neighborhood poverty in all areas. Also, there was no improvement in the high rates of school drop-out among the children of the intervention group. The researchers conclude there was no association between central city, neighborhood poverty, and non-employment or school drop-out rates.

A different Federal initiative, the Housing Choice Voucher Program (HCVP), posited that providing housing vouchers to enable families residing in poverty neighborhoods to move to a neighborhood of their choice would result in improved outcomes in employment and school performance as well as living in a less poor neighborhood. However, a review of cohort studies of HCVP participants finds mixed results [Basolo. 2013]. As compared with non-movers, among movers poverty rates were lower in the destination neighborhoods, the destination neighborhoods were more racially/ethnically diverse, and public school quality was better as compared with their previous neighborhoods, but employment dropped significantly from before to after their moves.

A wholly different type of intervention used public health nurses to measure exposure risks and biomarkers among 235 families in rural areas of Montana and Washington, and then provided personally tailored intervention assistance to randomly selected families, including in-home environmental health counseling by a nurse [Butterfield et al. 2011]. Positive associations were found between the interventions and measured outcomes, such as reduced concentrations of radon, carbon monoxide, mildew/mold, and drinking water contamination.

Conclusions and recommendations

Underlying this entire discussion is the self-evident fact that U.S. hired farm workers are a vulnerable population [Villarejo. 2012]. Hired farm workers have a five-fold higher occupational fatality rate than among all industries combined; have the lowest rate of medical insurance (25%) of any major occupational category; are excluded by Federal law, along with domestic workers, from many labor standards that protect workers in all other industries; and have low socio-economic status by reason of race/ethnicity, low annual income, and, oftentimes, marginal immigration status.

Given the high cost of housing in the state, despite the plunge in home values triggered by the on-going financial crisis, there is an irreconcilable problem facing low-wage workers and their families. The working poor cannot afford to pay market rents, let alone meet the financial standards required to qualify for home purchase.

There is a second aspect to the issue of affordability. As demonstrated in the Napa and Mendocino farm labor housing studies, the vast majority of workers come to the U.S. to work and send money to support their family members who remain home in Mexico or Central America. Typically, 15% of annual earnings are earmarked for this purpose. The consequences of this multi-faceted conflict lead to the doubling-up, or tripling-up, of families in rental housing occupied by the families of hired farm workers, or the discovery that 19 people are sharing a four-room dwelling.

Some workers seek to resolve this conflict by commuting on a daily basis from communities with more affordable housing costs, even if it requires as long as a two-hour commute each way. Thus, many workers may have jobs in a given county but commute, often in a *raitero* van or bus, for which \$5 to \$10 is the daily fee. Efforts to enumerate farm workers as “belonging” to a specific county for purposes of allocating resources to provide services may be confounded by this reality.

Recent scholarship has amplified the reality of the vulnerability of farm workers to incorporate the notion of “structural vulnerability,” by which social stratification and racism together relegate some to the status of a permanent underclass [Homes. 2011; Quesada et al. 2011]. At the very bottom of this hierarchy are migrants to the U.S. who come from villages where pre-Columbian languages are spoken. A recent book frames this concept within the experience of a cohort of Triqui migrant workers over a three-year period of farm jobs in the Pacific Coast region [Holmes. 2013]. Throughout these reports, the very worst farm labor housing conditions were found in the dwellings where indigenous migrants were living.

From the perspective of future research on the adverse health consequences of sub-standard farm labor housing, here is what is required:

- Dramatic improvements are needed in housing conditions for many, if not most, hired farm workers; cohort research should track behavioral and health status changes among householders by comparing pre- and post-intervention conditions;
- Include measures of resident socioeconomic status – race/ethnicity, household income, household assets/liabilities, household size and complexity - in future research on housing;
- Research on farm labor housing must include the larger cities of California’s major agricultural valleys as well as smaller communities and remote areas;
- Measures of workers’ health status must include objective, third-party determinations by medical professionals for both physical and mental health;

- A cross-sectional survey of the actual condition of housing occupied by current farm laborers is essential – we simply don't have adequate and reliable data on dwelling conditions where workers live;
- More attention is needed to the built environment where current farm laborers reside: infrastructure status (roads, utilities, drinking water quality), neighborhood public safety, public transportation, access to health services, access to recreational facilities for both children and adults, and school quality.

There are three on-going studies of the health of families, including hired farm workers, in agricultural regions of California in which housing circumstances likely plays an influential role in health outcomes. All of these are linked to CRLA through its on-going collaboration with the researchers. These are the CHAMACOS study of residents of Salinas, the MICASA study in Mendota, and the East Coachella Valley health survey. Of considerable importance is the additional participation of Arcury's research group in North Carolina.

The CHAMACOS cohort of women and children seeks to examine whether adverse health outcomes are linked to exposures of toxic chemicals in the home or nearby environment. The initial group included pregnant women.

The MICASA cohort of hired farm workers and resident family members seeks to measure population health and determine possible links between adverse health outcomes and occupational and environmental risk exposures. The cohort is limited to settled families.

The California Institute for Rural Studies has joined with the Eastern Coachella Valley Building Healthy Communities partnership to identify the health concerns of residents of four low-income communities in which large numbers of hired farm workers reside (Coachella, Mecca, North Shore and Thermal). The project will train community partners, and provide oversight, to conduct a cross-sectional health survey among one thousand residents to determine the prevalence of these conditions.

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