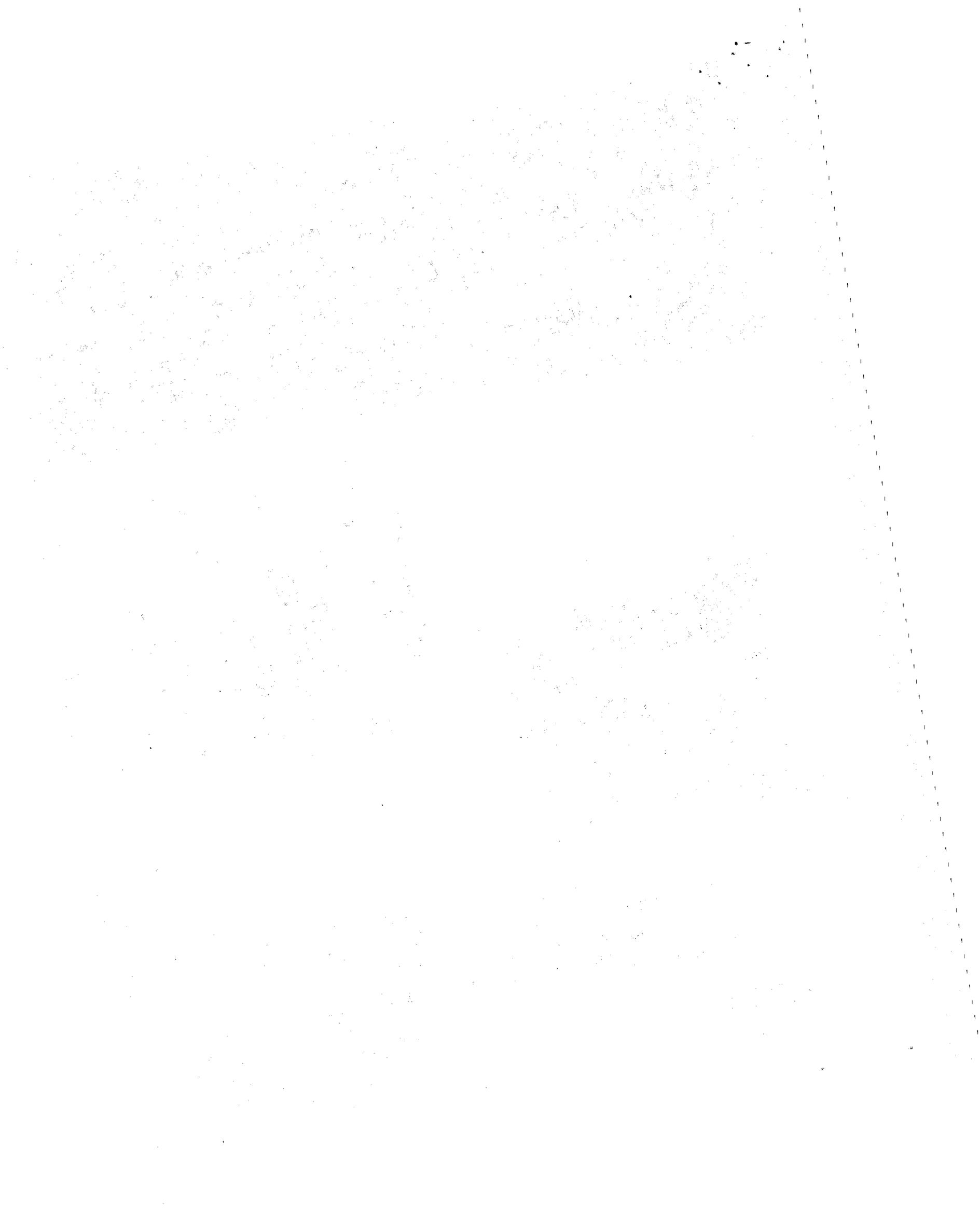


New Directions in the Surveillance of Hired Farm Worker Health and Occupational Safety



A Report of the Work Group
Convened by NIOSH May 5, 1995 to Identify
Priorities for Hired Farm Worker
Occupational Health Surveillance and Research





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May 5, 1995, to Identify Priorities for Hired Farm Worker
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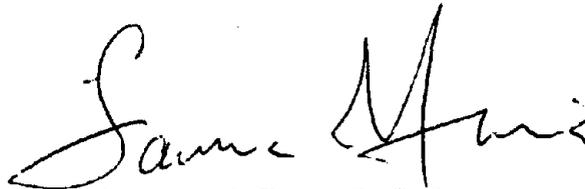
FOREWORD

There are approximately 2.5 million people who perform hired agricultural work in the United States. These workers face numerous hardships in the course of their normal work day, in addition to the added stress they face as a result of the seasonal nature of their work. According to data from the National Census of Fatal Occupational Injuries surveillance system, the agricultural industry has the second highest rate of occupational fatalities in the United States. Although poor working conditions for hired farm workers have been a persistent problem in the United States, they have not received sufficient attention. In 1990, the National Institute for Occupational Safety and Health (NIOSH), with a congressional mandate, began an agricultural safety and health initiative. As part of this initiative, NIOSH convened a work group in May 1995 consisting of experts in the areas of public policy, farm worker health, and occupational health, to assist in developing a prioritized set of objectives for the surveillance of hired farm worker occupational safety and health. In addition to the original meeting, work group members consulted with one another over the course of a year to finalize the priorities.

New Directions in the Surveillance of Hired Farm Worker Health and Occupational Safety is the report to NIOSH from that work group. In addition to priorities for surveillance and research of the occupational safety and health of hired farm workers, this comprehensive report outlines the factors that determine the occupational health status of hired farm workers. It also suggests recommendations for overcoming barriers involved in research with this population.

In 1996, NIOSH and its partners developed the National Occupational Research Agenda (NORA) in an effort to address changes in the U.S. workplace as well as the increasingly diversified U.S. work force. NORA consists of 21 priorities areas for occupational health research, many of which are relevant to this population and the priorities outlined in this report, including: Special Populations at Risk, Surveillance Research Methods, Allergic and Irritant Dermatitis, Musculoskeletal Disorders, Asthma and Chronic Obstructive Pulmonary Disease, Control Technology and Personal Protective Equipment, Infectious Diseases, and Traumatic Injuries. Farm workers provide a good example of a population of non-English speaking, low-literacy immigrant workers who migrate between a series of temporary jobs. This report provides recommendations and highlights the complex issues involved in studying these immigrant workers.

This document, as a consensus of experts from around the United States, will be a valuable resource on the occupational safety and health needs of farm workers.



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Executive Summary

Since its inception in 1970, the National Institute for Occupational Safety and Health (NIOSH) has sought to improve the health and safety of all United States workers through training, education, and research. Until 1990, NIOSH primarily targeted the occupational health and safety status of industrial workers. That year, however, the efforts of Senator Tom Harkin and family farm advocates produced the congressionally mandated NIOSH Agricultural Initiative. With steady support from Congress, NIOSH was able to place agriculture among its top surveillance and research priorities.

While this initiative succeeded in drawing attention to the many dangers that confront agricultural workers, the work largely focused on the traditional family farm. Recognizing that its surveillance and research projects had neglected other important members of the agricultural labor force such as hired farm workers, NIOSH expanded the scope of its agricultural initiative to include this distinct population. To this end, in May 1995, NIOSH Epidemiologist Lorraine Cameron convened a work group consisting of experts in the areas of public policy, farm worker advocacy, and occupational health to assist NIOSH in developing a prioritized set of objectives for the surveillance of hired farm worker occupational safety and health.

This thirteen member ad hoc committee began by determining the obstacles that have hampered previous efforts. They arrived at six:

- worker factors, such as immigration status;
- farm owner and labor contractor opposition to government regulations;
- migrant clinic and clinician factors, such as a lack of training in occupational medicine;
- weaknesses in the Workers' Compensation Insurance system;
- limitations of current and previously used surveillance techniques;
- the political climate toward agricultural labor.

The work group then devised a set of possible solutions for overcoming these obstacles. These proposals included the use of lay health workers, recruited from the hired farm worker population, to bridge the language and cultural gaps separating hired farm workers from those interested in monitoring their health status; increased support for organized labor; and greater enforcement of federal and state regulations.

The committee then turned its attention toward a discussion of topics central in the surveillance of the health status of hired farm workers. The group considered important health outcomes in the hired farm worker community, for example, back injuries and

traumatic accidents; hazardous workplace exposures, such as pesticides; systems for measuring the prevalence of these outcomes, such as Workers' Compensation Insurance; and interventions, which could be evaluated for their effectiveness, such as Worker Protection Standard training.

From this exchange of ideas emerged a consensus regarding health issues and work exposures for surveillance and research. For surveillance, the work group identified ten occupational health priorities and ranked them in order of their importance:

- workplace ergonomic conditions and musculoskeletal injuries,
- pesticides,
- traumatic injuries,
- respiratory diseases,
- water quality,
- infectious diseases,
- cancer,
- eye conditions,
- mental health.

Similarly, for research, the committee identified seven occupational health priorities and ranked them in order of their importance:

- pesticides,
- ergonomic and musculoskeletal conditions,
- injuries,
- effect of protective measures,
- cancer,
- identification of control or comparison populations,
- mental health.

Lastly, the committee addressed project design and methods for conducting surveillance; useful data sources and documents for future research and surveillance projects; additional means for procuring funding and increasing its distribution among those concerned with hired farm worker health and safety; and efforts for increased collaboration between governmental agencies and community based organizations such as hired farm worker interest groups.

This report summarizes those factors and recommended priorities originating from the Spring 1995 meeting. It is intended to serve as a guide for NIOSH and for other government agencies concerned with agriculture and with the health and well-being of its hired labor force.

**New Directions in the Surveillance of
Hired Farm Worker
Health and Occupational Safety**

**Valerie Wilk and Rose Holden,
Work Group Co-Chairs**

Introduction

Background and Process

The Occupational Safety and Health Act of 1970 established the National Institute for Occupational Safety and Health (NIOSH). As part of the Centers for Disease Control (CDC), its objective has been to improve the overall health and safety of all United States workers. In doing so, it conducts extensive scientific research in the area of occupational safety and health, provides workplace health hazard evaluations and technical assistance to states and other agencies, makes recommendations for new standards based on its research, and disseminates health and safety information.

Traditionally, NIOSH has been devoted to examining the health status of industrial workers. In 1990, however, family farm advocates and Senator Tom Harkin through a congressional mandate created the Agricultural Initiative, which directed NIOSH to place the agricultural industry among its top surveillance and research priorities. During the first five years, NIOSH focused its energies around the traditional family farm. With steady congressional support, the Agricultural Initiative brought needed attention to the hazards often present in the agricultural workplace.

As NIOSH's investigative efforts progressed, however, it became apparent that certain members of the agricultural labor force such as hired farm workers were not being addressed by its research and surveillance initiatives. Acknowledging this discrepancy, NIOSH redirected its focus and began to examine hired farm workers as a distinct and unique population. In need of further guidance about the health and safety issues that confront hired farm workers, Dr. Lorraine Cameron of NIOSH, in the Spring of 1995, organized a work group of experts with extensive experience in the field of migrant and seasonal farm worker health and occupational safety.

On May 5, 1995, the group convened in Cincinnati, Ohio, to produce a set of recommendations and to prioritize action items, which in turn, would direct NIOSH in developing surveillance, research, and intervention activities in

the area of hired farm worker health and occupational safety. The meeting was structured into workshops which focused on three central themes: 1) Health Status, 2) Hazardous Work Exposures, and 3) Intervention/Evaluation.

To facilitate the exchange of ideas, the group was divided into two subgroups: 1) Health Status Surveillance and 2) Exposure Surveillance. The two subgroups began their sessions by brainstorming around questions such as what are the important health outcomes in the hired farm worker community and what are the hazardous exposures that confront this population. NIOSH staff observed these sessions along with the plenary discussions and recorded the work group's ideas onto flip charts.

The work group separated into subgroups a second time to examine interventions and determine which types could be evaluated for their effectiveness such as improved ergonomic training and better ergonomic design of agricultural related implements. By the end of the meeting, the work group had produced a set of occupational health outcomes and workplace exposures for future surveillance systems and research projects, a set of proposals for increasing the distribution of funding and better project collaboration, and a set of priorities for project design.

Following the conference, work group co-chairs, Valerie Wilk and Rose Holden constructed an exercise for ranking the ideas generated during the meeting. Each work group member received a copy of the ranking exercise and then returned the completed copy to the co-chairs. Wilk and Holden tallied the results and prepared this report, which received a final review by the entire work group.

Challenges in the Occupational Health Surveillance of Hired Farm Workers

Since the Farmworker Justice Fund published its report, *The Occupational Health of Migrant and Seasonal Farmworkers in the United States*, twelve years ago, the attention given to hired farm workers has gradually improved. Cross-sectional studies of agricultural labor, such as the *National Agriculture Workers Survey*, have contributed new techniques,

which have proved extremely successful in tracking even highly nomadic hired farm workers and in gathering data on some of the occupational injuries and illnesses prevalent in this population. With these new approaches, knowledge about the demographics, health status, and occupational hazards of hired farm workers has become more detailed and more accurate. This information has enabled persons concerned with the well-being of agricultural laborers to inform policymaking at the federal, state, and local levels.

In spite of these advances, numerous obstacles continue to hinder effective hired farm worker surveillance and research. Political opposition farm owner and labor contractor groups, reduced funding for enforcement agencies, and a slow reaction on the part of state and federal governments to acknowledge the realities of hired farm workers represent a few examples. As a result of these roadblocks, problems acknowledged twenty years ago as threats to the health and overall condition of hired farm workers still persist. Issues such as the absence of employer provided field sanitation facilities, pesticide exposure, and musculoskeletal injuries are just some of the hazards that continue to confront agricultural workers. Even though some protective legislation and regulations have emerged, farm workers are often unaware of the laws and the agencies that enforce them, and consequently, many work-related injuries and illnesses as well as employer violations go unreported.

Similarly, misperceptions regarding the characteristics of hired farm workers have impaired funding and the direction of research. This, in turn, has restricted the progress of occupational safety and health programs. Both federal and state governments, unaware of the true characteristics and conditions of hired farm workers, have initiated well-intended programs that failed to resolve important issues affecting this population. In the case of labor contractors, who are significant players in the agricultural industry, conflicting laws at the federal, state, and county level along with the lack of inter-agency cooperation have made it extremely difficult to monitor and regulate their business activities. This report summarizes the challenges in conducting accurate occupational health surveillance of hired farm workers and offers a set of strategies and solutions for overcoming them. In this manner, it is intended to serve as a guide for a new direction in the surveillance of hired farm worker occupational safety and health.

Factors in Determining the Occupational Health Status of Hired Farm Workers

To conduct accurate hired farm worker surveillance and research, a thorough understanding of the population in question as well as of U.S. agriculture is required. Specifically, the complex demographic and employment characteristics of the estimated 2.5 million people who perform hired agricultural work each year needs to be understood.¹ Also needed is a thorough grasp of the changing conditions of U.S. agriculture. For example, in the last generation, there has been a dramatic shift from extensive crops, such as cereal grains, which typically require greater amounts of land, to intensive ones such as fruits, vegetables, and horticultural products, which use more pesticides and require more manual labor.

Other factors that may block effective tracking and evaluation of worker health status and exposure to workplace hazards include: workers' immigration status, opposition from farm owners and labor contractors, declining resources of migrant health centers, shortcomings of Workers' Compensation Insurance, limitations of current and previously used surveillance systems, and the political climate toward agricultural labor. With respect to the migrant health centers, a lack sufficient funding has hampered their ability to effectively serve hired farm workers. More importantly, many migrant clinicians do not possess the cultural or occupational knowledge that is necessary in assessing the health status of this population.

From a general discussion, the work group members isolated the obstacles that impede hired farm worker surveillance and placed them into six categories: worker factors, employer factors, clinic/clinician factors, Workers' Compensation Insurance factors, surveillance system factors, and political factors. They also proposed a set of solutions for overcoming these problems.

I. Worker Factors

Depending on the particular region of the country, hired farm workers may include Mexicans,

¹ *Report of the Commission on Agricultural Workers* (Washington: GPO, 1992) 1

Guatemalans, Haitians, African-Americans, non-Hispanic Whites, Southeast Asians, Native Americans, and various Central American indigenous peoples. While some groups are represented in greater numbers, it is impossible to conduct accurate observation and provide effective injury and illness prevention to the entire hired farm worker community without information that accurately represents all of its members. Likewise, the wide variety of languages, ranging from Spanish to a number of indigenous tongues such as Mixteco and Zapotec, coupled with the high levels of functional illiteracy among hired farm workers, present additional obstacles for health surveillance programs.

The growing diversity of the hired farm worker population owes itself both to an increase in immigration as well as to a restructuring of U.S. agriculture. Over the past generation, changes in consumer eating habits and increased demand from abroad have spurred a tremendous boom in the fruit, nut, and fresh vegetable industries. U.S. agriculture has also witnessed a dramatic rise in the popularity of ornamental and nursery crops. In response to these new preferences, farm owners and operators have shifted their production focus away from extensive crops such as wheat, barley, and oats and expanded into the potentially more lucrative arena of fruits, fresh vegetables, and horticulture commodities. Indicative of this transformation are agricultural statistics that show from 1982 to 1992 farm cash receipts for fruit, vegetable, and nursery crops jumped from one-fifth to nearly one-third of all U.S. crop production.²

Not only have these developments in U.S. agriculture brought an economic windfall to the industry as a whole; they have also created a greater need for manual labor. Even with improvements in farm machinery, growers of strawberries, grapes, and almonds still depend heavily on seasonal workers to prune trees and vines as well as harvest product. In California and elsewhere, the modernization of the workplace frequently involves shorter peak harvest periods, bigger crews, and consequently, shorter employment periods for workers. Despite this seasonality within agriculture, the notion that people enter the workforce for only part of year is a myth: eighty-nine percent of all hired farm work is done by people who spend the majority of the year working in agriculture. Moreover, most hired farm workers, due to a lack of skills or language ability, do not supplement their annual income by working in other

sectors; rather, they subsist by stringing together a series of short-term agricultural jobs. These industry changes have, in turn, greatly influenced the health, safety, and livelihood of the entire hired farm worker population.

Coinciding with this demand for manual labor has been the arrival of large numbers of immigrants from Mexico, the Caribbean, Central America, and Southeast Asia who have provided farm owners and operators and labor contractors with an inexpensive, steady supply of workers. In just seven years, the proportion of foreign-born workers in the agricultural workforce has risen significantly from 60% in 1989 to 70% in 1995.³

Within this new demographic structure, the dominant group has become young Latino males, mostly of Mexican origin. Whereas U.S. born African-American and non-Hispanic Whites once comprised a significant proportion of hired farm workers, those born in Mexico now constitute 65% of the population.⁴ Similarly, women, while continuing to occupy a role in the workforce, are quickly being replaced by newly arrived, young Mexican males. According to data gathered from the *National Agricultural Workers Survey (NAWS)*, the percentage of women doing hired farm work fell from 25% in 1989 to 19% in 1995. In planning future studies and interventions it will be important to consider these demographic changes.

As for children age 17 and under, their numbers have risen somewhat over the last decade. In 1989, NAWS research estimated their proportion of the hired work force to be 4% while in 1995 the figure increased to 8%.⁵ Their presence in agriculture directly relates to the industry's low wages with many families needing the supplemental income that a child can provide. Even extremely young children can be found at the workplace as many parents lack other daycare options.

Coming from primarily rural areas in their native countries, foreign-born farm workers usually know only their native language, possess only a few years of formal education, and, increasingly, lack authorization to work in the U.S. According to NAWS data, average educational attainment is just six years while the proportion of undocumented farm

² U.S. Department of Commerce, *1992 Census of Agriculture* (Washington: GPO, 1992) 10.

³ Gabbard, Mines, and Steirman, *A Profile of U.S. Farm Workers: Demographics, Household Composition, Income and Use of Services* (Washington: U.S. Department of Labor, Office of Policy, 1997) 1.

⁴ Gabbard, Mines, and Steirman, *A Profile of U.S. Farm Workers*, 3.

⁵ Gabbard, Mines, and Steirman, *A Profile of U.S. Farm workers*, 1.

workers has risen to an estimated 37% up from 7% in 1989.⁶

These numbers reflect not only the failure of the Immigration Reform and Control Act of 1986 (IRCA) but also a high and possibly growing turnover rate among hired farm workers. Low wages and poor benefits combined with the high frequency of injuries and accidents make agricultural work unappealing, especially to subsequent generations of hired farm workers. Studies of California hired farm workers reveal that only 3% of hired farm worker children intend to work in their parents' profession.⁷ For first generation hired farm workers the rate of attrition is also high. Based on NAWS information, in 1995, 18% of the farm workers were newcomers to U.S. agriculture.⁸ At this rate, the average stay for a worker ranges between five and six years. As older, experienced farm workers continue to leave the industry because of health problems or better economic opportunities, the quantity of undocumented immigrants is bound to increase. Illustrating this point, the NAWS indicates that of those 18% of workers who were new arrivals, 70% lacked work authorization.

Regardless of the boom in labor intensive agriculture or of the increase in worker turnover, immigration has created a labor surplus and widespread unemployment and underemployment. IRCA, designed to curtail the entry of undocumented immigrants, actually stimulated a new wave of immigration that continues today. The granting of temporary resident status to over one million hired farm workers through the Seasonal Agricultural Worker and General Amnesty Program permitted many, who might not have stayed, the opportunity to settle and work permanently in the United States. As the majority of these grantees acquired permanent residency status, they carved out immigration paths and opened the way for family members and friends from their native towns and villages, most of whom lack work authorization. Furthermore, poor enforcement of the law's employer sanctions provision allowed growers and labor contractors to continue their preference of using inexpensive, undocumented workers.

Taking all of this demographic information together, today's hired agricultural labor force consists of both domestic-born and foreign-born workers, migrating and settled seasonal workers,

and a sizeable foreign-born transnational population that spends part of the year abroad and part of it working in the U.S. Current estimates from the U.S. Department of Labor indicate that about four of ten hired farm workers migrate to find employment. About three in ten fall into the transnational category and seasonally shuttle migrate between their native town and a specific location in the U.S. Only one in ten of all hired farm workers engages in "follow the crop migration." Of course, these statistics vary from community to community as each region's hired farm worker population adapts to an area's characteristics.

Undocumented workers present several additional problems not only because they are typically the most exploited, but also because they are the least likely to seek out help and often refuse to participate in interviews or health screenings due to their status. Driven out by either political instability, economic crises, or both, these newcomers to U.S. agriculture arrive eager for any opportunity no matter how low the wage or how poor the conditions. Because their status may prevent them from receiving public assistance or obtaining benefits such as state disability insurance, undocumented workers frequently tolerate employer abuses and do not report injuries or illnesses.

Even workers legally authorized to work in the U.S. may not disclose all of the information about the origin of an injury or illness for fear of reprimand or retaliation by their employer. Problems with field sanitation, machine safety, or pesticide training represent just some of the topics that hired farm workers may fear discussing because of possible employer retributions. Hence, the attitude to endure and survive in order to maintain a job and an income source is quite prevalent. Even women who are pregnant often do not inform their supervisors or employers about their pregnancy reasoning that they would be replaced with another willing unemployed farm worker.

Adding to this idea of "suffer-sacrifice" is a general lack of health care services for low-income people. Since the majority of a hired farm workers' wages go to food, clothing, and shelter, health care usually falls near the bottom of personal priorities. Consequently, many workers return to Mexico for treatment or in some cases, rely on home remedies. In either case, this reduces the number of verified cases available for occupational health surveillance.

On those occasions when a worker has suffered a serious accident or becomes gravely ill, he or she will utilize the available resources. Unfortunately, many farm workers in this situation do not return for follow-up care, and the clinics lose continuity with

⁶ Gabbard, Mines, and Steirman, *A Profile of U.S. Farm Workers*, 1.

⁷ Ed Kissam and David Griffith, *The Farm Labor Supply Study: 1989-1990*, Volume 2, Case Studies, Parlier, California, December 30, 1991.

⁸ Gabbard, Mines, Steirman, *A Profile of U.S. Farm Workers*, 1.

the patient. Thus, it is extremely difficult to chart a hired farm worker's health status and then make inroads for prevention.

The beliefs and attitudes of many hired farm workers also impede their understanding of factual definitions of health and physical well-being which, subsequently, hinders health surveillance programs. An important example pertains to answering questions concerning levels of chronic pain. Farm workers often have trouble responding to these types of health questions because many of them view pain as a normal part of work and will only seek care when the condition becomes severe or disabling. This same issue carries over to preventive measures designed to reduce the incidence of musculoskeletal injuries or other hazardous work exposures. Frequently, workers do not understand the association of a problem with its source because of cultural misunderstandings.

In other instances, cultural philosophies can hamper treatments for health problems. For instance, ointments, herbal remedies, and massages are the typical solutions for a variety of injuries and illnesses. With respect to indigenous peoples such as Mixtecs, many hold serious reservations about visiting a clinic. Even when such services are available, these groups may prefer to see a tribal doctor or midwife. Another issue of cultural confusion involves language and the ability of both medical personnel and farm workers to understand each other.

The last area of concern regarding worker factors affecting health surveillance pertains to hired farm workers' knowledge of government and low cost private services. Specifically, laws like Workers' Compensation Insurance, the Worker Protection Standard, and the Federal Field Sanitation Standard are often unknown to them. This lack of awareness combined with language barriers, embarrassment, transportation problems, and fear of the government keep many hired farm workers from reporting incidents or seeking aid for a serious health problem. While volunteer or low-income migrant legal services can educate workers about their rights and serve as advocates, relatively few quality organizations exist. In recent years, Congress has substantially reduced funding for these programs and placed restrictions on the kinds of activities that advocates can use in representing their clients.

All of these issues greatly contribute to the difficulties in accurately monitoring the health status of hired farm workers. The increasing proportion of undocumented hired farm workers among the entire workforce simply compounds the problems already

present. This particular situation results in two significant problems: first, there has been an increase in the number of hired farm workers who are untrained and unaware of the laws designed to protect them (and therefore more prone to occupational injuries and illnesses), and second, because undocumented workers either do not qualify for or utilize the health care services available, a large group of hired farm workers is underrepresented in health surveillance data.

II. Employer Factors

Compounding the workers' lack of knowledge about occupational safety and health regulation is the reality that many farm owners and operators do not report incidents to the proper authorities. Out of fear of increased insurance rates or fines from government agencies, many farmers hide behind the labor contractors who employ a sizeable portion of the hired farm workers. In California, one in three hired farm workers reports being employed by a labor contractor who typically pay lower wages than farm owners.⁹ NAWS data from the fiscal year 1990-1991, show that in California employees of labor contractors received only \$4.45 per hour, the lowest median earnings when compared with employees of all types of farm operators.¹⁰

Large-scale agricultural operations that require a labor force of one hundred or more workers during the peak season depend heavily on labor contractors to procure and manage employees. Through this system, farm owners and operators often shift their responsibility as employers to the farm labor contractors, which in turn, frequently allows the former to escape any penalties that result from violations of health, safety, wage, and hiring laws.

As for the labor contractors, they receive very little scrutiny and their training is oftentimes suspect. In spite of the Migrant and Seasonal Agricultural Worker Protection Act, which states that all labor contractors must be registered with the U.S. Department of Labor, there are no minimum requirements for obtaining a credential. Moreover, many of these contractors do not possess any more knowledge regarding occupational safety and health regulations than the hired farm workers themselves.

⁹ Howard, Rosenberg, Rick Mines, and Susan Gabbard, *California Findings From the National Agricultural Workers Survey: A Demographic and Employment Profile of Perishable Crop Farm Workers* (Washington: U.S. Department of Labor Office of the Assistant Secretary for Policy, 1993) 34.

¹⁰ Rosenberg, Mines, and Gabbard, *California Findings From the National Agricultural Workers Survey*, 38.

This opposition to fair working conditions and wages reflects the agriculture industry's longstanding preference for cheap labor and minimal government regulation. To this end, both farmers and labor contractors have resorted to employing indigenous people from Guatemala or Mexico who often work for far less than other groups and are used to drive down the wages of the entire work force. In recent years, employers have lobbied for large-scale guest worker programs that would guarantee a steady supply of workers while relieving the industry of temporary employee shortages. Enactment of such programs could serve to further depress industry wages and hinder efforts to improve workplace conditions.

Indicative of the decline in real wage rates is the increase in the number of farm workers living below the poverty line. NAWS data maintains that between 1990 and 1995 the number of hired farm workers who reported incomes below the poverty line jumped from 50% to 61%.¹¹ As for regulations involving pesticides and equipment safety, farmer owners and operators have continuously campaigned to restrict the intervention policies of state and federal agencies despite the risks that chemical exposures and other workplace hazards pose to the farmers themselves and to their families.

III. Migrant Clinic/Clinician Factors

When hired farm workers do suffer severe injuries or arrive at the point where their chronic pain has become intolerable, they usually seek care at a local clinic. These clinics vary from migrant health care centers to rural outreach services. Often these health care providers offer farm workers a relatively inexpensive solution for treating illnesses or injuries. For various reasons, however, these clinics only provide health care services to approximately 20% of the full population of hired farm workers.

One area of concern involves the lack of occupational medicine training among clinicians. In many instances, rural health care providers possess neither the knowledge nor the training to record a proper medical history of a person's work exposure or the incident that led to the injury or illness. Furthermore, migrant clinicians either do not have access to prevalence data for specific kinds of injuries and illnesses or are unaware that such data exists. In other cases, either time constraints or an employer's unwillingness to cooperate prevent a physician from learning more about the origin of an individual's particular health problem. As a result,

the migrant health clinic usually sees the hired farm worker on only the one occasion, and the clinician loses any opportunity to examine the long-term effects of a given injury or illness.

Financial burdens due to cutbacks in migrant clinic funding have prevented many clinics from improving their health care services or expanding their knowledge about these types of patients. Without sufficient dollars, many migrant health clinics cannot invest in the laboratory equipment necessary to make correct evaluations of work-related illnesses and injuries such as a pesticide exposure. In addition, many large companies maintain contracts with private physicians and refer their employees who become injured or ill while working to them. This removal of a significant amount of hired farm workers from the patient pool treated by migrant health clinics creates further economic difficulties for the clinicians. With the few hired farm workers that are left, the significant amount of paperwork involved with Workers' Compensation claims, coupled with low reimbursement and the fear of litigation, may deter them from accepting such cases.

As mentioned earlier, the other obstacle blocking successful intervention by clinics and rural health facilities is of cultural origin. Primarily due to language and cultural differences, farm workers and clinicians may have trouble communicating with each other. Differences in terminology can affect a clinician's ability to take an accurate health history from a farm worker. In addition, many hired farm workers hold biases against western medicine and as a result, do not readily accept the advice of health care providers.

IV. Workers' Compensation Insurance System Factors

In those states that make it compulsory for employers to carry Workers' Compensation Insurance for their hired farm workers, the system effectively gathers data on job-related injuries and illnesses. However, due to insurance industry preference Workers' Compensation Insurance is a state option and not federal law. Only eleven states currently treat all seasonal agricultural workers the same as workers in other industries under the law. Another twenty states require coverage of only a portion of the hired farm labor force, which varies from state to state depending on each one's particular set of employer exemptions. As for the other nineteen states, any coverage through

¹¹ Gabbard, Mines, and Steirman, *A Profile of U.S. Farm Workers*, 25.

Workers' Compensation Insurance is at the discretion of the individual employer.¹²

In states like California, where Workers' Compensation Insurance applies to agricultural employees in the same manner as to workers in other industries, hired farm workers are entitled to indemnity and payment of medical bills. The only potential exception to this rule pertains to undocumented workers. In their case, states such as California have attempted to exclude them from public benefits under the 1996 Federal Welfare Reform Act, so far unsuccessfully. With respect to indemnity and compensation for injury, the amount of restitution is determined by the individual states, which in some cases may be less than adequate.

Regarding the surveillance of job-related illnesses and injuries of hired farm workers, states like California do so through a system that assigns employers to an industrial classification and individual employees to a risk category within the specific industry. This, in turn, enables a state's insurance bureau to monitor prevalence of injuries and illnesses within each agriculture sector such as work in deciduous tree fruit or stock farm. The lack of availability in Workers' Compensation Insurance in all states reduces the system's ability to serve as a sufficient collector of hired farm worker occupational safety and health data on a nationwide basis.

Other factors that affect the system's capacity for surveillance include unreported injuries and illnesses that occur when hired farm workers return to their native countries for treatment. This is commonly the case with unauthorized workers who may simply wait until they can seek medical attention in Mexico. In other instances, hired farm workers either are unfamiliar with the existence of the Workers' Compensation Insurance law and its applicability to them, or they are persuaded by an employer, such as a labor contractor, not to report the injury or illness. Due to these situations, a sizeable and unknown portion of hired farm worker injuries and illness goes unreported under Workers' Compensation Insurance.

¹² Brian R. Craddock, ed., *Federal and State Employment Standards and U.S. Farm Labor: A Reference Guide to Labor Protective Laws and Their Applicability in the Agricultural Workplace* (Austin: Motivation Education & Training Inc., 1988) 41-823. U.S. Chamber of Commerce, *1998 Analysis of Workers' Compensation Laws* (Washington: GPO, 1998) 9-17. For a complete list of all fifty states and their coverage of hired farm workers under Workers' Compensation Insurance, refer to Appendix A.

V. Surveillance System Factors

Even for those health surveillance systems already in place, there are additional obstacles that hinder their effectiveness. To begin with, a debate exists over the idea that farm work or any job associated with this enterprise is healthy. While clinicians and other medical professionals, who directly deal with hired farm workers when they become ill or injured, challenge this notion, health studies have consistently shown that this population is young, fit, and has lower than average high-risk behaviors such as smoking or excessive alcohol consumption.

Based on this latter perception, funding for health surveillance projects has on occasion been inadequate. Without the necessary dollars, it is impossible for health projects to enlarge their scope and cover greater portions of the hired farm worker population. Likewise, insufficient funding prevents the development of new data collection systems that use more active surveillance techniques to document problems that are never seen at clinical facilities.

The constant change of an already complex agriculture industry adds to the problems facing surveillance programs. With the introduction of new tools, pesticides, machines, and work processes, hired farm workers continually encounter new risks of disease and injury. Thus, those surveillance systems that do not or cannot adjust to these new realities will fail to gather accurate data on the entire spectrum of hired farm workers.

VI. Political Factors

Quite often politics compound the problems already present among workers, employers, clinicians, and regulatory acts. Anti-immigrant legislation like California's Proposition 187 and the federal government's 1996 Illegal Immigration Reform and Immigrant Responsibility Act constitute just two examples of public policy that have made it more difficult to conduct effective occupational surveillance of hired farm workers. This systematic targeting of groups based on immigration status and national origin makes many hired farm workers already uncertain about reporting their work-related injuries or illnesses less likely to do so. Moreover, this type of legislation simply increases the marginalization of hired farm workers.

VII. Strategies/Solutions

To bridge the language and culture gaps between hired farm workers and health

investigators, the continued use of promotoras or lay health workers, chosen from the hired farm worker community and trained on basic health promotion, should be a point of focus. As for increasing worker awareness with respect to legal rights and promoting better wages and working conditions, more support is needed for organized labor and unionization.

To counter the negative political campaigns waged by the agricultural industry, hired farm worker supporters need to target everyone affected by poor working conditions. This means making consumers and families of farm operators more cognizant of the realities present in the agricultural workplace. From this standpoint, it is essential to draw the attention of the general public to such key issues as pesticide use and exposure. As for state and federal governments and their respective agencies, substantial improvements need to be made such as raising the minimum wage, universalizing Workers'

Compensation Insurance for all agricultural employees, improving Unemployment Insurance coverage, and increasing the level of migrant clinic funding.

Increased levels of enforcement, stronger regulatory efforts, and greater cooperation among federal, state, and county agencies are also essential to insure farm owner and labor contractor compliance with state and federal laws. Targeted federal and state health and safety enforcement efforts conducted in a high profile manner over a multi-year period would lessen the abuse of hired farm workers and improve workplace health and safety.

In summary, the obstacles present in monitoring the health status and occupational exposures of hired farm workers will require a multi-faceted set of solutions.

Work Group Priorities

Work Group Priorities for Surveillance

Public health surveillance is a systematic approach for acquiring information needed for disease and injury prevention in a community or population. Using gathered data, health investigators can analyze the prevalence of specific diseases or injuries, identify epidemics or clusters of diseases and injuries, evaluate the effectiveness of intervention efforts such as enforcement and regulatory acts, and target new problems and research needs. In this manner, public health surveillance can serve as an excellent tool for assessing the needs of a given community or population and mustering resources to meet those needs.

In determining the most important health and safety concerns of hired farm workers, the work group considered data from critical sources such as the NAWS, Workers' Compensation Insurance, and the Hispanic Health and Nutrition Examination Survey (Hispanic HANES). In doing so, the committee members discussed what is known about the health status of farm workers, what is known about the hazards of the agricultural workplace, and what information gaps exist with respect to these two areas. The group concluded its analysis of surveillance system priorities by looking at interventions and which types of interventions can be measured for their effectiveness in improving the health and safety conditions of hired farm workers.

The ten priorities selected as the focus areas for future surveillance systems were developed from a polling process of the work group members. The priorities as well as their subcategories were ranked in order of importance. The decision for the ranking was largely based on current data taken from previous occupational health surveillance projects. The individual subcategories of the ten priorities

were then organized into three sub-topics, which were determined by the work group's responses. Accordingly, the priorities for surveillance consist of ten areas ranked by importance each accompanied by a set of subcategories and sub-topics. In certain instances, ideas or comments that did not fall into one of the subcategories were placed at the end of each topic under the heading "further comments." For a complete breakdown of the priorities for surveillance, refer to Appendix B.

Priority #1: Ergonomic/Musculoskeletal Conditions

The rigorous nature of farm work exposes workers to a number of risk factors that have been associated with musculoskeletal injuries. Heavy lifting, working in awkward positions for a prolonged period of time, and poorly designed tools and implements take an unforgiving toll on the bodies of hired farm workers and make musculoskeletal conditions the most commonly reported health problem. For these reasons, the work group chose this topic as the most important priority for surveillance.

Among musculoskeletal conditions, back problems and upper body injuries are the most prominent. In examining the various back conditions that affect hired farm workers, surveillance needs to accomplish three tasks. First, it must determine the prevalence of such injuries among working hired farm workers. Then, it should explore and implement ergonomic intervention programs including preseason training, better tool design, and a reorganization of work tasks to decrease repetitiveness and awkward postures. Lastly, it is essential that surveillance assess chronic conditions and long-term health outcomes. This can be achieved by investigating the prevalence of back conditions among disabled and retired farm workers.

As for other upper body extremities, surveillance needs to establish the origin of specific health problems. For example, tendonitis among pruners is one relationship that requires further analysis. To

solidify these findings, it will be necessary for future hired farm worker health projects to extrapolate comparative data from other non-agricultural industries.

The third notable area concerns the effectiveness of interventions already in place. In this category, physical conditioning, and its usefulness as a preventive measure for preventing early season injuries, ranks the highest. A second issue deals with Workers' Compensation Insurance and changing the system to recognize non-acute health conditions such as Cumulative Trauma Syndrome. This can be done by improving the definitions of health outcomes and educating claims reviewers on the validity of injuries such as tendonitis, Carpal Tunnel Syndrome, and lower back pain. Likewise, clinicians and migrant health practitioners should be given access to published materials that discuss the biological plausibility of farm work-related injuries and illnesses. The other aspect of the Workers' Compensation system that requires review involves the time lag of payments and its effect on the well-being of an injured or ill hired farm worker and his or her family.

The remaining aspects of ergonomics and musculoskeletal conditions focus on specialized themes. These consist of Carpal Tunnel Syndrome, handweeding, poorly designed ergonomic tools like the short-handled hoe, child safety, reproductive outcomes and their relationship with musculoskeletal injuries, early season injuries, and Workers' Compensation Insurance denial of claims for non-acute injuries. In each instance, surveillance needs to assess prevalence and determine the relationship between a specific work exposure and a subsequent set of possible health outcomes. For example, surveillance must first examine handweeding and its association with back injuries and bodily stress and then determine the prevalence of these types of injuries among workers who perform this task. For reproductive outcomes such as miscarriages and premature deliveries, researchers will need to develop new methodology in order to assess their relationship with musculoskeletal injuries and disorders.

Priority #2: Pesticides

In looking at the health risks associated with pesticides, the work group concluded that the three most important areas for investigation and surveillance are exposures, poisonings, and effectiveness of interventions. Regarding exposures and poisonings, the principle objectives are to gather more data on the actual number and type of incidents involving farm workers and to ascertain the

level of underreporting. Other significant issues in the surveillance of exposures and poisonings involve pesticide drift and workers training on this type of exposure, child poisonings from contaminated materials brought into the home, exposures from working with high foliage crops, and the clinical characteristics of over-exposure.

With respect to interventions, the primary concern is examining the already existing workplace requirements. The Worker Protection Standard, restricted entry intervals, Personal Protective Equipment (PPE), and worker and employer training fall into this category. Additional topics, which were not ranked, include the removal of pesticides from the market, the availability of laundry facilities and the provision of rehabilitation centers.

The remaining pesticide-related topics pertain to pesticide exposures and their effect on reproductive outcomes, heat stress and personal protective equipment, greenhouse hazards, untrained hired farm workers who work with pesticides and chemicals, and unknown health problems with cholinesterase inhibitors. Under reproductive outcomes, the key concerns are birth defects and miscarriages. For the latter, surveillance will need to develop new monitoring and data collection techniques.

A critical aspect in these remaining topics involves improving the training and education of workers and employers. For example, pesticide drift is a common cause of worker exposure; however, many hired farm workers are unaware of this danger. Consequently, surveillance needs to not only determine the extent of certain kinds of pesticide exposures but also measure worker awareness with respect to these types of work hazards. For some issues like cholinesterase inhibitors, health outcomes such as Parkinson's disease, muscular dystrophy, and other neurological disorders will require extensive surveillance and possibly the creation of new assessment methods.

Priority #3: Traumatic Injuries

Due to their frequency and their severity, the work group ranked traumatic injuries such as bone fractures, occupational fatalities, and other types of disabling accidents as the third priority. Among serious injuries, motor vehicle accidents involving the transportation of workers to and from the job-site are the most important topic for surveillance. With respect to those injuries directly associated with the workplace, the committee identified farm machinery, electrocutions, and ladder injuries as the most crucial. A key sub-topic involving all four of these categories pertains to incidence on small farms—

those employing eleven or fewer employers—where the federal Occupational Safety and Health Administration (OSHA) only has jurisdiction under specific circumstances such as a work-related deaths or if the establishment operates a temporary labor camp.

As with the pesticide and musculoskeletal priorities, Workers' Compensation Insurance was given high priority under traumatic injuries. In this case, surveillance needs to compare coverage for acute conditions with coverage for chronic problems, review the level of compensation for disabling health outcomes, and compare those states that grant farm workers coverage against those that do not.

Other priorities include child safety, interventions, disabled workers, reproductive problems associated with traumatic injuries, personal and societal costs of traumatic injuries, and the lack of rehabilitation facilities for hired farm workers. For children, surveillance efforts should be focused on developing preventive methods such as increased daycare services, assessing the prevalence of traumatic injuries, and analyzing issues such as child labor and living conditions.

For interventions, the main objectives pertain to looking at the effectiveness of programs that offer incentives for improving safety in the workplace and in transportation. From this standpoint, surveillance needs to assess programs like California's open rating with its experienced modification factor which allows farm operators and labor contractors who have lower workers' compensation claims to qualify for reduced insurance premiums.

Under the remaining categories, such as disabled workers, surveillance needs to determine the extent of the problem, develop techniques for monitoring the population concerned, for example binational studies, and address the availability of government agencies and health services, which can offer assistance. In the case of reproductive problems such as miscarriages and their relationship with traumatic injuries, new surveillance procedures must be created.

Priority #4: Upper and Lower Respiratory Problems

The variety of exposures that confront hired farm workers and their respiratory systems make upper and lower respiratory conditions a high priority for health surveillance. Pollen, dust, molds, pesticides, and other agricultural chemicals represent just some of the substances that can cause allergies and a wide range of other respiratory conditions. In this category, the top two priorities for surveillance are

nursery and greenhouse workers and interventions. As with others health outcomes, investigators need to assess the prevalence of respiratory diseases among nursery and greenhouse workers and then institute new programs to educate migrant clinicians about these kinds of occupational health hazards.

In looking at interventions, the first priority is to examine the impact of a change of environment on a worker's respiratory condition. Similarly, surveillance needs to consider rehabilitation and its influence on a worker's respiratory condition. Lastly, with respect to interventions, surveillance must explore avenues for preventing work-related respiratory illnesses.

The remaining areas of concern under upper and lower respiratory conditions deal with specific crops and work activities. For example, surveillance needs to investigate the relationship between certain respiratory problems and pesticides such as cotton defoliants and sulfur dust, which is used on table grapes; determine the prevalence of such health outcomes; and assess clinician training in recognizing these types of conditions.

In apple thinning, where workers are in frequent contact with pesticide residues, surveillance must look at the prevalence of respiratory illnesses and assess provider awareness of these health problems. Likewise, hops asthma, which is special respiratory concern, must be looked at for prevalence as well as for clinician familiarity with this particular health outcome. Other important priorities for surveillance include analyzing upper respiratory conditions such as rhinitis and conjunctivitis and their respective symptoms on a crop by crop basis, differentiating between allergic and irritative etiology, and examining lung diseases beyond asthma.

Priority #5: Dermatitis

Like back conditions, dermatitis is one of the most commonly reported health problems among hired farm workers. Allergic reactions to plants and contact with pesticide residues make up a significant proportion of the cases seen by migrant clinicians and other health practitioners. In this category, dermatitis caused by pesticides, dermatitis caused by plants, and dermatitis among nursery workers are the three most important priorities. Within these three categories, surveillance must analyze the prevalence of the problem, construct methods for improving clinician knowledge, and ascertain which activities are associated most with exposure.

Other topics that require investigation involve special reactions such as Urticaria (hives), effectiveness of interventions, and dermatitis caused

by insects. For hives, surveillance needs to assess their prevalence and educate health care providers on the pervasiveness of this health outcome among hired farm workers. Under interventions, surveillance needs to look at changing restricted entry intervals, explore methods for decreasing plant-related dermatitis such as increasing the availability of field sanitation facilities, and develop techniques for measuring the effectiveness of these interventions. With respect to skin problems associated with insects, surveillance needs to analyze a broad set of exposures ranging from mosquito bites to lice and scabies.

Priority #6: Water Quality

A host of communicable diseases such as dysentery and typhoid fever are spread through contaminated water. Furthermore, ingestion of pesticides or other agricultural chemicals frequently occurs through drinking water. From this standpoint, the work group chose contaminated water as the top surveillance priority under water quality. Within this category, examining contaminated drinking water for fecal coliforms, pesticides, fertilizers, and arsenic, in those areas where lead arsenate is used, should constitute the objectives for future surveillance projects.

Additional topics for surveillance involve field sanitation, urinary tract infections, and effectiveness of interventions. Investigation of field sanitation practices must include assessing employer compliance with the Occupational Safety and Health Act's field sanitation regulations and gathering information on worker use of facilities. Surveillance of this particular topic also needs to account for those farm owners and operators who are exempt from the aforementioned law and determine whether employees at these workplaces experience higher levels of sanitation-related diseases.

In a similar manner, urinary tract infections, common among female hired farm workers, are often related to the absence of sanitation facilities, specifically toilets and potable drinking water. For this particular health issue, surveillance must examine its prevalence and consider key topics such as restroom cleanliness and whether workers receive adequate time to use the facilities.

Under effectiveness of interventions, surveillance needs to consider those workplace situations where sanitation facilities are made available. In doing so, it is essential to look at the quality of these facilities and examine whether farm operators and labor contractors keep them in the appropriate condition as required by law. To obtain this type of information, surveillance must conduct

surveys of hired farm workers and gather feedback about their individual work experiences. Moreover, it should also review enforcement procedures and document their ability to promote employer compliance with the statutes.

Priority #7: Infectious Diseases

As previously mentioned, many infectious diseases that affect hired farm workers are associated with poor sanitation, particularly contaminated water. In this category, the first duty for surveillance with respect to these types of illnesses is to look at field sanitation-related health problems. The primary concerns are the unavailability and inaccessibility of facilities, heat stress, and urinary tract infections in women.

Outside of the workplace the other area where hired farm workers are susceptible to infectious diseases is their homes. Overcrowding, the absence of indoor plumbing facilities, and poor hygiene all contribute to the spread of communicable illnesses such as tuberculosis. With respect to tuberculosis, surveillance needs to focus on the aspect of overcrowding both in housing situations and in transportation. As for housing, the majority of hired farm workers have little option in choosing an adequate place to live, and thus it is necessary to view this topic as an occupational hazard. As with other occupational hazards surveillance must determine prevalence and look at means of intervention.

The two other important types of infectious diseases are sexually transmitted diseases (STDs) and zoonoses. Regarding the latter, these are sometimes transmitted at the workplace through human contact with animal waste, but more often, contraction occurs through contact with rodents, which often persist in areas with poor sanitation. Here, the key surveillance issue is analyzing the prevalence of zoonotic diseases among hired farm workers and examining their links with working and living conditions.

As for STDs, surveillance needs examine four specific themes: (1) male-only camps, (2) drug and alcohol abuse, (3) homosexual behavior, and (4) prostitution. In addition to these factors, surveillance needs to determine the prevalence of STDs, especially HIV and conclude to what extent the high-risk behaviors of hired farm workers are associated with these health outcomes.

The last two categories under infectious diseases pertain to effectiveness of interventions and the underreporting of communicable diseases. The key assessments for surveillance with respect to

interventions involve employer compliance with state and federal laws and the efficacy of regulatory enforcement. Surveillance should also look at the media and review its ability to improve public and hired farm worker awareness of infectious diseases. As for the underreporting of communicable diseases, it is impossible to create means for intervention without having a better idea of the magnitude of these health outcomes. Thus, surveillance needs to determine the degree of underreporting and then develop methods for correcting the problem.

Priority #8: Cancer

Unlike other illnesses and injuries, much less is known about the prevalence of cancer among hired farm workers. While previous studies have revealed some links between certain agricultural occupations and specific types of cancer, much of the gathered data is inconclusive.

Among the diseases that fall into this category, breast cancer and leukemia are the top two priorities. In these cases, the primary concerns involve establishing their relationship with farm work hazards, such as pesticides, and measuring their prevalence. For breast cancer, surveillance needs to examine its link with estrogenic pesticides and develop measurable methods of intervention. For leukemia, surveillance should review the work of the National Cancer Institute and its population studies.

Due to their frequent involvement with farm work and their living situations, which are often located near agricultural workplaces, the work group selected children as their third priority under cancer. Earlier studies have pointed to the existence of associations between pesticides and deadly childhood cancers such as leukemia and brain cancer. These studies, however, need to be updated with new surveillance. Similarly, the cancer clusters in agricultural areas, such as McFarland, California, are in need of further observation and analysis.

Other important surveillance priorities in the area of cancer involve creating a national descriptive study and looking at skin cancer. With respect to a national study, surveillance should prioritize epidemiological studies and then investigate and establish occupational linkages between specific work exposures and specific types of cancer. For skin cancer, the two objectives must include measuring prevalence and evaluating interventions.

Priority #9: Eye Conditions

The multitude of exposures ranging from dust to branches to pesticides makes eye conditions a significant health problem for many hired farm workers. Given the fact that most hired farm workers do not utilize health care services, untreated eye injuries frequently manifest themselves into a serious health problem. For example, repetitive eye irritations can develop into chronic inflammations such as blepharitis or conjunctivitis. From this standpoint, surveillance needs to consider chronic eye conditions as its first priority. Within this category, surveillance needs to assess prevalence, examine migrant clinician awareness of these type of health outcomes, and determine methods for prevention that can then be measured for their efficacy.

The second critical area pertains to Workers' Compensation Insurance and its underestimation of work-related eye problems such as chronic conjunctivitis. While it is hypothesized that chronic conditions are often missed by the Workers' Compensation Insurance claims reviewers, surveillance still needs to evaluate the actual prevalence of this problem. Once this has been determined, surveillance needs to see whether health care providers themselves are cognizant of this underestimation of eye conditions.

The last two topics dealing with eye conditions are Pterygia and measuring the effectiveness of interventions. Pterygia, membranous growths that occur on the eyes, is believed to develop as result of chronic irritation from wind and dust. In some cases, the growths can extend over parts of the cornea and obstruct vision. It is thought that this eye condition is often overlooked and that many health providers discount it as a serious problem. Examining the prevalence and provider awareness constitute the key priorities for surveillance of Pterygia. For effectiveness of interventions, the main objectives entail observing the use of protective equipment such as goggles, ultraviolet sunglasses, and hats and whether they result in fewer reported eye conditions.

Priority #10: Mental Health

The strenuous working and living conditions of hired farm workers often lead to various mental health problems. In addition, several studies have demonstrated that toxic chemical exposures can alter mental function and lead to a host of conditions such as depression and cognitive impairments.

In this category, the four priorities include surveys for prevalence, occupational links, stress

and its connection with domestic violence, and effectiveness of interventions. Under surveys for prevalence, surveillance needs to look at conditions like depression and pesticide exposure and measure health care provider awareness of these types of outcomes. For occupational links, the overall objective is to examine the relationship between living and working conditions and mental illness. Issues for surveillance include the link between mental health problems and increased occupational injury, lack of money and food and their relationship with severe mental stress, and drug and alcohol abuse.

With respect to stress and its link to domestic violence, it is necessary to measure the prevalence of domestic violence in the hired farm worker community. This can be accomplished by looking at the work of various farm worker women's groups, such as Lideres Campesinas, which have been conducting research and doing peer education since the early nineties. Lastly, surveillance needs to look at provider awareness of domestic violence and develop methods of prevention.

For effectiveness of interventions, surveillance must focus on clinics and hired farm worker access to mental health services. This should include determining whether clinics and migrant clinicians are adequately trained in the area of mental health, whether providers have sufficient resources for treating these health outcomes, and how to make mental health services culturally appropriate and more accessible for hired farm workers.

Work Group Priorities for Research

As mentioned, one of the objectives of public health surveillance is to identify new problems and research needs. With respect to hired farm workers, previous surveillance projects have uncovered a wide-range of health concerns in need of further research. For example, in the area of pesticides, more research on neuropsychiatric outcomes is necessary before undertaking surveillance activities

for such conditions. The seven categories selected by the work group are, in their view, the most important priorities in area of hired farm worker occupational safety and health.

Like the priorities for surveillance, those for research were chosen through a polling process of the entire work group. These priorities as well as their topics and sub-topics were ranked in order according to the participant's responses. For a complete listing of the seven research priorities, refer to Appendix C.

Priority #1: Pesticides

Under pesticides, the three most important research priorities are exposure studies, poisonings, and reproductive outcomes. For exposure studies, research needs to examine exposure versus health effects, "safe" levels of exposure, and biomarkers such as metabolites. In addition, cumulative effects of long-term, repeated exposures, antibody tests to determine cholinesterase inhibition and recognition of systemic exposure with dermal exposure require further study.

For poisonings, research needs to define diagnostic criteria, establish functional case definitions, and find a method for classifying cases by agricultural sector such as with the SIC code. As for reproduction, birth defects such as heart malformations, neural tube defects such as spina bifida, and sterility are the three priorities for research.

The remaining areas which research must address include: neurologic outcomes, multiple chemical sensitivity, genotoxicity, longitudinal health studies, immunological effects, and the difficulty of obtaining a control population. With respect to neurologic effects, research needs to be done on neuropsychiatric outcomes such as depression, physiological outcomes such as muscle weakness, and diseases such as Alzheimer's and Parkinson's.

For topics pertaining to multiple chemical sensitivity outcomes, research should look at allergies and other conditions such as flashback symptoms and eye reactions that develop as a result of continuous exposure to chemicals and pesticides. Similarly, an investigation into immunological effects should include an analysis of the relationship between pesticide exposure and various allergies. Other kinds of immunological concerns should pertain to the body's natural defense mechanisms and whether repetitive contact with pesticide renders a person more susceptible to infectious diseases.

Priority #2: Ergonomic/Musculoskeletal Conditions

As with surveillance, workplace ergonomics and musculoskeletal conditions are a top research priority. In this instance, case definition and diagnostic criteria are the greatest research needs. Under case definition, this pertains to the mechanism of injury, cervical and shoulder-related injuries, the impact of migration, and chronic back problems in individuals who have experienced at least one major injury during their life.

For diagnostic criteria, research needs to look at a broad spectrum of topics. First, it must consider those studies done when a patient has been inactive for a period of time and compare them with those that have been done when a patient has been working. Next, research needs to examine the criteria behind clinical judgments and how such health problems as overuse injuries are classified. Finally, it needs to look at Workers' Compensation Insurance and determine the criteria it uses for defining and classifying musculoskeletal injuries.

Priority #3: Traumatic Injuries

For traumatic injuries, the primary research concern pertains to Workers' Compensation Insurance. Here, research needs to investigate the prevalence of conditions, reporting and recognition of claims and acceptance and payment of claims, and barriers that block access to the system such as California's Proposition 187.

Another research need is rehabilitation. Specifically, research needs to assess its effectiveness in helping hired farm workers return to their jobs and the availability of services. With respect to the latter, it is important to consider issues such as Proposition 187 that can prevent some farm workers from using rehabilitation services.

The remaining research needs pertain to incidence of traumatic injuries, effectiveness of intervention strategies, transportation, and disability. With incidence and prevention strategies, it is essential that research focuses on the work environments, the living situations, and the modes of transportation of hired farm workers and makes comparisons between the three areas. For disability, research must consider both permanent and temporary disabilities as well as examine their long-term effects on specific populations such as older farm workers and retired farm workers.

Priority #4: Effect of Protective Measures

The two protective measures in need of additional study involve Restricted Entry Intervals (REIs) and Personal Protective Equipment (PPE). In both cases, research needs to look at their effectiveness in lowering injury and illness rates among hired farm workers. In addition, it should examine whether the methods prescribed by the government agencies that created the regulations are sufficient. This should include an analysis of the data that the EPA used to establish the REIs and an evaluation of the design of worker protective gear.

Beyond REIs and PPE, employer compliance with protective regulations, drift exposure, and hired farm worker training are the other topics in need of further study. Research should look at the extent of voluntary compliance among employers and the kinds of methods that employers rely on to train workers about pesticide safety. Likewise, research must consider the mediums through which hired farm workers receive their training and whether mediums such as videos serve as effective learning tools.

Priority #5: Cancer

Among the many cancers, the work group targeted breast cancer as the most important research priority. In this particular category, research needs to look at hired farm worker access to services and assess the impact of interventions. The other types that must be given high priority are cancers that affect children and leukemia. In each case, the research needs are the same: compare farmers and hired farm workers, compare hired farm workers and non-farm workers, and examine the availability of tumor registry information. In addition, research needs to look at prostate cancer, Hodgkin's and non-Hodgkin's lymphomas, and skin cancer and determine their prevalence among hired farm workers.

Priority #6: Choice of Control/Comparison Population

One of the difficulties in conducting hired farm worker research is finding or, rather, defining a control population with which to compare results. Consequently, it is necessary for research to examine different populations and assess their effectiveness as a control group. One consideration involves looking at non-agricultural populations. In this manner, research could consider Hispanics and their respective health characteristics as a

possibility, or it could compare hired farm workers with other residents from their community.

Other considerations for research could include farm worker versus non-farm worker populations with similar ethnicity, migrant versus permanently settled farm workers, or U.S. born farm workers versus Mexican-born workers. For all three approaches, it is essential that research determine whether the control group would be of sufficient size to create an accurate cross-sectional representation of the entire population.

Priority #7: Mental Health

In the area of mental health, stress needs to be the top research priority. Research should focus on factors such as long work hours, low wages, injuries and illnesses, job instability, and living conditions.

Similarly, pesticides require special attention under this category. Here, research must examine the relationship between pesticide exposure and mental illness. In doing so, it should consider diagnoses and conditions, which have been previously linked to pesticide exposures. It should also examine how the mental health status of those directly involved with pesticides, sprayers and mixers, fluctuates between the season and the off-season such as elevated levels of anxiety, depression, and insomnia.

Lastly, research needs to consider substance abuse, suicide, domestic violence, and differences between men and women with respect to mental health. In looking at these areas, it is important to pay special attention to the unique aspects of the hired farm worker community such as unfamiliar isolation, cultural settings, and undocumented immigration status. Added significance also needs to be given to political measures such as California 187 and their impact on the reporting of domestic violence.

Work Group Priorities Regarding Design and Methods

Following the discussions about priorities for surveillance and research, the work group addressed project design and methods. As with the two other areas, the study design priorities were ranked in order of importance and organized with a set of categories and sub-categories also ranked in order. As for the methods, the work group suggested several data and document sources that could be useful in the surveillance of hired farm worker safety and occupational health. In making its recommendations, the work group noted both the strengths and weaknesses of each method. For a complete breakdown of the project design priorities and a list of the data and document sources and their limitations, refer to Appendix D.

Priority #1: Regional and Local Studies

Under Regional and Local studies, the top three priorities pertain to household surveys, clinic-based projects, and studies that look at health outcomes and their associations with specific exposures. For community oriented household surveys, it is essential that the project design include means for gathering occupational information, enumerate and collect data from farm workers living in unconventional dwellings, and obtain data from ill or injured workers who are not seeking medical care for their problem.

With respect to the migrant health center, clinic-based approach, two important priorities are computerization and developing appropriate case-reporting mechanisms such as clinician reporting to state agencies and follow-up care. Other design priorities involve linking local survey efforts with clinics so that an exam component can be incorporated into the process. Lastly, the diagnoses of local clinics and migrant health care centers need to be compared to population baseline.

For health outcomes and their associations with exposures, determining causation is the first design priority. Second is a comparison between acute and chronic conditions. This can be done through both longitudinal and multi-site studies. A key element in this type of design will involve the identification of a suitable comparison or control group.

Other priorities for regional and local project design involve data collection systems. These methods include the use of NIOSH Agricultural Safety and Health Centers in conjunction with community based farm worker organizations and migrant clinics, the use of lay health workers, promotoras, recruited from the farm worker community, and the use of health fairs that offer free services such as health screenings. All of these approaches serve to improve contact with a population that rarely uses health care services.

The remaining two priorities involve geographic and temporal differences and measuring the extent to which workers' compensation data underestimate the true prevalence of specific conditions such as eye problems. With respect to the former, it is important that all surveillance projects incorporate these differences into their design. Otherwise, the results will fail to accurately represent the health outcomes for the hired farm worker population.

As for Workers' Compensation Insurance, its primary deficiencies stem from a lack of protection for hired farm workers nationwide. Since many states either exempt agricultural employers from having to provide coverage for their workers or only make it mandatory under limited conditions, this system cannot be used to obtain accurate cross-sectional data. However, comparisons can be made between those states that do make coverage mandatory for all agricultural workers and those that do not. Likewise, surveillance projects can examine regional differences between those states that do offer coverage and compare how those variations affect workers' compensation services.

Priority #2: National and International Studies

For National and International studies, the highest priority is to obtain national baseline data. The first step is to develop a series of exposure surveys similar to the National Occupational Health Survey (NOHS). In doing so, it is critical that the surveys accurately gather data that is representative of the entire hired farm worker population. This must include the capacity for detecting differences due to climate or geography while being flexible enough to gather information from those farm workers who live in unconventional dwellings.

The next procedure involves correlating the results from exposure surveillance with illness and injury data and determining the relationship between a specific exposure and a specific health outcome. Essential in the identification of illnesses and exposures will be the use of standard survey instruments such as National Health Information Survey (NHIS) and the Hispanic Health and Nutrition Examination Survey (HHANES). This information can be augmented and reinforced with data gathered by lay health workers conducting interviews of hired farm workers.

The second highest priority with respect to national/international studies involves clinic-based research for all categories of hazardous exposures. The design for this approach should include both migrant health centers and occupational clinics, and it should focus on developing appropriate case-reporting mechanisms such as continued follow-up care.

The third priority pertains to health outcomes and their associations with workplace exposures. Here, projects need to examine causation and compare acute and chronic conditions. Methods for addressing this particular issue should involve the use of both longitudinal and multi-site studies.

The remaining priorities for national/international studies pertain to surveys, cross-border surveillance, collaborative efforts between NIOSH Agricultural Safety and Health Centers and community-based clinics and organizations, Workers' Compensation Insurance and its underestimation of non-acute conditions, and surveillance of workers exposed to newly introduced agricultural products. Under surveys, the Department of Labor's NAWs, which is currently in use, employs methodology that has been very successful in tracking hired farm workers. The recent addition of a health supplement to this instrument eventually should make it possible to compare its findings with those from clinic-based surveillance and other local surveys. In addition, it

should also be possible to connect the NAWs work with local clinics and thereby obtain medical data from a subsample of survey participants.

Other survey designs, which are essential to national/international studies, are household surveys. The objectives for this approach are to obtain occupational information, to include workers living in "unconventional dwellings," to establish baseline data, and to gather data on injured or ill workers not seeking medical care.

With respect to cross-border surveillance, this entails monitoring hired farm workers between their workplaces here in the U.S. and their permanent homes in Mexico and Central America. One method involves establishing links with the sending villages in Mexico and Central America in order to capture older, retired hired farm workers. A second approach is to develop collaboration among physicians in Mexico and the U.S. A third option is to incorporate the binational methods of the Migrant Clinicians' Network in tracking and monitoring hired farm workers.

Priority #3: Special Populations

Under special populations, pregnant women and women of childbearing age represent the highest priorities. In each case, hazardous work exposures such as chemicals and injuries and their subsequent effect on a woman's pregnancy or her ability to become pregnant are important focal points for project design. With respect to pregnant workers, project design needs to consider a woman's vulnerability to injuries during her pregnancy, especially during the later trimesters. As for women of childbearing age, the key considerations are access to contraceptives, effect of work on miscarriages, and recovery from injuries as compared to men.

The next critical population is children. Of special concern are injuries and cancer. Regarding the former, project design needs to look at how both chronic conditions and traumatic accidents affect a child's development. As for cancer, exposures to pesticides and other chemicals and their link with childhood cancers such as Leukemia are critical components for project design.

The remaining populations all pertain to specific types of agricultural work or workers. These include greenhouse workers, disabled workers, tobacco workers, crab workers, and orchard workers. In the cases of agricultural work, the main considerations for project design are the different types of hazardous exposures that exist in each respective area and determining the prevalence of injuries that

are associated with those kinds of exposures. Examples include green tobacco illness, fall from ladders, and pesticide exposures due to contact with foliage. With respect to disabled workers, the primary concerns are prevalence and work status when a worker is no longer able to do agricultural work.

In all seven cases, an important aspect of project design involves measuring the effectiveness of interventions. Accordingly, project design will include means for analyzing preventive efforts such as Personal Protective Equipment, daycare availability, and improved tool designs and determine what impact, if any, these changes have in reducing the prevalence of certain types of adverse health outcomes.

Work Group Recommendations for Funding and Collaboration

For effective surveillance of hired farm workers to occur, it is essential that NIOSH diversify its funding to include support for national and community-based farm worker organizations, migrant health centers, and farm worker unions. In the past, previous recipients of such funding have largely been land grant universities and large-scale medical centers, which in turn, have only allowed limited participation of those organizations that have direct contact with hired farm workers. Consequently, progress in improving hired farm worker health and safety has been limited by the lack of first-hand information.

By increasing the diversification of funding, a new dynamic will be introduced into the study of hired farm worker health and occupational safety as grass-root groups would have greater opportunity for incorporating their community knowledge and cultural and language skills into surveillance projects. More importantly, successful methods such as the use of promotoras in monitoring hired farm worker health status could be given greater financial support and thus expanded.

Beyond increasing distribution of funding, hired farm worker projects need to seek out alternative financial resources. Currently, President Clinton's

Executive Order on Environmental Justice has created several grant opportunities. Through government agencies such as the EPA, community-based organizations can now apply for funds to finance environmentally-related projects. Since hired farm workers face a variety of occupational and environmental hazards on a regular basis, these grants represent an excellent opportunity for organizations considering health and occupational safety surveillance and research programs.

As for collaboration, NIOSH agricultural health and safety centers and universities with agricultural interests need to create more working partnerships with migrant health clinics and grassroots-based farm worker organizations. Previous health surveillance projects have demonstrated that such linkages can produce excellent results. Evidence of this success can be found in the studies of tuberculosis, parasites, and occupational injuries conducted by the University of North Carolina School of Public Health in cooperation with several North Carolina migrant health centers.

Other types of beneficial collaboration involve private foundations and non-profit farm worker

organizations. An important example is the W.K. Kellogg Foundation and its health and safety initiatives, which were undertaken between 1992 and 1998. This organization's collective work with NIOSH, universities, and grassroots groups has produced many important farm worker health studies and has helped grantees generate funding from government and private sources for additional projects. From this standpoint, it is imperative that this type of leadership in the funding world be publicly recognized and encouraged.

The last area of collaboration involves increasing the cooperative efforts of governmental agencies. This should include expanding on the efforts of NIOSH and the EPA with respect to pesticides; creating more multi-agency task forces involving the Department of Labor, OSHA, and state health departments to monitor hired farm worker housing and field sanitation requirements; and providing more funding for the National Cancer Institute in its work with universities, migrant health centers, and nonprofit organizations in developing methodologies to track hired farm worker subjects for cancer studies.

Appendix A: Workers' Compensation by State

States with Compulsory Coverage: (11)

Arizona	New Hampshire
California	New Jersey
Connecticut	Ohio
Hawaii	Oregon
Massachusetts	Washington
Montana	

States with Partial Coverage, Employer Exemptions: (20)

Alaska	Michigan	Vermont
Colorado	Minnesota	Virginia
Florida	New York	West Virginia
Illinois	North Carolina	Wisconsin
Iowa	Oklahoma	
Kansas	Pennsylvania	
Louisiana	Texas	
Maryland	Utah	

States with only Voluntary Coverage: (19)

Alabama	Maine	Rhode Island
Arkansas	Mississippi	South Carolina
Delaware	Missouri	South Dakota
Georgia	Nebraska	Tennessee
Idaho	Nevada	Wyoming
Indiana	New Mexico	
Kentucky	North Dakota	

Appendix B: List of Priorities for Surveillance

Priority #1: Ergonomic/Musculoskeletal Conditions

1. Back Conditions
 - (1) Prevalence among working farm workers
 - (2) Prevention
 - (3) Prevalence among disabled/retired farm workers
2. Upper body use problems, e.g., tendonitis among pruners
 - (1) Type of activity/crop—e.g., lifting overhead, twisting
 - (2) Extrapolate data from other non-agricultural industries
3. Effectiveness of interventions
 - (1) Conditioning, preventive measures to avoid early season injuries
 - (2) Payment of workers' compensation claims
Issues included:
 - Cumulative trauma syndrome (CTS) as a concrete category
 - Better definition of outcomes
 - Biological plausibility—published sources for clinicians' use
 - Education of Claims reviewers to understand all exposure is not just dermal
 - Time lag of payments
 - (3) Impact of Proposition 187—regressive work practices have resurfaced; as undocumented workers find it harder to get work and are more desperate, those who hire them have an easier time exploiting them
 - (4) Comments (not ranked):
 - Develop ergonomic standards for agricultural work
 - Evaluation of tool ergonomics
 - Modification of tools or implements
 - Worker training in ergonomics
4. Carpal tunnel syndrome
 - (1) Prevalence
 - (2) Warehouse sorters
5. Handweeding
 - (1) How relates to back injury and stress
 - (2) Prevalence
6. Short-handled hoe and similar implements
 - (1) How relate to back injury and stress
 - (2) Prevalence of use in the U.S.
 - (3) Prevalence of use in California
7. Measure extent to which workers' compensation underestimates true prevalence of specific conditions
 - (1) Often missed or denied as not due to acute injury
8. Child safety in fields, homes, etc.
9. Pregnancy/reproductive outcomes
 - (1) Surveillance of miscarriages—how to do?
 - (2) Premature/early delivery
 - (3) Compare to foreign studies
 - (4) Birth Defects
10. Early Season Injuries
 - (1) Prevalence
 - (2) Worker training

Priority #2: Pesticides

1. Pesticide Exposures
 - (1) Need for more pesticide exposure data
 - (2) Underreporting
 - (3) Drift
 - (4) High foliage crops
 - (5) Additional points
 - Public media campaign
 - Lack of laundry facilities
 - Take-home/at-home exposures
 - Use of pesticides for rodent/vector control

2. **Poisonings**
 - (1) Number and type
 - (2) Underreporting
 - Issues include:
 - Nonspecific symptoms
 - Measuring cholinesterase often not helpful (pesticide to which worker was exposed may not be a cholinesterase inhibitor)
 - Need for follow-up
 - (3) Child poisonings from take-home & in-home contamination
 - (4) Clinical characteristics of over-exposure
3. **Effectiveness of Interventions**
 - (1) Worker Protection Standard
 - (2) Restricted entry intervals
 - (3) Training
 - (4) Personal protective equipment (PPE)
 - (5) Additional ideas
 - Removal of pesticides from the market
 - Availability of laundry facilities
 - Provision of rehabilitation facilities
4. **Pregnancy/reproductive problems**
 - (1) Birth defects
 - (2) Surveillance of miscarriages—how to do?
 - (3) Other ideas
 - Infertility
 - Cohort identified for birth defect study
 - Worker training for miscarriages
 - Measure urinary metabolites in first trimester workers and in workers in labor-intensive crops
5. **Heat stress and Personal Protective Equipment**
 - (1) Equipment modification to reduce heat stress
 - (2) Worker training
 - (3) Diagnostic indicators to distinguish heat vs. poisoning
 - (4) Extended use of PPE for early entry
 - (5) Patterns of fluid consumption when temperature is greater than 85 degrees
6. **Greenhouse industry hazards**
 - (1) Extent of exposure/compare the risk with other agricultural jobs
 - (2) Ventilation/air quality
 - (3) Effectiveness of PPE
 - (4) Occurrence of pesticide illness
7. **Untrained workers who mix/load/apply pesticides**
 - (1) Extent of problem/acute and chronic health problems
 - (2) Worker knowledge/extent of training
 - (3) Consistency of PPE use/compare PPE footwear vs. leather boots
 - (4) Survey farmers re: risk/beliefs
8. **Unknown problems with cholinesterase inhibitors**
 - (1) Effect on drinking water
 - (2) Need for worker education on risk
 - (3) Central nervous system changes—“expert” post-poisoning evaluations almost always reject cause/effect relationship because no objective CNS deficits
 - (4) Connection to Parkinson’s disease
 - (5) Connection to muscular dystrophy
 - (6) Neurologic consequences of chronic exposure
 - (7) Immunologic effects
 - (8) Post-poisoning toxic syndrome
 - Mechanism
 - Incidence
 - Treatment
9. **Pesticide drift**
 - (1) Train all farm workers
 - (2) Access to chemical information

Priority #3: Traumatic Injuries

1. **Serious Injuries—death and disability**
 - (1) Transportation-related/motor vehicle accidents
 - (2) Farm machinery-related/mangling injuries
 - (3) Electrocutions
 - (4) Ladder injuries

- (5) Additional points
 - Farm labor contractor/grower-provided vehicles
 - Hazards in the field—run over by tractors, snake bites, lightning strikes
 - Incidence on small farms with 10 or fewer workers
2. Workers' Compensation
 - (1) Compare states with farm worker coverage to states without farm worker coverage
 - (2) Evaluate reliability of the data

Issues included:

 - Measure of extent to which workers' comp underestimates true prevalence of specific injuries
 - (3) Lack of or inadequate compensation for injury
 - (4) Acute vs. chronic conditions
 - (5) Additional points
 - Availability of treatment
 - Child labor
 - Problems leading to injury: lack of parental supervision, conditions in and around labor camps
3. Child safety in fields, homes
 - (1) Prevention: day care, schools to educate parents, children; public education campaign
 - (2) Number of injuries
 - (3) Other points
 - Availability of treatment
 - Child labor
 - Problems leading to injury: Lack of parental supervision, conditions in and around labor camps
4. Effectiveness of interventions
 - (1) Safety programs tied to lower premiums
 - (2) Transportation safety measures
 - (3) Workers' Compensation—a built in intervention?
 - (4) Other points
 - Rehabilitation services for disabled farm workers
 - Effect of passage of California's Proposition 187: decrease in reporting of motor vehicle accidents
 - Availability of workers' comp. Affects worker rehabilitation
 - Fear of employer retribution: lower filing of claims
5. Study of disabled workers
 - (1) Extent of problem
 - (2) Binational study
 - (3) Access to benefits/extent of involvement of clinics and government agencies
 - (4) Personal and societal costs
 - (5) Cross-sectional study of 50 year-old males
6. Pregnancy/reproductive problems
 - (1) Surveillance of miscarriage—how to do?
 - (2) Other Points
 - Birth Defects
 - Sterility
 - Complications/stillbirth
 - Worker training
 - Public education
7. Personal and societal costs
 - Lost work days and wages
 - Permanent/serious disabling conditions and medical costs
 - Losses to families
 - Physical abuse/crowding
 - Estimate costs
8. Lack of rehabilitation facilities for disabling injuries
 - Extent of problem
 - Lack of job alternatives
 - Lack of long-term medical coverage
 - Back problems not treated (25-50 year olds)
 - Lack of medical professionals in rural communities
 - Lack of cultural sensitivity among providers

Priority #4: Pulmonary or Respiratory

1. Nursery/greenhouse workers
 - Prevalence and occurrence
 - Provider training

2. Effectiveness of interventions
 - (1) Lung disability-change environment
 - (2) Lung disability-rehabilitation
 - (3) Prevention
3. Cotton pesticide defoliant
 - Prevalence and occurrence
 - Provider training
4. Sulfur dust used on table grapes
 - Prevalence and occurrence
 - Provider training
5. Apple thinners' exposure to pesticides (particularly residues)
 - Prevalence and occurrence
 - Provider training
 - Compare with organic orchards
 - Occurrence of allergic rhinitis/sinusitis
6. Hops asthma
 - Prevalence and occurrence
 - Provider training
7. Other
 - Descriptive evaluation
 - National survey
 - Upper respiratory conditions
 - (1) Rhinitis/conjunctivitis symptoms by crops; compare organic vs. non-organic operations
 - (2) Differentiate allergic vs. irritative etiology
 - Chronic lung disease beyond asthma

Priority #5: Dermatitis

1. Caused by pesticides like sulfur dust used on table grapes
 - Prevalence
 - Clinic provider training
 - Incidence of pigmentation/depigmentation
 - Listing of inert ingredients which can cause problems
 - Post-exposure sensitivity
2. Caused by plants—peaches, strawberries, poinsettias
 - Prevalence
 - Clinic provider training
 - Work-related—should be covered by workers' compensation
3. In nursery industry
 - Prevalence
 - Clinic provider training
 - Extent of exposure and dermatitis
 - High-risk activities
 - Preventive measures
4. Urticaria (hives)
 - Prevalence
 - Provider awareness
5. Effectiveness of Interventions
 - Changing restricted entry intervals
 - Methods to decrease plant-caused dermatitis
 - How to measure?
 - Relation to availability of sanitation
6. Other
 - Insect, mosquito, bacteria & fungus control
 - Ringworm, scabies, lice, mosquitoes, fleas, chiggers
 - Systemic exposure to some degree in many cases

Priority #6: Water Quality

1. Contaminated drinking water (in housing, wells, other water sources)
 - (1) Fecal coliforms
 - (2) Pesticides

- (3) Fertilizers/nitrates
 - (4) Other
 - Arsenic in areas with lead arsenate use
2. Field Sanitation
 - Extent of potable water
 - Access to facilities
 - Exclusions from provisions
 3. Urinary tract infections
 - Prevalence
 - Link to access to sanitation
 - Water not available
 - Time not allowed to use facilities
 - Restrooms not proper for human use
 4. Effectiveness of interventions
 - (1) Field sanitation facilities
 - (2) Other ideas
 - Extent of voluntary compliance/enforcement of regulations
 - Field worker feedback
 - Water system improvements

Priority #7: Infectious Diseases

1. Field sanitation-related
 - (1) Facilities unavailable/inaccessible for workers
Issues included:
 - Mechanized picking—workers unable to take bathroom breaks
 - Facilities too far from workers for them to be able to use
 - Low employer compliance with field sanitation standard
 - (2) Heat Stress—water/fluid consumption patterns
 - (3) Urinary tract infections in women
2. Tuberculosis
 - (1) Overcrowded housing
 - (2) Overcrowded transportation
 - Screening by clinics or health department outreach
 - Workers with home base in Mexico
3. Housing-related
 - Living as occupational hazard
 - Lack of indoor plumbing, insufficient bathroom facilities, and insects/mosquito control
 - Prevalence
 - Management by state vs. private sector
4. Rodent and vector control/zoonoses
 - Prevalence
5. Sexually transmitted diseases (STDs)
 - (1) male-only labor camps
 - (2) Drug/alcohol abuse as contributing factor
 - (3) Homosexual behavior
 - Prostitution, STD patterns/prevalence HIV locally
6. Effectiveness of Interventions
 - Extent of voluntary compliance & enforcement of regulations
 - How to measure
 - Media
7. Underreporting of communicable diseases
 - Prevalence

Priority # 8: Cancer

1. Breast
 - Link with estrogenic pesticide
 - Measure intervention
2. Leukemia
 - Link with pesticide exposure
 - Measure prevalence—National Cancer Institute

- Population studies—National Cancer Institute
- 3. Childhood
 - Leukemia and farm worker children
 - Brain cancer and farm worker children
 - NCI data
 - Cancer cluster follow-up
- 4. Other
 - National descriptive cancer study
 - Prioritize epidemiological studies
 - Investigate and establish occupational linkages
 - Skin Cancer
 - Measure prevalence
 - Evaluate intervention

Priority #9: Eye Conditions

1. Chronic conjunctivitis/inflammation
 - Prevalence
 - Provider awareness
 - Prevention
2. Measure extent to which workers' compensation underestimates the prevalence of eye conditions
 - Prevalence
 - Provider awareness
 - Prevention: ultraviolet sunglasses and workers' compensation
3. Pterygia (membranous growths on the eyes)
 - Prevalence
 - Provider awareness
4. Effectiveness of interventions
 - (1) Use of goggles in thinning
 - (2) Comment (not ranked)
 - Other preventive measures, such as hats

Priority #10: Mental Health

1. Surveys for prevalence
 - Depression and pesticide exposure
 - Measure need
 - Measure provider awareness
2. Link with occupation?
 - Association with pesticide exposure or poisoning
 - Effect on occupational stress
 - Link between mental health condition and increased occupational injury
 - Various factors contributing to severe mental stress such as lack of money, drugs/alcohol, housing, food shortages
 - Measure need
 - Provider awareness
 - Somatoform pain disorder—post injury
3. Stress and link to domestic violence
 - Measure need
 - Measure provider awareness
4. Effectiveness of interventions
 - Clinic access to services (mental health hours)

Appendix C: List of Research Priorities

Priority #1: Pesticides

1. Exposure studies
 - (1) Exposure vs. health effect
 - (2) Burden
 - What are "safe" levels of exposure to specific pesticides for pregnant women x days after application?
 - (3) Biomarkers
 - Changes over time, metabolites
 - (4) Other points
 - Antibody test to determine cholinesterase inhibition in absence of baseline
 - Recognition of some systemic exposure with dermal exposure
 - Cumulative effect of repeated, long-term exposure
2. Poisonings
 - (1) Need for diagnostic criteria (including clinical source, lab tests often not done at time of event)
 - (2) Need for functional case definition
 - (3) Other points
 - Recognize that definite exposure, without specific illness, is legitimate workers' compensation claim case
 - Distribution of cases by sector of agriculture, the SIC code
3. Pregnancy/reproductive outcomes
 - (1) Birth defects
 - (2) Neural tube
 - (3) Sterility
4. Neurologic
 - (1) Neuropsychiatric outcomes
 - Neuropsychologic effects such as anxiety or "nervios."
 - Prevalence, Causes—work, living conditions, money
 - (2) Parkinson's disease
 - (3) Muscle weakness
 - (4) Alzheimer's disease
 - (5) Other Points
 - Impossible to demonstrate cause/effect in individual cases with Parkinson's and Alzheimer's
 - Headaches
5. Multiple chemical sensitivity
 - (1) Allergies
 - (2) Other conditions
 - (3) Other points
 - Flashback symptoms, pesticide exposure produces symptoms caused by prior poisoning
 - Eye conditions
 - Extent of disability
6. Genotoxicity/chromosomal damage related to exposure
 - Inform physicians/health personnel of prevalence
7. Ongoing longitudinal health study
 - Compare applicators and field workers
 - Compare farm workers and non-farm workers
8. Immunological
 - Allergies—including upper respiratory
 - Allergies—including asthma vs. control population
 - Impaired host defenses to infectious diseases
9. Control population difficult to obtain
 - Study migrants and control in home base *see study by Dever, 1991

Priority #2: Ergonomic/Musculoskeletal Conditions

1. Case definition
 - Mechanism of injury
 - Cervical/shoulder
 - Affect of migration
 - Chronic back problems in individuals with major injury event

2. Diagnostic Criteria
 - Studies done when patient has been inactive for weeks/days. If working up until testing done?
 - Clinical judgments, gradation of severity of overuse injury
 - Incidence/prevalence data
 - Workers' compensation
 - Distribution of cases by sector of agriculture, SIC code
 - Type and prevalence by crop

Priority #3: Injuries

1. Workers' Compensation
 - (1) Prevalence of conditions
 - (2) Reporting and recognition of WC claims and acceptance and payment of claims
 - (3) Barriers (such as Proposition 187)
2. Rehabilitation
 - Effectiveness of rehabilitation
 - What percentage of disabled farm workers can obtain rehabilitation
 - Barriers to rehabilitation services, Proposition 187
 - Availability of services
3. Prevalence/incidence
 - Labor camp-related vs. on the job injuries
4. Prevention/intervention
 - Education re: safety on job, on highway, in labor camps
 - Personal protective equipment
 - Effectiveness
5. Transportation
 - State laws on licensing *rateros* (people who transport workers to job-sites for a fee)
6. Disability
 - How many 50-year-old farm workers are still able to do farm work?
 - How many disabled farm workers are able to find alternative work, especially if monolingual Spanish?
 - Permanent vs. temporary

Priority #4: Effect of Protective Measures

1. Evaluate pesticide restricted entry intervals
 - Effectiveness of REIs
 - Quality of data used by EPA to make REI decisions
2. Personal protective equipment
 - Design of gear (comfort and cost issues, appropriateness)
 - Effectiveness
 - Compliance with recommended use foot gear and respiratory equipment (frequency of cartridge changes)
 - Compare use of PPE in pesticide application done by small farmer vs. hired farm workers
 - Use of leather boots in mixer/sprayer workers
 - Retrofitting equipment
3. Others
 - Safe distance from drift?
 - Evaluate effectiveness of training
 - Enforcement of protective regulations (extent of voluntary compliance)
 - Pesticide alternatives/integrated pest management
 - Evaluate worker training programs in relation to workers' control in the workplace
 - Evaluate effects of disincentives on chemical use, cholinesterase testing requirement
 - Safety interlocks on machinery
 - Ventilation in greenhouses

Priority #5: Cancer

1. Breast Cancer
 - Assess access to services
 - Assess impact of intervention
2. Childhood Cancers
 - Compare farmer and farm worker
 - Compare farm worker and non-farm workers

- Availability of tumor registry information
3. Leukemia
 - Compare farmer and farm worker
 - Compare farm worker and non-farm workers
 - Availability of tumor registry information
 4. Other
 - Prostate
 - Hodgkin's and non-Hodgkin's lymphomas
 - Skin
 - National study

Priority #6: Choice of Control/Comparison Population

1. Non-agricultural populations
 - Hispanic (health characteristics)
 - Hispanic HANES
 - Residents of same community
2. Other
 - Farm worker vs. non-farm worker (similar ethnicity)
 - Migrant vs. permanent, year-round population on pesticides
 - Access to personal protective equipment
 - Prevalence of poisoning and injury
 - Simultaneous surveillance vs. retrospective case control
 - Migrant population (US resident, Mexican, other)
 - Seasonal population
 - Insurance actuarial data profile for a "typical" U. S. resident?

Priority #7: Mental Health

1. Stress
 - Occupational causes
 - Contributing factor in illness or injury
 - Low wage employment
 - Repeated interruption of employment
 - Residence in unfamiliar cultural setting
2. Pesticides
 - Diagnoses and conditions linked to pesticide exposures
 - Personality profiles (example: anxiety, depression, insomnia among mixers/sprayers during season vs. off-season)
3. Others
 - Depression
 - Occupational causes
 - Link to pesticide exposure
 - Link to stress
 - Measure suicide/homicide rates and impact of intervention such as access to mental health, community health education, outreach
 - Impact of Proposition 187 on reporting of domestic violence
 - Effects of migrant status
 - Substance use/abuse
 - Women vs. men

Appendix D: Project Designs and Methods

Priority #1: Regional/Local Studies

1. Community-wide, "house-to-house" surveys
 - (1) Get occupational information
 - (2) Include "unconventional" settings and baseline data
 - (3) Get cases not seeking medical care
2. Migrant health center/clinic-based
 - (1) Computerized
 - (2) Appropriate case-reporting mechanism—linked to action and appropriate follow-up
 - (3) Link local survey efforts with clinics for medical exam component
 - (4) Compare diagnoses to population baseline (e.g., thyroid disease)
3. Health outcomes—associations with exposures
 - (1) Causation
 - (2) Acute vs. chronic conditions
 - Longitudinal studies
 - Multi-site studies
 - (3) Need for control group
4. Use NIOSH Agricultural Safety and Health Centers to collect data
 - (1) Collaborate with migrant health centers and community-based farm worker organizations
5. Use lay health advisors/community members who have trust of farm workers to gather data
6. Reach farm workers at health fairs that give free health services, disease screening
7. Observe geographic/temporal differences
8. Measure extent to which workers' compensation data underestimates true prevalence of specific conditions (e.g., eye problems)
 - Non-existent workers' compensation in states—publicize differences for farm workers vs. other workers
 - Compare regional differences in workers' compensation services
 - Explore effects of occupational medicine education courses (CMEs) on worker participation in workers' compensation systems

Priority#2: National / International Studies

1. National baseline data needed
 - (1) Create a National Agricultural Exposure Survey like the National Occupational Health Survey (NOHS)
 - (2) Assure representativeness of surveys
 - Observe geographic/temporal differences
 - Address unique living conditions (e.g., surveys done at state-run labor camps only capture one portion of the farm worker population)
 - (3) Correlate exposure surveillance with illness data
 - Link exposure to outcome. At individual level (may be later step)
 - (4) Use standard instrument like Farm Family Health Hazard Survey (FFHHS), National Health Information Survey (NHIS), and Hispanic Health and Nutrition Examination Survey (HHANES)
 - (5) Augment with information from lay health advisors/farm worker interviews
2. Clinic-based research for all categories of hazardous exposures
 - (1) Migrant health centers
 - (2) Appropriate case-reporting mechanism—linked to action and appropriate follow-up
 - (3) Occupational clinics
3. Health outcomes—associations with exposures
 - (1) Causation
 - (2) Acute vs. chronic conditions
 - Longitudinal studies
 - Multi-site studies
4. Build on Department of Labor's National Agricultural Workers Survey (NAWS)
 - (1) Do occupational health supplement
 - (2) Use to validate clinic-based surveillance, link with local surveys
 - (3) Get medical data on subsample of NAWS
 - (4) Add questions regarding farm labor contractors
 - (5) Investigate representativeness of NAWS
5. Household Surveys
 - (1) Get occupational information

- (2) Include "unconventional" settings
 - (3) Baseline data
 - (4) Get cases not seeking medical care
6. Cross-border surveillance (i.e., US-Mexico/Central America)
 - (1) Link back to sending villages in Mexico to capture older population
 - (2) Collaboration among physicians in Mexico and the US
 - (3) Migrant Clinicians' Network binational tracking efforts
 7. Use NIOSH Agricultural Safety and Health Centers to collect data
 - (1) Collaborate with migrant health centers and community-based farm worker organizations.
 8. Measure extent to which workers' compensation data underestimate true prevalence of specific conditions (e.g., eye problems)
 - Prevalence of complaint at camps vs. clinic prevalence
 9. Health surveillance on workers exposed to newly introduced agricultural products and new applications
 - Clinic surveillance and case descriptions
 - Symptom incidence and prevalence
 - Preventive studies directed at new agents

Priority #3: Special Populations

Two items received an equal rank.

1. Pregnant Women Hired Farm Workers
 - (1) Pesticide exposures
 - (2) Comments
 - Vulnerability to injuries especially in 2nd and 3rd trimesters of pregnancy
 - Border issues/pesticides used in each country
 - Effect of work on miscarriages
 - Effect of chemicals on pregnancy
1. Women of childbearing age
 - Recovery from injuries vs. men
 - Effect of work on miscarriages
 - Effect of chemicals on pregnancy
 - Access to contraception
2. Children
 - (1) Injuries
 - (2) Cancer
 - (3) Day care availability
3. Greenhouse workers
4. Disabled workers
 - Prevalence
 - "Job" when no longer able to do agricultural work
5. Tobacco workers—green tobacco sickness
 - Exposure to pesticides
 - Green tobacco illness
 - Accidents in the fields
6. Crab workers
7. Effectiveness of interventions
8. Orchard workers
 - Injuries with ladders
 - Exposure from foliage

Appropriate Data Sources for Farm Worker Surveillance and Research Projects

NIOSH SENSOR (Sentinel Event Notification System for Occupational Risks) data from California, Oregon, Texas, and New York regarding pesticide poisonings

NIOSH Agricultural Safety and Health Centers

Bureau of Labor Statistics Survey

Workers' Compensation Insurance national compilation of data

Agricultural Census of 1992

Data for US and by state

Reports analyzing data from one or more years

National Agricultural Workers Survey (NAWS)—US Dept of Labor

New quarterly fact sheets

Reports analyzing data from one or more years

OSHA data on migrant housing and field sanitation inspections and enforcement actions

Hospital discharge data

Death Certificates

Newsletters

RCAP/MESA newsletter

Migrant Health Newslite

Migrant Clinicians Network Streamline

University of California at Davis Agricultural Health and Safety Center

Cancer registries

Birth defect registries

EPA Pesticide Farm Safety Center Final Report (1988)

Lay health worker/promotores

US Department of Agriculture/Easter Seal Society Agrability data

Clinic-based surveillance—migrant health centers, occupational clinics

Household surveys, including "unconventional" settings

Emergency rooms

EPA data (reports)

Poison control centers

State-based programs

1. California pesticide use reports
2. Department of Agriculture
3. Health Department
 - a. Field sanitation inspections
 - b. Housing inspections
4. Workers' Compensation Insurance
5. Rehabilitation Services

Compendium of national and state farm worker laws by Motivation, Education, and Training (MET) in Texas—published 1988

Berkeley Planning Associates study of farm worker rehabilitation

Limitations of These Data Sources

Do not provide adequate information on farm workers

1. Prevalence of exposure and/or illness in migrant population
2. Distribution of/by work tasks
3. Need for data in special populations, e.g., pregnant women
4. Incomplete or poor data may be worse than none (e.g., may look as though no problem exists)

Do not address problems related to agriculture

Exclude small farms

Need to address the way exposed: skin, seasonal

Need NIOSH Recommended Exposure Levels (RELs) for pesticides

Sampling methods miss people

NAWS done only three times per season and misses geographic areas

1992 Census of Agriculture is self-reported data, excludes crew leaders, etc.

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