

Occupational Injury and Illness Among Migrant and Seasonal Farmworkers in New York State and Pennsylvania, 1997-1999: Pilot Study of a New Surveillance Method

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Background Traditional worksite injury surveillance methods are often ineffective for Northeastern farms employing seasonal harvest labor. Many are small farms, exempt from mandatory injury reporting. The high proportion of foreign workers and the temporary nature of the work further discourages reporting. Therefore, an alternative migrant health center-based occupational injury and illness surveillance system was piloted during 1997-1999.

Methods Anonymous medical chart data from nine migrant health centers and four regional hospital emergency rooms was collected during 1997-1999.

Results There were 516 injury/illness cases over two seasons. Joint/muscle straining (31%), falling (18%), poison ivy contact (10%), and object strikes (8%) were most common injurious events. The participation rate of health care was 75%; 130 cases were reported by hospital emergency rooms; and optimal health center participation was associated with: being a farmworker-dedicated program, and including the chart reviewer in the health center's decision to participate.

Conclusions Further development of a medical records-based surveillance system should include hospital emergency rooms and focus on identified health center performance factors. *Am. J. Ind. Med.* 44:37-45, 2003. © 2003 Wiley-Liss, Inc.

KEY WORDS: occupational injury; migrant farmworkers; seasonal farmworkers; hazardous working conditions; occupational illness; injury surveillance; agricultural workers; clinical record data

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INTRODUCTION

Agriculture has one of the highest occupational injury and death rates in the nation, ranking second among all industries in fatalities and third in nonfatal work injuries [National Safety Council, 2000]. Limited data also suggest that within agriculture, migrant, and seasonal farmworkers may be at particularly high risk for certain types of nonfatal injuries [Ciesielski et al., 1991; Isaacs and Bean, 1995; Villarejo and Baron, 1999].

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The high frequency of injury among migrant and seasonal harvest workers is likely due to the physically demanding nature of the work, as well as the conditions of employment. Workers are often paid piece-rate, which provides an incentive to work at high speed and to skip recommended breaks. Harvest work also necessitates a relatively short period of long, intense workdays with little time for workers to physically acclimate to the demands of manual labor. Several studies on farmworker safety have found relatively low rates of worker safety training [Isaacs and Bean, 1995; Osorio et al., 1998; Arcury et al., 1999; Villarejo et al., 2000]. Lastly, the informal nature of harvest worker employment and the uncertainty of their legal status in the US frequently lead to an extreme power imbalance between employer and employee [Decker and Knight, 1990] which may discourage workers from complaining about hazardous working conditions [Isaacs and Bean, 1995; Earle-Richardson et al., 1998].

The Bureau of Labor Statistics occupational injury data are incomplete because many farms in the study region are exempt from mandatory Occupational Safety and Hazards Administration (OSHA) reporting. For this reason, previous studies have used data from farmworker surveys and Workers' Compensation claims to identify leading types of occupational injury among farmworkers. In New York State, survey research was conducted in the mid-eighties by Chi et al. on a population that was demographically quite different from the largely Latino workforce of today [Chi, 1986, 1991]. Since that time, researchers attempting to interview farmworkers with survey questions have encountered significant resistance. Focus group research conducted by the authors indicates that this resistance reflects the common worker fears of job loss and deportation [Earle-Richardson et al., 1998]. The absence of any alternative methodology for assessing the nature and extent of occupational illness and injury in this population indicates a need for a new approach.

The purpose of this study was twofold: first, to gather preliminary data on occupational injury and illness among migrant and seasonal farmworkers in New York and Pennsylvania; and second, to assess the feasibility of establishing a health center-based surveillance system. If successful, a similar program could potentially be expanded to include the entire Northeast, filling the current gap in farmworker occupational injury and illness data in this region.

In New York State, the six participating migrant health centers were located in the Lower Hudson Valley Region, the Central Finger Lakes Region, and the Eastern Lake Ontario Region. The four hospital emergency rooms were also in the Central Finger Lakes Region. In Pennsylvania, all three migrant health centers represented counties in the Southern-central part of the state. These health centers receive public funding to serve migrant and seasonal agricultural

workers, providing language-appropriate medical and outreach services to this largely foreign-born population.

METHODS

Recruiting Data Sites

Because the goal of the data collection was to identify migrant and seasonal farmworker medical visits, migrant health centers in New York that receive funding from the Division of Community and migrant Health, Bureau of Primary Health Care Migrant Health Program were recruited from the publicly available directory of migrant and community health centers [Dailey, 1994]. These centers receive federal support due to documented service to migrant and seasonal farmworker patients. Some migrant health centers operate as farmworker-only facilities, while others receive multiple grants to serve multiple populations. Two of the New York migrant health centers were included on the basis of state funding, since they were known to be the only publicly supported migrant health centers in that area.

In all cases, recruiting of centers consisted of contact by mail or phone, followed by a personal visit to describe the purpose and logistics of the data collection. Recruiting efforts emphasized the value of the report they would receive at the end of the study for their use, and the potential benefit to the farm workers.

Migrant health centers in Pennsylvania were recruited to join the study in its second year. For this reason, a third year of data collection was done in Pennsylvania alone so that data were collected over a period of two seasons from the sites of each state.

During the process of recruiting, it also became apparent that clinical record data was already being collected by a state-funded agricultural health nurse on all agricultural injuries and work-related illnesses in one study region. Including this data in the study presented a unique opportunity to supplement health center primary care data with emergency room cases.

Identifying Charts for Review

An effort was made at each health center to identify a targeted pool of migrant and seasonal farmworker medical charts for review. Specific means by which farmworker cases were identified for review varied from site to site, according to each center's administrative structure. A range of possible methods was presented to the health centers: (a) manual log-book recording of every farmworker patient visit for a potentially occupational condition; (b) computer-generated list of farmworker visits and diagnoses printed at the end of the year; (c) "work-related" check box on encounter form; and (d) having the nurse complete a chart abstraction form at the time of the qualifying medical visit.

Case Identification

In the first year of the study, researchers visited each health center every 2 months and reviewed charts identified during that period using one of the above methods. The determination of inclusion depended on whether the physician indicated (in the medical progress note) that the medical condition was work-related. Specifically, the physician's progress note had to state that the health problem described occurred during work (in the case of an injury), was in some way a result of work, or was substantially aggravated by work. Furthermore, disease occurring while working had to be consistent with occupational disease. Non-occupational chronic disease cases, (e.g., heart disease, diabetes), were excluded, regardless of whether symptoms occurred during the work day.

Once a determination of inclusion had been made, researchers recorded the type of injurious events or exposures; the resulting medical diagnoses; the agricultural commodity involved; contributing circumstances; and basic patient demographic data. No personally identifying information, such as name or birthdate, was collected.

In the second year, the data collection protocol was changed such that health center staff carried out the chart review themselves. This was logistically important as the number of data collection sites expanded from five to ten in the second year.

Training the Data Collectors (Year Two)

In the second year of the study, one staff person at each health center was identified to conduct the chart review. This person received on-site training from research staff on case inclusion criteria and how to complete a chart abstraction form. Several practice examples were given and reviewed. Data collectors were also given a research contact name and number, and encouraged to call them at any time if they had questions.

Training the Medical Care Providers

Ultimately, the quality of the data collected depended on the quality of the medical progress note. While a complete medical progress note should contain all the information needed by chart reviewers to determine inclusion status, and to complete a data abstraction, the realities of time-pressured medical care are such that the circumstances (e.g., "occurred while working") of an injury or other health problem are sometimes not completely described.

In order to remind medical care providers of the importance of documenting how injuries and occupational illnesses occur, researchers made a presentation to the medical staff at the beginning of each season, and provided

them with 11 by 17-inch posters for examining rooms, reminding them about the study, and the importance of proper documentation.

Throughout the study, frequent communication with health center medical and administrative staff (by phone, mail, and in-person) occurred. The goal was to maintain the awareness of the study among medical care providers and other health center staff as well as to receive staff input in surveillance implementation. While participation in the study was voluntary, the study did offer to pay migrant health center chart reviewers or provide a small amount of financial assistance to the health center. The study was determined to be exempt from continuing review by the Bassett Healthcare Institutional Review Board because it collected existing data without identifiers.

RESULTS

Health center participation, of the 12 possible migrant health center data collection sites, nine participated (75% participation). Figure 1 shows the counties where data were collected in each season.

Cases Identified

Over two harvest seasons, 516 occupational injury or illness cases were collected. During this chart review process, 25 were found to be multiple injury events or exposures to the same individual. Twenty-five percent (130) were cases collected from a hospital emergency room. One-third of all cases (159) resulted in the filing of a Workers' Compensation claim.

Farmworker Patient Demographics

The average age of the workers was 39 years. Ninety-three percent were male. Forty-nine percent were identified as Mexican, 16% were Haitian, and 15% were Puerto Rican. No other nationality, ethnicity, or racial group exceeded 6%.

Occupational Incidents and Exposures Leading to Farmworker Medical Visits

The most frequently observed types of injurious events or exposures are shown in Figure 2. Workers most commonly sought care after: straining a muscle, falling, poison ivy exposure, or an object strike, respectively. These four most common are described in more detail below. Only occurrences representing over 5% of the total 516 are shown. It is important to note that these are the precursors to injury and illness, rather than the injuries themselves.

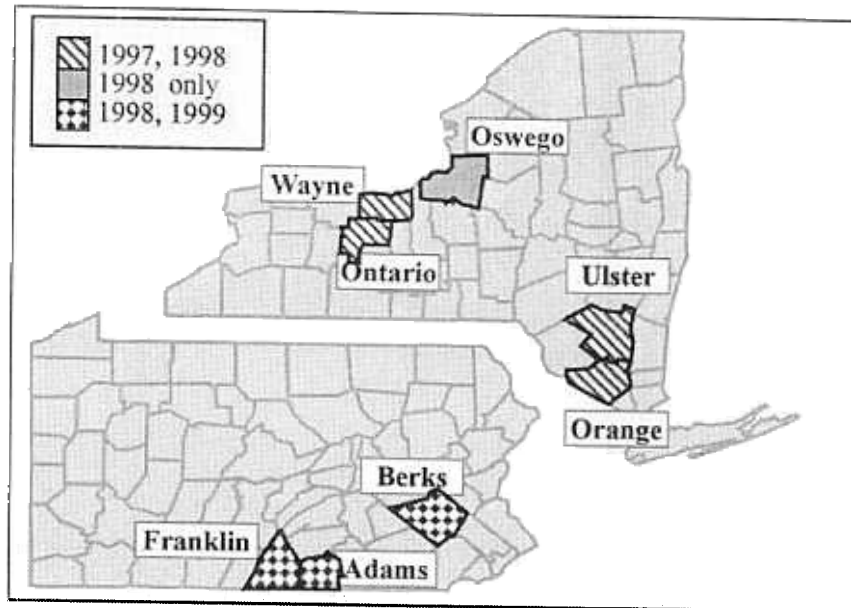


FIGURE 1. New York (NY) and Pennsylvania (PA) counties included in farmworker occupational injury/illness surveillance by year.

Straining Posture or Activity

Straining constitutes 31% of all injurious events or exposures, making it the most common type. The 162 reported straining events can be broken down further into four distinct groups: overwork/overuse (n = 89), assuming an awkward position (n = 47), weight bearing activity (n = 12), and unspecified (n = 14).

Most of the injuries resulting from strain occurrences affected the trunk (including the back, shoulder, neck, chest, and ribs) (76%, n = 111). Fewer occurrences impacted the abdomen and lower extremities (abdomen, pelvis, knees, legs, and feet) (12%, n = 18). An additional ten affected the

upper extremities (arms, wrists, elbows, and hands). Sixty-five percent (n = 101) of the cases involving strains were reported to have occurred in orchards. Packing houses accounted for 17% (n = 26).

Falling

Ninety-five farmworker falls were reported, representing 18% of all occurrences. The most commonly reported contributing factor was being on or around a ladder (44%, n = 41). The second most common was being in a tree (n = 28). Not surprisingly, the majority of these falls occurred in apple orchards (86%, n = 79). Falls most commonly

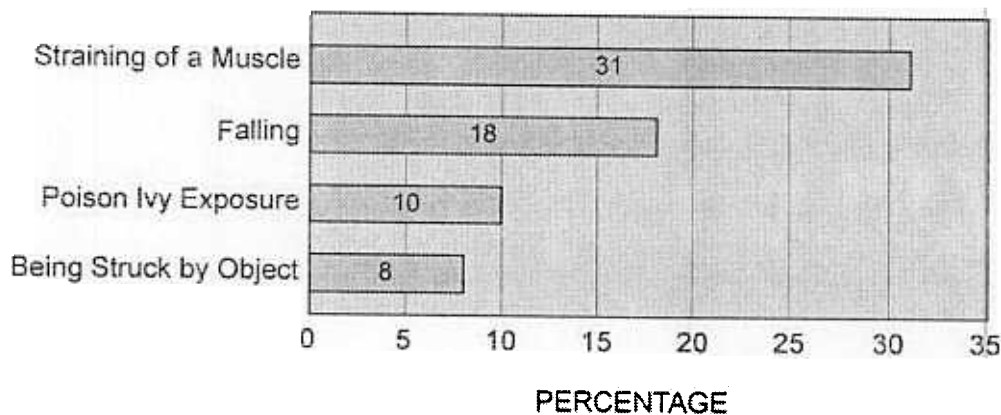


FIGURE 2. Most common types of farmworker occupational injury and illness reported in the NY and PA study region.

resulted in contusions (34% of reported diagnoses) and sprains (29%). The back was most frequently affected (28%), followed by the knee (11%), and the shoulder (9%).

Poison Ivy Exposure

The third most common event or exposure was poison ivy exposure. Medically confirmed poison ivy exposures comprised 10% (n = 49) of all exposures/events. Seventeen of these were reported to be a result of cutting weeds and four while working in a tree. The major commodities involved were fruit crops: 92% (n = 31, 14 for apples and peaches, respectively). It is notable that eight poison ivy cases were severe enough that the worker filed for Workers' Compensation.

Being Struck by an Object

Fourth in frequency was being struck by an object (8%, n = 43). Workers most commonly reported being struck in an orchard setting (72%, n = 31). Of these 43 workers, 11 reported being struck while reaching up to pick fruit, ten while working in a tree, and seven while on or around a ladder. Three farmworkers reported being struck by an object while riding a tractor. Twenty-nine resulting injuries involved the facial area, (particularly the eye), 11 affected the lower body, and 11 affected the arm or hand.

Chart Identification Method

Of the nine participating migrant health centers, three used computerized medical encounter records retrospectively to identify eligible farmworker medical charts for review. Two health centers kept a manual log of individuals arriving at the health center with injuries and potentially occupationally related illnesses. Four migrant health centers conducted the chart abstraction at the time of the medical encounter. No health center added a "work-related" check box to the encounter form to identify charts for later review.

The agricultural health nurse collecting hospital emergency room data reviewed hospital intake logs on a monthly or bimonthly basis, and pulled appropriate charts for abstraction.

Success of Surveillance Implementation at Data Collection Sites

There was a wide variation in how smoothly surveillance activities ran from one data site to another. In order to assess the "success" of surveillance in the different migrant health centers, researchers categorized the data collection sites into "highly successful," "successful," and "marginally successful," surveillance sites. This assessment was made through considering a number of qualitative factors, such as: the number of cases reported each season (as compared to the expected volume), the participation level at trainings, how well mutually set reporting deadlines were followed, and the quality of the chart review lists and completed data abstraction forms. Of the nine migrant health centers included in the analysis, two were classified as "highly successful," three as "successful," and four as "marginally successful."

The purpose of this assessment was to determine if there were any factors that could explain surveillance success. Table I shows four key characteristics of each migrant health center which were thought to play a role in surveillance success: (1) method of initial chart identification, (2) program structure (being a separate migrant health program or part of a general community health clinic), (3) the role that the chart reviewer had played in the initial decision for the migrant health center to join the study, and (4) whether the site received any financial reimbursement for chart review activities. As shown in the table, of the four items, only (2) program structure and (3) chart reviewer role in decision appeared to correspond with surveillance success level.

DISCUSSION

Because this group may not be a representative sample of farmworkers, the resulting pattern of injurious events and

TABLE I. Key Factors Affecting Migrant Health Center Participation in Surveillance, New York and Pennsylvania, 1997–1999

Level of surveillance success ^a	N	Mean number of cases	Using automated chart list generation (%)	Self-defined as separate program for migrant/seasonal farmworkers (%)	Centers where individual doing chart reviews was involved in initial decision to participate in study (%)	Centers where individual doing chart reviews was paid by the study (%)
Highly successful	2	84.5	50	100	100	0
Moderately successful	3	60.7	0	100	66	0
Marginally successful	4	35	50	25	0	50

^aMigrant health centers were assigned to a level of "success" on the basis of several qualitative factors such as timely reporting, completeness of surveillance data collection, participation in medical provider and staff training, and sustained participation.

exposures that was seen cannot be definitively generalized to all farmworkers in New York and Pennsylvania. Overall, straining a muscle or joint, falling, poison ivy exposure, and being struck by an object stand out as common occurrences in this sample. This is consistent with results of farmworker studies from other regions, all of which identify strain as a major factor [Hewson et al., 1987; Dever and Adams, 1993; Isaacs and Bean, 1995]. While further research is needed to obtain occupational injury and illness incidence rates in the region, this data is consistent with research from around the country implicating strains and falls as important areas for further research.

The patterns of injurious events and exposures reported here are most likely a reflection of those experienced in apple harvesting, since apples are the dominant crop (in terms of total hand labor hours required) in three of the four study regions (Finger Lakes Region, Hudson Valley, and the Pennsylvania three-county region). The Eastern Lake Ontario Region, by contrast, has the greatest reported hand labor hours dedicated to onions, followed by a smaller labor demand for apples. Not surprisingly a greater number of ground-crop related injuries and conditions were reported in this region. Of the three migrant health center data sites that declined to participate, two were located in Western New York State, and one very small service site was located in the center of the state. The two Western sites were relatively large sites, with regional crop patterns similar to the three apple dominated regions, whereas the central New York site was more similar to the Eastern Lake Ontario Region in having a greater proportion of groundcrops [New York State Department of Agriculture and Markets, 1999].

In Pennsylvania, notably fewer falls were reported than in the apple-dominated regions of New York State. Pennsylvania migrant health center staff attributed this to the state's practice of designating certain physicians (generally not affiliated with migrant health centers) to see all potential Workers' Compensation cases. More traumatic injuries such as falls might be channeled directly to these physicians. Further research is needed to assess this possibility.

The main findings of interest in this pilot study related to surveillance methods.

Seventy-Five Percent Migrant Health Center Participation

It was encouraging to find that migrant health centers were generally willing to participate, apparently motivated by the desire to have more descriptive data about their patient population, and to promote the development of occupational health and safety for farm workers. Since the initial contact, the 75% participation has increased to 100%, as two of the three health centers initially declining have

joined the study, and the third has withdrawn from the federal program.

One Hundred Thirty Cases Reported From Hospital Emergency Rooms

A main assumption of the original surveillance design was that most farmworker injuries and occupational illnesses would be seen at migrant health centers, due to the fact that they offer low-cost, rural care, and have Spanish-language and transportation services. It was believed that the vast majority of farmworker occupational injuries and conditions are treated on an outpatient basis, and that even the more traumatic cases seen at hospitals would be referred back to migrant health centers for follow-up. In contrast, the data show that in at least one region of the pilot study, hospital emergency rooms play a major role in treating farmworker occupational injuries.

It appears that while the migrant health center facilitates emergency room visits for its patients when needed, there is a large segment of the worker population that goes directly to the emergency room for care. Clearly, future surveillance needs to include hospital emergency department reporting.

Characteristics of Migrant Health Centers With Successful Surveillance

It was hypothesized that all four characteristics shown in Table I would predict successful surveillance. Using computerized medical encounter records retrospectively to identify eligible farmworker medical charts seemed the easiest method, and therefore, most likely to succeed. Migrant health centers with staff dedicated entirely to serving farmworkers seemed likely to have a stronger motivation to actively participate in research on this population. Individuals conducting chart reviews were thought more likely to complete the task effectively if paid for the task, and also if the individual felt that he/she had had some input into the initial decision for the migrant health center to participate in the study.

Of the four factors shown in Table I, two factors correspond with surveillance success and two do not. The two factors linked to health center success level were: (1) being a separate migrant health program and (2) having had the staff chart reviewer involved in the initial decision to participate in the study. The method of chart identification, and being paid by the study did not seem to determine success. This may indicate that surveillance functions best when involved staff are very dedicated to migrant and seasonal farmworkers in particular, and when the staff being asked to do most of the work feel they took it on voluntarily, rather than having simply been told to do it by a superior. These findings also suggest that interest and empowerment may be stronger motivators than money or ease of task.

Following these observations, it seems that involving the health center staff in the early planning stages of research, and giving them some autonomy in how the work is done creates the most promising avenues for successful implementation.

Additional Methodological Observations

Case identification methodology

It appears that there are advantages and disadvantages to both manual prospective chart identification and abstraction (noting the case as it happens and immediately collecting data) and computerized retrospective chart identification and review. Health centers were encouraged to implement data abstraction protocols most appropriate for their own sites, so variation existed between centers, allowing for comparison between the two methods. At some sites, one staff member would simply complete a data form each time a qualifying individual was encountered (prospective). At other sites, where there were few providers, a log-book of qualifying cases was kept even though chart review was not conducted until several had accumulated. This method is retrospective, but only by a few weeks to a month, which enables the health center staff to potentially provide any missing information from other case records. At the larger sites, all potential occupational cases over a span of several months were identified through migrant health program billing records and retrospective data collection was conducted.

Prospective data collection has the advantage of detail. Health center staff who are close to the farmworker community can often provide additional data missing from the chart, such as what commodity the injured worker was handling, the race/ethnicity of the worker, etc. On the other hand, this type of surveillance is entirely dependent on the vigilance of one staff member and will collapse if the individual is sick, loses the job, or simply loses interest. For example, data collection essentially ended for the season at one center after a single staff person became seriously ill.

Conversely, retrospective review using billing data is more reliable, but is likely to provide less detailed information. Medical providers often provide insufficient data on the circumstances of injury in the medical chart. The study attempted to minimize this limitation by providing training to medical providers at the beginning of each season, but as a group they proved extremely difficult to reach for training. Furthermore, there may be some case loss with this method since cases of work-related injuries are not always coded as such in billing records, and chart lists narrowed by ICD9 diagnosis codes may lack some qualifying cases.

Ultimately, the most practical, yet most accurate method of chart abstraction, may be to ask health center staff to abstract cases they encounter prospectively, keeping identi-

fiers in their own records, and then to have research staff do an end-of-year retrospective review from computer billing records (not reducing by ICD9 diagnosis code), asking health center staff to identify cases already recorded. This method will need to be tested in future research.

Who should do the chart abstraction. In the second and third years of data collection, there was an increased variation in the number of cases collected between data sites, most likely due to the responsibility placed on the health centers of conducting chart reviews themselves. It was originally believed that having health centers do their own reviews would be advantageous because it would make the surveillance more self-sustaining and act as a further protection to confidentiality. However, the impact on data collection accuracy is of concern and is currently under further study.

Completeness and accuracy of the data in the chart. The data collection system relies on the medical care provider determining and documenting whether the medical condition occurred as a result of the patient's agricultural work. Once a case is determined to be work-related, the study relies primarily on the medical visit note for descriptions of injurious events/exposures and of crop type, as well as relevant diagnoses. While this information is supposed to be part of the medical encounter, in reality, the work-relatedness and circumstances surrounding an injury or the development of an occupational condition are often not well documented. It is clear that this surveillance system, while relying on existing information, needs to make medical care providers aware of the importance of being thorough in ascertaining and documenting work-related status. This requires a substantial investment of time and resources in training.

Classifying injury and illness occurrences. If results are presented in terms of relative frequencies of various injury and illness types, then the way in which these types are categorized is of paramount importance. For the purposes of this pilot study, broad categories were used, such as "straining a muscle" and "being struck by an object." Injurious events and exposures deemed to occur frequently will certainly be given greater attention than problems deemed rare, so careful thought must be given to the way in which these problems are classified. For example, although "straining of a muscle or joint" is the leading injurious event type in this study, had these cases been presented using a more detailed categorization system, for example, "straining a muscle by overwork," "straining a muscle lifting," and "straining a muscle from holding an awkward posture," each would have a smaller frequency. This would have resulted in "falling" moving into the top position in terms of frequency. Further development of a classification structure based on groups of events and exposures with the same basic etiology and prevention potential is needed.

Collaboration and Dissemination of Study Results

Health centers

Health centers were given regular data reports and a presentation of the final study results. This was done to sustain their interest in participation, to give them a sense of data ownership, and to support their use of the results for the benefit of the migrant and seasonal farmworkers in their communities. This final stage of dissemination and processing of the results is often a neglected part of community-based research that should be addressed more fully in future work.

Farmworkers

Although the data collection method protected farmworkers by avoiding both direct contact and the collection of any identifying information, it also did not give the farmworkers any opportunities to see the data or to give commentary on their own experiences of occupational injury and illness. This is a limitation of the design that could possibly be corrected with the addition of focus group meetings at each health center as part of the study protocol.

Limitations

The size of the underlying migrant and seasonal farmworker population in New York and Pennsylvania is unknown. Because the population is largely transient and many workers are not legally documented, estimating its size is extremely difficult. Existing estimations vary widely [Rust, 1990]. Without a reliable population size estimate, it is not possible to determine cumulative injury or illness incidence rates. Future use of this type of surveillance will necessitate detailed estimates of the farmworker population, or alternatively total worker hours of exposure. A study is underway by our group which should make incidence rate estimation in New York State possible in the future.

A second limitation is that the study population is limited to migrant health center patients (and in one region, hospital emergency room patients). It is likely that some proportion of farmworkers do not seek care at these sites. This may particularly be true in Pennsylvania where individuals filing for Workers' Compensation are often seen by state-designated physicians. Without knowing the size of the underlying population, it is difficult to assess the proportion served by participating migrant health centers in both New York and Pennsylvania. Research is currently underway to estimate the size of the farmworker population not served by publicly supported migrant health centers and hospital emergency rooms in those same regions.

CONCLUSIONS

Given the relatively small farmworker population, their short stay in New York and Pennsylvania, and their apparent reluctance to be interviewed or to file for Workers' Compensation, the clinical records data collection system seems to be a promising low-cost methodology. If good estimates of the farmworker population in Northeastern states can be made, this method would allow researchers to take advantage of already existing data in a manner that protects the privacy of the farmworker.

Certain challenges remain in terms of attaining full participation of health centers and hospital emergency rooms, employing the most effective data abstraction system within each site, classifying injury and illness cases, and finally, assuring that results are effectively utilized by the communities providing the data. Further development of a medical records-based surveillance system should include hospital emergency rooms, focus on the identified health center factors associated with high performance and seek to identify a valid denominator for estimating occupational injury and illness rates.

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