Personal protective equipment and work safety climate among Latino poultry processing workers in Western North Carolina, USA

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Background: Job-appropriate personal protective equipment (PPE) is important for decreasing the high rates of occupational injury experienced by poultry processing workers.
Objectives: This analysis describes the job-appropriate PPE provided to poultry processing workers by their employers and the PPE used by these workers, and it delineates the association of work safety climate with job-appropriate PPE.
Methods: Data are from a cross-sectional study of 403 Latino poultry processing workers in North Carolina.
Results: Most poultry processing workers are not provided with nor use job-appropriate PPE; however, more workers use PPE than are provided. The provision and use of PPE differs by employer. Work safety climate was associated with use of job-appropriate PPE.
Conclusions: Poultry processing workers should be provided with job-appropriate PPE. Workers' use of PPE is an indicator of safety climate. Further research about work safety climate and other work organization characteristics and job safety characteristics is needed.

Keywords: Manufacturing, Immigrant workers, Personal protective equipment, Organization of work, Work safety culture

Introduction

Poultry processing is a dangerous industry in which workers experience high levels of occupational injury and illness.[1–9] Occupational injury and illness frequently experienced by poultry processing workers include musculoskeletal injures that result from falls, lifting, and repetitive motion; lacerations that result from knives, scissors, and powered cutting tools, as well as from getting hands and fingers caught in equipment; and skin infection and inflammation that result from exposure to chicken fluids and chemicals used for sanitation. Evidence suggests that work in poultry processing also affects the mental health of workers.[10]

Workers in the US poultry processing industry are generally members of minority groups. Over half are immigrants from Latin American countries.[11–13] The high proportion of poultry processing workers who are members of minority and immigrant populations, and the high prevalence of occupational injuries, raise concerns about the occupational justice and health disparities experienced by these workers.[14–16]

One mechanism for decreasing occupational injury and illness among poultry processing workers is the use of appropriate personal protective equipment (PPE).[6] The PPE that is appropriate for poultry processing workers must reflect their specific jobs. These jobs are diverse and represent the process of transforming live chickens to chilled and packaged meat that is distributed to stores and restaurants. They include receiving the live birds from trucks; hanging these live birds for killing and plucking; eviscerating, cutting, trimming, and deboning the birds; washing the bird parts; and then chilling and packing the bird parts.[12] Additionally, sanitation is an important job in poultry processing plants. The PPE required for each of these jobs varies.[17]

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However, little research has documented the provision of job-appropriate PPE to poultry processing workers or the use of PPE by these workers. Recent analyses of PPE for poultry processing workers have been directed at prevention of exposure to avian influenza.[18,19]

Work safety culture is an indicator of the value of occupational safety shared by workers and their supervisors.[20,21] Work safety climate is one component of work safety culture that indicates workers' perceptions of the value that their supervisors place on occupational safety. The provision of job-appropriate PPE by employers and the use of this PPE by workers should reflect the safety climate in which they work.[20–22] Work safety climate is particularly important for immigrant Latino workers.[23,24] These workers are vulnerable: they have limited formal education and low incomes, they live in communities with high unemployment, and they are frequently undocumented.[6,7] Therefore, they are often unwilling to complain when safe working standards, such as the provision of job-appropriate PPE, are not observed. Even when documented, they often fear increased discrimination and harassment if they complain about the lack of safety.[16] Workers from Latin American countries have little experience with regulated workplace safety and do not expect employers to minimize hazardous exposures. Finally, male workers from Latin American countries often feel that they cannot complain about the lack of workplace safety or about uncomfortable conditions.[23,25–27]

This analysis has two objectives. The first is to describe the job-appropriate PPE provided to poultry processing workers by their employers, and the job-appropriate PPE used by workers. The second objective is to delineate the association of work safety climate with receiving and using job-appropriate PPE among poultry processing workers.

Methods

Data are from a cross-sectional study of Latino poultry processing workers employed in four western North Carolina counties. Three different companies operate poultry processing plants in these counties.

Sample

A community-based approach was used to recruit a representative sample.[28] A sample frame was developed of dwellings where Latinos lived in the study counties. Working with a community-based organization, the study team mapped the neighborhoods in each county with high proportions of Latino residents. The research team also surveyed other areas of the counties to identify other dispersed dwellings that were likely inhabited by Latino residents; surveyors looked for cultural or behavioral indicators known to characterize Latino residents (e.g. car decals, bicycles, particular satellite dishes) to identify such dwellings. The lists of neighborhood and dispersed dwellings contained 4,376 possible Latino dwellings, with about two-thirds in neighborhoods. The lists were randomized and stratified to ensure that two-thirds of potential dwellings were located in neighborhoods and one-third of potential dwellings were dispersed.

Two to four members of the local Latino communities were hired as recruiters in each of the four counties. Recruiters approached randomly selected dwellings in order. If no one was home, recruiters returned at different times and on different days. Residents were screened for inclusion criteria: self-identified as being Latino or Hispanic, worked 35 hours or more per week in a manual labor job, and were 18 years or older. Manual labor jobs were defined as employment in non-managerial jobs in industries such as poultry processing, landscaping, construction, restaurant work, hotel work, child care, or manufacturing. Non-poultry manual workers with previous work in poultry only qualified if lifetime employment in poultry production or processing was 6 months or less, and not within the past 2 years. The larger study from which this analysis was drawn examined the prevalence of occupational injuries among poultry processing workers compared to immigrant manual workers employed in other industries.[8,9] Therefore, those immigrant manual workers employed in other industries but who had substantial experience working poultry processing were excluded to reduce potential confounding. Work in poultry processing was defined as any type of non-supervisory work in a poultry processing plant with job categories from receiving through sanitation. Employees of poultry production farms were excluded, also to reduce potential confounding from similar exposures that might affect the presence of respiratory or dermatological conditions. More than one resident per dwelling could be recruited, if eligible. Of 1681 dwellings selected, 965 were screened, for a screening rate of 57%. A total of 1526 residents were screened. Of those eligible, 78% were interviewed. Of the 742 interviewed participants, 403 were poultry processing workers who were included in this analysis.

Data collection

Interviewers completed a 1-day training session that addressed interview techniques, questionnaires contents, human subject protection, and ethics. Each interviewer was required to conduct a practice interview before beginning data collection. Participants completed face-to-face interviews in their homes. All interviews were conducted in Spanish. Interviews took approximately 60 minutes to complete and included

information on work history, work environment, symptoms and disability, and psychosocial characteristics. Participants received a $10 incentive at the completion of the interview. All procedures were approved by the Wake Forest School of Medicine Institutional Review Board. All participants provided written informed consent.

Measures

Two sets of measures of job-appropriate PPE are included in the analysis: whether the PPE is provided by the employer and whether the PPE is used by the employee. The job-appropriate PPE for each job was determined by first reviewing the Occupational Safety and Health Administration's "poultry processing industry e-tool".[17] The resulting list was reviewed by a representative of the United Food and Commercial Workers familiar with occupational safety in the poultry processing industry (Jackie Nowell, personal communication, 22 March 2012). The minimal set of appropriate PPE was determined for each job (Table 1). Examples of eye protection include safety goggles, safety glasses, and face shields; of hearing protection include ear plugs or muffs; of hand protection include cut-resistant mesh gloves or non-slip gloves; of special footwear include non-slip shoes and steel-toed boots; of specialized hand tools include bent-handled knives and pneumatic or spring-loaded scissors; of specialize material handling tools included hand dollies and boxes with handles; of head protection included hard hats, plastic helmets or colored hats; and of protective clothing included coveralls and warm jackets. Participants were asked if they were provided with every type of PPE in the list, and they were asked if they used every type of PPE in the list. For each type of PPE that was appropriate to their job, participants were categorized as it being provided by their employer and as it being used. Participants were also categorized as to whether or not their employer provided all of the job-appropriate PPE, and as to whether or not they used all of the job-appropriate PPE. The number of job-appropriate PPE items provided by the employer and the number of job-appropriate items used by the worker were also calculated.

Participants evaluated their supervisors with the 10-item Perceived Safety Climate Scale.[29] Nine of the items in this scale used a four-point Likert format (strongly agree, agree, disagree, strongly disagree). The tenth item included three response categories. After analysis to assess internal consistency was performed, one of the nine four-point Likert format items was discarded due to lack of fit within the scale. This item had a correlation with the total scale that was close to 0, indicating that it was not measuring the same construct as the remaining scale items. A

Table 1 Type of appropriate personal protective equipment provided for each job, poultry processing workers

Personal protective equipment	Jobs											
	Receiving	Hanging	Killing and plucking	Evisceration	Cutting	Trimming	Deboning	ECTD*	Wash-up	Chilling	Packing	Sanitation
Eye protection			X									X
Hearing protection	X	X	X	X	X	X	X	X	X	X	X	X
Dust masks	X											
Hand protection	X	X	X	X	X	X	X	X	X	X	X	
Special footwear	X		X	X	X	X	X		X	X	X	
Specialized hand tools			X	X	X	X	X	X				
Specialized material handling tools										X	X	
Head protection											X	
Protective clothing		X	X							X		X

Note: *Includes jobs in which workers perform two or more of the jobs of evisceration, cutting, trimming, and deboning.

total Work Safety Climate was calculated by summing the remaining nine items. Values for the scale ranged from 9 to 35, with higher values indicating better work safety climate. The mean score in this study was 24.8, with a standard deviation of 3.2 (alpha=0.73).

Personal and work characteristics considered in the analysis are gender, language, age, years working in poultry, employer, and job. Language has the values of Spanish and indigenous indicating the language spoken in their home when they were children. Age and years working in poultry processing are continuous measures. Employer is a categorical variable with three values. Thirteen jobs were identified among the participants: receiving, hanging, killing and plucking, evisceration, cutting, trimming, deboning, evisceration–cutting–trimming–deboning (ECTD), wash-up, chilling, packing, sanitation, and others. When participants indicated that they had more than one job in a plant, they were assigned to the job at which they worked the greatest number of hours. If they worked in two jobs for the same number of hours, they were assigned to the job with the greatest number of job-appropriate PPE. A number of workers reported that they worked equally in the jobs of cutting, trimming, deboning, and evisceration; these jobs have the same set of job-appropriate PPE. Therefore, the ECTD category was included.

Analysis

Data were summarized using means and standard deviations (SDs) for continuous variables, and frequencies and percents for categorical variables. All analyses accounted for the sampling structure of the data, clustering on county of residence and dwelling unit. Associations of employer with PPE provision and use were explored using Rao–Scott Chi-square tests. Associations between the work safety climate total score and job were explored with ANOVA tests. Subsequently, these ANOVA tests were also adjusted for employer. Job categories with fewer than 10 participants were not included in the association analyses. Associations between the work safety climate total score and job-appropriate PPE use and provision (both the number of PPE and whether or not all appropriate PPE were used and provided) were also explored with ANOVA tests, adjusting for employer. All analyses were completed using SAS version 9.2 (SAS Institute, Inc., Cary, NC, USA). A *P*-value of 0.05 or less was considered statistically significant.

Results

Participant characteristics

A majority of the participants were male (Table 2). The primary language for most was Spanish, although one-quarter spoke an indigenous language. Their mean age was 35 years, and the mean number of years worked in poultry processing was 4.9. About one-third worked for each of the three employers. The jobs held by the participants included all aspects of poultry processing. Several of the jobs were not frequent; these included receiving, killing and

Table 2 Personal characteristic, employer and jobs of poultry processing workers, Western North Carolina, 2010 (*n*=403)

Personal characteristics, employers and jobs	*n*	%	Mean	SD
Gender				
Female	173	42.9		
Male	230	57.1		
Language				
Spanish	293	73.4		
Indigenous	106	26.6		
Age			35.0	10.8
Years working in poultry processing			4.9	4.2
Employer				
Employer 1	139	35.1		
Employer 2	121	30.6		
Employer 3	136	34.3		
Jobs				
Receiving*	6	1.5		
Hanging	24	6.0		
Killing and plucking*	5	1.2		
Evisceration*	5	1.2		
Cutting	41	10.2		
Trimming	36	8.9		
Deboning	61	15.1		
ECTD†	49	12.2		
Wash-up*	7	1.7		
Chilling*	2	0.5		
Packing	98	24.3		
Sanitation	44	10.9		
Other‡	25	6.2		

Note: *Removed from remaining analyses due to small numbers.
†Includes jobs in which workers perform two or more of the jobs of evisceration, cutting, trimming, and deboning.
‡Removed from remaining analyses due to inability to determine proper PPE.

Table 3 Distribution of jobs by employer, poultry processing workers, Western North Carolina, 2010 (n=403)

	Employer 1		Employer 2		Employer 3	
Jobs	*N*	%	*N*	%	*N*	%
Receiving	4	66.7	1	16.7	1	16.7
Hanging	12	52.2	2	8.7	9	39.1
Killing and plucking	1	25.0	0	…	3	75.0
Evisceration	5	100.0	0	…	0	…
Cutting	4	9.8	7	17.1	30	73.2
Trimming	26	72.2	8	22.2	2	5.6
Deboning	0	…	59	96.7	2	3.3
ECTD*	1	2.0	7	14.3	41	83.7
Wash-up	1	14.3	5	71.4	1	14.3
Chilling	0	…	1	100.0	0	…
Packing	53	55.8	10	10.5	32	33.7
Sanitation	14	31.8	19	43.2	11	25.0
Other	18	75.0	2	8.3	4	16.7

Note: *Includes jobs in which workers perform two or more of the jobs of evisceration, cutting, trimming, and deboning.

plucking, evisceration, wash-up, and chilling. A substantial number of participants had the jobs hanging, cutting, trimming, ECTD, packing, and sanitation. Twenty-five had other jobs that fall outside this analysis.

The distribution of jobs reported by the participants differed among the employers (Table 3). Most of those with the job of hanging, trimming, packing, and other worked for Employer 1. Most of those with the job of deboning worked for Employer 2. Most of those with the jobs of cutting and ECTD worked for Employer 3.

Personal protective equipment

Eye protection was generally provided and used by sanitation workers (Table 4). Hearing protection was also generally provided and used. Special footwear was less often provided, especially for those with the jobs of trimming and deboning, as well as packing. However, special footwear was generally used. Specialized hand tools were not frequently provided by employers. A greater number of workers actually used these specialized hand tools. Specialized material handling tools were seldom provided by employers, and seldom used by workers. Head protection was provided to and used by about three-in-five workers. Protective clothing was generally provided and used by those having the jobs hanging and sanitation. All appropriate PPE being provided by employers differed widely by job. Most of those with the job of hanging received all of the appropriate PPE, as did those with sanitation jobs. Fewer than half of those with the jobs of cutting and ECTD were provided with all of the appropriate PPE. About one-in-ten workers with the job of trimming were provided with all the appropriate PPE, while fewer than 10% of those with the jobs of deboning and packing are provided with all of the appropriate PPE. Generally, a greater number of workers used all appropriate PPE than were provided this PPE by their employers.

The provision and use of all job-appropriate PPE differed significantly by employer. The provision of

Table 4 Appropriate personal protective equipment that is employer provided and that is used by poultry processing workers for each job, Western North Carolina, 2010

	Hanging	Cutting	Trimming	Deboning	ECTD*	Packing	Sanitation
Personal protective equipment	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)
Total number of appropriate personal protective equipment items	3	4	4	4	4	5	4
Employer provided							
Eye protection	…	…	…	…	…	…	41 (93.2)
Hearing protection	23 (95.8)	40 (100.0)	36 (100.0)	61 (100.0)	48 (98.0)	96 (98.0)	44 (100.0)
Hand protection	23 (95.8)	36 (90.0)	34 (94.4)	31 (50.8)	47 (95.9)	74 (75.5)	42 (95.5)
Special footwear	…	27 (67.5)	12 (33.3)	3 (4.9)	44 (95.9)	48 (49.0)	…
Specialized hand tools	…	24 (60.0)	17 (47.2)	12 (19.7)	27 (55.1)	…	…
Specialized material handling tools	…	…	…	…	…	22 (22.5)	…
Head protection	…	…	…	…	…	58 (59.2)	…
Protective clothing	23 (95.8)	…	…	…	…		42 (95.5)
All appropriate personal protective equipment provided	21 (87.5)	17 (41.5)	4 (11.1)	3 (4.9)	23(46.9)	7 (7.1)	37 (84.1)
Used							
Eye protection	…	…	…	…	…	…	41 (93.2)
Hearing protection	23 (95.8)	41 (100.0)	36 (100.0)	61 (100.0)	47 (95.9)	98 (100.0)	44 (100.0)
Hand protection	20 (83.3)	40 (97.6)	36 (100.0)	61 (100.0)	49 (100.0)	72 (74.2)	40 (90.9)
Special footwear	…	34 (82.9)	17 (47.2)	59 (96.7)	45 (91.8)	56 (57.7)	…
Specialized hand tools	…	29 (76.3)	21 (58.3)	12 (19.7)	31 (63.3)	…	…
Specialized material handling tools	…	…	…	…	…	27 (27.8)	…
Head protection	…	…	…	…	…	59 (60.8)	…
Protective clothing	23 (95.8)	…	…	…	…		43 (97.7)
All appropriate personal protective equipment used	19 (79.2)	25 (61.0)	6 (16.7)	10 (16.4)	28 (57.1)	12 (12.2)	37 (84.1)

Note: *Includes jobs in which workers perform two or more of the jobs of evisceration, cutting, trimming, and deboning.

Table 5 Work safety climate by job for poultry processing workers, Western North Carolina, 2010

	Total sample	Jobs						
		Hanging	Cutting	Trimming	Deboning	ECTD	Packing	Sanitation
Number of participants	403	24	41	36	61	49	98	44
Work Safety Climate items		Percent agree or strongly agree						
1. Workers' safety practices are very important to management	89.1	87.0	91.9	100.0	100.0	79.2	88.5	84.1
2. Workers are regularly made aware of dangerous work practices or conditions	90.6	87.5	95.1	91.7	98.4	81.6	88.7	95.5
3. Workers are regularly praised for safe conduct	50.1	37.5	60.0	36.1	88.5	57.1	34.0	54.6
4. Workers receive instructions on safety when hired	87.5	83.3	90.2	88.6	98.4	75.5	87.8	93.0
5. Workers attend regular safety meetings	82.7	75.0	90.0	82.9	98.4	77.6	76.0	88.6
6. Proper safety equipment is always available	89.6	91.7	97.3	91.4	100.0	91.8	86.3	84.1
7. Workers have almost total control over personal safety	84.9	91.7	79.0	77.1	100.0	81.6	83.3	88.6
8. Taking risks is not a part of my job	64.7	41.7	62.2	75.0	95.1	25.0	63.5	70.5
9. Overall safety climate assessment:		Percent giving each of the three responses						
Supervisors do as much as possible to make my job safe	24.2	26.1	10.8	21.2	50.8	10.2	16.7	32.6
Supervisors could do more to make my job safe	26.0	8.7	21.6	21.2	44.3	18.4	30.2	20.9
Supervisors are only interested in doing the job fast and cheap	49.7	65.2	67.6	57.6	4.9	71.4	53.1	46.5
Total score: mean (SD)	24.8 (3.2)	24.7 (3.1)	25.3 (3.1)	24.8 (2.5)	26.6 (1.6)	23.7 (4.0)	24.3 (2.9)	25.7 (3.5)

all job-appropriate PPE was reported by 22 (18.2%) Employer 1 workers and 24 (21.2%) Employer 2 workers, but by 66 (50.0%) Employer 3 workers ($P<0.01$). The use of all job-appropriate PPE was reported by 22 (18.2%) Employer 1 workers and 34 (28.6%) Employer 2 workers, but by 85 (64.0%) Employer 3 workers ($P<0.01$).

Work safety climate

The elements of Work Safety Climate differed among workers with different jobs (Table 5). Most (75% or more) participants in each job agreed with the statements that "workers' safety practices are very important to management", "workers are regularly made aware of dangerous work practices or conditions", "workers receive instructions on safety when hired", "proper safety equipment is always available", and "workers have almost total control over personal safety". Fewer workers agreed with the statement that "workers are regularly praised for safe conduct", with as few as 34.0% of those working in packing and 37.5% of those working in hanging agreeing with this statement. However, 88.5% of those working in deboning agreed with this statement. Similarly, fewer workers agreed with the statement that "taking risks is not a part of my job", with as few as 10.2% of those working in ECTD, 10.8% of those working in cutting, and 16.7% of those working packing agreeing with the statement. However, 50.8% of those working in deboning agreed with this statement. In responding to the statement that "supervisors are only interested in doing the job fast and cheap", two-thirds or more of those working in hanging, cutting, and ECTD agreed with the statement and about half or more of those employed in trimming, packing, and sanitation agreed with the statement, but only 4.9% of those working in deboning agreed with the statement.

Total Work Safety Climate score differed significantly by job ($P<0.01$) in an unadjusted analysis. However, these differences were no longer significant ($P=0.09$) when the analysis was adjusted for employer.

Total Work Safety Climate score did not differ significantly ($P=0.51$) when participants were compared as to whether or not their employer provided all the job-appropriate PPE for their job (mean scores for both all provided and not all provided was 24.9). This association remained non-significant when the analysis considered Work Safety Climate by number of job-appropriate PPE provided (Spearman correlation=0.02, $P=0.73$). However, total Work Safety Climate score was significantly greater ($P<0.02$) for those who used all job-appropriate PPE (mean score of 25.2) compared to those who did not use all job-appropriate PPE (mean score of 24.7). The significant association of Work Safety Climate with use of job-appropriate PPE remained when the analysis compared Work Safety Climate by number of job-appropriate PPE used (Spearman correlation=0.17, $P<0.01$).

Discussion

Most Latino workers in Western North Carolina poultry processing plants are not provided with a

minimum set of job-appropriate PPE, and most of these workers do not use a minimum set of job-appropriate PPE. However, a greater percentage of workers use job-appropriate PPE than are provided with this PPE, indicating that some workers are purchasing their own PPE. The provision and use of job-appropriate PPE differs among these Latino poultry processing workers by employer. Work safety climate did not differ by job, once employer was considered. However, work safety climate was associated with whether job-appropriate PPE was used.

The use of appropriate PPE is important for protecting workers from occupational injuries.[17] Appropriate PPE should be provided to workers at no cost, "except for certain safety-toe shoes and boots, prescription safety eyewear, and logging boots".[30] Job-appropriate PPE provided to poultry processing workers and their use of this PPE has not been documented in previous research. This analysis shows that few poultry processing workers are provided with the minimum PPE that is appropriate for their job. The job-appropriate PPE that is generally provided is PPE that is inexpensive: eye protection and hand protection. More expensive PPE, such as special footwear and specialized hand tools, is provided to far fewer workers. In addition, it is not clear whether PPE, such as specialized hand tools, which is provided to these workers, is appropriately designed for women and ethnic minority workers. The specialized hand tools designed for European heritage men generally are not of the proper size for women or for some ethnic minority men, such as indigenous language speakers, who are generally smaller than white men. That more workers use job-appropriate PPE than is provided by their employers suggests that these workers value the protection afforded to them by the PPE.

The use of PPE improves occupational safety and reduces occupational injury and illness.[17] However, employers are not providing Latino poultry processing workers with the minimum PPE that is required for their jobs, even though they are required to provide this PPE by current regulations,[30] and workers are not using the minimum job-appropriate PPE. The lack of job-appropriate PPE occurs in the face of high rates of occupational injury and illness experienced by workers in the poultry processing industry.[2,3,5,8,9] It is essential that processes and structures be implemented to ensure that employers provide all job-appropriate PPE to workers in the poultry processing industry. It is also essential that these processes and structures be implemented to ensure that workers use all job-appropriate PPE. For example, employers should be required to provide every employee with a list of the appropriate PPE for every job at which the employee works. The list of job appropriate PPE should include contact information for state and federal OSHA officials to which workers could anonymously report employers who do not provide the PPE or who charge workers for the PPE. Programs could be implemented through local service or health organizations for disseminating information about job appropriate PPE to immigrant workers; these organizations could provide needed PPE to workers at low cost. Information about job-appropriate PPE has been provided successfully to poultry processing workers in community interventions outside of the workplace.[15]

A component of work organization,[22] work safety climate, is a measure of how workers perceive the value their supervisors place on safety over production.[20] Little research has examined work safety climate in manufacturing. Among Latino manufacturing workers who participated in this study, work safety climate did not differ by job when employer was considered in the analysis. Therefore, although work safety climate may be affected by job among Latino poultry processing workers, it is driven by the employer. This reflects Zohar's[31] conclusion that those working for a specific employer were homogenous in their perceptions of work safety climate. However, this differs from Latino construction workers in which work safety climate did differ by job (roofers perceived work safety climate to be worse than framers and general construction workers).[24] This difference reflects how work safety climate may differ in terms of other work organization characteristics. Manufacturing plants such as the poultry processing companies considered in this analysis often have a large number of employees. These employees work under one set of safety guidelines that reflects a common safety culture, even when they have different jobs within the same company. Even contract workers in a manufacturing plant must abide by the company's safety policies. Comparatively, construction workers often work in small groups with different employers, even if on the same job site.

Work safety climate is important for Latino immigrant workers. These workers are financially and politically vulnerable.[14] They generally will not complain if they are faced with a poor work safety climate.[23,24] They will continue to work in unsafe environments because they need the jobs and they fear harassment from authorities if they complain.[16] However, occupational health research is just beginning to examine work safety climate among Latino immigrant workers. Menzel and Gutierrez[27] and Arcury and colleagues[24] report that work safety climate was associated with the use of PPE among Latino immigrant construction workers. Quandt and colleagues[6] report measures of work safety climate

and employer paying for specific PPE among Latino poultry processing workers, but they do not consider the association of safety climate and employer provided PPE. Grzywacz and colleagues[7] found that safety commitment among supervisors was associated with the prevalence of musculoskeletal problems, respiratory problems, and injury in bivariate analyses of data from Latino poultry processing workers. Investigations of work safety climate among immigrant Latino farmworkers indicate that work safety climate is related to employer safety practices[32] and to occupational injuries.[23] The diversity of industries and jobs in which Latino immigrants work requires further investigations before greater generalizations can be provided about work safety climate among these workers, and about the associations among work safety climate, occupational safety behaviors, and health outcomes.

These results should be considered within the study's limitations. Participants were recruited from one area of North Carolina and all were Latino, limiting generalizability to other areas and workers from other ethnic groups. The study had a cross-sectional design, which does not allow for determination of causation between provision and use of PPE, employer, and work safety climate. The provision and use of PPE is based on self-report. However, the study's strengths are also important. The sample was large and participants worked for three different poultry processing companies. The sample design attempted to recruit participants randomly. The study used a standard measure of work safety climate,[29] which has been used in other analyses of immigrant Latino workers.[6,7,23,24]

Greater effort is needed to ensure that all poultry processing workers are provided with and use job-appropriate PPE. Work safety climate reflects the degree to which workers use job-appropriate PPE. Further research on the influence of work safety climate and other work organization characteristics on the use of PPE and other job safety characteristics is needed.

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