

# Delivery of Health Services to Migrant and Seasonal Farmworkers

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## Key Words

occupational health, immigrant health, minority health, health disparities

## Abstract

Farmworkers are low-paid, uninsured employees in an extremely hazardous industry, and they provide an essential service for U.S. society. This review evaluates the delivery of health services to farmworkers. It describes the farmworker population in the United States, noting characteristics (e.g., migratory and immigration status) that limit their access to and utilization of health services. It describes the health services needs of this population, including occupational health, mental health, oral health, and chronic disease treatment. Cultural, structural, legal, financial, and geographic barriers to health services utilization are described. Existing research on health services utilization among farmworkers is discussed. Programs that have been developed to address the barriers to health services utilization among farmworkers are reviewed. Finally, research needed to improve knowledge of farmworker health services utilization is suggested. These research needs include formal evaluations of existing programs and basic research to characterize the health services utilization patterns of farmworkers.

## INTRODUCTION

The production of vegetables and fruits in the United States and other nations is dependent on the hand labor provided by migrant and seasonal farmworkers. Agriculture is one of the most dangerous industries in the United States. While providing this essential service to society, migrant farmworkers are exposed to numerous occupational and environmental health risks that result in high rates of physical injury and illness (99–101). Farmworkers suffer psychological as well as physical stressors, including discrimination, separation from family, long work hours, and fear of unemployment and underemployment, which increase their risks for mental illness and substance abuse (3, 34, 42, 45, 60). Although their work is essential and their exposure to harm is high, farmworkers generally receive low wages, and they are seldom provided health benefits by their employers (18).

Providing health services to farmworkers has been a concern for several decades (26, 31, 89, 91, 96). Programs have been implemented by governmental agencies, as well as by non-profit organizations, to address the health services needs of farmworkers and their families. Clinics have been established in many locales to provide health care to this population. However, knowledge of the health services needs of the farmworker population remains inadequate. Few studies have asked farmworkers about their health care needs and utilization or those of their families (exceptions include 95, 104, 105). Few data are available that evaluate the effectiveness of existing programs to improve health, health behaviors, or health services (exceptions include 38).

This review evaluates in five parts the current knowledge of farmworker health services. It begins by defining and describing the migrant and seasonal farmworker population in the United States. Second, it describes the health services needs of the farmworker population. Third, it delineates the barriers experienced by farmworkers for accessing health services. Fourth, it reviews existing research

on health services utilization among farmworkers and their families. Fifth, it describes programs that have been developed to overcome the barriers to farmworkers' receiving health services. Finally, research needed to improve knowledge of farmworker health services utilization is suggested.

## FARMWORKERS IN THE UNITED STATES

Definitions of "farmworker" share specific key elements related to type of work, period of employment, and changing residence to engage in work. Using the definitions found in federal statutes governing migrant health funds, a migrant farmworker is an individual whose principal employment is in agriculture on a seasonal basis, and who, for purposes of employment, establishes a temporary home. The migration may be from farm to farm, within a state, interstate, or international. A seasonal farmworker is an individual whose principal employment is in agriculture on a seasonal basis but who does not migrate. In both cases the definition extends to employment within the past 24 months. For many purposes, the immediate family members (spouse, children) of a farmworker who reside with the farmworker have the same benefits as do the farmworker, e.g., access to health care at migrant clinics and enrollment in migrant education programs. However, because "farmworker" is an occupational category, an individual who is a farmworker one year may be a construction worker the next year, and a farmworker again the following year. Unless explicitly stated, the term farmworker is used in this review to include both migrant and seasonal farmworkers.

Farmworkers are predominantly adult men. However, approximately one in five farmworkers is a woman, and one in twenty farmworkers is under age eighteen (18). Most (58%) farmworkers are married, and half (51%) have children. Whereas most (57%) farmworkers are unaccompanied by a spouse or children, 63% of those who have children

are accompanied by at least some of their children.

Migrant and seasonal farmworkers work in at least 42 of the 50 states. National Agricultural Workers Survey (NAWS) data show that the national farmworker population became predominantly Latino and Mexican in the 1990s. In 1995, 90% of all migrant and seasonal farmworkers in the United States were Latino, and 70% of all farmworkers were born in Mexico (70). In 2002, 84% of migrant and seasonal farmworkers in the United States self-identified as Hispanic; 75% of all farmworkers were born in Mexico, 23% in the United States, 2% in Central America, and 1% in other countries (18).

Many farmworkers are legal residents of the United States; in 2002, 25% of farmworkers were U.S. citizens, and 21% were legal permanent residents (18). The remaining 53% were in the country without authorization. Nationally, a small proportion are immigrants who come to the United States annually with H2A visas, which authorize nonimmigrant aliens to work in agricultural employment in the United States for a specified time period, normally less than one year. The lack of documentation often leads farmworkers to avoid contact with individuals they do not know, such as health care providers and researchers, and keeps them from seeking care at clinics and other health care facilities to avoid detection by the authorities.

An accurate count of farmworkers in the United States is difficult to establish. The Health Resources and Services Administration (HRSA) (43) estimated that there were 4.2 million seasonal and migrant farmworkers and their dependents in the United States, with 1.6 million classified as migrant in 1990. In 2000, Larson (56) prepared estimates of farmworkers in the ten states with the largest farmworker populations (Arkansas, California, Florida, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, Texas, and Washington) and reported the number of migrant farmworkers, seasonal farmworkers, total farmworkers, nonfarmworkers in migrant

households, and nonfarmworkers in seasonal households, and the number of migrant and seasonal farmworkers and nonfarmworkers in farmworker households by county. Some state agencies provide estimates of the number of farmworkers employed in their state. For example, in North Carolina at the end of each agricultural season the Employment Security Commission provides estimates of the number of farmworkers "during peak harvest" by category for each county and for the entire state. For the state in 2004, the most recent year for which data are available, the commission estimated that there were 42,095 migrant farmworkers, of whom 39,410 were Spanish speaking; 35,050 seasonal farmworkers; 17,215 farmworkers, who worked more than 150 days; and 8903 farmworkers with H2A visas. Although different sources provide a general indication of the number of farmworkers in specific spatial units, it is virtually impossible to establish the exact size of the farmworker population, particularly when dependents are considered.

Although many farmworkers are seasonal and do not change residence to work, many others are migrants. These migrant farmworkers are in particular locales only during specific periods of each year. In 2001 and 2002, 42% of all farmworkers migrated. The migration routes and streams, as well as the times that migrant farmworkers work in a region, are discussed in several publications (66, 68, 85). Of farmworkers who migrated in 2001 and 2002, 38% were foreign-born newcomers, 30% international shuttle migrants, 5% international follow-the-crop migrants, 13% domestic shuttle migrants, and 14% domestic follow-the-crop migrants (18). The follow-the-crop migrants often follow the major traditional north and south routes (west coast, midwest, and east coast migrant streams). Shuttle migrants travel 75 or more miles from their home bases to an area to do farmwork, but work within a 75 mile radius of that locale.

In addition to the larger migration patterns, there is short-term mobility within

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**NAWS:** National Agricultural Workers Survey

**HRSA:** Health Resources and Services Administration

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**CAWHS:** California Agricultural Workers Health Survey

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local farmworker populations. Only one study has considered the degree of mobility among farmworkers across a season and how this mobility can affect the availability of health services as well as ease of conducting health research. Data on turnover in North Carolina residential sites in two studies of farmworker health showed that approximately 30% of farmworkers changed residence over the course of the summer (85). Analysis of specific work sites revealed both in- and out-migration. Whereas some sites were very stable, others experienced a complete turnover of residents across the agricultural season. Health-care programs and research must account for the residential fluidity of this population.

Several characteristics of the farmworker population affect the provision of health services. Although farmworkers are largely adult and male, they also include women and children as workers, and the children of workers. They are disbursed throughout the country. They are overwhelmingly minority, and they often lack immigration documentation. They often move great distances from their homes to work, and they make frequent short- and long-distance moves to maintain employment.

### **FARMWORKER HEALTH SERVICES NEEDS**

Farmworkers' need for health services results from occupational and lifestyle exposures. Occupationally, they experience unintentional injuries related to repetitive motion and to single events. More than one fourth (27%) of current workers in the Binational Farmworker Health Survey reported at least one injury during their working lifetime. Pain, sprains, and dislocation were most frequently reported from repetitive motion injuries; for single events, cuts or tears were most frequently reported, followed by fractures or crush injuries (71). The most frequent crop activity during injury involved deciduous fruit trees. Equipment was involved in two thirds

of injuries; ladders were the most common equipment and were involved in 30% of injuries. In a cohort study of Texas-based farmworker families, unintentional occupational injuries were reported at an annual rate of 12.5 injuries per 100 full-time workers (27). Injuries were highly varied. Working for a contractor increased the odds of injury, whereas using seat belts and working for more than one employer decreased the likelihood of injuries.

Pesticide exposure is a significant hazard for farmworkers. Exposures include both poisonings caused by unintentional exposure to large doses and low-level exposure that results in subclinical or absent immediate effects (9, 28, 32, 44).

Occupational skin disease is highly prevalent among all agricultural workers owing to exposure to pesticides and other chemicals, plants, and infectious agents. The Bureau of Labor Statistics reports that crop production workers have the highest incidence of skin diseases of any industrial classification (31.0/10,000 workers) (17). The few studies among migrant and seasonal farmworkers have found that up to 46% of workers report rashes, depending on time of the season and crops (6, 40, 65).

Farmworkers face multiple hazards to their eyes, including traumatic injuries caused by plants, tools, and equipment; exposure to agricultural chemicals including pesticides; and environmental conditions including wind, dust, allergens, and ultraviolet light. Short-term effects of ultraviolet light include photokeratitis, sensitivity, and irritation; long-term effects can include cataracts, pterygia, and retinal damage. Few surveys of eye injuries have been conducted. A survey in North Carolina found that 41% of farmworkers reported eye pain at some point after working in the fields all day; 43%, redness; 25%, itching; and 13%, blurred vision (84). In the California Agricultural Workers Health Survey (CAWHS), 23% reported irritated itchy eyes, and 12%, blurred vision (101). A 1996 survey of health care providers in migrant farmworker clinics found refractive errors were the

most common eye problems seen in clinics, followed by eye infections, diabetes-related eye problems, and pterygia (87).

Oral health has been ranked as one of the major health problems facing migrant and seasonal farmworkers. The CAWHS found that more than two thirds of workers had at least one adverse condition, including untreated caries, periodontal disease, and missing or broken teeth. Results are similar in field surveys and reviews of clinic records (31, 59).

Infectious diseases pose a significant threat to farmworkers, as well as to those who have contact with them. Farmworkers are estimated at six times the risk of other workers to develop tuberculosis (20). Rates of positive tuberculosis tests between 17% and 50% have been recorded in studies throughout the United States (19, 25, 51, 64, 81).

Farmworkers have a number of attributes that are risk factors associated with HIV/AIDS and other sexually transmitted infections. These attributes include poverty, limited education, mobility, and isolated living conditions. Representative data on seroprevalence rates are limited, but available data suggest that rates are high (33, 73). Rates of using commercial sex workers among single men and those living apart from their wives are higher than 40%, measured both in men returning to Mexico (75) and in those residing in the United States (77). Women farmworkers in Florida and California have been found to be at greater risk than men in sexually acquiring HIV owing to the failure to use condoms and the practice of exchanging sex for money (33, 74). Women's knowledge of transmission is inaccurate, and concerns about being seen as promiscuous lead to the choice not to carry condoms (76).

Recent research on the mental health of farmworkers has found that nearly 40% of workers studied have reached caseness for depression, and 30%, for anxiety (45, 46). Stressors commonly experienced by farmworkers include characteristics of farmwork (e.g., difficult physical work) as well as its consequences (e.g., unpredictable housing) (47, 60). These

stressors are linked to lower self-esteem and limited social support, as well as to more frequent feelings of hopelessness, anxiety, depression, and suicidality. For those workers ambivalent about leaving family for work, anxiety as a stress response was reduced among those able to telephone home more frequently (42). The work to date on mental health suggests that healthy use of coping strategies may influence workers' appraisal of stressors encountered in migrant farmwork and may lead to reductions in stress, anxiety, and depression (48).

Data on chronic diseases among farmworkers are generally based on clinic data or self-reported diagnoses and must be considered underreports (71). The CAWHS measured several chronic disease risk factors in California farmworkers (101). This survey found that 81% of male and 76% of female farmworkers were overweight or obese. Compared with the U.S. general population, a higher percentage of male, but not female, farmworkers had high serum cholesterol. The incidence of high blood pressure was greater than in the U.S. population for both males and females, particularly in the 20–44 age range. These data suggest that farmworkers are at elevated risk for diabetes and heart disease. The cause of these risk factors is unknown. However, food insecurity and the resulting food choices made by workers with limited incomes may be part of the problem. Food insecurity and hunger reported by both unaccompanied male farmworkers and farmworker families, as well as for Hispanic Americans, are substantially higher than the U.S. population average (83).

## **BARRIERS TO FARMWORKERS ACCESSING HEALTH SERVICES**

Health care providers and health researchers have long recognized several farmworker attributes that are barriers to health services utilization (10, 79, 107). These barriers are similar to those experienced by other immigrant Latino communities in the United States (23,

36, 37, 50, 92). They include linguistic and cultural differences from the majority population, low educational attainment, frequent moving, inadequate transportation, financial strains, lack of health insurance, lack of documentation, and a limited number of health care facilities. For example, cultural attributes (fatalismo, embarrassment, and shame), cost, transportation, fear of the medical system, and time constraints are barriers for women in farmworker families to receiving breast and cervical cancer screening (41). Clinic outreach programs have helped women overcome these barriers (41).

Language is a major barrier to health services utilization for farmworkers. Although some farmworkers are native English speakers and others speak a French Creole (39) or one of several South Asian languages (29), the great majority (84%) of farmworkers in the United States are Latino, and the primary language in this population is Spanish (18, 68). Several linguistic characteristics make simple English to Spanish translation or interpretation difficult when providing care to farmworkers. First, farmworkers from different Latin American countries or from different regions of Mexico speak a variety of national and regional Spanish dialects. Second, the primary language of many "Latino" farmworkers is an indigenous (Native American) language, such as Mixteco, Tarasco, or Quiche (3). For these farmworkers, Spanish is a second language with which they may have limited facility. For example, 43% of the farmworkers who participated in a study in Oregon spoke an indigenous language (63). Farmworker surveys in North Carolina typically find that the primary language for 10%–15% of the participants is an indigenous language (8). Finally, farmworkers often use both folk and Spanglish (blended Spanish and English) terms, which are unfamiliar to those formally trained to speak Spanish.

Latino farmworkers often share health beliefs (culture) that affect their utilization of health services (55). For example, a significant proportion of Mexican farmworkers adhere to

the hot-cold (humoral) theory of health (90, 106). These beliefs can result in workers delaying medical care, ignoring medical treatments, and choosing not to engage in preventive behaviors (e.g., 5, 82). Several folk illnesses, such as *susto*, *mal de ojo*, and *caida de mollera* are current among Latino farmworkers in Florida (12, 13). In one instance (11), farmworkers did not seek health care for exposure to pesticides because they believed that they were suffering from *susto*. The use of traditional herbal remedies has been documented among farmworkers in Texas (80). Finally, farmworkers either bring with them from Mexico or buy at "tiendas" over-the-counter and prescription medicines unavailable to them without prescriptions from U.S. pharmacies. This practice has been documented for the use of injections among Mexican farmworkers in North Carolina (67). This widely acknowledged but poorly documented problem reflects pharmacy practice laws in Mexico and other Latin American countries, which differ from those in the United States (109).

Although some farmworkers have college degrees, they generally have fewer than nine years of education (*secundario* level in the Mexican educational system); and they often have fewer than six years (*primario* level in the Mexican system) (7, 30, 53, 63). Less than one third (31%) of farmworkers interviewed in 2001 and 2002 by the NAWS had 12 or more years of education (18). Literacy levels are also low among farmworkers; many are functionally illiterate in both Spanish and English.

Farmworker mobility and the migrant lifestyle limit health services utilization. Simply knowing where health services are available is difficult when there is constant residential change. This knowledge is further limited when almost 40% of the population is new each year. Mobility also makes follow-up care (e.g., from a cancer screening) and long-term care (e.g., for tuberculosis or diabetes) difficult to provide. Furthermore, many farmworkers prefer to delay health care until they return to their home communities. For

example, farmworker parents report that half of the health care provided to their children in the U.S.-Mexico border region was received in Mexico (93). Approximately half of those children with U.S. health insurance received health care in Mexico.

Although farmworkers have a migratory lifestyle, many do not have the transportation needed to obtain health services. A minority (42%) of farmworkers drive or have cars in the United States (18). Many are transported as crews in vans to new locales. Many documented and undocumented workers do not have a U.S. driver's license or automobile insurance. They are often dependent on their employers for transportation to buy groceries or wash laundry, as well as obtain health services. Although many clinics have vans, the number of vans is usually insufficient for the population.

The lack of health insurance and extremely low incomes make it difficult for farmworkers to afford health care. At least 75% of farmworkers and as many as 90% of the children in farmworker families do not have health insurance (18, 89). Although most farmworkers have incomes well below the poverty line, they often do not qualify for Medicaid because they are undocumented or because they do not meet other eligibility criteria (2, 49, 89). The U.S.-born children of farmworkers can receive Medicaid, and they often qualify for other health and nutrition programs [e.g., Women, Infants and Children (WIC) benefits]. However, this can result in the untenable situation that those children from one family who were born in the United States can receive health services, while their foreign-born siblings cannot.

The lack of documentation limits access to health care in ways other than the lack of insurance. Farmworkers without documents want to remain anonymous. They do not seek health care at emergency departments as well as migrant and community clinics because they fear they will be reported to authorities.

Farmworkers are in the United States to work, to support themselves and any family

members who are with them, and to provide financial support for family members who remain in their home communities (21, 22). Farmworkers work by the hour or by piece rate, and they do not receive paid time off for health care. When work is missed as a result of obtaining health services, a farmworker's income declines substantially, causing economic hardship for family members in the United States and in Mexico, as well as for the farmworker him/herself. Likewise, employers, the farmers, are often working under deadlines, which require the demand that farmworkers do not miss work. Farmworkers will not utilize health services if doing so interferes with their employment (55). Therefore, farmworkers must often endure a severe injury or illness until it becomes unbearable before they will miss work to obtain health care (86).

One final barrier to farmworkers' health services utilization is the limited number of health care facilities provided for the farmworker population. Because of the relatively limited number of facilities and providers, health care, particularly specialty care, is difficult to obtain in the rural communities in which farmworkers live and work (88). Although the Bureau of Primary Health Care at the HRSA provides funds for migrant health clinics, and many states provide additional funds for these programs, the number of facilities, their locations, and their hours of operation cannot respond to the needs of the farmworker population. For example, in North Carolina, ~15 migrant clinics are funded and operating during the agricultural season, whereas farmworkers are spread across the 100 counties in the state. Although these clinics have outreach programs that deliver health care to the places farmworkers live, the clinics' hours of operation are generally limited to two evenings per week.

Cultural, structural, legal, financial, and geographic characteristics are all barriers to the provision of health services to farmworker communities. Farmworkers share these barriers with other immigrant, low-income, and minority populations.

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P3C: Parent's  
Perceptions of  
Primary Care  
Measure

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## RESEARCH ON FARMWORKER HEALTH SERVICES

Scant peer-reviewed empirical literature documents the health services that farmworkers need, farmworker access to health services, farmworker utilization of health services (i.e., how often they use which kinds of services for which kinds of health care), or farmworker satisfaction with their access to health services or with the health services used. Only a single study (104) reports using the classic conceptual framework of health services research, the health behavior model (1, 4), to investigate the health services needs or utilization of farmworkers. A handful of analyses document general health services for farmworker communities (24, 57, 78, 89, 96, 107). Several studies document farmworkers' dental health services needs (31, 58, 79, 101). Three studies provide information about the health services needs for the children of farmworkers (54, 61, 62, 93-95, 104, 105).

The few analyses of adult farmworkers' general health services needs and utilization are largely out of date and fragmented. They focus on single states, counties, or communities located across the country. The research uses a variety of methods (survey interview as well as focus groups) based on different disciplinary perspectives. These factors make it difficult to draw any conclusions about farmworker health services. For example, one study (57) emphasizes the need for family planning and food programs, whereas another (107) delineates the importance of personal (e.g., language and education) and financial (e.g., health insurance) resources in the utilization of subsidized migrant clinics. A third study (78) discusses the importance of obtaining information about health care needs directly from farmworkers. The need for eye care is highlighted by a CAWHS finding that more than two thirds of farmworkers surveyed had never had an eye examination (101). Three separate studies document that more than 50% of migrant workers do not seek oral health care regularly (31, 58, 101). Reasons

for not seeking care included lack of time, money, transportation, and education concerning dental care (31, 58, 79). A systematic effort is needed to document migrant and seasonal farmworkers' health services needs and utilization.

A recent analysis describes health insurance coverage among farmworkers (89). This report shows that 85% of farmworkers did not have health insurance in 2000. Twenty percent of farmworker family members received health care in 2000, and 42% of pregnant women in farmworker families received health care. Federally funded health centers provide a high proportion of the care to this uninsured population.

Analyses of health services for children in farmworker families have some of the same problems as does health services research for adult farmworkers; studies are limited in number and fragmented in geographic distribution. However, they are fairly current. Two of these investigations (93, 104, 105) indicate that factors other than financial resources drive health care utilization for farmworker children. In a series of analyses focused on child health services among farmworker families living along the U.S.-Mexico border, the Parent's Perceptions of Primary Care Measure (P3C) has been developed and validated (94, 95). These same researchers (93) have reported on the use of health services for young children in farmworker families, finding that more than half the health care received by these children was received in Mexico. Having health insurance had little effect on the receipt of child health care in the United States or Mexico. However, there was greater satisfaction with health care (as measured by P3C) among parents who took their children to Mexico for this care. Others have delineated access and utilization of health care services among children in farmworker families residing in eastern North Carolina (104, 105). More than half of these children had an unmet medical care need. Need was greater among children who were preschool age and whose caregiver experienced very high pressure to



work. However, lack of transportation to or knowledge of facilities, rather than financial resources, was the most common barriers to receiving health care, while ill health was the greatest predictor of health care utilization. Finally, an examination of the levels and causes of mental health problems among the children of migrant and seasonal farmworkers in central North Carolina (54, 61) also considered service utilization for mental health problems among these children (62). While 64% of the children met criteria for a psychiatric diagnosis, fewer than half of these children received care for this diagnosis from a health professional.

### FARMWORKER HEALTH SERVICES PROGRAMS

Numerous programs have been established to meet the health care needs of farmworkers and their families. Many local clinics and organizations have developed programs to improve their ability to provide health services to farmworkers. National programs to improve health services for farmworkers have also been instituted, with significant support from federal agencies.

Local programs and providers have documented several different initiatives to improve health services for farmworkers. These initiatives address several aspects for improving the delivery of health services, including conducting culturally appropriate community health assessments (14, 15), using clinic models (79, 108), using culture brokers and outreach workers to improve service delivery (52, 98), and using lay health advisors (35, 102, 103). There are no evaluations of these programs or indicators of whether the programs have continued or if they have been replicated in other locales. Several of the specific approaches used by these programs, e.g., outreach workers and lay health advisors, have been incorporated into national programs.

HRSA has implemented consistent efforts to address the health services needs of migrant farmworkers nationally. HRSA's Bureau of

Primary Care (<http://bphc.hrsa.gov/>) provides direct support in providing health services by funding 137 migrant health centers and 955 community health centers throughout the United States. Working with local providers, the Bureau has instituted innovative programs to improve the delivery of health services to farmworkers. For example, they support a voucher program that allows farmworkers to obtain care from community providers rather than from migrant or community health centers when these centers are not accessible (69, 97). In addition, HRSA addresses the major barriers for the provision of health services to farmworkers by funding nonprofit organizations that support the efforts of local clinics and service organizations. These central grantees include the Farmworker Justice Fund, Farmworker Health Services, Migrant Clinicians Network, Migrant Health Promotion, National Center for Farmworker Health, and the National Association of Community Health Centers. **Table 1** includes information for contacting each of the central grantees and accessing their materials.

The main focus of Farmworker Justice, Inc., (FJ) is migrant health legislation and policy. FJ addresses the health care needs of farmworkers and their families primarily through addressing legislative issues that affect farmworkers' living and working conditions. The range of issues is broad, including wages and working conditions, labor and immigration policy, access to the justice system, and health and occupational safety. For example, FJ engages in pesticide litigation and advocates farmworker housing reform, both of which affect farmworker health at the policy level. FJ publishes a newsletter and posts information on their Web site to disseminate information and report updates in their efforts.

In addition to legislation and policy, FJ works directly with farmworkers around the U.S.-Mexico border region by collaborating with community-based organizations and migrant and community health care clinics to

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FJ: Farmworker  
Justice

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**Table 1** Contact information for Health Resources and Services Administration, Bureau of Primary Health Care central grantees for farmworker health services

Central grantee	Contact information
Farmworker Justice, Inc. (FJ)	1010 Vermont Avenue, NW, Suite 915 Washington, DC 20005 (202) 783-2628 voice (202) 783-2561 fax <a href="http://www.fwjustice.org">http://www.fwjustice.org</a> <i>Farmworker Justice News</i> (biannual newsletter) <a href="http://www.fwjustice.org/newsletter.htm">http://www.fwjustice.org/newsletter.htm</a>
Farmworker Health Services, Inc. (FHSI)	1221 Massachusetts Avenue, NW, Suite S Washington, DC 20005 (202) 347-7377 voice (202) 347-6385 fax <a href="http://www.farmworkerhealth.org">http://www.farmworkerhealth.org</a> <i>Outreach to Farmworkers</i> (quarterly newsletter) <a href="http://www.farmworkerhealth.org/resource.jsp#newsletters">http://www.farmworkerhealth.org/resource.jsp#newsletters</a>
Migrant Clinicians Network, Inc. (MCN)	1001 Land Creek Cove P.O. Box 164284 Austin, TX 78716 (512) 327-2017 voice (512) 327-0719 fax <a href="http://www.migrantclinician.org">http://www.migrantclinician.org</a> <i>Streamline</i> (bimonthly newsletter) <a href="http://www.migrantclinician.org/news/streamline/">http://www.migrantclinician.org/news/streamline/</a>
Migrant Health Promotion (MHP)	224 West Michigan Avenue Saline, MI 48176 (734) 944-0244 voice (734) 944-1405 fax <a href="http://www.migranthealth.org">http://www.migranthealth.org</a> <i>La Esperanza</i> (annual newsletter) <a href="http://migranthealth.org/publications/la_esperanza.php">http://migranthealth.org/publications/la_esperanza.php</a>
National Center for Farmworker Health, Inc. (NCFH)	1770 FM 967 Buda, TX 78610 (800) 531-5120 voice (512) 312-2600 fax <a href="http://www.ncfh.org">http://www.ncfh.org</a> <i>Migrant Health Newslite</i> (bimonthly newsletter) <a href="http://www.ncfh.org/00_ns_newslite.php">http://www.ncfh.org/00_ns_newslite.php</a>
National Association of Community Health Centers, Inc. (NACHC)	7200 Wisconsin Ave., Suite 210 Bethesda, MD 20814 (301) 347-0400 voice (301) 347-0459 fax <a href="http://www.nachc.com">http://www.nachc.com</a> <i>Community Health Forum</i> (monthly newsletter) <a href="http://www.nachc.com/magazine/default.asp">http://www.nachc.com/magazine/default.asp</a>

organize several health promotion programs that address population-specific health concerns. Foci include HIV/AIDS and children's environmental health. Prevention and treatment efforts are challenging owing to factors such as mobility, language and literacy barriers, cultural practices and beliefs, and limited access to health care. FJ organizes a *promotores de salud* program focused on HIV/AIDS prevention. For migrant individuals that are already infected, FJ maintains a binational directory of HIV/AIDS services as a locator tool for health services providers to facilitate continuity of care.

Project Clean Environment for Healthy Kids is a FJ health education program that addresses environmental health hazards for farmworkers and their families. *Promotores de salud* are trained to address five environmental health and safety topics with their peers: agricultural and residential pesticide safety, lead poisoning, water purification, safe waste disposal, and ways to reduce the frequency and severity of asthma. Health care professionals are trained to recognize, manage, and report pesticide-related health problems.

Farmworker Health Services, Inc., (FHSI) focuses on supporting outreach worker programs for migrant and community health centers by providing products, services, and activities that enable them to understand and effectively address farmworker health issues. FHSI addresses four priority areas: (a) health outreach and enabling services designed to increase access to health care and reduce health disparities; (b) health education and prevention strategies that promote holistic health care and encourage equal partnership from farmworkers; (c) cultural competency and responsiveness, which address the transitory, vulnerable, and isolated characteristics of the farmworker population; and (d) health data and outcome measures as tools for addressing farmworker needs, and planning, developing, and evaluating health programs.

Migrant Clinicians Network, Inc., (MCN) works to strengthen the infrastructure for health care facilities serving farmworkers and

other mobile poor populations. Through its newsletter, topic-specific monographs, workshops, conferences, continuing education classes on site, and the Internet, MCN disseminates to clinicians information on cancer, cultural competency, diabetes, environmental and occupational health, family violence, hepatitis, immunizations, tuberculosis, and women's and children's health.

In addition to training and technical assistance, the MCN Health Network Program addresses the need for continuity of care by allowing for the transfer of medical records between clinics. The health network program gives patients a card, similar to a credit card, displaying their name and an identifying number. This card is shown at each doctor visit and can be used to identify patients and to release and obtain their medical records, eliminating confusion over patients' names and histories. Under the umbrella Health Network Program, MCN has assembled three tracking programs: TBNet for patients with tuberculosis, Track II for patients with diabetes, and CAN-track for patients with cancer. There is no cost for patients or clinics to participate in the MCN Health Network Program. Details about these programs are provided in documents located on the MCN Web site.

Migrant Health Promotion (MHP) has developed six outreach program models designed to reach a specific group of people or to address a particular health issue: the Camp Health Aide program, the *Colonia* Health Worker Program, the *Infórmate* Teen Health program, the *Salud Para Todos* program, the Farmworker Doula program, and community coalitions. These models are used to guide program development and can be adapted to local communities and circumstances. In addition to these model outreach programs, MHP uses coalition-building strategies to bring together community members and stakeholders to address community problems, pool resources, and work in partnership for solutions.

The Camp Health Aide program, MHP's original program model, trains farmworker men and women living in camps and

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FHSI: Farmworker Health Services, Inc.

MCN: Migrant Clinicians Network

MHP: Migrant Health Promotion

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communities in Michigan as *promotores* or *promotoras* who offer their peers health education, support, and access to migrant and community health centers and other services. Many of these *promotores(as)* migrate to south Texas during the winter months. There, they join Texas-based *promotores(as)* and take on new roles in the *Colonia* Health Worker program. For this program, *promotores(as)* make door-to-door visits to those living in remote *colonias*, offering outreach, health education, and support. Two papers provide information evaluating the activities of the Camp Health Aide program. An evaluation of the effects of the program on the health aides found that participation in the program increases the health aides' level of self-efficacy (16). Another found that the program was effective for training farmworkers in eye health and safety by improving the use of personal protective equipment and knowledge (38).

The *Infórmate* Teen Health program trains and supports specifically teens on HIV/AIDS prevention, substance abuse prevention, leadership, community building, and related issues. Trained teens act as peer health educators and advocates, providing health education through fun, healthy activities in their labor camps and rural and border communities. These activities include games, contests, bilingual newsletters, one-on-one health education, and, most prominently, the *Infórmate* Teen Theater Troupe.

Another model program, *Salud Para Todos*, trains *promotores(as)* to address mental health, substance abuse, stress, and violence in their camps and communities. These *promotores(as)* also provide health education, advocacy, and referrals to migrant and community health centers, helping health care providers improve their service delivery to farmworkers and rural communities.

In the Farmworker Doula program, experienced *promotoras* are trained as doulas, or birth attendants, that guide farmworker women through pregnancy, childbirth, and early motherhood. Many farmworker women miss prenatal and postpartum appointments

owing to a lack of transportation, lack of appropriate social support, and unfamiliarity with the health care system and procedures. Doulas remove these barriers, provide emotional and educational support during the birth process, and act as cultural brokers between farmworkers and clinicians.

The National Center for Farmworker Health, Inc. (NCFH), provides information, services, and products to health care centers. NCFH's migrant health leadership development and training center offers training programs in health center governance, health center management, and migrant health orientation and training. NCFH also acts as an information broker, providing library services.

NCFH's Call for Health program is a nationwide, toll-free, bilingual, information and referral service program for farmworkers and their families. This program responds to the need for continuity of care as well as the need for health care in places where migrant or community health centers do not exist. Call for Health assists farmworker families with a maximum of \$600 per year for health care expenditures, negotiates reduced rates with private providers, and helps farmworkers pay for services when they cannot afford to pay, when there is no migrant or community health center in the area, or when it cannot provide services and there are no other local resources available, such as public or private insurance.

NCFH also provides farmworker service organizations with Web-based information about farmworkers' insurance eligibility through their State Child Health Insurance Program (SCHIP) and Medicaid Demonstration project. Farmworkers are often eligible for, but underutilize, programs such as Medicaid and SCHIP. Low participation is in part due to regulations and administration of child health insurance programs that create barriers for farmworkers to obtain or retain access to benefits. This program provides information and resources for farmworker service providers to enable them to better serve

farmworkers and their families in accessing these resources.

National Association of Community Health Centers, Inc. (NACHC), serves as an informational resource for community-based health centers by providing education, training, technical assistance, and leadership development. NACHC's Community Health Corps program uses AmeriCorps members to provide outreach and support services for low-income families served by community, migrant, and homeless health centers.

Numerous programs address many of the barriers to health services experienced by farmworkers; it appears that these programs can improve the accessibility and utilization of health services among farmworkers. However, there has been very limited evaluation of these programs. Only two published papers appear in the literature that provide assessments of the effects of these programs, and both of these assess aspects of the MHP's Camp Health Aide program (16, 38).

## CONCLUSIONS: NEEDED RESEARCH

Farmworkers have a substantial need for health services owing to the hazards of their occupation and their immigrant and migrant worker status. Characteristics including limited English language skills, limited educational attainment, low income, and lack of health insurance are barriers to farmworkers' use of health services. In addition, structural, legal, and geographic barriers to health services utilization exist for farmworkers, including a limited number of health care facilities, laws that bar farmworkers' use of some services and programs, and lack of access to transportation. Finally, farmworkers usually live in rural areas, and they face all the problems of rural health care (88). Excellent programs have been implemented to address the health services needs of farmworkers and their dependents. However, few data exist on the national health services utilization patterns of the farmworker population or on

regional variations in these patterns, on the health services that farmworkers want, or on their assessments of the health services they do receive. Although current programs are addressing many of farmworkers' barriers to health services, there is currently no information that evaluates the efficacy of these programs.

Data on farmworker health services utilization are desperately needed. The Bureau of Primary Health Care's uniform data system contains patient information for the health care provided by the clinics it funds, but these data are generally not available for analysis. These data also have the same inherent bias as do all clinic-based data in assessing health services needs: They can only tell the story of those who receive care, but not of those who are not in the system. A national farmworker database has been proposed (72), but this would be limited to those farmworkers who use services provided the Association of Farmworker Opportunity Programs. There has been no further announcement that this database has been established or used. The NAWS has collected health data. However, analyses of these data have not been published.

Research is needed in several areas to provide the foundation for the delivery of appropriate health services to farmworkers. First, empirical data are needed to document the health services utilization patterns of farmworkers, their perceptions of barriers to accessing health care, their perceived health services needs, their knowledge of available health services, and their evaluations of the quality of the services that they receive. These basic data are needed for public health knowledge and policy and program planning. As the only regularly implemented survey of farmworkers, the NAWS can provide some of these data. These survey data could be tied to data collected systematically from migrant and community health center patients and from participants in outreach programs to provide a comprehensive picture of farmworker health services characteristics. Second, formal evaluations of existing federally

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NACHC: National Association of Community Health Centers

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funded projects must be conducted and published in the peer-reviewed literature. Only with published evaluation data will program and policy planners know how successful these programs are and how they can be improved. Finally, data are needed on how farmworkers are self-treating and self-managing their health. Farmworkers often work sick rather than miss work or bear the expense of formal medical care (86). Researchers need to know

whether farmworkers' self-management includes waiting to receive care on return to Mexico or another country of origin (95), using prescription medicines obtained outside the U.S. medical system (67, 109), or using traditional and folk remedies (80) because receiving care outside the system can result in decreased health for the individual, the farmworker community, and the general population.

#### LITERATURE CITED

1. Aday LA, Awe WC. 1997. Health services utilization models. In *Handbook of Health Behavior Research: Personal and Social Determinants*, Vol. 1, ed. DS Gochman, pp. 153-72. New York: Plenum
2. Adm. Child. Fam. 1996. *The Personal Responsibility and Work Opportunity Reconciliation Act of 1996*. US Dep. Health Hum. Serv., Adm. Child. Fam. <http://www.acf.dhhs.gov/programs/ofa/prwora96.htm>
3. Alderete E, Vega WA, Kolody B, Aguilar-Caxiola S. 2000. Lifetime prevalence of and risk factors for psychiatric disorders among Mexican migrant farmworkers in California. *Am. J. Public Health* 90:608-14
4. Andersen RM, Newman J. 1973. Societal and individual determinants of medical care utilization in the United States. *Milbank Meml. Fund Q.* 51:95-124
5. Arcury TA, Quandt SA, Cravey AJ, Elmore RC, Russell GB. 2001. Farmworker reports of pesticide safety and sanitation in the work environment. *Am. J. Ind. Med.* 39:487-98
6. Arcury TA, Quandt SA, Mellen BG. 2003. An exploratory analysis of occupational skin disease among Latino migrant and seasonal farmworkers in North Carolina. *J. Agric. Saf. Health* 9:221-32
7. Arcury TA, Quandt SA, Preisser JS. 2001. Predictors of illness incidence and prevalence of green tobacco sickness among Latino farmworkers in North Carolina, U.S.A. *J. Epidemiol. Community Health* 55:818-24
8. Arcury TA, Quandt SA, Preisser JS, Norton D. 2001. The incidence of green tobacco sickness among Latino farmworkers. *J. Occup. Environ. Med.* 43:601-9
9. Arcury TA, Quandt SA, Rao P, Doran AM, Snively BM, et al. 2005. Organophosphate pesticide exposure in farmworker family members in western North Carolina and Virginia: case comparisons. *Hum. Organ.* 64:40-51
10. Artemis L. 1996. Migrant health care: creativity in primary care. *Adv. Pract. Nurs. Q.* 2:45-49
11. Baer RD, Bustillo M. 1993. Susto and mal de ojo among Florida farmworkers. *Med. Anthropol. Q.* 7:90-100
12. Baer RD, Bustillo M. 1998. Caida de Mollera among children of Mexican migrant workers: implications for the study of folk illnesses. *Med. Anthropol. Q.* 12:241-49
13. Baer RD, Penzell D. 1993. Susto and pesticide poisoning among Florida farmworkers. *Cult. Med. Psychiatry* 17:321-27
14. Betchel GA, Davidhizar R, Spurlock WR. 2000. Migrant farm workers and their families: cultural patterns and delivery of care in the United States. *Int. J. Nurs. Pract.* 6:300-6

15. Betchel GA, Shepherd MA, Rogers PW. 1995. Family, culture, and health practices among migrant farmworkers. *J. Community Health Nurs.* 12:15–22
16. Booker VK, Robinson JG, Kay BJ, Najera LG, Stewart G. 1997. Changes in empowerment: effects of participation in a lay health promotion program. *Health Educ. Behav.* 24:452–64
17. Bur. Labor Stat. 2003. *Incidence rates of nonfatal occupational illnesses, by industry and category of illness, 2003.* <http://www.bls.gov/iif/oshwc/osh/os/ostb1350.pdf>
18. Carroll DJ, Samardick R, Bernard S, Gabbard S, Hernandez T. 2005. *Findings from the National Agricultural Workers Survey (NAWS) 2001–2002: A Demographic and Employment Profile of United States Farm Workers. Rep. 9.* Washington, DC: US Dep. Labor, Off. Assist. Sec. Policy
19. Cent. Dis. Control Prev. 1992. HIV infection, syphilis, and tuberculosis screening among migrant farmworkers—Florida. *MMWR* 41:723–25
20. Cent. Dis. Control Prev. 1992. Prevention and control of tuberculosis in migrant farm workers: recommendations of the Advisory Council for the Elimination of Tuberculosis. *MMWR* 41(10):1–15
21. Chavez LR. 1992. *Shadowed Lives: Undocumented Immigrants in American Society.* Fort Worth, TX: Harcourt Brace
22. Chavez LR. 1998. Settlers and sojourners: the case of Mexicans in the United States. *Hum. Organ.* 47:95–108
23. Chavez LR, Flores ET, Lopez-Garza M. 1992. Undocumented Latin American immigrants and U.S. health services: an approach to a political economy of utilization. *Med. Anthropol. Q.* 6:6–26
24. Chi PS. 1985. Medical utilization patterns of migrant farm workers in Wayne County, New York. *Public Health Rep.* 100:480–90
25. Ciesielski SD, Seed JR, Esposito DH, Hunter N. 1991. The epidemiology of tuberculosis among North Carolina migrant farm workers. *JAMA* 265:1715–19
26. Comm. Community Health Serv. 2005. Providing care for immigrant, homeless, and migrant Children. *Pediatrics* 115:1095–100
27. Cooper SP, Burau K, Frankowski R, Shipp EM, Del Junco DJ, et al. 2006. A cohort study of injuries in migrant farm worker families in south Texas. *Ann. Epidemiol.* 16:313–20
28. Curl CL, Fenske RA, Elgethum K. 2003. Organophosphorus pesticide exposure of urban and suburban preschool children with organic and conventional diets. *Environ. Health Perspect.* 111:377–82
29. Davies HW, Kennedy SM, Teschke K, Jenny P, Quintana E. 1998. Cytogenetic analysis of South Asian berry pickers in British Columbia using the micronucleus assay in peripheral lymphocytes. *Mutat. Res.* 416:101–13
30. Engel LS, Keifer MC, Zahm SH. 2001. Comparison of a traditional questionnaire with an icon/calendar-based questionnaire used to assess occupational history. *Am. J. Ind. Med.* 40:502–11
31. Entwistle BA, Swanson TM. 1989. Dental needs and perceptions of adult Hispanic migrant farmworkers in Colorado. *J. Dent. Hyg.* 63:286–92
32. Eskenazi B, Karley K, Bradman A, Weltzien E, Jewell NP, et al. 2004. Association of in utero organophosphate pesticide exposure and fetal growth and length of gestation in an agricultural population. *Environ. Health Perspect.* 112:1116–24
33. Fernandez MI, Collazo JB, Hernandez M, Bowen GS, Varga LM. 2004. Predictors of HIV risk among Hispanic farm workers in South Florida: Women are at higher risk than men. *AIDS Behav.* 8:165–74

34. Finch BK, Catalano RC, Novaco RW, Vega WA. 2003. Employment frustration and alcohol abuse/dependence among labor migrants in California. *J. Immigr. Health* 5:181-86
35. Fitzgerald K, Chakraborty J, Shah T, Khuder S, Duggan J. 2003. HIV/AIDS knowledge among female migrant farm workers in the Midwest. *J. Immigr. Health* 5:29-36
36. Flores G, Abreu M, Olivar MA, Kastner B. 1998. Access barriers to health care for Latino children. *Arch. Pediatr. Adolesc. Med.* 152:1119-25
37. Flores G, Fuentes-Afflick E, Barbot O, Carter-Pokras O, Claudio L, et al. 2002. The health of Latino children: urgent priorities, unanswered questions, and a research agenda. *JAMA* 288:82-90
38. Forst L, Lacey S, Chen HY, Jimenez R, Bauer S, et al. 2004. Effectiveness of community health workers for promoting use of safety eyewear by Latino farm workers. *Am. J. Ind. Med.* 46:607-13
39. Gadon M, Chierici RM, Rios P. 2001. Afro-American migrant farmworkers: a culture in isolation. *AIDS Care* 13:789-801
40. Gamsky TE, McCurdy SA, Wiggins P, Samuels SJ, Berman B, Skenker MB. 1992. Epidemiology of dermatitis among California farm workers. *J. Occup. Med.* 34:304-10
41. Goldsmith DF, Sisneros GC. 1996. Cancer prevention strategies among California farmworkers: preliminary findings. *J. Rural Health* 12(Suppl. 4):343-48
42. Grzywacz JG, Quandt SA, Early J, Tapia J, Graham CN, Arcury TA. 2006. Leaving family for work: ambivalence and mental health among migrant Latinos. *J. Immigr. Health* 8:85-97
43. Health Resour. Serv. Adm. 1990. *An Atlas of State Profiles which Estimates Number of Migrant and Seasonal Workers and Members of Their Families*. Washington, DC: Health Resour. Serv. Adm.
44. Hernández-Valero MA, Bondy ML, Spitz MR, Zahm SH. 2001. Evaluation of Mexican American migrant farmworker work practices and organochlorine pesticide metabolites. *Am. J. Ind. Med.* 40:554-60
45. Hovey JD, Magaña CG. 2000. Acculturative stress, anxiety, and depression among Mexican immigrant farmworkers in the Midwest United States. *J. Immigr. Health* 2:119-31
46. Hovey JD, Magaña C. 2002. Psychosocial predictors of anxiety among immigrant Mexican migrant farmworkers: implications for prevention and treatment. *Cultur. Divers. Ethnic. Minor. Psychol.* 8:274-78
47. Hovey JD, Magaña C. 2003. Suicide risk factors among Mexican migrant farmworker women in the Midwest United States. *Arch. Suicide Res.* 7:107-21
48. Hovey JD, Seligman LD. 2005. The mental health of agricultural workers in the United States. In *Manual of Agricultural Medicine*, ed. JE Lessenger, pp. 282-99. New York: Springer-Verlag
49. Immigr. Nat. Serv. 1997. *Illegal Immigration Reform and Immigrant Responsibility Act of 1996*. Washington, DC: US Dep. Justice, Immigr. Nat. Serv. <http://uscis.gov/graphix/publicaffairs/factsheets/948.htm>
50. Iniguez E, Palinkas LA. 2003. Varieties of health services utilization by underserved Mexican American women. *J. Health Care Poor Underserv.* 14:52-69
51. Jacobson ML, Mercer MA, Miller LK, Simpson TW. 1987. Tuberculosis risk among migrant farm workers on the Delmarva Peninsula. *Am. J. Public Health* 77:29-32
52. Jezewski MA. 1990. Culture brokering in migrant farmworker health care. *West J. Nurs. Res.* 12:497-513



53. Kamel F, Moreno T, Rowland AS, Stallone L, Ramirez-Garnica G, Sandler DP. 2001. Recruiting a community sample in collaboration with farmworkers. *Environ. Health Perspect.* 109(Suppl. 3):457-59
54. Kupersmidt JB, Martin SL. 1997. Mental health problems of children of migrant and seasonal farm workers: a pilot study. *J. Am. Acad. Child Adolesc. Psychiatry* 36:224-32
55. Lantz PM, Dupuis L, Reding D, Krauska M, Lappe K. 1994. Peer discussions of cancer among Hispanic migrant farm workers. *Public Health Rep.* 109:512-20
56. Larson AC. 2000. *Migrant and seasonal farmworker enumeration profiles study*. <http://bphc.hrsa.gov/migrant/Enumeration/EnumerationStudy.htm/>
57. Littlefield C, Stout CL. 1987. A survey of Colorado's migrant farmworkers: access to health care. *Int. Migr. Rev.* 21:688-908
58. Lukes SM, Miller FY. 2002. Oral health issues among migrant farmworkers. *J. Dent. Hyg.* 76:134-40
59. Lukes SM, Simon B. 2005. Dental decay in southern Illinois migrant and seasonal farmworkers: an analysis of clinic data. *J. Rural Health* 21:254-58
60. Magaña CG, Hovey JD. 2003. Psychosocial stressors associated with Mexican migrant farmworkers in the midwest United States. *J. Immigr. Health* 5:75-86
61. Martin SL, Gordon TE, Kupersmidt JB. 1995. Survey of exposure to violence among the children of migrant and seasonal farm workers. *Public Health Rep.* 110:268-76
62. Martin SL, Kupersmidt JB, Harter KS. 1996. Children of farm laborers: utilization of services for mental health problems. *Community Ment. Health J.* 32:327-40
63. McCauley LA, Lasarev MR, Higgins G, Rothlein J, Muniz J, Ebbert C, et al. 2001. Work characteristics and pesticide exposures among migrant agricultural families: a community-based research approach. *Environ. Health Perspect.* 109:533-38
64. McCurdy SA, Arretz DS, Bates RO. 1997. Tuberculin reactivity among California Hispanic migrant farm workers. *Am. J. Ind. Med.* 32:600-5
65. McCurdy SA, Wiggins P, Schenker MB, Munn S, Shaieb AM, et al. 1989. Assessing dermatitis in epidemiologic studies: occupational skin disease among California grape and tomato harvesters. *Am. J. Ind. Med.* 16:147-57
66. MCN (Migr. Clin. Netw.). 2005. *Migrant information - migration patterns*. [http://www.migrantclinician.org/migrant\\_info/migration\\_patterns.php/](http://www.migrantclinician.org/migrant_info/migration_patterns.php/)
67. McVea KL. 1997. Lay injection practices among migrant farmworkers in the age of AIDS: evolution of a biomedical folk practice. *Soc. Sci. Med.* 45:91-98
68. Mehta KS, Gabbard M, Barrat V, Lewis M, Carroll D, Mines R. 2000. Findings from the National Agricultural Workers Survey (NAWS) 1997-1998: a demographic and employment profile of United States farmworkers. *Res. Rep. 8*, Assist. Sec. Policy, Off. Program Econ., US Dep. Labor Off., Washington, DC
69. Miles M, Freeman Lambar E. 2004. A brief history of migrant health voucher programs and their approach to increase access to health care for migrant and seasonal farmworkers. *Migrant. Health Newslines* 21(6):1-2
70. Mines R, Gabbard S, Steirman A. 1997. *A Profile of U.S. Farm Workers: Demographic, Household Composition, Income and Use of Services*. Based on data from the National Agricultural Workers Survey (NAWS). Off. Assist. Sec. Policy, prepared for Comm. Immigr. Reform. Washington, DC: US Dep. Labor
71. Mines R, Mullenax N, Saca L. 2001. *The Binational Farmworker Health Survey*. Davis: Calif. Inst. Rural Stud.
72. Mull LD, Engel LS, Outterson B, Zahm SH. 2001. National farmworker database: establishing a farmworker cohort for epidemiological research. *Am. J. Ind. Med.* 40:612-18

73. Organista KC, Organista PB. 1997. Migrant laborers and AIDS in the United States: a review of the literature. *AIDS Educ. Prev.* 9:83-93
74. Organista KC, Organista PB, Garcia de Albe JE, Castillo Moran MA, Carrillo H. 1996. AIDS and condom-related knowledge, beliefs, and behaviors in Mexican Migrant laborers. *Hisp. J. Behav. Sci.* 18:392-406
75. Organista KC, Organista PB, Garcia de Albe JE, Castillo Moran MA, Ureta Carrillo LE. 1997. Survey of condom-related beliefs, behaviors, and perceived social norms in Mexican migrant laborers. *J. Community Health* 22:185-98
76. Organista PB, Organista KC, Soloff PR. 1998. Exploring AIDS-related knowledge, attitudes, and behaviors of females Mexican migrant workers. *Health Soc. Work* 23:96-103
77. Parrado EA, Flippen CA, McQuiston C. 2004. Use of commercial sex workers among Hispanic migrants in North Carolina: implications for the spread of HIV. *Perspect. Sex. Reprod. Health* 36:150-56
78. Perrilla JL, Wilson AH, Wold JL, Spencer L. 1998. Listening to migrant voices: focus groups on health issues in south Georgia. *J. Community Health Nurs.* 15:251-63
79. Poss J, Meeks BH. 1994. Meeting the health care needs of migrant farmworkers: the experience of the Niagara county migrant clinic. *J. Community Health Nurs.* 11:219-28
80. Poss J, Pierce R, Prieto V. 2005. Herbal remedies used by selected migrant farmworkers in El Paso, Texas. *J. Rural Health* 21:187-91
81. Poss JE, Rangel R. 1997. A tuberculosis screening and treatment program for migrant farmworker families. *J. Health Care Poor Underserv.* 8:133-40
82. Quandt SA, Arcury TA, Austin CK, Saavedra RM. 1998. Farmworker and farmer perceptions of farmworker agricultural chemical exposure in North Carolina. *Hum. Organ.* 57:359-68
83. Quandt SA, Arcury TA, Early J, Tapia J, Davis JD. 2004. Household food security among Latino farmworkers in North Carolina. *Public Health Rep.* 119:568-76
84. Quandt SA, Elmore RC, Arcury TA, Norton D. 2001. Eye symptoms and eye protection use by seasonal and migrant farmworkers. *South Med. J.* 94:603-7
85. Quandt SA, Preisser JS, Arcury TA. 2002. Mobility patterns of migrant farmworkers in North Carolina: implications for occupational health research and policy. *Hum. Organ.* 61:21-29
86. Rao P, Arcury TA, Quandt SA. 2002. Hispanic farmworker interpretations of green tobacco sickness. *J. Rural Health* 18:503-11
87. Retzlaff C, Hopewell J. 1996. "Puntos de Vista: Primary Eye Care in Migrant Health" *Eye Care Needs Assessment*. Austin, TX: MCN Monogr. Ser., Migr. Clin. Netw.
88. Ricketts TC. 2000. The changing nature of rural health care. *Annu. Rev. Public Health* 21:639-57
89. Rosenbaum S, Shin P. 2005. *Migrant and Seasonal Farmworkers: Health Insurance Coverage and Access to Care*. Kaiser Comm. Medicaid Uninsured, Henry J. Kaiser Family Found., Washington, DC
90. Rubel AJ. 1960. Concepts of disease in Mexican-American culture. *Am. Anthropol.* 62:795-814
91. Rust GS. 1990. Health status of migrant farmworkers: a literature review and commentary. *Am. J. Public Health* 80:1213-17
92. Scott G, Ni H. 2004. Access to health care among Hispanic/Latino Children: United States, 1998-2001. *CDC Adv. Data* 344:1-24
93. Seid M, Casteneda D, Mize R, Zivkovic M, Varni JW. 2003. Crossing the border for health care: access and primary care characteristics for young children of Latino farm workers along the US-Mexico border. *Pediatrics* 3:121-30

94. Seid M, Varni JW. 2005. Measuring primary care for children of Latino farmworkers: reliability and validity of the parent's perceptions of primary care measure (P3C). *Matern. Child Health J.* 9:49-57
95. Seid M, Varni JW, Bermudez LO, Zivkovic M, Far MD, et al. 2001. Parents' perceptions of primary care: measuring parents' experiences of pediatric primary care quality. *Pediatrics* 108:264-70
96. Slesinger DP, Cautley E. 1981. Medical utilization patterns of Hispanic migrant farmworkers in Wisconsin. *Public Health Rep.* 96:255-63
97. Slesinger DP, Ofstead C. 1996. Using a voucher system to extend health services to migrant farmworkers. *Public Health Rep.* 111:57-62
98. Stein LM. 1993. Health care delivery to farmworkers in the southwest: an innovative nursing clinic. *J. Am. Acad. Nurse Pract.* 5:119-24
99. Villarejo D. 2003. The health of U.S. hired farm workers. *Annu. Rev. Public Health* 24:175-93
100. Villarejo D, Baron SL. 1999. The occupational health status of hired farm workers. *Occup. Med.: State Art Rev.* 14:613-35
101. Villarejo D, Lighthall D, Williams D, Souter A, Mines R, et al. 2000. Suffering in silence: a report on the health of California's agricultural workers. The California Endowment. *Rep.* 47, Calif. Endow., Woodland Hills, Calif.
102. Warrick LH, Wood AH, Meister JS, de Zapien JG. 1992. Evaluation of a peer health worker prenatal outreach and education program for Hispanic farmworker families. *J. Community Health* 17:13-26
103. Watkins EL, Larson K, Harlan C, Young S. 1990. A model program for providing health services for migrant farmworker mothers and children. *Public Health Rep.* 105:567-69
104. Weathers A, Minkovitz C, O'Campo P, Diener-West M. 2003. Health services use by children of migratory farmworkers: exploring the role of need for care. *Pediatrics* 111:956-63
105. Weathers A, Minkovitz C, O'Campo P, Diener-West M. 2004. Access to care for children of migratory agricultural workers: factors associated with unmet need for medical care. *Pediatrics* 113:e276-82
106. Weller SC. 1983. New data on intracultural variability: the hot-cold concept of medicine and illness. *Hum. Organ.* 42:249-57
107. White-Means SI. 1992. Health characteristics and utilization of public sector health facilities among migrant agricultural workers in Orange County, New York. *J. Health Soc. Pol.* 4:57-75
108. Wilson AH, Wold JL, Spencer L, Pittman K. 2000. Primary health care for Hispanic children of migrant farm workers. *J. Pediatr. Health Care* 14:209-15
109. Work DR. 2005. Tiendas and contraband pharmaceuticals. *NC Med. Board Forum* 10(2):16



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