

**Center for Latino Health Research  
Wake Forest University School of Medicine**

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among Immigrant Latinos in Poultry Processing**

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**The Organization of Work: Implications for Injury and Illness among Immigrant Latinos  
in Poultry Processing<sup>1</sup>**

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## **Executive Summary**

Poultry processing has among the highest occupational illness rates of any private industry. A large number of poultry processing workers are immigrants. The National Occupational Research Agenda argues that worker health is influenced by the “organization of work,” the organizational practices related to management methods and the way jobs are designed and performed. Previous research has not studied the potential health effects of how poultry processing work is organized. Using a representative sample of immigrant Latino workers in six counties of western North Carolina, face-to-face survey interviews were conducted with 200 poultry workers. Data were collected on worker health, characteristics of poultry processing jobs, and the management practices related to safety and supervision.

Most of the respondents were less than 35 years of age and had been in the United States less than ten years. Half were from Mexico; many others were from Guatemala.

- Over 50% of workers reported musculoskeletal symptoms in the past 30 days, and over 25% reported an occupational illness/injury in the past year.
- Management’s commitment to safety was perceived as moderate.
- Poultry workers’ jobs require frequent awkward postures and repetitive movements, and workers have little control over and variety in their work.
- Risk factors for musculoskeletal symptoms included low variety in job tasks and high levels of psychological job demands.
- Low commitment to safety, as it is perceived by workers, is a risk factor for recent respiratory symptoms and occupational illness/injury.

Policy changes focused on the “organization of work” are needed to improve health and safety of poultry workers:

- Worker advocacy groups and community agencies should work with poultry processing plants to build a culture of safety in the plants.
- Companies should create “safety committees” that include workers from across the company as a way of giving workers control over their work environment.
- Companies should implement a job-rotation program, such as that described in OSHA’s 2004 ergonomic guidelines, at these poultry companies to increase job variety and reduce the prevalence of musculoskeletal injuries.

Continued research is needed to:

- Identify ways of redesigning poultry processing jobs to give workers greater control over their job-related tasks.
- Determine the job rotation strategies that maximize task-related variety and minimize occupational illness and injury.

These policy changes and research will help ensure that poultry processing jobs are organized in a way that protects worker health in this vulnerable population.

## **Introduction**

The risk of occupational injury and illness among workers in the poultry processing industry is substantial (Government Accountability Office [GAO], 2005). In 2004 the nonfatal injury rate was 5.5 per 100 full-time workers, and the illness rate was 2.3 per 100 full-time workers (Bureau of Labor Statistics [BLS], 2005a; BLS, 2005c). Recognizing that estimates from the BLS Annual Survey of Occupational Illness and Injuries underestimate nonfatal occupational injuries (Leigh et al., 2004), a minimum of 7.8% of full-time poultry processing workers, or nearly 20,000 individuals, reported occupational injuries or illnesses in 2004. Common injuries and illnesses among poultry processing workers include a host of musculoskeletal disorders, including cumulative trauma disorders, as well respiratory and dermatologic conditions (GAO, 2005). In 2004 poultry processing had the sixth highest occupational illness rate of any private industry in the U.S. (BLS, 2005b). Recent research focused on immigrant Latinos in poultry processing reported rates of illness and injury that are substantially higher than national estimates (Quandt et al., 2006).

The National Occupational Research Agenda (NORA) contends that worker health is partly a function of the “organization of work.” Organization of work refers broadly to organizational practices related to management and production methods as well as the way jobs are designed and performed (Sauter et al., 2002). The organization of work shapes every element of workers’ lives on the job, including the safety climate, the physical and psychological demands required by the work that is performed, and the amount of control that workers have over their work. Substantial research indicates that physical and psychological features of the work environment reflecting how work is organized contribute to a variety of worker health outcomes including onset of musculoskeletal problems, greater risk of compensable spinal injury, experiencing an occupational accident, and coronary heart disease and cardiovascular mortality (Kivimaki et al., 2002; Kuper and Marmot, 2003; Krause et al., 1998; Swaen et al., 2004).

Little research has examined the potential health effects of how poultry processing work is organized. Early research indicated that full-time and rotating poultry inspectors experienced elevated rates of musculoskeletal, respiratory, and other health complaints (Wilkes et al., 1981). More recent evidence from a single cohort of workers in poultry slaughter and canning in France indicates that several variables reflecting the organization of work are associated with worker illness and injury. Working in awkward postures, measured in terms of poorly fitted work station, performing repetitive movements, and arm exertion were associated with greater risk of Raynaud’s phenomenon, general sickness absence, and musculoskeletal-related sickness absence (Kaminski et al., 1997; Messing et al., 1998). Psychological strain from work requiring focused concentration, irregular working hours, and the quality of supervisor-subordinate and co-worker relations were also associated with greater risk of Raynaud’s, elevated blood pressure, and sickness absence (Messing et al., 1998; Ledesert et al., 1994). Although based on a specific cohort, previous results suggest that the organization of poultry processing work can contribute to variation in worker illness and injury.

## **Poultry Processing in the U.S.**

In 2004 there were an estimated 235,100 workers employed in the poultry processing industry (BLS, 2005a). A substantial proportion of these workers are concentrated in southern states, including North Carolina, Georgia, Alabama, Mississippi, and Arkansas (U.S. Department of Agriculture, 2004). Greater than 50% of poultry production is controlled by five corporations resulting in a heavily consolidated industry that is intensely competitive. Turnover in poultry processing is known to be high, sometimes exceeding 100% in some plants (GAO, 2005), suggesting that the number of current workers dramatically underestimates the number of individuals exposed to the industry. During the 1980s the number of poultry processing workers represented by a union fell from 46% to 21% and remains low (GAO, 2005). The industry has long relied on a minority workforce, but is increasingly reliant on workers who are foreign-born (GAO, 2005). Fully 42% of poultry processing workers are Hispanic, and 26% are foreign born representing countries from across Latin America, Southeast Asia, and the Pacific.

The organization of poultry processing creates a variety of factors that undermine worker health (GAO, 2005; Lipscomb et al., 2005). Increased mechanization and assembly line production require prolonged periods of standing and rapid repetitive motions; both contribute to musculoskeletal injuries, including repetitive trauma disorders and chronic low back pain (Carayon et al., 1999; GAO, 2005). Close proximity among workers on the production line coupled with rapid line speeds and heavy reliance on hand tools contributes to unintentional injuries (GAO, 2005). The relative lack of control over work, particularly the speed of the production line, and restricted range of task variety inherent in assembly line production creates stress and contributes to illness and injury (Ahlberg-Hulten, Theorell, and Sigala, 1995; Carayon et al., 1999; GAO, 2005). Chronic ambient noise and the continual pace of the production line are psychologically demanding and are believed to undermine worker health through physiological and behavioral stress processes (Carayon et al., 1999; Cohen and Herbert, 1996). Intense competition among the poultry processing operations can undermine safety standards within the industry as organizations seek ways to minimize production costs (Lipscomb et al., 2005). Finally, an ethnically diverse, foreign-born workforce is at risk for occupational injury and illness because of difficulties in communication, training, and enforcement of safety standards, as well as fears on the part of undocumented workers about raising safety concerns (GAO, 2005).

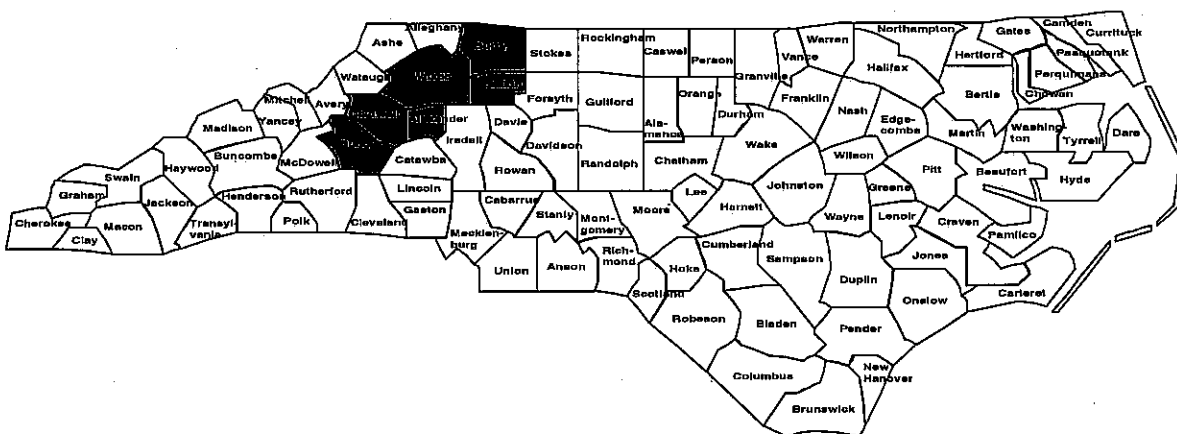
The goal of this study was to determine whether variables reflecting the organization of work are associated with occupational illness and injury among immigrant Latino poultry processing workers. The organization of work variables on which we focus capture management methods related to safety and supervision, as well as common indicators of how jobs are designed and performed. Given the relative paucity of previous research, particularly in the U.S., we begin by describing the organization of work variables measured in this study. We then explore the associations of these variables with workers' reports of occupational illness and injury.

## Methods

This study was conducted as part of a 4-year project funded by the National Institute on Occupational Safety and Health. The project brings together environmental health scientists, health care providers, a community-based organization (Centro Latino of Caldwell County), and poultry workers to form a partnership. The goals of this partnership are to research the physical and psychosocial impacts of poultry employment on Latino workers in western North Carolina, and to develop ways of assisting workers individually and collectively in protecting themselves from the demands of this work.

## Sampling and Recruitment

Current poultry workers were recruited in a six-county area of western North Carolina, including Alexander, Burke, Caldwell, Surry, Wilkes, and Yadkin Counties (Figure 1). This region has a total of five processing plants belonging to three different companies. To be eligible, a respondent had to be (1) 18 years of age, (2) currently employed as a worker in a poultry processing plant, and (3) of Latino ethnicity. The sampling plan called for 100 males and 100 females, with 100 located in Wilkes County, 50 in Burke, Alexander, or Caldwell, and 50 in Surry or Yadkin Counties. In the absence of a census listing of all eligible poultry workers, a site-based sampling method was used to recruit a representative sample (Arcury & Quandt, 1999). Briefly, such an approach reasons that every person is a member of at least one residential group, or "site." Sites can include residential enclaves, areas of high concentrations of workers, or dispersed residences, workers living apart from other poultry workers. If sites that vary across characteristics of the community (e.g., being composed of single men vs. families) are chosen and respondents are selected from a variety of sites, the resulting sample should reflect the variability in the community.



**Figure 1. Counties for poultry worker study, North Carolina 2005**

Project staff compiled a list of 41 residential enclaves in the study counties known to have a high concentration of Latino poultry workers. Individuals at the sites were approached for participation. Respondents were recruited at all 41 enclaves proportional to the estimated

number of eligible residents. Because not all workers live in enclaves, a total of 70 workers who lived outside these enclaves were also recruited, proportional to the estimated population size. Interviewers explained the purpose of the study, the study procedures, and the risks and benefits of the study. They stated that the respondent would receive ten dollars as a thank you at the end of the interview. The interviewers answered any questions of the worker and asked for consent to proceed with the interview. The respondent was given an information sheet in Spanish with the same information on it that had been reviewed orally. This sheet contained the contact information for the Wake Forest University School of Medicine Institutional Review Board, which approved the procedures for data collection and for obtaining informed consent.

## Data Collection

Data were collected in face-to-face interviews conducted by seven trained interviewers. All interviewers were native Spanish speakers familiar with the study counties. Interviewers participated in a one day training, which covered interview techniques, questionnaire content, human subject protection, and ethics. Interviewers were required to conduct a minimum of two practice interviews before beginning study data collection. Field supervisors collected and reviewed questionnaires on a weekly basis; 14 % of respondents were recontacted to verify the interview.

## Measures

The outcomes for this study were three occupational health variables that were constructed from a set of self-reported items. Illness symptoms were assessed with 20 items found on several symptom inventories, such as the Cohen-Hoberman Inventory of Physical Symptoms (Cohen and Hoberman, 1983) and the Quality of Well-being, Self-Administered instrument (Kaplan et al., 1997), asking whether the respondent experienced the symptom in the past month (yes/no). Musculoskeletal problems was coded 1 for respondents responding “yes” to items about “pain, stiffness, cramps, or weakness in *neck or back*,” “pain, stiffness, cramps, or weakness in *arms, wrist or hands*,” or “pain, stiffness, cramps, or weakness in the *legs or feet*” in the past 30 days. Respiratory symptoms was coded 1 for respondents reporting “yes” to the items asking about “coughing or sneezing” or “shortness of breath or difficulty breathing” in the past 30 days. Self-reported injury/illness was assessed with a single question asking respondents “In the past 12 months, how many times were you injured while doing poultry work, or become sick because of your poultry work?” Individuals reporting one or more times were coded 1, 0 otherwise.

The predictor variables were different aspects of how poultry processing work is organized and were constructed from self-reported information. Variables capturing two management methods with health implications were constructed from items obtained from existing instruments. Safety commitment was measured with a 10-item Perceived Safety Climate Scale (Gillen et al., 2002). In this study, the seven items focused on management practices related to safety were used (e.g., “workers are regularly made aware of dangerous work practices and conditions”). The items were summed with higher values indicating greater perceived management commitment to worker safety. Abusive supervision was measured with a seven-item index assessing the extent to which supervisors/managers use coercive tactics with their employees (e.g., “my supervisor could make my work difficult for me”) (Tepper, 2000). The items are summed with higher



values indicating greater belief that supervisors/managers in poultry processing use coercive tactics.

Several variables reflecting how jobs are designed and performed were created from items included in well-established instruments. Physical demands of the job were assessed with a 26-item shortened version of the Dutch Musculoskeletal Questionnaire, a global assessment of musculoskeletal workload (Hildebrandt et al., 2001). Using data from three separate cohorts Bot and colleagues (2004) demonstrated that the 26 items loaded on two distinct factors reflecting physical workload and long-lasting postures and repetitive movement. In this study we assessed the internal consistency of each set of items and dropped items with low item-to-total correlation resulting in nine items measuring physical workload and six items measuring posture and repetitive movement. Items in each set were summed with higher values reflecting greater frequency of physical workload and posture and repetitive movements.

A modified version of the Job Content Questionnaire (JCQ) (Karasek and Theorell, 1990) was used to measure psychosocial elements of job design and performance. During pilot testing we learned that immigrant Latinos had difficulty responding to the original response categories; consequently, we modified the items and response categories using a four-point frequency-based set ('never' to 'always'). Authority was assessed with three items tapping opportunities to exert control over work (e.g., "How often are you allowed to make your own decisions about your work?"). Items were summed and multiplied by 4 with greater values indicating greater frequency of exerting control over work. Variety was assessed with six items tapping how jobs vary in content, location, and routine (e.g., "How often do you do a variety of different things on your job?"). Items were summed with greater values indicating more variation in tasks and activities on the job. Psychological workload was assessed with nine items tapping the stressors or demands inherent in participants' jobs (e.g., "How often is your job hectic?"). Items are summed with higher values reflecting greater psychological workload.

## **Data Analysis**

All analyses were performed using SPSS version 13. Univariate statistics such as percentages and means and standard deviations were calculated to describe the sample of poultry processing workers and the organization of poultry processing work. Pearson correlation coefficients were computed to evaluate the inter-correlation among indicators of work organization. Simple and multivariate logistic regression models were fit to examine associations among indicators of the organization of work and worker health outcomes.

## Findings

### Participants

The demographic and occupational characteristics of study participants are described in Table 1. Participants were predominantly from Mexico (47.5%), but one-third of participants were born in Guatemala. Approximately 75% of participants had been in North Carolina for 5 or more years and only 15% had been in the United States for fewer than 5 years. On average, participants were 33 years of age (SD = 9.6 years), women comprised half of the sample, and the modal level of education was primary, which is approximately equivalent to an elementary education in the U.S. Over half of the respondents reported symptoms of musculoskeletal problems in the past 30 days (n = 108). Approximately one in seven workers (n = 29) reported symptoms in the past 30 days suggestive of a respiratory problem. Over one-quarter of respondents (n = 56) reported an occupational injury or illness in the past 12 months.

A wide range of poultry processing tasks were performed by participants. The majority were involved in evisceration as well as cutting and deboning, tasks that occur in the early to middle stages of processing and involve working with raw carcasses and the use of knives and other sharp instruments. Approximately one in five participants worked in packout or the stage of production that packages the processed product for shipping from the plant to retailers. Approximately 11% of participants were in sanitation and were responsible for cleaning the machinery and surfaces in compliance with Food Safety Inspection Services requirements. Another 11% of participants worked in other jobs including fork lift operator, quality control, and supervision. One-third of workers reported working in poultry processing for fewer than two years, but 20% had worked in poultry processing for more than 5

**Table 1. Demographic and occupational characteristics**

	Total Sample (N = 200)	
	n	%
<b>Demographic</b>		
Country of Birth		
Mexico	95	47.5
Guatemala	66	33.0
El Salvador	25	12.5
Honduras	9	4.5
Other	5	2.5
Years in U.S.§		
≤ 4	31	15.5
5 – 9	86	43.0
10 – 14	51	25.5
≥ 15	30	15.0
Years in N.C.‡		
≤ 4	51	25.5
5 – 9	97	48.5
10 – 14	41	20.5
≥ 15	9	4.5
Age		
≤ 24	33	16.5
25 – 29	46	23.0
30 – 34	46	23.0
35 – 44	49	24.5
≥ 45	26	13.0
Gender (Female)	99	49.5
Education		
None	23	11.5
Primary	109	54.5
Secondary	42	21.0
Preparatory or Higher	26	13.0
<b>Occupational</b>		
Years in Poultry		
< 2	64	32.0
2 – 5 years	91	45.5
> 5 years	45	22.5
Job Classification		
Receiving & Killing	7	3.5
Evisceration	56	28.0
Cutting & Deboning	48	24.0
Packout	44	22.0
Sanitation	22	11.0
Other	23	11.5

§ missing data on 1 male and 1 female respondent.

‡ missing data on two male respondents.

years. Nearly 90% of respondents reported working 40 – 45 hours per week in poultry processing.

### The Organization of Poultry Work

Table 2 describes management practices and how jobs are designed and performed in poultry processing. In terms of management practices, average scores for safety commitment were at the mid-point of the possible range of scores, and the majority of poultry processing workers reported low levels of abusive supervision as indicated by the mean and standard deviation lying below the midpoint of the possible range of scores. Turning to indicators of job design and performance, the majority of participants had a physical workload score below the midpoint of the possible range of values, but the average score for awkward posture and repetitive movements was above the midpoint. The average score for decision authority and variety were below the midpoint for their respective ranges and, when variation around the mean is considered, the majority of participants had values below the midpoint of the range for each variable. The average score for psychological workload was at the mid-point of the possible range.

**Table 2. Descriptive statistics for organization of work variables among poultry processing workers**

Variable	<u>M</u>	<u>SD</u>	<u>Range</u>
Safety Commitment	18.59	4.19	9 – 27
Abusive Supervision	13.24	4.35	7 – 28
Physical Workload	17.02	6.91	9 – 36
Posture and Repetitive	18.12	4.93	6 – 24
Authority	17.04	8.59	12 – 48
Variety	20.30	7.53	12 – 42
Psychological Workload	19.83	5.77	9 – 33

Variables reflecting management practices and job design and performance in the poultry processing industry were inter-correlated (Table 3). Greater safety commitment, one indicator of management practices, was associated with less frequent awkward postures and repetitive movements as well as less psychological workload. Abusive supervision, a second measure of management practices, was associated with greater physical workload as well as higher levels of control over work and variety in tasks. Nearly all of the indicators of job design and performance were inter-correlated. Greater physical workload was associated with more frequent awkward postures and repetitive movements, as well as more frequent control and variety at work, and greater psychological workload. More frequent awkward postures and repetitive movements were associated with less authority and variety at work and greater psychological workload. Control in the workplace was associated with greater variety in job tasks.

**Table 3. Inter-correlation of organization of work variables among poultry processing workers**

Variable	1	2	3	4	5	6	7
1. Safety Commitment	----						
2. Abusive Supervision	-0.14	----					
3. Physical Workload	-0.05	<b>0.20</b>	----				
4. Posture and Repetitive	<b>-0.35</b>	0.03	<b>0.22</b>	----			
5. Authority	0.14	<b>0.16</b>	<b>0.19</b>	<b>-0.28</b>	----		
6. Variety	0.08	<b>0.29</b>	<b>0.35</b>	<b>-0.22</b>	<b>0.37</b>	----	
7. Psychological Workload	<b>-0.43</b>	0.09	<b>0.32</b>	<b>0.52</b>	-0.10	0.10	----

Bolded correlation coefficients differ significantly from zero ( $p < .05$ )

### Organization of Work and Worker Health

All of the organization of work variables, except for abusive supervision and physical workload, were associated with reports of musculoskeletal problems in the past month in the bivariate analyses (Table 4). However, only indicators of job design and performance remain significantly associated with musculoskeletal problems in the multivariate analyses. For every one unit increase in variety, the odds of reporting musculoskeletal problems decreased by 9%. By contrast, for every unit increase in psychological workload, the odds of reporting musculoskeletal problems in the past 30 days increased by 13%. The association of authority with musculoskeletal problems approached statistical significance ( $p < .07$ ) and suggests it may have a protective health effect.

**Table 4. Bivariate<sup>a</sup> and multivariate<sup>b</sup> models of the effects of organization of work variables on musculoskeletal problems**

	O.R. <sup>a</sup>	O.R. <sup>b</sup>
Management Practices		
Safety Commitment	0.87***	0.97
Abusive Supervision	1.02	1.06
Job Design & Performance		
Physical Workload	1.03	1.03
Posture and Repetitive	1.18***	1.04
Authority	0.94**	0.95†
Variety	0.94**	0.91***
Psychological Workload	1.15**	1.13**

†  $p < .10$  \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$  (two-tailed). Multivariate models are adjusted for participant's primary job task in poultry processing industry.

Few organization of work variables were associated with respiratory problems in the bivariate analyses, but both variables reflecting management practices remained significantly associated with this outcome in the multivariate analyses (Table 5). Whereas a one unit increase in safety commitment was associated with 16% decrease in the odds of reporting respiratory problems, a one unit increase in abusive supervision was associated with 12% increase in respiratory problems. The association of posture and repetitive movement with respiratory problems approached significance ( $p = .05$ )

**Table 5. Bivariate<sup>a</sup> and multivariate<sup>b</sup> models of the effects of organization of work variables on respiratory problems**

	O.R. <sup>a</sup>	O.R. <sup>b</sup>
Management Practices		
Safety Commitment	0.85**	0.84***
Abusive Supervision	1.10*	1.12*
Job Design & Performance		
Physical Workload	1.03	1.00
Posture and Repetitive	1.13**	1.14†
Authority	0.98	0.97
Variety	1.02	1.05
Psychological Workload	1.07†	0.96

†  $p < .10$  \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$  (two-tailed). Multivariate models are adjusted for participant's primary job task in poultry processing industry.

Several organization of work variables were associated with self-reported occupational illness or injury in the past year in bivariate analyses; however, only two of these associations persisted in the multivariate models (Table 6). For every one unit increase in safety commitment the odds of reporting an illness or injury in the past year decreased by 17%. This model also indicated that each unit increase in psychological workload was associated with increased odds of reporting an occupational illness or injury in the past year.

**Table 6. Bivariate<sup>a</sup> and multivariate<sup>b</sup> models of the effects of organization of work variables on injury/illness**

	O.R. <sup>a</sup>	O.R. <sup>b</sup>
Management Practices		
Safety Commitment	0.77***	0.83***
Abusive Supervision	1.04	0.99
Job Design & Performance		
Physical Workload	1.06**	1.04
Posture and Repetitive	1.20***	1.06
Authority	0.98	1.00
Variety	1.02	1.04
Psychological Workload	1.22***	1.12**

†  $p < .10$  \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$  (two-tailed). Multivariate models are adjusted for participant's primary job task in poultry processing industry.

## **Interpretation**

Poultry processing is dangerous, demanding work resulting in consistently high rates of occupational illness and injury (GAO, 2005; BLS, 2005b). This work is increasingly performed by immigrants who experience high rates of illness and injury (Quandt et al., 2006). Despite high rates of illness and injury in this sector of the manufacturing industry, very little peer-reviewed research has documented the factors that contribute to variation in occupational health outcomes among poultry processing workers in the U.S. Drawing on a central theme of the National Occupational Research Agenda, this study was designed to determine if factors reflecting the way poultry processing work is organized are associated with occupational illness and injury. Given the relative absence of previous research focused on poultry processing workers in the U.S., a workforce that is increasingly foreign-born, this paper makes several contributions to the literature.

The results of this study present a mixed portrayal of management practices used in poultry processing. Management practices reported in the sample are perhaps best described in terms of 'benign neglect:' although there was little evidence of coercive or abusive supervisory practices, there was also little perceived commitment on the part of managers for workers' safety. Indeed, the fact that most workers' reports of safety commitment were located in the middle of the possible range of values suggests that very few participants reported strong agreement with statements about management practices reflective of organizational commitment to safety. These results are consistent with historical reports of ongoing occupational safety and health problems in poultry processing plants in North Carolina, and recent claims that poultry processing plants are reticent to focus on safety concerns, in part, because of costs (Lipscomb et al., 2005).

The results also present a mixed portrayal of how poultry processing jobs are designed and performed. Although workers' appraisals of physical workload were generally low, they did report that their jobs frequently required sustaining awkward postures and repetitive motions. There was also clear evidence indicating that poultry workers had few opportunities to exert control over how their work is performed, and that they had little variety in their job-related tasks. These results are consistent with a recent characterization of the poultry processing operation as being highly mechanized operation that requires workers to stand for long periods of time and perform repetitive movements (GAO, 2005). However, in contrast to the GAO's (2005) characterization of poultry processing work as stressful, workers did not report an excessive psychological workload. These results could reflect a 'healthy worker' effect as well as the possibility that these immigrant workers developed effective strategies for coping with the inherent psychological demands of their work (Lipscomb et al., 2005).

Our results linking different indicators of how poultry processing work is organized to worker health outcomes also contributes to the literature, particularly in the relative absence of comparable research in the U.S. Our results suggest that little task variety and elevated psychological workload are both associated with increased risk of musculoskeletal problems in the past 30 days. These results, which parallel previous results from a French cohort (Messing et al., 1998; Ledesert et al., 1994) reinforce recommendations by the Occupational Safety and Health Administration for job rotation as well as calls for line-speed reductions. Our results also

suggest that management practices contribute to worker health. Our results provide consistent evidence indicating that that management's commitment to safety, at least as it is perceived by workers, may contribute to illness and injury in the workplace. Additionally, the use of abusive or coercive supervision was a risk factor for respiratory problems. This association has not been documented in the literature so an explanation is not readily apparent. However, in our ongoing ethnographic study of these workers, we have heard that supervisors sometimes punish employees by assigning them unpleasant job tasks. The observed association may be picking up these management practices to the extent that these tasks contribute to greater exposure to dust, endotoxins or molds. More research is needed to understand this association.

The results of this study must be interpreted in light of its limitations. First, we cannot make causal inferences because our results are based on cross-sectional data. Second, assessments of different aspects of work organization in poultry processing was based on self-report instruments. Although evidence indicates that self-reported indicators of work organization are valid (Gimeno et al., 2004; Kawakami et al., 1995; Landsbergis et al., 2002) reporting biases may affect assessments. It is worth noting that previous research has found that individuals in the same industry and in the same job title are exposed to different physical and psychological workloads (Hooftman et al., 2005; Messing et al., 1994) Consequently, the within-industry variation in indicators of how poultry processing work is organized observed in the study should not be interpreted as poor measurement. Third, the survey relied on retrospective self-reports of injuries, rather than physical examinations or on-going surveillance. Because retrospective data are subject to memory lapses, the reports of injuries presented here are likely underestimates. The fourth limitation is the use of a nonrandom sample. Drawing a random sample of immigrant Latinos, as well as other "hidden" populations, is challenging because they are frequently undocumented and fearful of possible deportation, and there are no reliable listings of names that can be obtained. For these populations more creative methods must be devised. The site-based sampling used here is a reasonable substitute, but one for which corroborating data would be useful. Finally, the usual method for studying occupational injuries—sampling from the worksite—was not possible because the poultry plants would not allow us to sample and recruit workers from their employee populations. This limits the generalizability of these findings.

Despite these limitations, the results of this study suggest that modifications in management practices and changes in how poultry processing jobs are designed and performed may yield improvements in worker health. Specifically, employers can better protect worker health by clearly demonstrating a commitment to worker safety, executing job rotation policies to minimize exposure to repetitive movements and increase task variety, reducing line speed to minimize the psychological workload and repetitive movements, and avoiding abusive or coercive supervisory tactics. Additional research is clearly needed; nevertheless, this research presents strong preliminary evidence suggesting that the organization of work underlies high rates of injury and illness among immigrant workers in poultry processing.

## **Recommendations**

The following recommendations for policy and further research are based on the data presented in this report.

### **Policy:**

- Worker advocacy groups and community agencies should work with poultry processing plants to build a culture of safety in the plants.
- Companies should create “safety committees” that include workers from across the company as a way of giving workers control over their work environment.
- Companies should implement a job-rotation program, such as that described in OSHA’s 2004 ergonomic guidelines, at these poultry companies to increase job variety and reduce the incidence of musculoskeletal injuries.

### **Research:**

- Identify ways of redesigning poultry processing jobs to give workers greater control over their job-related tasks.
- Determine the job rotation strategies that maximize task-related variety and minimize occupational illness and injury.

These policy changes and research will help ensure that poultry processing jobs are organized in a way that protects worker health in this vulnerable population.



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