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Abstract

Background:

Large data gaps exist in our understanding of the occupational experience and health profile of Latino migrant workers in non-agriculture settings. Current research is limited to cross-sectional studies with limited inclusion of both undocumented workers and day laborers. Data on health endpoints beyond injury are sparse. To address these data gaps, we conducted a 6-month study of Latino migrant workers in New Orleans, Louisiana. The purpose of the study was to describe the occupational experience over time, to document occupational health and safety risks and to correlate risk with selected health outcomes including injury, respiratory symptoms and blood lead level.

Methods:

A six-month prospective study was conducted within a larger cohort of migrant workers being followed for STI risk. At baseline data were collected on job title, job tasks, duration of time spent working, use of personal protective equipment and selected health symptoms in the previous six months. Job data was updated monthly for the following six months. At the six-month follow-up health symptoms were again assessed and blood lead level was measured.

Results:

Seventy-nine men were enrolled in the study; 73 had complete data (baseline survey, at least 3 follow-up surveys, 6-month survey) resulting in a retention rate of 92.4%. Eighty-nine men provided blood samples for lead sampling. The majority of men worked in the construction industry and found full time work averaging 43 hours per week for the duration of the study. Use of personal protective was low and use of any type of respirator declined significantly over time. Study participants had relatively stable employment, having an average of three jobs and performing an average of 3.5 different tasks over 12 months. Respiratory symptoms were commonly reported and symptoms often improved when away from work suggesting that workplace irritant exposure is likely. Blood lead levels ranged from .6 to 38.4 $\mu\text{g}/\text{dL}$ and approximately half of participants had levels that, if persist, are known to be associated with adverse health effects. Construction workers were significantly more likely to have higher lead levels compared to other occupations. Although the rate of injury was low, 75% of injuries reported required hospitalization or a visit to the emergency room.

Conclusion:

This pilot study gives insight into the occupational experience of a cohort of Latino migrant workers. Construction work is common and related to increased lead levels yet use of personal protective equipment is limited. Although respiratory symptoms were common, and improved when away from work, limited sample size prevented detailed analysis of the occupations predictive of health symptoms. More information on the pattern of injury is needed. Future research should focus on expanding the size of the cohort and comparing the occupational experience of migrant day laborers to those of other group of similarly employed workers.

Five Key Points:

1. The majority of the cohort worked in construction or construction-related activities however the percentage dropped over the course of the study from 81.4% at baseline to 54.8% at the six-month follow-up.
2. Of men working in an occupation where respirator use was either recommended or required (according to OSHA guidelines), at baseline 34.5% and 41.5% reported always wearing a respirator at baseline and six month follow-up respectively.
3. Over the follow-up period, the participants held an average of 3 jobs and changed job tasks a mean number of 3.5 times.
4. Over half of the participants (51%) reported being somewhat to severely affected by respiratory symptoms, 45% by headaches and 45% by sino-nasal symptoms. Of those with respiratory symptoms, 41% reported that their symptoms sometimes to always improved when away from work, and similarly, 41% of those with headaches and 39% of those with sino-nasal symptoms reported improved symptoms when away from the workplace.
5. Working in construction is significantly associated ($p=.03$) with higher blood lead levels compared to other occupations.

Introduction

Since 1990, there has been a significant increase in the percentage of the U.S. population that is foreign-born, along with a rapid increase in the percentage of the immigrant population that lack documentation and rely on informal work or “day labor” as their primary source of income. An estimated 37.2 million foreign-born persons live in the U.S., of which 48.3% are from Latin America[1]. Approximately 7.2 million unauthorized migrants were employed in March 2005, accounting for 4.9% of the civilian labor force[2]. The Greater New Orleans area reflects these national trends. In 2005, 3.1% and 8.1% of the population of Orleans and Jefferson Parishes (counties) were Latino[3]. In 2006, the Latino population rose to an estimated 9.9% and 9.6%, respectively[4]. The increased proportion of Latino residents in the New Orleans area is thought to be due to the influx of migrant workers helping to rebuild areas with widespread destruction due to natural disasters and where demand for their work is high. According to available data, these migrant workers are almost exclusively undocumented and work primarily as day laborers[5].

While Latino migrant workers typically work numerous jobs and change jobs frequently, they are often employed in the construction, cleaning, and service industries[2],[6]. Nationally, the number of Latinos employed in construction has risen from 1.4 million in 2000 to approximately 2.6 million in 2005[7]. These census statistics may be an underestimate as they often exclude day laborers and undocumented workers. The National Day Labor Survey, found that 90% of participants worked in the construction industry, while the Latino Labor Report estimates that 17.5% of foreign-born Hispanics are employed in construction with nearly half of those working in the South (47%) [8],[9].

Since a high proportion of Latino workers gravitate towards jobs within the construction industry, they may be at elevated risk of occupational hazards. Construction work has one of the highest rates of occupational injuries and illnesses in the U.S. compared with other industries and compared with the construction industry in other developed countries [10]. Workers are exposed to a wide array of toxic substances and health and safety risks, including respiratory and skin irritants and allergenic substances. One of the more harmful occupational exposures encountered is lead. Construction

activities involving lead-based materials can increase potential exposure in workers, their families, and their communities. After passage of the Occupational Safety and Health Administration (OSHA) general industry lead standard in 1978, the distribution of lead air exposure levels decreased for every industry except construction. Between 1991 and 1995, the Massachusetts Occupational Lead Registry found 664 cases of elevated lead levels; of those 70% were from the construction industry[11]. One cross-sectional study from 2008 found that day laborers are often exposed to more hazardous conditions and have little access to health care. They offered the participants free lead testing, and found a significant association ($p < .05$) between blood lead level and country of origin[12].

Data on occupational health experience in Latino migrant workers in non-agriculture settings are lacking. For those working as day laborers, data are even more limited. According to the National Day Labor Study, the growth of day laborer hiring sites is on the rise and there are approximately 117,000 workers considered day laborers. Current research on immigrant occupational health is based primarily on telephone surveys. These studies tend to reach workers who have been in the country for long periods of time, have documentation or are U.S. citizens, and have a permanent residence with a home telephone[13],[14],[15]. Few studies have included undocumented Latino migrants interviewed in person[16],[6],[17]. These studies provide important information on issues related to the role of unionization, work-related exposures, safety training and practices, housing, discrimination, and income but did not measure occupational health outcomes beyond worksite injuries. A particular concern for newly arrived Latinos is that as a result of limited legal rights, immigration status, and generally low-socioeconomic level, they are hindered in their ability to protect themselves from physical, financial, or discriminatory abuse on the job. In a large national study and several small qualitative interview projects, excess exposure to hazardous health and safety concerns and high injury rates on the job have been highlighted as major concerns [18],[8]. Language difficulties and/or workplace discrimination may result in inadequate safety training, and as unskilled workers, Latino migrant day laborers are frequently relegated to the most hazardous jobs. Disparate occupational mortality rates seem to support these observations. Mexican and Central American workers represented more than half of fatal occupational injuries to foreign-born workers in 2007[19]. Latino laborers represented less than 16% of the workforce, despite representing 23.5% of fatal injuries and in 2000, Hispanic construction workers were approximately twice as likely to be killed by occupational injuries as their non-Hispanic counterparts[10].

Large data gaps exist in our understanding of the occupational experience and health profile of Latino day laborers. The dynamic, temporary, and hazardous nature of day laborer work makes them an especially difficult group in which to conduct research. Barriers include difficulties accessing the population and following them longitudinally and heightened concerns about confidentiality. Current research is limited by its cross-sectional design, inadequate inclusion of undocumented and day laborers, and lack of health endpoints beyond injury. To address these data gaps, we conducted a 6-month prospective study of Latino migrant workers in New Orleans, Louisiana. The purpose of the study was to describe the occupational profile of a cohort of day laborers over time, to quantify occupational health and safety risks and to correlate risk with selected health outcomes including injury, respiratory symptoms and blood lead level.

Methods

Subjects, Recruitment, and Sampling

Study participants were recruited and enrolled from an existing cohort of 125 Latino migrant workers (LMW cohort) residing in the Greater New Orleans area[20]. The cohort was assembled to assess HIV/STI risk behavior. The present study is a sub-study within the LMW cohort. Baseline data collection for the occupational sub-study commenced at the HIV/STI study 6 month mark.

Because Latino migrant workers are a “hidden population”[21], a sampling frame is not available and obtaining a probability sample is a challenge. To overcome this statistical challenge, respondent driven sampling (RDS) was used to recruit the LMW cohort. RDS is described in detail elsewhere but briefly, RDS is a type of systematic snowball sampling that uses a dual incentive approach to recruit participants[21]. A selected number of early enrollees or “seeds” are given reward coupons to distribute within their social network. The downstream participants in turn receive a specific number of coupons to distribute to additional recruits. The first level (initial seed selection) is based on known or assumed demographic characteristics of the target population, for which RDS study results may then be inferred. Each seed (recruiter) was incentivized with \$25 per recruit up to three recruits.

Eligibility Criteria

The eligibility criteria were identical for both the HIV/STI study and this sub-study. Eligibility criteria included, a native Spanish speaking non-US citizen, male gender, 18 years of age or older, born in Central or Latin America, and having arrived in New Orleans after August 29, 2005 for the purpose of work. An additional enrollment criterion was engaging in sex with women (but also could have sex with men). The “sex with women” inclusion criterion was required because the LMW cohort was assembled to examine risk factors for HIV heterosexual transmission. All those eligible and willing to enroll provided active informed consent.

Data Collection

Data were collected from July 2008 through December 2008. Surveys assessing occupational exposure, safety risks, and selected health outcomes were administered at baseline and monthly thereafter for 6 months. At baseline, Spanish speaking staff conducted face-to-face interviews. The interviews occurred primarily on weekends in various non-threatening locations to accommodate the highly mobile and cautious population. Interview sites included the interviewer's car, participant's hotel rooms or trailers, and residential streets where the participant felt safe and at low risk of being exposed as an illegal immigrant. Participants were either visited in person or contacted by phone on a monthly basis to provide follow-up information on occupation, job tasks, and injury information. In order to eliminate the possibility of collecting follow-up survey data on a non-study participant (many participants lacked identification documentation), interviewers confirmed a random set of responses to ensure the identity of the respondent. In addition to survey data, a venous blood sample was drawn from each participant and tested for lead at the six month visit.

Occupational Exposure Assessment Survey

The Occupational Exposure Assessment Survey measured type of job, job tasks (and the duration of each), and use of personal protective equipment in the previous month. Survey questions were taken from the California State Occupational Lead Poisoning Program's Occupational Exposure Assessment Survey, a standardized survey questionnaire.

To assure face and content validity, the survey was reviewed by numerous parties including the principal investigators (Rabito: occupational sub-study, Kissinger and Salinas: HIV/STI study), the field interviewers, and the study coordinator. Questions were refined as needed to reflect the New Orleans environment. The survey was translated into Spanish by the study interviewer and back-translated to verify accuracy. The translated survey was then pilot tested on a group of Latino migrant workers who are not part of the LMW cohort and further clarifications were made as needed. The instrument was again pilot tested prior to study use. An abbreviated version of the occupational exposure assessment survey was used at each of the monthly follow-up interviews to update occupational information. At each data collection point respondents were asked to list all jobs held during the past month, to describe the tasks associated with each job, and the duration of time spent on each job and task. Jobs were categorized as follows: general construction, construction-related activities (includes painting, welding, carpentry, plumbing, electrician), cleaning, shipyard work, roofing, grainery (factory) work, food services, other, and unemployed. A change in job was defined as a change between these 9 categories.

Health Symptom Assessment Survey

The Health Symptom Assessment Survey was administered at baseline and 6 months. The questions were adapted from the Medical History / Symptom Review portion of the California State Occupational Lead Poisoning Program's occupational exposure assessment survey, the health assessment tool used by the World Trade Center health assessment medical screening program¹⁸ and the 20-Item Sino-Nasal Outcome Test.¹⁹ Outcome variables of interest included sino-nasal symptoms, upper and lower respiratory symptoms, eye and skin symptoms and headache. Face and content validity were assessed as described above.

Lead Testing

Three milliliters (mL) of whole blood was collected at the 6-month follow-up. All venipuncture were performed by a certified phlebotomist. Blood was drawn into a 3-mL EDTA tube certified for metals. The collection tubes were shipped overnight to the Lead Poisoning/Trace Elements Laboratory at the Wadsworth Center, New York State Department of Health. Whole blood lead levels were measured via Inductively Coupled Plasma-Mass Spectrometer (ICP-MS) fitted with a Dynamic Reaction Cell, ELAN DRC Plus (Perkin-Elmer Corp., Shelton, CT). The laboratory is CLIA (Clinical Laboratory Improvement Amendments) and New York State certified. The method detection limit for blood lead by ICP-MS is approximately 0.1 µg/dL lead.

Results from all blood measurements were shared with study participants via face-to-face interview with Spanish speaking study staff. All participants received counseling on the importance of preventing lead exposure both on the job and in the home environment, ways to prevent exposure on the job, and were given information on the ways to prevent lead from being brought into the home. In the event of an elevated blood lead level (as defined by OSHA), field staff also provided the worker with the names and addresses of clinics where follow-up blood lead testing could be performed.

Compensation

Upon consent into the sub-study, each participant was compensated with a \$20 international phone calling card. At each monthly follow-up, participants were provided with an additional phone card worth \$5. At the conclusion of the final follow-up visit, participants were given a \$30 international phone calling card.

Statistical Analyses

Statistical analyses include describing selected socio-demographic and occupational characteristics of the study population, describing the occupational profile of workers over the study period including enumerating the number of different jobs and job tasks and reporting the prevalence of injury, respiratory symptoms and blood lead level. Analyses also include calculation of unadjusted point estimates and tests of the association between occupation, selected health symptoms, and log transformed blood lead levels. Statistical tests include chi-square, t-tests, and crude odds ratios along with 95% confidence intervals. Exact two-tailed p-values are presented and statistical tests are considered significant at $p < .05$. As an exploratory study with no hypothesis testing, sample size calculations were not performed. Exposure and outcome statistics derived from this study, however, will help form the basis of sample size calculations to ensure adequate power for future studies.

Results

RSD for the LMW cohort began with eight initial seeds and produced a homophily score of 0 suggesting heterogeneity of the sample. Two seeds produced long chains comprised of multi-ethnic groups. One hundred twenty five participants were recruited into the LMW cohort. Of those, 79 were present for the LMW 6-month follow-up (baseline for the occupational sub-study). They were invited to enroll in the sub-study and all 79 agreed to participate. Of those, 73 men had complete data defined as a baseline survey, at least 3 follow-up surveys and the 6-month survey, resulting in a retention rate of 92.4%. Table 1 describes the sociodemographic characteristics of the occupational sub-study participants compared to the total LMW cohort. The socio-demographic characteristics of sub-study participants are similar to the larger LMW cohort. Study participants were primarily young ($60.3\% \leq 30$ years) and from Honduras (69.9%). Most men had less than 6 years of formal education (54.8%) and incomes less than \$450 per week (52.1%). All but one of the participants had undocumented legal status and were unable to understand or speak English. Thirty-seven percent came to the New Orleans area from outside of the U.S.

The men in the occupational sub-study were employed in a number of occupations with the majority working in construction for the entire follow-up period (Table 2). At baseline all men were employed and 79.6% worked in construction or construction-related activities. Six months later 61.6% were employed in construction or construction-related activities and 5.5% were unemployed reflecting the overall downturn in the economy. Roofing, shipyard work, grainery work, and cleaning services were also frequently held jobs. Job title at each follow-up was assessed by choosing the job at which the participant reported working the majority of his time. Among men working in jobs requiring some form of respirator (as defined by OSHA [22]), less than half reported always using some form of respirator at either baseline or follow-up. 24% and 37% reported never using a respirator at baseline or 6-months respectively. Among those wearing some form of respirator, the number trained or fit-tested declined from 70% at baseline to 50% at the 6 month follow-up. A large proportion of men reported wearing gloves and eye protection as least some of the time while at work.

To characterize the occupational experience of the cohort over one year, we calculated the mean number of jobs (out of the nine categories) and the mean number of job task changes. For this sub-analysis, we included all job titles listed on each follow-up, *including occupation data collected at the baseline visit where we recorded all jobs held in the previous 6 months (for a total data collection period of 12 months)*. *The men held an average of 3 different jobs and changed job tasks an average of 3.5 times (Table 3) over the previous 12 months.* Table 4 illustrates all of the job tasks and their distribution by follow-up. The majority of men held down one job for the majority of each month and reported a small numbers of jobs at which they worked on average 1-5 days per month. The rate of job

task changes is higher than the rate of job changes because participants often switched tasks within their assigned jobs. Data also show that construction and cleaning jobs both experienced a decline at the six-month period, while there was an increase in grainery and roofing jobs.

Health Outcomes

Data were collected on the following health outcomes: headaches, respiratory, sino-nasal, throat, eye, and skin symptoms. Respiratory symptoms include dry cough, cough with phlegm, shortness of breath, wheeze, and chest tightness. Sino-nasal symptoms include frontal head or sinus congestion, nasal discharge, blowing your nose more than usual, stuffy nose, sneezing, and nose irritation. Throat symptoms include throat irritation and hoarseness. The headache, eye (irritation), and skin (itchy rash) symptoms were unique variables. For those reporting symptoms, the proportion for whom symptoms improved when they left work was calculated.

At six months, respiratory symptoms, headache, sino-nasal, throat, eye and skin symptoms were reported by 51%, 45%, 44%, 25%, 30%, and 14% respectively. The percentage whose symptoms subsided when away from the workplace was 41%, 41%, 39%, 33%, 48%, and 30% respectively for each of the symptoms listed (Table 5). Only eight men reported being injured on the job over the six-month study period. However, of those injured, 75% required either hospitalization or a visit to the emergency room suggesting that only serious injuries were reported (data not shown).

To determine which characteristics are related to respiratory, sino-nasal, headache, eye, throat, and skin symptoms, bivariate analysis was performed (Table 6). Covariates shown in previous studies to be important predictors of immigrant health were assessed (education, age, monthly income, previous residence). Jobs were categorized into two groups, construction (including construction-related activities), and non-construction activities. Due to the low rate of job change, participants were assigned an occupational category based on the job they held at the six month follow-up period. Separate models were built for each health indicator.

The results of bivariate analysis indicate that education, age, monthly income, and previous residence were not significant predictors of respiratory symptoms, sino-nasal symptoms, headaches, or eye, skin, or throat symptoms. There was a significant relationship ($p < .05$) between headaches and whether the participant was from outside the U.S. or not, but we did not see the relationship with any of the other variables and did not consider it consistent enough to include in multivariate models.

To assess whether occupation is related to selected health outcomes controlling for important covariates we conducted multivariable analysis. We examined the relation between construction and non-construction occupations to symptom occurrence, controlling for smoking, age, and respirator use at work for respiratory, sino-nasal, and throat outcomes. For eye outcomes, only eye protection use was controlled for. For skin outcomes, only glove use was controlled for. The results of the multivariate analysis indicate that job title (construction vs. non-construction) is not a significant predictor of selected respiratory, sino-nasal, and other health outcomes, even after controlling for potential covariates.

Separate analysis was run to assess whether occupation was related to blood lead level (Table 8). We found that working in construction was associated with a significantly higher lead level compared to other occupations. We assessed whether participant exposure to lead could be coming from outside of

the workplace. On the baseline and 6-month survey questions about use of leaded pottery, outside activities involving lead (stained glass making, furniture repair, battery repair, etc), using greta or azarcon, were included. None of these activities were prevalent in our cohort. Therefore, we conclude that participant exposure to lead was via their occupation.

Discussion

To our knowledge this is the first longitudinal study of occupational health and safety risks of a non-agriculture migrant day labor population. Although the population of Latinos is on the rise, day laborers in New Orleans are primarily from Central America, consistent with the population demographic prior to Hurricane Katrina. The participants in our study represent a vulnerable population; they are undocumented workers with limited English proficiency, are young and have little education. We found that consistent with Latino workers throughout the country, these undocumented day laborers worked primarily in the construction industry confirming a commonly held belief that the rebuilding effort in the New Orleans area is being led by a migrant workforce. Workers found full time work, averaging 43 hour work weeks for the duration of the study. Use of personal protective was low and use of any form of respirator declined significantly over time.

Despite being day laborers, study participants had relatively stable employment, having an average of three jobs and performing an average of 3.5 different tasks over 12 months. Upon close examination of the data, it appears that the men tended to remain in one job category for the majority of the time. It is possible that this stability in job work may be due to selection bias since study participants represent those men who remained in the area and chose to keep in contact with study personnel. However, with a retention rate of 92% this bias is likely to be minimal.

Respiratory symptoms were commonly reported and symptoms often improved when away from work suggesting that workplace irritant exposure is likely. The blood lead levels ranged from .6 to 38.4 $\mu\text{g}/\text{dL}$ and approximately half the men had blood lead levels that, if persist, are known to be associated with adverse health effects including persistent headaches, high blood pressure, and renal problems, among others. Not surprisingly, those who worked in construction were significantly more likely to have elevated lead levels. More information on the pattern of injury is needed and emphasis on use of personal protective equipment and adequate training is needed to protect workers both from respiratory irritants and lead exposure.

This pilot study is a preliminary look at the occupational experience of a group of Latino migrant day laborers working the New Orleans area. Although there is a plethora of literature on workplace issues of migrant agricultural workers demographic studies show that many of these workers as well as new immigrants have moved to the construction and service industries. The rapid increase of Latino migrants into the US workforce, the vulnerabilities that migration creates, and data gaps that exist make assessing workplace issues among this group an important area of research. Future research should focus of expanding the size of the cohort and comparing the occupational experience of migrant day laborers to those of other group of workers.

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Tables

Table 1. Socio-demographic characteristics

	Full LMW Cohort (N=125) n (%)	Occupational sub-study (n=73) n (%)
Age		
≤30 years	77 (61.6)	44 (60.3)
Country of Origin		
Honduras	89 (71.2)	51 (69.9)
Mexico	14 (11.2)	7 (9.6)
Nicaragua	7 (5.6)	6 (8.2)
Guatemala	7 (5.6)	5 (6.8)
Other Central American Country	8 (6.4)	4 (5.5)
Education		
≤ 6 years	74 (59.2)	40 (54.8)
Weekly Income		
≤ \$450	57 (55.9)	38 (52.1)
Legal Status		
Undocumented	123 (98.4)	72 (98.6)
English Proficiency		
Cannot understand English	123 (98.4)	72 (98.6)
Cannot speak English	123 (98.4)	72 (98.6)
Prior Residence		
Inside U.S.	66 (52.8)	45 (61.6)
Outside U.S.	59 (47.2)	27 (37.0)
Ever Smoker		26 (35.6)

Table 2. Occupational characteristics (n=73)

Occupation	Baseline n (%)	6-month n (%)
General construction	35 (48.0)	26 (35.6)
Construction-related activities	17 (23.4)	14 (19.2)
Painter	11 (15.1)	0
Welder	5 (6.9)	4 (5.5)
Electrician	1 (1.4)	2 (2.7)
Concrete	0	4 (5.5)
Carpenter	0	1 (1.4)
Demolition	0	3 (4.1)
Cleaning Services	7 (9.6)	4 (5.5)
Shipyards Work	6 (8.2)	5 (6.8)
Roofer	2 (2.7)	9 (12.3)
Food Service	2 (2.7)	2 (2.7)
Factory (Grainery)	2 (2.7)	6 (8.2)
Other	2 (2.7)	3 (4.1)
Unemployed	0	4 (5.5)
Average number of hours/ week worked in the previous month	43.1	43.4
% wearing respirator*		
Always	19 (34.5)	17 (41.5)
Sometimes	23 (41.8)	9 (22.0)
Never	13 (23.6)	15 (37.0)
Number trained to use respirator*	31 (70.4)	13 (50)
% wearing gloves	49 (67.1)	48 (70.6)
% wearing eye protection	40 (54.8)	46 (67.6)

* of those in a profession where respirator use if recommended or required by OSHA (n=55 at baseline and n= 42 at six months)

Table 3. Occupational experience over 12 month period (n=73)

Average number of jobs held	3.0
Average number of different job tasks	3.5
Average number of follow-up surveys	6.0

Table 4. Job titles and job tasks held over 12 months (n=73)

	Baseline	Follow-up 1	Follow-up 2	Follow-up 3	Follow-up 4	6-month
	n=73	n=73	n=73	n=71	n=58	n=73
Number of tasks reported	94	111	88	90	70	91
Construction	43 (45.7%)	30 (27.0%)	34 (38.6%)	24 (26.7%)	21 (30.0%)	29 (31.9%)
Construction-Related Activities	24 (25.5%)	34 (30.6%)	21 (23.9%)	28 (31.1%)	12 (17.1%)	19 (20.9%)
Asbestos/Lead Work	0	1	1	0	0	0
Carpentry	2	5	3	4	0	1
Ceramic Work	0	1	0	0	0	0
Concrete Work	0	4	3	3	2	4
Demolition	1	6	3	2	1	5
Electrician	1	2	2	2	1	2
Fiberglass	0	0	0	1	0	0
Gutting	0	0	0	0	0	1
Metal framing	0	0	0	1	0	1
Painter	14	11	3	10	3	0
Plumbing	0	1	1	2	2	1
Scaffolding	0	0	0	0	1	0
Siding	1	0	0	0	0	0
Welding	5	3	5	3	2	4
Roofer	3 (3.2%)	4 (3.6%)	4 (4.5%)	4 (4.4%)	6 (8.6%)	7 (7.7%)
Grainery (Factory)	3 (3.2%)	3 (2.7%)	3 (3.4%)	4 (4.4%)	6 (8.6%)	6 (6.6%)
Shipyards Work	6 (6.4%)	6 (5.4%)	8 (9%)	5 (5.6%)	3 (4.3%)	5 (5.5%)
Cleaning	10 (10.6%)	16 (14.4%)	8 (9%)	14 (15.6%)	13 (18.6%)	5 (5.5%)
Food Service	2 (2.1%)	2 (1.8%)	1 (1.1%)	2 (2.2%)	0 (0%)	2 (2.2%)
Unemployed	0 (0%)	0 (0%)	0 (0%)	1 (1.1%)	1 (1.4%)	4 (4.4%)
Other	3 (4.1%)	16 (14.4%)	9 (10.2%)	8 (8.9%)	7 (10%)	13 (14.3%)
A/C work	0	2	0	0	0	0
Auto mechanic	1	8	3	2	3	6
Furniture Repair	0	0	1	1	1	0
Hardware Store	0	0	0	1	1	0
Laundry Mart	1	0	0	0	0	0
Lawn Care	1	2	2	1	1	1
Levee Work	0	0	0	0	0	1
Melting Metals	0	4	3	2	1	4
Packing/Storage	0	0	0	1	0	1
Street Cleaning	0	0	0	0	1	1

Table 5. Respiratory and sino-nasal symptoms (n=73)

Symptoms reported in the last six months	n (%)	Symptoms improve when away from work** n (%)
Respiratory symptoms*	37 (50.7)	15 (40.5)
Headache	32 (45.1)	13(40.6)
Sino-nasal symptoms	31 (43.7)	12(38.7)
Throat symptoms	18 (25.0)	6(33.3)
Eye symptoms	21 (29.6)	10 (47.6)
Skin symptoms	10(14.1)	3 (30.0)

* dry cough, cough with phlegm, shortness of breath, wheeze or chest tightness

** of those reporting being affected while at work

Table 6. Bivariate analysis of potential health symptoms and outcomes

	Health Symptom or Outcome (O.R.; 95% C.I.)					
	Respiratory	Sino-Nasal	Headache	Eye	Skin	Throat
Occupation						
Construction	2.36 (.90-6.18)	2.22(.83-5.94)	.64(.24-1.69)	.57(.20-1.60)	.91(.23-3.56)	.77(.26-2.27)
Non-Construction	.65 (.40-1.05)	.45(.17-1.20)	1.56(.59-4.08)	1.76(.63-5.00)	1.10(.28-4.32)	1.29(.44-3.80)
Education (≤6 vs >6 years)	.48(.19-1.23)	.64(.25-1.62)	1.22(.48-3.12)	.94(.34-2.60)	.53(.14-2.07)	1.04(.78-1.31)
Age (≥ 30 vs < 30)	1.07(.42-2.74)	.93(.36-2.40)	.78(.30-2.02)	1.96(.70-5.49)	.31(.06-1.61)	.34(.10-1.17)
Monthly income (≤450 vs >450)	.48(.19-1.23)	.49(.19-1.26)	.86(.34-2.19)	.59(.21-1.65)	.91(.24-3.45)	.67(.23-1.94)
Prior residence (outside US vs US)	1.13(.43-2.92)	.65(.25-1.72)	3.0(1.08-8.34)*	.58(.21-1.65)	1.56(.37-6.62)	.92(.31-2.77)

*significant at p<.05

Table 7. Multivariate analysis of job categories and health symptoms and outcomes

	Health Symptom or Outcome (O.R.; 95% C.I.)					
	Respiratory*	Sino-Nasal*	Headache*	Throat*	Eye**	Skin***
Construction	2.91(.94-9.06)	2.62(.86-7.98)	.87(.31-2.50)	1.12(.31-4.0)	.62(.20-1.93)	1.18(.26-5.22)
Respirator Use	1.83(.98-3.43)	1.10(.60-2.00)	1.33(.74-2.39)	.63(.19-2.12)	-	-
Smoking	1.04(.37-2.92)	.77(.28-2.14)	.69(.25-1.86)	1.01(.50-2.05)	-	-
Eye Protection Use	-	-	-	-	2.51(.70-8.95)	-
Glove Use	-	-	-	-	-	1.62(.31-8.60)

*controlling for smoking and **respirator** use

**controlling for eye protection use

***controlling for glove use

Table 8. Relationship between occupation and blood lead level (n=89)

Occupation	Mean (Standard Deviation)	P Value
Construction	1.15 (.94)	.03
Non-Construction	.75 (.77)	