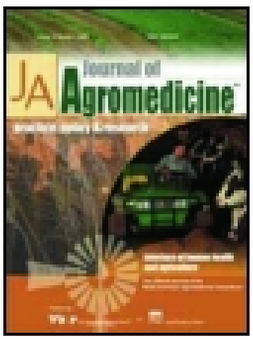

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Chronic Back Pain and Associated Work and Non-Work Variables Among Farmworkers from Starr County, Texas

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ABSTRACT. *Objectives:* This study estimated the prevalence of chronic back pain among migrant farmworker family members and identified associated work and non-work variables. *Methods:* Migrant farmworkers (n = 390 from 267 families) from Starr County, Texas were interviewed in their home once a year for 2 years. The original survey included items measuring demographics, smoking, sleep, farm work, and chronic back pain. For this cross-sectional analysis, multi-level logistic regression was used to identify associated work and other variables associated with chronic back pain while accounting for intraclass correlations due to repeated measures and multiple family members. *Results:* The prevalence of chronic back pain during the last migration season ranged from 9.5% among the youngest children to 33.3% among mothers. Variables significantly associated with chronic back pain were age (odds ratio [OR], 1.03, per year increase), depressive symptoms while migrating (OR, 8.72), fewer than 8 hours of sleep at home in Starr County (OR, 2.26), fairly bad/very bad quality of sleep while migrating (OR, 3.25), sorting crops at work (OR, 0.18), and working tree crops (OR, 11.72). *Conclusion:* The role of work

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exposures, depressive symptoms, and sleep in chronic back pain among farmworkers warrants further examination. Refinements in outcome and exposure assessments are also needed given the lack of a standardized case definition and the variety of tasks and crops involved in farm work in the United States.

KEYWORDS. Back pain, farmworkers, Hispanic, migrant, musculoskeletal symptoms

INTRODUCTION

Research in various populations supports an association between work and back pain. An estimated 37% of low back pain worldwide is attributable to occupation.[1] The back is involved in about half of all musculoskeletal disorders with days away from work each year in the United States.[2] Furthermore, a third of all workers' compensation claims costs are from low back pain alone.[3]

Agriculture consistently ranks among the most hazardous industries in the United States in terms of occupational fatal and nonfatal injuries.[4,5] Within this industry, the back is overrepresented in studies of non-fatal injuries. Meyers et al.[6] reviewed the Occupational Safety and Health Administration (OSHA) 200 injury report logs from three vineyards for a 30-month period. Of the 29 reported musculoskeletal injuries, 20 involved back strain. Richardson and May-Lambert[7] reviewed agricultural injuries collected during the 1993 Annual Survey of Occupational Injuries and Illnesses in Texas. The back was involved in 20% of recorded injuries, more often than any other single body part. Bobick and Myers[8] analyzed worker's compensation records from 25 states participating in the Supplementary Data System from 1984–1986. Of the 1639 sprain/strain injuries sustained by farmworkers employed in the fruit and tree nuts industry, 778 (47.5%) involved the back.

While the agricultural industry benefits from a variety of technological advances, one to four million migrant and seasonal farmworkers provide the manual labor still required by this industry in the United States.[9] The type of work performed by farmworkers frequently involves awkward postures and strenuous movements (e.g., static bent postures, repetitive bending, and twisting) that could increase their risk for back problems. However, this largely Hispanic, foreign-born, working population is economically disadvantaged and often without access to medical care for treatment of occupational or non-occupational injury or illness.[10,11]

Apart from work exposures, health behaviors also could increase farmworkers' risk of back pain. Reports reveal an association between smoking and back pain in working populations.[12] The causal mechanism has not been identified and remains under debate. An alternative explanation follows that smoking is a risk indicator for an unidentified causal factor. In addition, psychosocial factors and mental health, as well as fatigue, may be risk factors for back pain among workers.[12] These may also be important among farmworkers given their long work hours, potentially precarious working conditions, and mobile lifestyle that can increase stress and compromise well-being.[13]

Research examining back pain in agricultural workers in the United States has notable limitations. Vulnerable populations including migrants are not well-represented.[14] Data on females and youth are also needed. While the literature examining ergonomic interventions is growing, only a small number of studies explore potential work or non-work risk factors associated with back pain.[6,14–19] The majority of published studies focus on farm owners or operators.[14,18] A more complete knowledge of the determinants of back pain among farmworkers of both genders and all ages would facilitate the design of future etiologic studies and more comprehensive interventions. To address gaps in the literature, the current study describes the prevalence of chronic back pain in a population of migrant farmworker families from South Texas and explores work and non-work variables associated with this health outcome. By examining back pain in a special population of agricultural workers, this research is uniquely responsive to the National Occupational Research Agenda, a framework developed by the National Institute for Occupational

Safety and Health for guiding occupational research.[20]

METHODS

Data for the present cross-sectional analysis were collected as part of a 2-year cohort study titled, "Injury and Illness Surveillance in Migrant Farmworkers" (5 R01 OH04041) that primarily focused on acute farm work injury.[21] In short, the cohort included 267 migrant farmworker families who usually reside in Starr County, Texas. Located along the Texas-Mexico border, Starr County (pop. 53,597) is largely Hispanic (97.5%). About half the population lives below the poverty level.[22] *Farm work* jobs involved any aspect of food production. Farmworkers were considered *migrants* if they spent the night away from their permanent residences in Starr County to do their farm jobs. The *migration season* for these workers is usually during summer months. To be eligible to participate, families had to have at least one child enrolled in the Rio Grande City Consolidated Independent School District (RGCCISD) and the Migrant Education Program (MEP) during the 1998-1999 school year. Use of MEP as a sampling frame enabled the inclusion of an especially vulnerable and understudied population of migrant farmworkers, adolescents. These farmworker children are known to travel with their families to the job sites and return to attend school near their permanent homes. In addition, an estimated 43% of crop workers across the United States work alongside at least one member of their nuclear family.[10] RGCCISD is the largest of three school districts in Starr County, Texas and enrolls approximately 60% of the county's students.[23] Working with RGCCISD, MEP maintains the New Generation System, a national, school-based, electronic tracking system for identifying migrant students and transferring their enrollment, demographic, academic, and health data across the United States. Participating families were sampled randomly from 1520 families listed in the database at that time.

In the parent study, families were enrolled in the cohort with a baseline interview in the spring of 2000. Two subsequent follow-up surveys were administered, the first at the end of the 2000 migration season (year 1 survey) and the second at the end of the 2001 migration season (year 2 survey). In the fall of 2000 and 2001, each of the 267 families was re-contacted. If the mother and her family migrated that season, the mother was asked to complete a follow-up survey. Each mother responded on behalf of herself, her husband, her oldest child, and her youngest child who migrated. To validate the use of maternal proxy responses, paired interviews were conducted in a sample of families (i.e., mother with father and mother with oldest child).[24] Of the 267 families enrolled in spring 2000, 154 and 143 families migrated in year 1 and year 2, respectively. Each year, approximately 96% of the mothers who migrated completed the follow-up survey.

Since very few of the youngest children did farm work in year 1, only the oldest child was included in the year 2 survey. The instrument used for the two follow-up surveys was in Spanish and English administered in-person by experienced bilingual interviewers while at the mothers' homes in Starr County. Each year, the follow-up survey contained largely the same items to maintain consistency and comparability of data across survey years. Survey items pertinent to the present study were demographics, work history, work hazards, health symptoms (e.g., chronic back pain), depressive symptoms, smoking, and sleep. The survey required approximately a half hour to an hour to complete. A $15 gift card to a local grocery/discount store was offered to each mother for participating in each follow-up survey. Written informed consent was obtained. Forms and procedures were reviewed and approved by the Committee for the Protection of Human Subjects at The University of Texas Health Science Center at Houston.

The outcome for the present study was defined as *having experienced chronic back pain during the prior migration season*. To be consistent with the definition of back pain used in the 1988 National Health Interview Survey (NHIS) Occupational Health Supplement (i.e., pain every day for a week or more during the previous year), the year 2 survey included a similar item.[25] Mothers responded either "yes" or "no" to these back pain items for herself and her family members.

The independent variables of primary interest were state (e.g., Texas), work intensity (e.g., number of hours/day, days/week), type of crop (i.e., yes or no), task (i.e., yes or no), and work hazards (i.e., yes or no). Additional independent variables included demographics (e.g., age, gender, preferred language for speaking), depressive symptoms while migrating (i.e., yes or no), smoking (i.e., yes or no), and sleep. Average quantity (e.g., <8 hours/night) and quality of sleep (e.g., very good, fairly good) were assessed while migrating and at home in Starr County, TX. The definition of depressive symptoms was *feeling sad or lonely for 2 weeks or more*.

Sample size calculations were based on standard parameters (alpha = 0.05, beta = 0.20, 2-sided test).[26] There was sufficient sample size to detect odds ratio (OR) from 1.99 to 2.84 depending on a range of exposure prevalence (10-30%) and a range of chronic back pain prevalence (20-30%).

Data Analyses

Data were analyzed using Intercooled STATA for Microsoft Windows v.10.0. To be included in the dataset for the present analyses, the farmworker had to migrate and participate in farm work during the 2000 (year 1) or 2001 (year 2) migration season. Counts, frequency distributions, and percentages were computed for each variable.

Responses for the mother, father, oldest child, and youngest child within a single family may be correlated, violating the assumption of independence of observations in a logistic regression model. Farmworkers who participated in both years of follow-up could contribute up to two records, one from year 1 and a second from year 2. As a result, correlation of responses at the individual level also could be an issue. To account for intraclass correlation due either to repeated measures on an individual or multiple members from within the same family, the multi-level logistic regression included individual identification (I.D.) number and family I.D. number as separate random variables.[27]

The modeling process began with entering each independent variable into a univariate multi-level mixed logistic regression model. Then, each independent variable significant at the $p<0.25$ level in the univariate models was entered one at a time into an intermediate model. Variables significant at the $p<0.05$ level or that induced a >20% change in the OR for another variable in the model were retained. Then, previously eliminated variables including variables not significant at the $p<0.25$ level in the univariate models were entered into the intermediate model one at a time to ensure that all important variables were included in the final model. Next, all first-order interaction terms were tested one at a time. Each final model included all significant main effects (at the $p<0.05$ level), confounders (induced a 20% change in the OR of another variable), and effect modifiers (i.e., biologically plausible interaction term significant at $p<0.05$ level). Approximately 6% of records had missing values. Records with missing values were allowed to drop out during the model building process.

RESULTS

Descriptive Statistics

Table 1 displays the available sample size and demographics by year and family member. A total of 390 unique farmworkers migrated and participated in farm work across years 1 and 2. Of those, 190 (48.7%) family members participated in both years providing a total of 580 observations. Average ages ranged from 44.3 years among fathers to 14.3 years among youngest children (year 1 only). Both years, children were largely male. All families were Hispanic. Table 2 displays the prevalence of depressive symptoms, sleep habits, and smoking across both years. The prevalence of depressive symptoms was 7.5%. Overall, farmworkers slept more hours while at home in Starr County compared to their sleep duration while migrating. However, the proportion of those experiencing fairly good or very good sleep was consistently near 80.0% while at home and while migrating. The survey only asked about smoking among mothers and fathers. Approximately a quarter of

TABLE 1. Sample Size and Demographic Characteristics by Family Member and Year

	Mother	Father	Oldest child	Youngest child
Sample size (n; %)				
Participated in year 1 only	41 (28.1%)	36 (27.5%)	27 (29.3%)	21 (100.0%)
Participated in year 1 and year 2	78 (53.4%)	68 (51.9%)	44 (47.8%)	n/a‡
Participated in year 2 only	27 (18.5%)	27 (26.6%)	21 (22.8%)	n/a‡
Total†	146 (100.0%)	131 (100.0%)	92 (100.0%)	21 (100.0%)
Average age (years)				
Year 1	40.1	43.8	17.7	14.3
Year 2	41.1	44.3	18.1	n/a‡
Gender (%)				
Year 1 male	0.0	100.0	60.6	75.0
Year 1 female	100.0	0.0	39.4	25.0
Year 2 male	0.0	100.0	58.5	n/a‡
Year 2 female	100.0	0.0	41.5	n/a‡
Hispanic ethnicity years 1 and 2 (%)	100.0	100.0	100.0	100.0

†n = 390 unique participants and n = 580 observations (n = 315 in year 1; n = 265 in year 2). ‡Data not collected for youngest children in year 2.

parents reported having ever smoked 100+ cigarettes in their lifetime.

On average in year 1 and year 2, farmworkers worked 6 days/week, 10 hours/day, and held one to two farm jobs. In years 1 and 2, 34.0% and 27.9% respectively, worked only at sites within Texas. Each year, 58.5–75.2% of farmworkers worked for only growers/farm owners as opposed to contractors/other employer types. Table 3 displays the prevalence of the most common crops worked and work tasks, work intensity, and ergonomic hazards, across years 1 and 2. Common crops included asparagus, beets, corn, cotton, and potatoes. Frequent work tasks included harvesting from the ground, hoeing, sorting, and weeding. A large proportion (77.2%) worked an average of 8 or more hours per day. Common ergonomic hazards were bending or stooping repetitively, lifting object repetitively, or moving heavy objects.

In year 1 and year 2, respectively, the prevalence of chronic back pain among mothers was 33.3% (95% confidence interval [CI], 24.9–42.6%) and 28.2% (95% CI, 19.7–37.9%), among fathers was 23.8% (95% CI, 15.9–33.3%) and 21.1% (95% CI, 13.4–30.6%), among oldest children was 15.7.% (95% CI, 8.1–26.4%) and 15.6% (95% CI, 7.8–26.9%), and among youngest children was 9.5% (95% CI, 1.1–30.3%) (year 1 only). Among mothers, the prevalence of back pain using the NHIS definition[25] of daily pain lasting 1 week or longer was 18.5% similar to the national annual estimate of 17.6% in the prior 12 months. The prevalence was markedly lower among fathers (10.5%) and oldest children (10.9%), perhaps due to using a surrogate responder.

Unadjusted Multi-Level Logistic Regression Models

Table 2 displays results for univariate models pertaining to age, gender, sleep quantity and quality, depressive symptoms and smoking. The association between chronic back pain and age significantly increased (OR, 1.04) with each year of age. Females were 2.20 times more likely than males to experience chronic back pain. Farmworkers with depressive symptoms (e.g., feeling sad or hopeless for 2 weeks or more) were 9.63 times more likely to experience chronic back pain during the last migration season. Chronic back pain was more prevalent among farmworkers reporting fairly bad or very bad quality of sleep while migrating (OR, 4.55), as well as among those reporting an average of <8 hours of sleep per night while at home in Starr County (OR, 3.18). ORs were elevated, but not significantly, for quality of sleep at home in Starr County (OR, 2.18) and an average of <8 hours of sleep per night while migrating (OR, 2.06). The association

TABLE 2. Unadjusted Odds Ratios (OR) for Demographics, Sleep, Depressive Symptoms, and Smoking Among Migrant Farmworker Families from Starr County, Texas

Variable	%	OR	95% CI	p-value
Demographics				
Age (continuous; n = 556)				
Per year increase	n/a	1.04	1.01–1.07	0.003
Gender (n = 570)				
Male	51.0	1.00		
Female	49.0	2.20	1.21–4.00	0.010
Depressive symptoms				
Feeling sad/hopeless for 2+ weeks (n = 568)				
No	92.5	1.00		
Yes	7.5	9.63	2.27–40.77	0.002
Sleep				
Hours of sleep (Starr County; n = 566)				
≥ 8 hours/day	84.6	1.00		
< 8 hours/day	15.4	3.18	1.28–7.95	0.013
Quality of sleep (Starr County; n = 567)				
Fairly good/very good	78.8	1.00		
Fairly bad/very bad	21.2	2.18	0.88–5.42	0.094
Hours of sleep (migrating; n = 570)				
≥ 8 hours/day	34.2	1.00		
< 8 hours/day	65.9	2.06	0.91–4.67	0.082
Quality of sleep (migrating; n = 571)				
Fairly good/very good	80.9	1.00		
Fairly bad/very bad	19.1	4.55	2.00–10.38	0.000
Tobacco use (mothers & fathers only)				
Lifetime smoking (n = 415)				
< 100 + cigarettes	74.4	1.00		
≥ 100 + cigarettes	25.6	0.79	0.34–1.81	0.573

NOTE: Sample size varies due to missing values. CI, confidence interval.

TABLE 3. Unadjusted Odds Ratios (OR) for Common Crops, Work Tasks, and Ergonomic Work Hazards Among Migrant Farmworker Families from Starr County, Texas

Variable	%	OR	95% CI	p-value
Crops				
Asparagus (n = 571)				
No	87.9	1.00		
Yes	12.1	1.25	0.25–6.17	0.782
Beets (n = 571)				
No	89.1	1.00		
Yes	10.9	2.90	0.50–16.88	0.237
Corn (n = 571)				
No	81.4	1.00		
Yes	18.6	0.49	0.14–1.68	0.256
Cotton (n = 571)				
No	66.9	1.00		
Yes	33.1	1.23	0.45–3.32	0.689
Potatoes (n = 571)				
No	88.6	1.00		
Yes	11.4	0.21	0.038–1.21	0.082
Work tasks				
Harvest from the ground (n = 571)				
No	84.3	1.00		
Yes	15.7	0.92	0.30–2.85	0.883
Hoeing (n = 571)				
No	62.9	1.00		
Yes	37.1	1.46	0.63–3.36	0.378
Sorting (n = 571)				
No	80.5	1.00		
Yes	19.5	0.26	0.09–0.74	0.011
Weeding (n = 571)				
No	85.9	1.00		
Yes	14.1	0.83	0.31–2.26	0.715
Work intensity & ergonomic hazards				
Average hours per day (n = 570)				
≤8 hours	22.8	1.00		
8+ hours	77.2	2.97	1.03–8.56	0.044
Bend or stoop repetitively (n = 565)				
No	55.1	1.00		
Yes	44.9	1.64	0.72–3.71	0.234
Lift objects repetitively (n = 570)				
No	75.4	1.00		
Yes	24.6	0.47	0.19–1.20	0.116
Move heavy objects (n = 560)				
No	77.6	1.00		
Yes	22.4	0.72	0.29–1.87	0.511

NOTE: Sample size varies due to missing values. CI, confidence interval.

between chronic back pain and lifetime smoking status among parents was not significant or elevated.

Table 3 displays results for univariate models with work variables. None of the univariate models for the most frequently worked crops (e.g., asparagus, beets, corn, cotton, and potatoes) were significantly related to chronic back pain. Of the most common job tasks (e.g., harvesting from the ground, hoeing, sorting, and weeding) displayed in Table 3, the only significant adjusted OR was for sorting (OR, 0.26) and it was protective. Of the potential ergonomic work hazards, the associations with repetitive bending/stooping,

repetitive lifting, and moving heavy objects were not significant. However, a significant association was found for working more than 8 hours per day on average (OR, 2.97).

Multilevel Multivariable Logistic Regression

The final model included six variables displayed in Table 4. Adjusting for the effect of the other variables in the model (and for family and individual I.D. numbers), for each year increase in age, the risk associated with chronic back pain significantly increased 1.03 times. In addition, statistically significant increased associations were found for depressive symptoms during the prior migration season (OR, 8.72), bad or fairly bad quality of sleep on average while migrating (OR, 2.26), fewer than 8 hours of sleep each night on average at home in Starr County (OR, 3.25), and working tree crops (OR, 11.72). Finally, sorting as a work task yielded a protective effect (OR, 0.18). The model did not include additional confounders or effect modifiers.

TABLE 4. Final Multi-Level Mixed Logistic Regression Model Examining Variables Associated with Chronic Back Pain Among Migrant Farmworker Families from Starr County, Texas

Variable	OR	95% CI	p-value
Age (continuous)	1.03	1.00–1.06	0.021
Depression symptoms (migrating)			
No	1.00		
Yes	8.72	1.80–42.25	0.007
Hours of sleep (Starr County)			
≥8 hours/day	1.00		
<8 hours/day	2.26	1.16–8.12	0.024
Quality of sleep (migrating)			
Fairly good/very good	1.00		
Fairly bad/very bad	3.25	1.78–10.25	0.001
Worked sorting crops (task)			
No	0.18		
Yes	0.18	0.06–0.55	0.003
Worked trees (crop)			
No	1.00		
Yes	11.72	1.91–79.44	0.008

NOTE: n = 548 records without missing data. CI, confidence interval; OR, odds ratio

DISCUSSION

Since this study is among the few that examine factors associated with chronic back pain in farmworkers, interpretation of results within the context of the current literature is constrained mostly to studies with farmers. Compared to farmers, farmworkers generally are younger and Hispanic and more likely to perform intense manual labor.[28] Farmworkers and farmers also likely differ from one another with respect to several factors (e.g., socio-economic status, legal status, access to care) that also influence health. Consistent research findings across both populations may be informative for developing preventive measures. However, differences between these two occupational groups may restrict extrapolation of research findings from one population to the other. Despite variation in outcome definition and time period of interest, the prevalence of chronic back pain among the mothers and fathers is similar to the prevalence reported for other farmworker populations. Although use of the more restrictive definition of chronic back pain resulted in lower overall prevalence rates, it actually intensified the ORs for the majority of factors identified as significant in the previous models (data available upon request). Approximately 20-25% of the 971 farmworkers who participated in the California Agricultural Worker Heath Survey in 1999 reported back pain lasting 1 week or longer in the prior year.[11] Participants were largely Hispanic/Latin/Mexican. A prior year prevalence of back pain or discomfort was reported for migrant farmworkers in Illinois (24.0%) and Florida (39.0%).[15] In a validation study of an instrument designed to collect musculoskeletal symptom data from immigrant Hispanic farmworkers, 213 workers in the nursery industry in southern California were surveyed. Approximately 30% of the participants reported back pain in the last 30 days.[29] Less research is available among youth, but the prevalence reported for two studies is concerning. Of 15-18 year-old Wisconsin workers (n = 33) employed in fresh market vegetable production, 50% reported low back discomfort in the last year.[30] Among 280 migrant farmworkers from high schools in South Texas, 16.4% reported severe back pain in the prior 9 months.[17] Again, despite the difference

in outcome definitions and sample sizes, the prevalence of chronic back pain among children in the present study was similar to the latter estimate when averaged across the two subgroups of children in farmworker families, oldest and youngest child (14.3% in year 1; 15.6% in year 2).

Studies of back pain in working adult populations, including those with agricultural workers,[16,31–36] do not consistently reveal an association with gender as may be expected given physical differences between males and females. However, data from the New York State Farm Family Health and Hazard Surveillance Project suggested a protective and significant effect (OR, 0.71; 95% CI, 0.45–0.78) for males after adjusting for owner/operator status and tractor use.[16] In the present study, the unadjusted model also suggested that males experienced a lower risk of chronic back, but gender did not contribute to the multivariable model.

In the general population, the prevalence of back pain increases markedly with age.[37] Studies conducted among farmers by Park et al.[38] and Xiang et al.[36] also suggest an increased risk through middle-age with a null association among older farmers. The authors hypothesized that the lack of an association was a consequence of the healthy worker effect.[36,38] Increasing age also was significantly associated with chronic back pain in the present study.

Numerous reports support an association between back pain and smoking in other populations. We were only able to examine lifetime smoking behavior among mothers and fathers due to a lack of data from children for this variable. No relationship was found with having smoked 100+ cigarettes in a lifetime. A more comprehensive measure of exposure may be needed to be able to detect an association. Similarly, Xiang et al.[36] found no association between smoking and back pain in the last year in their study of 742 farmers from Colorado. However, among adolescent farmworkers from South Texas (n = 306), those who currently used tobacco were 2.79 time more likely to report severe back pain in the prior 9 months compared to abstainers.[17]

Depressive symptoms were associated with an increased OR in the multivariable model. The literature assessing psychosocial factors and musculoskeletal disorders in other industries is more abundant and supports an association.[12,39] However, the temporality and a potential mechanism remain under debate.[12,39] Regarding studies of farmers, the available research shows mixed results. An association was found between depression and back pain lasting everyday for a week or more in the last 12 months (OR, 4.02; 95% CI, 2.40–6.74) in the study by Xiang et al.[36] In a cohort study of male farmers from Iowa using similar exposure and outcome definitions, the OR was elevated (2.27), but the association was not significant.[38] Again, referring to adolescent farmworkers from South Texas, those who felt tense, stressed, or anxious sometimes or often were 4.11 (95% CI, 1.78–9.51) times more likely to report severe back pain compared to those who experienced these symptoms not often or never.[17]

Sleep quantity and quality were important in the multivariable model. Farmworkers with chronic back pain were more likely to sleep <8 hours when not migrating and to sleep poorly when migrating. Those with pain may not be able to sleep well due to their discomfort. In addition, studies of fibromyalgia sufferers and burn patients suggest that poor sleep could precede or follow increased pain.[40,41] Furthermore, farmworkers lacking quality or quantity of sleep may not have sufficient rest or recovery time prior to their next exposure. Also pertaining to recovery periods, farmworkers who labored more than 8 hours per day, on average, were more likely to experience chronic back pain in the unadjusted model. However, this significant association did not persist in the multivariable model.

Two additional work variables proved important. Farmworkers who sorted crops were less likely to experience chronic back pain. Sorting crops can involve standing upright as opposed to assuming a bent/stooped posture for long periods as would be required by harvesting crops from the ground. This may explain the observed protective effect. Finally, working with tree crops was associated with an increased association with chronic back pain. Those working with heavy, large trees may be involved in heavy lifting and awkward postures that could increase their risk of chronic back pain. Due to breadth of crops

and tasks performed by this cohort, it is difficult to pinpoint the aspects of sorting crops and working with trees that could lead to back problems. Both of these variables may also be surrogates for a combination of hazards/exposures.

Supporting the validity of the data, the work patterns are the same as those reported as recently as 2005 by adolescent farmworkers from South Texas.[17] An additional strength of the study is the response rate. Given the mobile nature of this temporary workforce, the response rate for the original study was remarkable (96%) and affords increased generalizability of results.

It should also be noted that back pain is notoriously difficult to assess without limitations. The exact cause of back pain frequently is unknown, labeled nonspecific, and impossible to clinically validate.[42] Therefore, incorporating specific pathology (e.g., herniated disc, sciatica) into the outcome definition can lead to a gross underestimate of the prevalence. This methodologic challenge often forces researchers to rely on self-reported data. Misclassification of chronic back pain may result from the use of self-reported data and is a concern in the present study as well as others. Attenuation of the measures of association between work and non-work factors and back pain may occur given this type of bias. Further complicating research in this area, published studies employ an array of definitions that vary by recall period (e.g., prior week, 30 days, 12 months), duration (e.g., everyday for a week or more[25]), and severity (e.g., lost time from work, medical treatment).[4] Back pain typically is dichotomized as "yes" or "no;" however, the criteria above can be used to create an ordinal variable. Since pain is highly individual, a variety of descriptors (e.g., pain, stiffness, numbness, tingling, and burning) are also used.[43] As discussed in recent publications, the lack of a standardized definition hinders comparison of findings across studies.[18,44]

Back pain, in the current study, was described as "chronic" to reduce the reporting of minor discomfort. Beyond requiring the pain to have occurred during the prior migration season, participants were not provided any further restrictions on severity and duration. Participants, as a result, may have used different interpretations of 'chronic.' However, the prevalence estimates and associated 95% CIs were comparable to studies using more precise definitions.[11,17] Bilingual, highly trained, and experienced interviewers also provided clarification for this survey item, as well as the other survey items when needed.

The use of a proxy respondent for the fathers and children could also be a limitation. This may have led to an underestimate of the prevalence of back pain among family members. In a separate analysis, the impact of using maternal proxies in the original study was assessed by a sample of paired interviews of the mother with the father and with the oldest child.[24] Results indicated that mothers tended to underreport health symptoms for other family members and did so to a greater extent for their oldest children. The results emphasized the need to ask children directly about their health symptoms. The temporality of work-related exposures and chronic back pain could not be determined. However, both the outcome and independent work variables referred to the prior migration season.

CONCLUSION

The prevalence of back pain in this study reinforces that it is an important health concern among adult and adolescent farmworkers. The livelihood of many farmworkers depends on their ability to do physically demanding work. Therefore, the potential for back pain to become debilitating is troubling and highlights the need for interventions and prevention. This study facilitates hypothesis generation and provides parameters (e.g., prevalence of pain among groups without specific exposures) for designing more rigorous studies. The identification of determinants is also a step towards developing targeted intervention programs from an ecological perspective and inclusive of ergonomic and other factors. Specifically, studies that establish the temporal relationship with work exposures, sleep, and depressive symptoms among farmworkers are needed. Sleep quality and quantity should be targeted in this population for confirmatory research and their potential as preventive measures assessed.

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